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MAKING SENSE OF THE WORLD: SOME ENACTIVE-ECOLOGICAL CONSIDERATIONS ON THE HISTORICITY OF SENSE, REFERENCE, AND SCIENTIFIC KNOWLEDGE CONSTRUCTION

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Unsere Probleme sind nicht abstrakt, sondern vielleicht die konkretesten, die es gibt.

– Ludwig Wittgenstein

Abstract: This dissertation deals with the controversy that arises from the philosophies of Thomas Kuhn and Saul Kripke, which amount to diametrically opposed understandings of ongoing scientific interests and progress. The aforementioned controversy is analyzed under the assumption that Thomas Kuhn's position – especially as it yields the "New World Problem" – is fundamentally based on the combined intuitions that mental states are representational states and that cognitive systems are systems specialized in processing representational information about the world. Based on a brief genealogy of what is called "the representationalist intuition" in the first chapter, and on readings of Wittgenstein's and Kripke's works, elaborated in the second, it is argued that Thomas Kuhn's combined intuitions are mistaken. However, because of their seemingly irreplaceable role in much of what is done in the sciences and philosophies of mind and cognition, in the third chapter the enactive-ecological approach to mind and cognition is presented as an apt alternative. It is argued that the enactive-ecological approach is compatible with the philosophical views of Wittgenstein's (on propositional sense) and Kripke's (on the direct reference of singular terms), thus providing a conceptual framework to understand minds alongside these philosophers' views. Accordingly, then, it is argued that propositional sense, direct reference, and scientific knowledge construction are all inherently historical phenomena, so that the New World Problem dissolves.

Keywords: Language; Logic; Science; Cognition; Enactive Ecology

Resumo: Esta tese trata da controvérsia que advém das filosofias de Thomas Kuhn e Saul Kripke, que dão origem a compreensões diametralmente opostas dos interesses e do progresso científicos em curso. A controvérsia acima mencionada é analisada sob a premissa de que a posição de Thomas Kuhn — especialmente à medida que gera o "Problema dos Novos Mundos" — se baseia fundamentalmente nas intuições combinadas de que estados mentais são estados representacionais e que sistemas cognitivos são sistemas internos especializados no processamento de informações representacionais sobre o mundo. Com base em uma breve genealogia do que é chamado de "intuição representacionalista" no primeiro capítulo e em leituras das obras de Wittgenstein e Kripke, elaboradas no segundo, argumenta-se que as intuições combinadas de Thomas Kuhn estão erradas. No entanto, devido ao seu papel aparentemente insubstituível em grande parte do que é feito nas ciências e filosofias da mente e da cognição, no terceiro capítulo a abordagem enativo-ecológica à mente e à cognição é apresentada como uma alternativa adequada. Argumenta-se que a abordagem enativo-ecológica é compatível com as visões filosóficas de Wittgenstein (sobre o sentido proposicional) e Kripke (sobre a referência direta de termos singulares), fornecendo assim uma estrutura conceitual para compreender a mente juntamente com as visões desses filósofos. Assim, argumenta-se que o sentido proposicional, a referência direta e a construção do conhecimento científico são todos fenômenos inerentemente históricos, de modo que o Problema dos Novos Mundos se dissolve.

Palavras-chave: Linguagem; Lógica; Ciência; Cognição; Ecologia Enativa

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Introduction

In the pages to follow what I treat about is a happy coincidence. Many are familiarized with a certain intellectual stalemate around the phenomenon of *scientific progress* as, though undoubtedly a thing, it seems to escape comprehension by force of the structure of its most dazzling stages: scientific revolutions. In the 1960s, philosopher Thomas Kuhn has convincingly argued that, even though scientific revolutions constitute a form of epistemic progress, forms of experimenting on, categorizing, and describing events of scientific interest are so drastically altered across such events that scientists can no longer be taken as being interested in, and dealing with, the same kinds of events as they were before the revolution started. This bears the unpalatable consequence that scientific progress, if real, is actually discontinuous across episodes of scientific revolution. That, in other words, the sciences sporadically loose their past, and cannot be said to be accumulating knowledge of the world across scientific revolutions.

Already in *The Structure of Scientific Revolutions*, Kuhn was convinced that this was the truth. That, even though scientific communities – such as that of physicists and that of biologists – do undergo phases in which knowledge is *deepened*, *accumulated*, *expanded* (as expected of any kind of epistemic *progress*), epistemic progress is inevitably sometimes *broken* and *redirected*, such times being scientific revolutions. The explanation Kuhn gave for this in the *Structure* was already clear enough, but part of his subsequent intellectual efforts made it even clearer: it is that when scientists alter their most basic, practical and theoretical commitments, their phenomenal, perceptual, intentional, and anyhow cognitive systems get *restructured*. If these things get so restructured, however, then it may seem clear that *that of which* scientists think, talk to each other, and learn more with their research – in a word, their shared *reference* – cannot be the same anymore from the moment when the revolution is complete.

The intuition that lurks behind this seeming dependence of reference on a "structure" that mediates perception, imagination, illusion, reason, and dreams, is clear. After all, what does it remain of reference as something independent of such mediating structures, if all the rest of our minds is thus mediated? If it is precisely to things we perceive and reason about, for instance, that we make reference, then our perceptual and reasoning powers' dependence on mediating structures would seem to be transferred to reference.

Kuhn supports his understanding of the structuring of experience with a widely accepted tenet of the cognitive sciences (with a few specific, more disputed details), that the structure in question is a symbolic structure, like that which is implemented in computers for generating lines of symbolic code to be processed by the computing system every time it receives an input from an external source. Once we change the "program" that is the symbolic structure we are "equipped with" in order to experience reality (as well as dreaming, imagining) in any possible manner, we can no longer make reference to anything whose thus structured expression be encompassed by the structural changes. Hence, scientific revolutions, being characterized by Kuhn as a restructuring of the symbolic intermediaries giving scientists access to the world, drive scientists to start working in "a new world" of properties, kinds, and phenomena, that start being the new objects of their theories and experiments.

Since the first chapter, I name Kuhn's intuition as the *representationalist intuition*. This is the intuition that our minds are series of representational states. As such, all of our mental states are like sentences, they have "a language", as logicians say (a symbolic structure), which contains the representational elements that constitute every aspect of one's experience. By consisting in taking the symbolic structures of our cognitive systems as determinants of all our possible cognitive states, the representationalist intuition is Kuhn's intuition. If I am right to point to the representationalist intuition as the basis of Kuhn's unpalatable conclusions regarding scientific progress (something I will argue for in the second chapter), then it is important to realize how deeply entrenched this intuition is, not as a philosophical thesis of Kuhn's but as feature of the moment of the history of ideas in which we are all immersed. Hence, in order to examine whether, unpalatable or not, Kuhn's conclusions are sound, I propose to put this whole moment into perspective and to find its roots in the history of thinking about the mind.

In the first chapter, I recount some well known stories about an ancient time when the representationalist intuition was not. (Or at least it was not so "intuitive") I start, of course, by Aristotle. Before *The* Scientific Revolution, the one that unfolded, roughly, from the sixteenth to the eighteenth century in Europe, the study of nature was deeply influenced by Aristotle's

ontology – his categorial inventory of everything we can think about, as well as his discernment of two fundamental aspects of everything that is found in nature: its form and its matter. I briefly outline the Aristotelian directives for conducting what was later to be called "natural philosophy", its principles, its objectives. Those directives, I hope I can show, are candidly intuitive and yet rigorously continuous and subservient to Aristotle's ontology.

A remarkable feature of Aristotelian directives for studying nature is that they served an objective that many that are not familiarized with the modern canon of Western philosophy (Descartes, Hume, Kant), nor with twentieth century analytic philosophy of science (including Kuhn), might still ascribe to nowadays scientific efforts: to unveil the specific nature (the essence) of each and every kind of thing we can observe, from water and thunders to (if transposed to our times) electricity and photons. Thus, Aristotelian-inspired "natural philosophy" did not aim at investigating "nature" by taking it as an all-encompassing realm of phenomena that can only be contrasted to the supernatural (well, actually Aristotle did make some whimsical contrasts to the study of what he called "sensible substances", but we'll not get into that). Rather, the inherently ramified studies of natural philosophers were to consist in foraging now the nature of horses, now the nature of the stars, now the nature of plants, and so on. It aimed to build knowledge on the *essence* of *this* and *that* kind of thing, not only knowledge that applied to anything. Not only, I say: for those guidelines obviously recognized that the various entities of the observable world share several traits, and so that investigating these common traits would come in aid of their principal, inherently discriminatory goals.

The study of the nature of things (let us put like that) that was prescribed and taught along Aristotelian lines was very rigorously conducted in pre-modern times, but when Renaissance, financial incentive, and relative professionalization of this study rose in Europe, this same rigour revealed some of those lines' insufficiency at the same time as it enabled the discovery of alternative forms of conducting inquiry. Now, the main thing about these alternatives was their complete indifference and independence with respect to Aristotelian ontology. The way Galileo (and others) described spatial movement, for instance, helped bringing an end to centuries-old debates about the nature of "unnatural" movements, like an object's being thrown in the air and traveling for a while in an upward trajectory. Things like this were poorly described with Aristotelian conceptual precepts, and thus they were also poorly understood, measured, and controlled; knowledge about them could barely advance. Alongside conceptual clarity with respect to dynamics, with the abandonment Aristotelian ontology – his "categories of being" – nascent scientific efforts gained in breadth and depth of discovery to an unprecedented degree.

What ensued, then, was a double movement in the history of ideas. On the one hand, knowledge construction quickly began to be conceived as inherently *counterintuitive*. For all one could begin to tell from Galileo's studies of spatial movement, for instance, knowledge construction required abstraction: one is to take some set of discernible quantitative variables that are systematically related to one another and build models of how they relate in time, to be compared with the material instantiations of such variables in observed phenomena. Galileo did not inquire into "the nature of a pendulum", he applied to the pendulum principles he would apply anywhere he could measure the relevant variables. So, complete indifference to essential differences was seemingly the key to modern science's success.

On the other hand, the essential differences that rising scientific knowledge ignored were not only essential, they were intuitive. It is intuitive that a man can become older and still be the same man but cannot become a stone and still be the same man. It is intuitive that different forms of life have different capabilities, and that they act with different purposes, some typical of their kinds, some particular to individuals. It is intuitive that the purpose of a tool lies in the one who uses it, while the purpose of the latter lies in themselves. With the abandonment of Aristotelian categories' yielding, in modern times, an impressive epistemic progress, far superior to every thing seen before, it seemed that our most basic intuitions about the world (e.g., that it is filled with things belonging to Aristotelian categories) are in fact misleading, if not utterly delusional.

It stroke people with a particular force at that time, around the *seiscento*, that the things seen and heard and even touched upon by us could not be taken for granted as the types of thing that God had in mind for his craft (and it was somewhat in such terms that the drama was then posed, I guess). Rational credit for scientific discoveries appeared to palpably undermine credence in our prescientific bare eyes. It just seemed that what is *really* real (other phrases include "the fundamentals", "the grounds", "the things in themselves", or even, "what our best theories tell us that exist") does not simply show in front of our eyes, but rather – if at all – in descriptions provided with the aid of both, instrumentally enhanced empirical observation and mathematical calculus.

This predicament – i.e., what I shall be characterizing as modern philosophy's most characteristic predicament – yielded the need to provide a theory of knowledge (and thereby what came later to be perceived as a theory of how words acquire their meaning); a theory that established how such a poorly endowed guessing mind (that since before Descartes was for a long time conceived of as somehow singly connected to the Trinity in each case) might attain all the wonders newly recognized within and through scientific enterprise broadly un-

derstood (so as to include logic and mathematics, I mean). There has arisen, in other words, a newly conceived philosophical task: to understand both the original sin and the scientific redemption of human thought.

I wish not to delve further into this subject-matter by now, but this modern predicament that I talk about is where I identify the roots of the representationalist intuition, of Kuhn's intuition, that our mental states are representational states. The intuition is that the relation between two representations of the same landscape, one poorly made and one precisely made, is the same relation that obtains between the "sinful" condition our minds find themselves in while trusting Aristotelian-like views of the world, and the "redemptive" condition our minds move themselves toward while, instead, trusting science.

But I said I was going to talk about a happy coincidence. In fact, this coincidence is a casual convergence between certain positions in fairly recent philosophies of language, logic, and science, on the one hand, and certain (more recent) positions in the philosophy of mind and the cognitive sciences, on the other. The former side, I argue, has noticeably undergone in the late decades of the twentieth century a phase of suspicion, if not thorough self-criticism, with respect to profoundly entrenched tenets of modern philosophy, such as its long-standing opposition to essentialism, and the default belief that our minds are series of representational states whose contents inform all possible experience.

Saul Kripke's distinction between metaphysical and epistemological distinctions, leading him to devise, in almost a puerile mode, both necessary *a posteriori* truths, and contingent *a priori* truths, also permitted him to retrieve the antique notion of "essence", whose ostracism from philosophical thinking comes nearly to a defining trait of modern philosophy. Before Kripke, another thinker that was perhaps even more recognizably a fierce opponent to central philosophical tenets of modernity was Wittgenstein. Admittedly the performer of a much more convoluted prose than Kripke's, the author of the *Philosophical Investigations* and *On Certainty* has concentrated throughout his philosophical career on the elucidation of the nature of propositional sense. And, though a notoriously weak historian of philosophy, his struggle to understand the nature of signs' meaningfulness, generally, and of propositions, in particular, led him to identify little more than confusion in a specially relevant kind of sign for modern philosophy: the representations that are supposed to be produced in, and by, our minds.

Converging, as I claim, with both Wittgenstein's and Kripke's understanding of the *logic* of our language, certain theoretical frameworks for studying and describing minds (including cognition, affect, emotion, and intentional action), which are known by up-to-date la-

bels, such as “4-” or “5-E Cognition”, “Enaction Theory”, “Ecological Psychology”, among others, have recently been put forward and are rapidly developing into empirically supported alternatives to the representationalist intuition concerning minds. While strangeness to this modern virtual consensus regarding the representational character of mental states is a *prima facie* point of convergence for the aforementioned philosophies of logic and language, on the one hand, and the anti-representationalist philosophies of the mind and the cognitive sciences, on the other (something that, *prima facie* or not, I will argue for), my main argument in this dissertation is that the *positive* stances of Wittgenstein’s on propositional sense, Kripke’s on direct reference, *and* these late, anti-representationalist theories of the mind, all converge. What allows this positive convergence encompassing all the three of them is that, while the two great philosophers invoke *history* to explain, each and respectively, sense and reference, the anti-representationalist theories of mind I will present are positive theories of *agency*, in general, and of participatory agency, historically embedded agency, in particular.

For different, respective reasons, such a convergence comes to the benefit of all three parties. By weaving them together, what I principally aim at is to allow a clearer view on sense, reference, and the mind as *historical* phenomena. Consequentially, I defend a view on sense, reference, and knowledge construction that yields a conception of scientific progress that is aligned with Kripke’s, Aristotle’s, and many of those who remain uninitiated in the philosophical reflection about science, in such a way that – if I am right – the New World Problem dissolves.

In the first chapter, I make a historical-psychological case that the representationalist intuition is sourced by profound perplexity and confusion. The story is not new: it is about the rooting of the representationalist intuition in the rise of modern scientific communities in Europe around the sixteenth and seventeenth centuries, as I briefly outlined above. In the second chapter, I continue making my case against the representationalist intuition, this time with respect to the yielding by such a confusion of a less than realist view of the sciences, which latter view clearly dominated the first half of the twentieth century in the guise of empiricism and what I dub the logical-syntactical view of propositional sense. Further in that chapter, I present philosophical arguments (mostly due to Wittgenstein and Kripke) for viewing the representationalist intuition (and, in particular, empiricism and the logical-syntactical view of propositional sense) as leading to paradoxical consequences on several accounts: in particular, for thinking about rules, propositional sense, and direct reference. I take the paradigmatic case of Thomas Kuhn’s New World Problem (as it was termed by Ian Hacking) as instantiating

such paradoxical lines of reasoning ensued by the representationalist intuition, in spite of Kuhn's markedly anti-empiricist philosophical stance.

Finally, in the third chapter I try to show how best equipped to understand mental phenomena would we all be if we traded the representationalist intuition for another (fortunately already developed) view on the mind, which is the enactive-ecological approach to the mind. I argue that the enactive-ecological view on perception, agency, and our reasoning capabilities are not only borne rid of the paradoxical consequences of the representationalist intuition (because it rejects the latter), but also gives flesh to the vague defenses made by Wittgenstein and Kripke that propositional sense and direct reference are historically established.

Let the reader be warned. I would not praise myself for writing clearly. I feel the lengths I go through in order to argue for my thesis an exaggeration, yet I also feel unable to avoid going through such lengths. Thus, I would be very glad if what I have written in these pages be at least felt as amusing by someone. My most sincere desire is that someone who is apter than myself to elaborate on them may take what I write as a hint in the right direction, to solve the difficulties hereby addressed in all respects in which I myself have failed to do.

1 CHAPTER I: THE MODERN PREDICAMENT, AND THE REPRESENTATIONALIST INTUITION

What is a mind? What is the explanation for things, or events, such as sensations, perceptions, actions, habits, feelings, to make up the whole of reality, together with all the remaining kinds of things and events, instead of there being just quarks, gluons, bosoms, photons, moving and repositioning themselves in relation to each other according to their specifically and nomologically distinctive dispositions? What explains it that changes in the universe do not happen in such a way so as to generate, in concert, events in the most diverse spatio-temporal scales, and yet never witnessed, never felt, never appreciated anyhow from whatever perspective? Is the fact that there exists *experience* in a few remote corners of the universe telling us – showing us – that there is some kind of supernatural entity, things like souls, or spirits, which incarnate, or in some other fashion interact with certain chunks of matter, assuming perspectives on the latter's surroundings? Or, alternatively, is it a tendency of nature itself that, under certain hitherto unexplained conditions, it assumes points of view upon itself? Could it not also be that nature itself, with all its lakes and rivers and mountains, its animals, plants, and even planets, stars, and galaxies, amounts really to nothing more than a spontaneous projection of *minds,* which in unison bring forth every such wonder into being, as delighting caprices without any non-mental foundation?

It is a thought-provoking enough fact about minds that, in one way or another, the human intellect has already trodden all these pathways, moreover having taken them very seriously[1]. We have entertained them in order to explain what we are, whether through mythical narratives, which excite and relieve rather than explain; or else through philosophical reasoning, so often oscillating between rationalizations of biased feelings and the ascetic determination for logic's sobriety; or, finally, and more recently in human history, by rehearsing the creation of scientific research that be concerned with mental phenomena. These are pathways that are not mutually exclusive, and which, each in their own manner, take their part-roles within ourselves. Within our imaginations and our purported explanations of what we now think that is a mind.

There has never been agnosticism about the existence of "mental life" amidst the list of things that have been assumed to constitute the whole of reality. When we interact with

1 And there are others. See, e.g., VIVEIROS DE CASTRO, E. (2002/2017) "Perspectivismo e multinaturalismo na América indígena" In A Inconstância da Alma Selvagem. Br: Ubu; and Loy, D.R. (1989/2019), Nonduality: In Buddhism and Beyond. USA: Wisdom.

other people, we have each other to offer ourselves as uncontested *prima facie* examples of actualizations of the necessary and sufficient conditions (whatever they be), found by the billions, for the existence of minds. The question that arises, and which, depending on how it is answered, leads curiosity to halts, awes, and cumbersome doctrines of all kinds is: what are we, who thus undeniably instantiate the kind of thing that is called 'mind'? And this question is somewhat redundant: there is no guess that we take seriously (or, to put it another way, that can ever satisfy us) telling us *what we are* which leaves aside questions as to what makes of our existences instances of mentality, of perspective, of a form of life that is experienced (if only "being experienced" is the hallmark of any particular form of life) by whoever lives it. Nor, therefore, can any reasonable person conjecture about what a mind is, without thereby referring to at least part of what we are.

There are obvious connections between ways of thinking and story-telling about minds, on the one hand, and cultural heritage, on the other. It is hardly imaginable that there has ever been any language without there being people asking themselves what is it like to die, and how does it feel afterwards, however there has also been questioning about the very sense of such questions. Provided that such and such a response *is* given, however, to what *death* consists in, it is hardly possible not to try to say something coherent about what it is *to be alive*. But don't the responses people gave against said questions depended, whence formulated, on the rather different conditions under which human life (and language) once flourished? The ways in which the question – 'What is a mind?' – is framed belongs together in this set of doubts. It is a question of life and death, and this is what endows it with its virtual universality across the multiple pathways that human history has so long undertaken.

As the question has been framed in Europe along the late four centuries, however, it became the way it is currently framed by most philosophers and cognitive scientists around the world today. Explanation is easy; justification, not so much. In one way or the other, the "thinking substance" of Descartes' provided the history of thinking about the mind an approach to the doorsteps at the threshold of scientific progress. It coalesced a set of suppositions, metaphors, and research agendas over more than a century, in the hopes of clearing out fantasy, and finally picturing the mind for what it is. But this strategy – this specific coalescence of suppositions, metaphors, and research agendas, that originated from European cultural heritage – has been signaling its own exhaustion over recent decades, as seemingly determined causal relations between neurophysiology, behavior, and the supposed cognitive architecture operative in our nervous systems remain unclear and disunified, to say the least. *Unclear* because the concepts deployed in spelling-out what is specifically cognitive, or men-

tal, in the observed neurophysiological and behavioral phenomena are a bounced check: they are irrevocably enigmatic, hopelessly obscure – or so I am about to argue in later chapters of this work. *Disunified* because, plausible side effect of such inherent conceptual confusion, there is a plethora of alternative models with which experimenters hypothesize about the kind of computing machine our internal cognitive systems are. Unification occurs, if only, by restricting research to the requisite assumption that mental phenomena are *representational* phenomena; that the mind is something successively put in *comparison* with what is outside of it; that *knowledge and control* are its defining features against the rest of the natural world. Thus it is that unification in most of contemporary cognitive sciences and philosophy of mind occurs, if only, by virtue of their guiding (representational) analogies, which, as I implied above and will in time be arguing for, are hopelessly unclear. Now, it seems, it is dialogue of such a prototype of a scientific community, the cognitive sciences, with alternative views – whose latter inspiration recalls other pathways of humanity's cultural heritage – which might lead it into maturity and actual progress.

Soon in this chapter, I will illustrate through a few prominent (though certainly not exhaustive) examples how it is that discussion is usually undertaken in the philosophy of mind and the cognitive sciences as to what the nature of mind and cognition is, so as to highlight and display to the reader how it is that the aforementioned *representationalist intuition* about mental phenomena leads to most of late-past and current philosophical and scientific debates. By subsuming all different approaches to be mentioned below under the concept of 'broadly representationalist accounts of the mind' and stating its most basic principles, I highlight the assumptions that all of them share. I start by presenting some of the latter's historical roots, the most significant ones, in my view, for its current hegemony. This is my way to say: this is not all mere rubbish; not everything has gone awry; there has been some reason, even some good, in the pathway that has hitherto been followed. Also, of course, this is a way of attempting to show more clearly what is still lacking in what's been regarded as progress so far, that may nevertheless be provided once we change directions.

1.1 THE RISE OF MODERN SCIENCE

Pre-modern precedents to European modernity that might already be characterized as holding broadly representationalist accounts of the mind have seemingly been around since at

least Augustine's *cogito*, and Thomas Aquinas' interpretation of Aristotle's prefigured "separation" of the soul's both intellectual and active part from the rest (see *De Anima*, II.2). However, this kind of view did not acquire the significant momentum it enjoys to day until late medieval European intellects were confronted with scientific discoveries.

In order to understand more clearly how it was that, as Alexandre Koyré put it, the "metaphysical attitude" of modern European thinkers changed along the vague period of the Scientific Revolution (stretching somewhat between the 16th and the 18th centuries), it is important to understand the attitude that was generally held before – some aspects of which we shall recover ahead. The very talk of different *attitudes*, not only different *beliefs*, will be better understood this way. And the old metaphysical attitude is of course the Aristotelian one.

After more than two thousand years of discussion as to what exactly did the most famous Stagirite of all time mean in each of his works (or sentences, really), it surely does not fall upon me anything near to the burden of stating what is the best and definitive way of interpreting works like the *Physics*, the *Categories*, or the *Metaphysics*. As implied above, my earliest intention is to provide a picture of the intellectual scene immediately preceding the Scientific Revolution, and thus also the subsequent emergence of broadly representationalist accounts of the mind. True, in order to comply with this earliest intention I would arguably have to do no more than exposing the way Aristotle *was* interpreted by, say, Galileo and his contemporaries. Still, to the extent that my exposition aims at an understanding of Aristotle's reception along late Renaissance, I am certain that taking a stance on a few relevant interpretive issues will cause no harm to the reader, as well as that restraining myself from delving too much into said interpretive issues' details will spare us some precious time. Besides, my main justification for daring to picture so roughly (as I am announcing) what the Aristotelian worldview might have been lies entirely in my hopes that it may provide us with some aid in the chapters to come. Insofar as Aristotle provided the history of ideas with a "philosophy of nature" (Gallagher, 2017), i.e., a worldview from which natural phenomena – some more, some rather than others – would be cared about and then possibly investigated, the readings that I favor and outline below serve both the purposes of explicating the fruitfulness of modern scientific thinking relative to Aristotelian natural philosophy, when the former came about, and of introducing some elements of that ancient worldview which I shall later be arguing to be worth reconvening with.

1.1.1 Primarily and most of all: Aristotle

To be sure, Aristotle had a cosmology. Although there exist speculations today that are called "cosmological" consisting in, e.g., expanding the application of known natural regularities to widely distant spatio-temporal scales relative to those actually experimented with (Smeenk and Ellis, 2017), this is nothing like the cosmology of Aristotle's. The philosopher did not use equations of any kind in order to devise and describe either dynamical patterns characterizing this or that kind of event in the universe, or experimentally drawn laws applying *ceteris paribus* in such and such situations. In short, there is nothing resembling the use of models – however we understand what it is for science today to use models – behind *Aristotelian* cosmology, as necessarily is for contemporarily so-called cosmologies. More importantly, however, his concerns were cosmological (for among other reasons) insofar as he purported to devise an *ontology*: an *order* in the absolutely general realm of being which would be immediately drawn from the logical order of (truth-valuable) thought. Whatever significant resemblance there might be between investigating the natural world before and after the Scientific Revolution can only be grasped after realizing – and pondering with – this fundamental difference, that the science-resembling portions of former ways of foraging and characterizing natural phenomena were mandatorily responsive to ontological considerations.

1.1.1.1 Ways of being

I shall begin by a relatively uncontroversial interpretation of the *Categories*, perhaps the simplest surviving exposition of Aristotelian ontology. Accordingly, what Aristotle was doing in that early treatise was a classification of the most general kinds of being, such that no such kind would be reducible to another, though one of them would be *logically* prior to the rest, i.e., that of substances.

It is worthy of note that the first chapter of Aristotle's *Categories* is not about any category at all, but rather about *naming*. That is to say, as a way of *preparing* his subsequent unraveling of kinds of being into that of substances and those of others, it is remarked, for example, that things can be different from each other, and yet, as in the case of a man and of a portrait of a man, receive the same name, whence they are said to be *homonymous* with one an-

other. By contrast, *synonymy* occurs when "things have the name in common and the definition of being which corresponds to the name is the same" (*Cat.*1., 1a6), for example when the *name* 'animal' is applied to the *names* 'man' (i.e., 'human') and 'ox'.

What this "preparation" indicates is that the categories Aristotle devised are not – as perhaps a contemporary reader might guess – different from each other with respect to being equally *referred to* in our judgments. We shall therefore bear in mind that none of such categories comprehends things like Fregean "unsaturated" entities. When we say that *Socrates is a man*, we are not *denoting* Socrates alone, but also mankind.

The *summa genera*, i.e., the categories of being, would be ten in number: besides substances themselves, the world would be inhabited by quantities, qualities, relations, places, times, positions, possessions, activities, and affections, for all of which the aforementioned denoting stance applies. Again, this perhaps surprising classification of the world's furniture is an attempt to devise an order in the absolutely general realm of being, which would be immediately drawn from the logical order of thought. The ontological order of primacy which the *Categories* develop is directly traced from the role different things in the world – things within each of the above listed categories – play in determining the truth of – what we nowadays call – propositions. From such a way of devising things, such that the world is agreeable to the logical compositionality of propositions[2], it seemed to follow an asymmetry: for every thing is subject to some kind of true predication (e.g., Socrates is white, and white is a color)[3], but there are some things (e.g., Socrates) whose names cannot be predicated of anything else. They cannot, not because of some natural contingency, but rather in the sense that it doesn't make sense to say that this or that "is *a* Socrates", but only to say that Socrates is thus and so. Besides, however entities of non-substantial categories combine among themselves, as in a certain hue of yellow's being found in a certain place, such combinations' being stated will always *mean* that, accordingly, there will be a substance that is of *that* color located in *that* place. These logically ultimate subjects of any chain of predication, e.g., Socrates and Plato and the flowers in my room, fall together in the category of substances; and, since – and in the sense that – the world is devised according to how things make propositions true, substances are afforded the title of ontologically prior entities in the world. Thence, putting aside individ-

2 I do not wish to delve so soon into this topic, which will deserve our close attention later in this work; namely, whether propositions are logically compositional or not. In a sense, of course they are, but the caveats that are to be put in place to avoid a monolithic, impersonal scaffolding of every single thought thought by a person shall be better explored only when we talk about more recent philosophy.

3 We could continue by saying that color is a quality, and that quality is a category of being. From this point onwards, only transcategorical predicates (i.e., *one* and *being*) apply, but there are no limits for its recurrence.

ual substances together with their species and genera (species and genera *of* primary substances being afforded the title of 'secondary substances'), all other kinds of being are regarded as *accidentals*, things whose (kinds') existence depends on that of particular (kinds of) substances, while the latter's are independent of any particular (kind of) accidental's existence.

There are two basic ways in which something may be said to depend for its existence (or its "being"), on the existence (or "being") of another, according to Aristotle. In his (of course, translated) terms, these are the *said-of* and the *inherence* logical relations. Both hold of pairs of worldly entities which are correspondent to subjects and predicates in categorical, true propositions. The difference between these logical relations is that only the former is a transitive relation, to the effect that whatever is *said of* something corresponding to a predicate will also be *said of* anything of which this predicate is itself *said of*. Thus, e.g., it is because (the predicate) *animal* is said of (the predicate) *human being* that it is also said of Socrates, and because to be a living being is *said of* animals that it is also said of human beings in general, and Socrates, in particular. On the contrary, when something merely *is in* another, nothing that is said of it will be said of its subject. Thus *color* is said of *white*, but nothing white – nothing that the color white *is in* – is a color. How do we *know* whether some predication is of one or another kind is by attending to whether the predicative relation in question is necessary or not: Socrates was in fact a philosopher, but he might have been a sailor instead *and still be Socrates*; hence philosophy merely inheres in him, it is not *said of* him as *being a human* and *being an animal* are. The difference is crucial for Aristotle to classify the world's furniture into the ten above-mentioned categories of being; for these are construed precisely on the basis of the transitive predication of the *said-of* kind[4], the kind whereof essential properties are attributed to anything: it is the different transitive chains of predication that give the categories. This is also the reason why, although individual substances are called 'primary', all *kinds* of substances that are thus *essentially* predicated of them also count as substances, e.g., the human species, the animal realm, etc.. In terms of these ontological relations, we can extract from the *Categories* the following ontological framework:

I. x does not inhere in a subject & x is not said-of a subject ≡ x is a substance individual.

II. x does not inhere in a subject & x is said-of a subject ≡ x is a substance universal.

III. x inheres in a subject & x is not said-of a subject ≡ x is a nonsubstance individual.

4 See Wedin (2000), pp. 21-27

IV. x inheres in a subject & x is said-of a subject ≡ x is a nonsubstance universal.[5]

This sets the special status of individual substances as the bedrock of Aristotle's ontology in the *Categories* (however, as I said, it also establishes the substantial status of some universals). The existence of individual substances, i.e., things like individual men and individual horses, must be the case so that the existence of substance universals, like their respective species and genera, can also be, as well as so that the existence of their particular shades of color, their deeds and sizes, and the types under which the latter fall, can be. Only individual substantial things "exist by themselves" – in none but the sense thereby outlined, i.e., of independing on anything else on which it would be predicated – if the criterion for ontologically primary subsistence is ultimate subjecthood. As Michael Frede (1987, p. 74) put it,

> They must be assumed to exist in their own right, but everything else exists because it is involved in some truth about a particular object or because it is involved in some truth about something that is involved in some truth about a particular object, etc. It is in this way that properties depend on objects for their being.

1.1.1.2 More precisely: aspects of being

As I implied before, however, Aristotle's thoughts on ultimate subjecthood in the *Categories* are far from being his last ones on it. He is heavily concerned with the notion from the beginning to the end of the central books of the *Metaphysics* (*Met.*ZHΘ), not to mention peripheral books and other parts of his main works besides the *Metaphysics* and the *Categories*, in which he provides interpreters with puzzling sets of remarks that to this day allow to argue either that in the *Metaphysics* he is *revising*, or else that he is *explaining* his previous thoughts on what substance is, "primarily and most of all".

The opening chapter of *Met.*Z seems to be well in agreement with the *Categories*. He does mention "our book on the various senses of words" right on its second line (1028^{a}11), in order to remember his reader that there is no novelty in saying that things may be said to be in

5 Slightly modified from Wedin (2000), p.16

several ways. Moreover, he recalls which of these senses is primary and why. It is the one denoting substance, because none of the other ways for something to be can be thought of as independent from any individual substance (1028ª25-30). He further adds that to say of an accidental, i.e. a quality or a quantity etc., what it is, it is necessary to say of which substance it is or may be an accident. Still, this summary of the *Categories*' account is restricted to *Met*.Z1, which in effect ends with the *question* 'What is substance?', and doubts on the good old account are raised (and answered) from this point onwards.

According to the interpretation that I favor, however, what the *Metaphysics* does, relative to the *Categories* is in the end to *explain*, not rectify, that for something to be liable to predication in its own respect (*not*, as occurs with accidentals, such as colors, actions, places, etc., to be liable to predication only with respect to another thing's such liability) is, most precisely, for what is *actually determined* and, so long as it exists, *immutable* in it to be liable to predication in its own respect, rather than what is merely potential and indefinite in it.[6] Apart from God (on whose nature we shall remain as silent as possible), things through which primary substances were exemplified within the *Categories* change, without nevertheless loosing their identities. This amounts to the difference (unexplored in the *Categories*) between the *form* and the *matter* of primary substances.

Form is the set of individually necessary and jointly sufficient – in sum, essential – properties for something to be *named* as it is (or, what amounts to the same, properties the maintenance of which is necessary and sufficient for something to be possibly referred to twice by the same person by using names or demonstratives), while *matter* is the set of potentialities (for change) that is relative to a formal – essential – determination. And, again, the criterion for regarding form ontologically prior to matter is logical. However a set of determinations, a form, requires some pre-existing set of potentialities to be accordingly determined (the form of wine requires the matter of water, grapes, etc.), any set of potentialities is a determinate one (referent of a singular term, if you will) only insofar as it is such and such a substance's (form's) set of potentialities, among which are the potentialities to become, or constitute, another substance. If you want to refer to Socrates' form, you'll simply talk of Socrates. By contrast, if you want to refer to Socrates' matter, you must talk of *Socrates's* (form's) matter.

In *Met*.H.6 (the textual kernel of the interpretation that I am favoring), the question posed in *Met*.Z.17 as to how, or in which sense, form and matter are one, is answered at last:

6 I learned to read these passages the way I do mostly thanks to Fabián Mié (2018), and to his and Mary Louise Gil's talk at the Workshop on Aristotelian Substances and their Substantiality (2019), that took place in the Federal University of Rio Grande do Sul (UFRGS).

one is the actuality of what the other is potency: "the proximate matter", i.e., the matter that is respective to each sensible substance, "and the form *are one and the same thing*, the one potentially, the other actually" ($1045^{b}18$-19, emphasis added). In the case of individual substances such as those that imply the possibility of change and were the first to be called "primary" since the *Categories*, form and matter (and the hylemorphic compound) are but inseparable aspects of one self-actualizing substantial unity. A substance's form or essence *just is* the determination of a set of potentialities, out of complete randomness.[7] Thus, stating that primary substances are entities like Socrates, or *that* individual horse (as Aristotle did in the *Categories*), and stating (as he does in *Met*.ZHΘ) that substance is "primarily and most of all" the form, in contrast to the matter, would accordingly *not* be inconsistent, nor therefore imply revision of any one Aristotelian work by the other, if only individual substances are allowed their own respective forms, a set of essential properties of their own and of no other entity.[8] Against Plato, Aristotle thought that everything is identical with its own essence (1032^{a} 1-5), and another (though derived) form of saying this in the case of the "sensible substances", things that inhabit the sublunar natural world, is that everything is identical with the set of potentialities that makes it what it is.

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7 One doubt that arises immediately in connection with this identity of form and proximate matter is dealt with in *Met*.Θ7: if for there to be change, and in particular substantial change (where a previously existing substance is no longer), there must be some ultimate subject of such a change, and since the unity of form and proximate matter implies that proximate matter is what it is only thanks to the compound's actuality or form, it would seem that in the absence of form, e.g., from the moment of the compound's anihilation onwards, the proximate matter should become some kind of brute, absolute potency with no definite properties (an idea that is allured to in *Met*.Z3). In order to get rid of this absurd idea, Aristotle explains that the relation of potential-to-become is no transitive relation. That is to say, if A can become B and B can become C, it is not the case that A can become C. This step-by-step temporal structure of change holds in both directions, the one of emergence and the one of deterioration of a substance. Hence, from the annihilation of a substance it results non-random determination that was already circumscribed by the set of potentialities of the matter previously composing the annihilated substance in question.

8 Michael Frede (1987), among many others argue, on the contrary, that by the time Aristotle wrote the *Metaphysics* he thought, in spite of what he had stated in the *Categories*, that individual forms' "specification, down to the smallest detail, is exactly the same for all things of the same kind" (Frede, 1987, p. 78), so that God (the Prime Mover) would be the only pure substance because it is the only one endowed with no matter. Although I do think that this interpretation relies too much on a dubious analogy between the somewhat *degenerate* sense of 'being' ascribed to accidentals relative to that of substances, on the one hand, and, on the other (supposedly, in the same sense), the *degenerate* sense of 'being' ascribed to matter relative to form, and hence to particular (material) men and horses, once and again I must say that I am not purporting to state what the right interpretation of Aristotle is (apparently no interpretation is without its faults). I wish, nevertheless, only to sum up in overview the interpretation that I find most interesting and, besides, most palatable for the contemporary mind. Accordingly, I guess that interpretations like Frede's picture Aristotelian theses at an excessively high level of speculation or creative imagination about what constitutes reality, while Aristotle may perhaps be read (often, though not always), on the contrary, as a master of the detailed enunciation of obviousness. Isn't it after all obvious that an ideal human life is, if anything, simply derived from what the ideal life would be for each of us?

1.1.1.3 Search for something's nature

I believe that with this brief preamble on Aristotle's ontology (perhaps with even less than it) we can achieve a satisfactory overlook onto one of the main guidelines for practically all "natural philosophers" in Europe (though also, and mainly throughout the middle ages, in the Islamic caliphates) until the gradual rise of the Scientific Revolution: the *Physics*. Having been concerned in the *Categories* with devising mutually irreducible kinds of being, and in the *Metaphysics* in devising mutually irreducible aspects of substances, Aristotle now worries to establish what *investigating nature* should be like.

> Knowledge is the object of our inquiry, and men do not think they know a thing till they have grasped the 'why' of it (which is to grasp its primary cause). So clearly we too must do this as regards both coming to be and passing away and every kind of natural change, in order that, knowing their principles, we may try to refer to these principles each of our problems. (*Physics*.II, 194b18-22)

In *Physics*, particularly on Book II, Aristotle devises all kinds of *explanatory factors* to be found that he is able to foresee, on the basis of his ontology, for natural phenomena – i.e., on the basis of both the earlier classification of kinds of being and the distinction between the form and the matter within their instances. This is what past on into history as his "doctrine of four causes". It is there also, and thereby, that he argued for the irreducibility to others, of one kind of explanatory factor, or cause, in particular: the "final cause", or, simply put: agency. The latter thesis is the one that has most effectively been torn out of the scientific worldview of modern days, and also the one that is currently back in foresight, as we shall later appreciate.

In the first chapter of *Physics.*II, Aristotle begins by the following sentence: "Of the things that exist, some exist by nature; others, by other causes" (192b 9) – it is worthy to recall that what he means by "things" here includes items of all categories, including universals within each of the latter; hence it includes "things" such as the falling of the rain, and a person's going to the marketplace. "By nature", he continues, "animals and their parts exist", as well as "plants and simple bodies (earth, fire, air, water)" (192b 9-11). Artifacts, by contrast, such as beds and coats and other things that are produced by some form of human art or technique, do *not* come to be by nature (194b 12-17).

Importantly, however, confronted with and thinking about what is in fact an artifact, like a bed, we may refer to the product of a carpenter's skill that it is, but also, nonetheless, to the piece of wood that the bed is actually made of. For the bed is – in some cases, at least – also a piece of wood, both before and after it has been carved and used accordingly, and perhaps even after it has ceased to be a bed. Both properties, the one rendering it a piece of wood and the one rendering it a bed – both forms – are there, but remain distinct from one another and are explanatory factors for different features and happenings therein. Hence it is as a product of the carpenter's skill that the bed is excluded from the roll of things that "exist by nature". The piece of wood, however, exists by nature, because the existence of wood in the world is due to the nature of such and such species of plant that are, by their nature, pieces of wood. Therefore, it is not "by nature" that an existing piece of wood is a bed, but it is "by nature" that it is wooden (and so that it is floatable, that it is flammable, as well as that it possesses any such potentiality that is due to some property it possesses "by nature", e.g., being wooden).

Then the "nature" that "causes" the existence of something when this something exists "by nature" is *its respective* nature, "an *internal* principle of movement [change] and rest [permanence]"[9] (192b 20, emphasis added) that is different in the case of pieces of wood from the pieces of bronze in the world, for example. The principles governing the "movements" of the bed *qua* bed, however, are not due to the nature of the piece of wood that the bed is, but rather to the skill of the entity *external* to itself that is the carpenter, the use of its owner, etc..

As implied by the book's opening sentence, "cause" denotes a broader concept than (and encompasses) that of "nature". The bed has its *cause* in the carpenter's skill, but not its nature. In general, what is explained about something by pointing out its cause (and, in certain cases, its nature) is the fact that it satisfies sufficient conditions to be designated in the way it is: to be regarded as what it is named as. And what specifies natures among other causes is the fact that the properties constituting something's nature are properties of the very entity whose designation one wishes to explain (they are internal principles of movement and rest), e.g.: why is Socrates rational? Because human beings are, and Socrates is a human being. By contrast, the explanatory factors to be found for several things (facts, happenings) in the world lie outside the scope of properties of the substances involved in such *explananda*: these will be explained by certain causes, sometimes including the nature of some substances. It is the case

9 Remember the characterization given above of what the form of something is in relation to its matter: it is the determination of a set of potentialities in relation to the potentialities that are thus determined.

of artifacts in relation to our abilities, or, in general, accidentals in relation to substances[10] (in the same manner in which "the nature of the bed" is rather the nature of the wood it is made of, "the nature" of an accidental, e.g., a certain temperature, is or includes the nature of whatever is heated to such a degree).

Aristotle then tries to engage in a dialogue with the philosophical positions current in his time about what is investigated when investigating the nature of something – for the phrase "the nature of that" was far from idiosyncratic. One of said philosophical positions is that according to which "the nature or substance of a natural object [is] that immediate constituent of it which, taken by itself, has no definite ordering, e.g. wood is the nature of the bed; bronze, the nature of the statue" (193a 10-12). It should be noted, then, that Aristotle makes an effort to concede this opinion a certain reasonableness: for it is precisely as a piece of wood and as a piece of bronze that the bed and the statue are natural objects[11] – as artifacts, as we have seen, the bed and the statue are not natural objects, do not possess natures as such, but rather only insofar as they are made of natural substances. Both wood in relation to the bed and bronze in relation to the statue are also, however, "immediate constituents which, taken by themselves, have no definite ordering", just as the natures of natural objects should *generally* be, according to the philosophers with whom Aristotle dialogues. However, the Stagirite's goodwill with the reflections that preceded him is exhausted when the same relationship that exists (and he himself admits that it exists) from bed to wood and from statue to bronze was thought of, for example, from wood to earth; from bronze to water, and so from anything to its (supposed) "immediate constituents which, taken by themselves, have no definite ordering". It is precisely this immediate constituency, which persists throughout the existence of a substance, that Aristotle called its "matter" and which, according to him, past philosophers had argued to be their nature in each case. This is why Aristotle calls those the "materialist" philosophers.

According to materialist philosophers, then, for any natural object, its nature would be given by what constitutes it, but disregarding the form – the definition – assumed by it at the time of its emergence and during its subsistence. If the relation "x is the matter of y" (interpreted by materialist philosophers as equivalent to "x is the nature of y") is transitive, then it is easy to see how material "elements" such as earth, fire, air, and water (or what else) could be thought of by the likes of Tales, Anaximenes, Heraclitus, Democritus, Empedocles, among

10 All but the category of substances encompass accidentals. Thus what explains the existence of the color red (or of any other accidental) splits into several different *causes* that include the *nature* of several different substances.

11 Supposing, of course, that the piece of bronze in question is not an artificial alloy.

others, as first candidates for being regarded as the ultimate nature of *everything* that exists. This type of explanation of what the nature of a substance (or cause of anything in general) would be is rejected by Aristotle in favor of an explanation that appeals to what allows us to discern one definite thing among others at all, namely, the definite order that (this or that kind of) matter takes in its particular case: what makes a portion of water a piece of bronze in one case, or gold in another; what makes a portion of earth a piece of wood in one case, or bone in another.

However, the definite order that each thing is respectively endowed with – the one turning it, from earth, to either stone or wood; from water, to either bronze or gold – is its form. Therefore, "[f]orm in fact is nature, rather than matter; for a thing is more properly said to be what it is when it exists in act than when it exists potentially" (193b 7-8). In other words, even if a man consists of various elements combined in such and such a way (70% of water, etc., etc.), then the set of these elements, even if considered in typical proportions and agglutinated, does not by itself constitute a man. The same goes for earth (or quarks, if you will) in relation to wood; for water in relation to bronze; for wood in relation to a bed; for bronze in relation to a statue; for DNA, relative to a man. The question of the nature of a (kind of) natural object is the question of the difference that defines it out of common (shared) potentialities across the natural world. For Aristotle, then, "nature is everywhere the cause of order" (*Physics.*VIII, 252a11), it is the kind of explanatory factor we look after for understanding the reasons why we discriminate this from that, instead of treating (naming, dealing with) everything as it were the same, or part of the same, thing. The reason why we predispose ourselves toward discriminating at all is simply that there are stable enough differences around us. Such differences allow us to discriminate and to live through our ongoing relationships with the world, acting in the various ways we do, all suitable, to an extent, to the natures of things around us, and thus to name them differently. It is – and it will be, for the rest of this work – important to note that, for Aristotle, there is no way of purporting to actually *talk about* anything whatsoever while doubting whether what is being talked about *has* a nature.

> *What* nature is, then, and the meaning of the terms 'by nature' and 'according to nature', has been stated. *That* nature exists, it would be absurd to try to prove; for it is obvious that there are many things of this kind, and to prove what is obvious by what is not is the mark of a man who is unable to distinguish what is self-evident from what is not. (This is clearly possible. A man blind from birth might reason about colors.) Presumably therefore such persons must be talking about words without any thought to correspond. (Physics.II.1 192a02-9)

Again, there is a role attributed by Aristotle to the discernment of the natures of substances that is philosophical in the sense of contributing to achieving clarity about our own thoughts, about the meanings of our own words – remember the beginning of the *Categories*' being about *names*. The Stagirite thought that it is reasonable for us to try to find out the nature of this or that, and finding *that* out is a task that is endeavored by foraging the world around us in search of what happens "always or for the most part" (197a20), by contrast to what happens only sometimes, or "by chance". But at no point Aristotle asks the question of *whether* or not there are natures of substances. He takes the boundary between accepting and not accepting the very existence of natures of substances as a boundary between satisfying the conditions of possibility for genuine thought about anything, on the one hand, and "talking about words without any correspondence to thoughts", on the other. Hence the importance of delving as deeply as possible into understanding what the nature of something is as such (which is the task of "first philosophy", explored in the *Metaphysics*), and how to discern it from what is not in the nature of something, in order to uncover it. The investigation of nature – i.e. the nature of each substance – is the investigation through which the natural philosopher attempts to explain why each substance is exactly the substance it is, rather than being another substance.

1.1.1.4 Other explanations

Should then "the student of nature" concern herself with discovering essential properties of the substances he finds, and entirely disregard the accidentals that are due to their material potentialities alone? No. The use of the expression "the nature of x" where x varies over natural substances is, according to Aristotle, analogous to the use of the expression "the art/technique of y" where y varies over products or results of human skills. Just as the physician, in order to possess knowledge about that of which she herself is the cause (health), must thereby know the bile, the heart, the lungs and other parts of the body that can be, or else come to be, healthy, and the builder must know bricks, beams, mortar and other things that can constitute, or else come to constitute a house, the student of nature (i.e., of natural substances) must know countless things that can be or come to be constituent parts of well-defined natural substances. The relationship between the form and the matter of a natural substance is such that it is impossible to deal with the form *qua* form of a natural substance by

separating it, in thought, from the transformations undergone by the matter to which it belongs, just as – to use a classical Aristotelian example – it is impossible to speak of aduncity without speaking of noses. This is the reason why the study of nature is no mathematical study (the whole theme of *Physics*.II, chapter 2). In general, there is no kind of change except by virtue of there being matter, i.e., a potentiality respective to whatever changes, to change according to such and such a kind of change, and every natural substance, whether particular or universal (primary or secondary), changes. While form thus determines a certain set of potentialities in the overall dynamics of a natural substance, the matter (i.e., the one such set of potentialities) of a natural substance enables it to go by the changes in the course of its existence which are due to its nature, so much as it enables its substance to acquire (and loose) the variety of accidental properties which shall constitute the latter's history. The student of nature will therefore have to study matter in order to explain substances, and accidentals, in order to understand matter.

Form being the set of properties making of each thing what it is instead of another, all matter – regardless of whether it is elementary, such as earth or water, or non-elemental, such as wood or bronze – is endowed with its own form, i.e. a set of internal principles of movement, of essential properties, that will be jointly characteristic and distinctive of it as the type of matter it is. The conclusion that follows is that in every natural substance there will be change of at least two kinds: change whose explanation will lie in the defining internal principle of movement of the natural substance in question, on the one hand, and change whose explanation will lie in the defining internal principle of movement of its matter, on the other. I think because I am a human being, but I remain stuck to the ground because I am earth.

This is the truth of the pre-Socratic philosophies of nature, and the sense in which "matter" gives a sort of secondary meaning to expressions such as "nature", "by nature", etc.. Just as by definition there can be no aduncity without a nose, there can be no nose that comes into being from something that can't become a nose. And the reason why there is the set of changes that a nose can undergo is because there is matter that a nose is essentially made of.

In the third chapter of Physics II, Aristotle turns his attention to the broader notion of "cause". With his account of it, he made the distinction between accidental causality, insubordinate to the specifics of what is being talked about, and essential causality: precisely, causality subordinate to the hypothesis that it is *this* object (belonging to any category), named *this* way, that is being talked about.

According to Aristotle, what is indicated as the cause of an event – i.e. of a coming to be, of a ceasing to be and of all kinds of natural change – falls under one of the four types that

would pass down through the history of ideas as “material cause”, “formal cause”, “efficient cause”, and “final cause” (194b24-195a2). If the natures of substances are explanatory characters for the fact that they are what they are, in the same way, causes in general explain the fact that anything, natural substance or anything else, is what it is.

A “material cause” of something is part of “that from which a thing comes to be and which persists”, like bronze’s being the material cause of a bronze statue, or as grabbing a wooden plank might be the material cause for someone’s floating.

A “formal cause” of something is a subset of the set of all its essential properties, which in turn are separately necessary and jointly sufficient for something to be what it is. Being greater than 2 is one formal cause for the fact that 3 is greater than 1, and being the color of a wall is a formal cause of a certain hue of blue found in a wall.

An “efficient cause” of something is among the conditions that should be in place prior to its emergence, which may or may not remain during its existence. Examples are a person in relation to a theory; a father in relation to his daughter or son.

A “final cause” of something is what can be pointed out as “that for the sake of which”, a purpose, either actually or merely appreciated as *good*, for which something came to be (done). Thus, health is the final cause for the medical art; virtue and rationality, for a human being; a statue, for a sculptor (considered as such).

That there are four different ways of specifying why one thing is what it is and not something else means not only that things have different causes, but also that the relation “x explains y” can be symmetrical, as long as the explanatory role (material, formal, efficient or final) of x in relation to y is not the same as that held by y in relation to x. However, again, the ways x and y are designated (their names) will always be of paramount importance, under any sense of causality. The shape of the bed is a formal and a final cause of a piece of wood, and the piece of wood is a material cause of the bed.

> It is clear, then, that there are causes, and that their number is what we have said. The number is the same as the number of things covered by the question ‘why’. ‘Why’ ultimately refers also to things that don’t involve movement, e.g., in mathematics, to ‘what’ (the definition of a straight line, or of commensurability, or the like); or to what initiated a movement, e.g., ‘why did they go to war?’ - ‘because there was a robbery’; or we are investigating ‘with a view to what?’ - ‘so that they can rule’; or, in the case of things that come to light, we are looking for matter. The causes are therefore these and that much more in number (198a 14-21).

In fact, each of these four ways of saying *why* something *is* what it is claimed to contribute, to a greater or lesser extent – though, importantly, in different senses – to understanding *what* these things *are*. The matter of the state of belligerence of those people who went onto war could be, for example, a certain state of animosity between the peoples or tribes involved, with such and such a history; conflicting, contemporary interests of such and such a nature, and everything else that made the outbreak of war possible and remained constituting the ongoing event. It is not surprising that Aristotle considered this kind of information – about enabling conditions for a certain war – relevant to understanding *what* some war was, just as history books teach us today, with this same kind of information (let us say, material), what the Paraguayan War was, for example. Nor is it surprising that this type of information is distinct from the fuse of the war, on the one hand; the aims of the parties (or what would be, or seem to be, good for each party) in waging it, on the other, and, finally, the definition or essence of that war, all of which are important for us to understand what that war was.

It is with these questions that Aristotle outlines the design and purpose of (what would be known as) natural philosophy. The "student of nature" (198b 5) must inquire what each thing, whatever the category it belongs to, is, and for such a purpose she should attend not to one, but rather to several kinds of explanation.

1.1.1.5 That for the sake of which

Speaking of purpose. The point of (even if so hastily) examining how it was that Aristotle conceived of the task of foraging the ways things change around us was, as I said (section 1.1.1.1), not only to make it contrast with the modern fashion of doing so (soon to be also briefly recalled), but also to highlight an element of the old ways that is *currently* on the foreground, which will be given attention in our third chapter: purpose. And it was not mere attending to purpose as an explanatory factor for certain kinds of change that marked Aristotelian natural philosophy, but rather argument for the irreducibility of the "final cause" to any of the other kinds of explanatory factor. What this means is that, whence a final cause is involved, it *must* be pointed to in order for us to properly understand certain aspects of the happenings in question. Hence, of course, mention must be made of certain purposes in order to obtain a *full* understanding of certain happenings.

To be sure, what is currently on the foreground of cognitive science is not a revival of Aristotelian cosmology, in particular it is not the belief that the *universe* has a purpose, the several kinds of stuff around us – i.e., the universals – having their existence and often far-sight subsistence explained by appeal to such a cosmological driving force. The Stagirite purported to explain the fact that we have teeth, and, in general, species' reproduction as phenomena in this manner (in *Physics*.II, chapter 8, and in several other writings), i.e., by thinking of the kinds of stuff, whether living or not, that people in general cared about in his surroundings, as parts of an all-encompassing, purposeful whole. Within the scope of the biosphere at least, this was the very opposite of the theory of natural selection, which thousands of years later came to be established by Darwin, and Darwin's picture undoubtedly came to stay.[12] Difficulties with the very task of spelling out what we mean by such a universal purpose would also be at hand, were we to concern ourselves with such a thesis.

What I shall be concerning myself with, ahead in this dissertation, is what commentators have sometimes referred to as the "immanent purpose" that is characteristic of a paradigmatic example of Aristotelian individual substance: living beings. By contrast – made, as we saw, in *Physics*.II – with artifacts, the kind of purpose defining living beings is, relative to the latter, an "internal principle of movement and rest", while an artifact, say, a chair, is defined by the purposes of something (someone) distinct from it. Thus the interesting (for us) Aristotelian thesis is that *that for the sake of which* living beings live their lives *as what they are* cannot be ignored once we purport to understand their ways of living. In effect, for Aristotle (*De Anima*.II.2) kinds of living beings – kinds of "soul" – could be defined as kinds of purposes: (i) to breath and feed; (ii) to move itself and perceive; (iii) to think. Such kinds of purposes relate in this order to each other as necessary to sufficient conditions for a kind (i-iii) of purpose to obtain, and these kinds of purpose are all defined along with respective objects: (i) means of survival; (ii) environmental properties; (iii) thoughts, all of which are forms of value, of good, aimed at in several degrees of wit and capacity in the living of any form of life. Human life in general, for instance, can be defined as the *pursuit* of rationality, which requires the *pursuit* of physical well-being, as well as (the latter requires) the *pursuit* to keep living, and implies, inasmuch as it ever gets actualized, not only thoughts to be thought of among people, but also an enabling and affording environment.[13]

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12 Of course, one is possibly attracted, still today, by talk of a cosmological sense of 'good' that holds independently of anciently supposed manifestations of such a good in the extant forms of life in our planet.

13 Yet again I am favouring one interpretation over another. Aristotle is notoriously ambiguous on the "separability" of the "thinking part" of animals capable of thought, to the point of affirming and denying it as quickly as from chapter 2 to 3 of *De Anima*.II, respectively. To give an argument for the interpretation that I favour, thought is perhaps deemed "separable" because it is an attribute of God according to Aristotle, so

While formal and final causes thus coincide in the case of living beings, while our *also cognitive* relationship with the objects of our purposes in all (i-iii) dimensions defines what we are as humans, we must recall the identity of form and matter I alluded to above (1.1.1.1.2). According to the suggestion I am reading in Aristotle, the soul – the purposes driving the lives of living beings – is no less concrete than anything else in the world (apart from God, the purely formal purpose of the whole of reality), and it extends over a complex comprehending a living body of a certain kind together with the environmental conditions – means of survival, affording environmental structures, thoughts – making them what they are. We are souls, primarily than we are matter, but in the plain sense that we are not merely sets of potentialities: we are concrete stuff *acting out of* our given concrete potentialities.

How much of Aristotelian teleology resonates with current construals of minds as nothing but the (purposeful) agency of concrete organism-environment wholes is yet to be clarified.[14] Suffice to say, for now, that there has been a growing interest in the claim that "genuine understandings of consciousness demand close and serious study of evolution as a history of animate form" (Sheets-Johnstone, 2011). One point of sure ongoing resonance with Aristotelian views on animate forms is the Aristotelian claim for the irreducibility of the final cause, which, together with the identification of the latter to the soul (the set of all essential properties of a living being), yields the identification of the main explanatory factor for agency at the level of a concrete whole involving both the living being and things it purposefully relates to, *not* at the level of such a concrete system's components. It is the claim that the *behavior* of a living being is not analogous to the mere dynamics of any non-living chunk of matter, for in order to explain events concerning the latter it *is* generally sufficient to identify what it is made of, and so subsequently, until presumably we shall find an explanation for the dynamics of any non-living chunk of matter in that of which *everything* is ultimately made.

Broadly representationalist accounts of the mind emerge together with the abandonment of Aristotle's cosmology, for the simple reason that his baby teleology – the one he applied to individual living beings, not only the one he applied to universals and to the universe – goes along with the water shed. This abandonment had its good and its bad motives. We move forward in hopes of discernment.

1.1.1.6 *Impetus* for Physics

that it cannot be said that thinking *per se* implies having a body, though being a thinking animal does.

14 I say "nothing but", but it will take me a whole chapter to spell it out.

We have briefly seen in the previous sections how it was that once upon a time investigation of the natural world could be designed entirely on the basis of ontology, i.e., on the basis of discernment of the many ways in which things – substances, (and substances') quantities, qualities, relations, places, times, positions, possessions, activities, and affections – combine into the states of affairs that render some propositions, either occasionally or always, true, as well as on the basis of how the actuality and the potentiality of anything within those categories might be appealed to in order to explain change of practically all sorts in the world. Those were times when no one asked about the role of philosophy in the investigation of the natural world, as it has been of so much use over the last few centuries. The opposite supposition was the one regularly made, ever since Aristotle and throughout Roman and middle ages; it was for the investigation on the nature of each thing to keep track of its own importance to philosophy; it was for empirical investigation to keep track of its own relevance for questions of the essence of this, the essence of that. Investigation upon the ways things changed around us was supposed to illuminate our acquaintance with the essences of the world's furniture, providing better answers to questions of the form 'What is *this*?'[15]. This supposition has never been proved wrong. It just didn't work so well as simply not making it.

By the turn from the 16th to the 17th century, the revolution investigation on the natural world began to undergo with Galileo's approach to (spatial) motion was radical, implying, as summarized by Alexandre Koyré (1986, p. 18), both "the geometrization of space" and "the dissolution of the cosmos". Such an intellectual revolution would render the world practically unrecognizable for whomever participated in (broadly speaking) philosophical inquiry by the time. By contrast with the old ontological guidelines for natural philosophy, Galileo, some of his contemporaries, and later in-takers of the rising revolution, began to find better results in assuming a panoramic and abstract view of spatial movement, and so they began to realize that no attention to the different kinds of explanation outlined by Aristotle (material, formal, efficient, final) was required, as neither was attention to any one thing in particular, in order to attain the desired understanding. If in order to explain what happens around us there be no need to talk about things like substances, or final causes, then talk about things like these already starts to seem a mere distraction without any cognitive value. The antecedent was the case, and so what served for millennia for people to understand and investigate the world began, in fact, to be deemed as inadequate and misleading. As Thomas Kuhn (1962) would later

15 And thus, arguably thought Aristotle, natural philosophy was supposed to illuminate our acquaintance with God, providing better answers to questions of a form like "What is *all of this*?".

epitomize, however, in order for such a revolution in understanding to take place, it is generally required that the accepted worldview first bends beneath its own weight.

Whether it was spatial motion, as we understand it today, or "motion" in the broadest sense, which for Aristotle encompassed any kind of change that a substance could undergo, motion was understood, until around the time of Galileo's (1564-1642), as a change beginning at one point in time and ceasing at another. Necessarily so. There were two kinds of change in general, to be sure: the one suffered by what keeps on existing in spite of alternation of accidental properties over time, and the one present in a house's being constructed as well as in its being destroyed, in a day's beginning and ending, or in a person's birth and demise: cases in which a substance comes into existence or ceases to exist. In any case, change was seen by Aristotle as something happening to a particular thing, whether by force of its essential properties (i.e., by nature), or because of accidents affecting it (i.e., by some other cause), that actualize some of its current potentialities. It was always *that* change in *that* thing which should be explicated, and the way Aristotle envisaged to explicate any particular change was for some potentiality inherent in what goes through the change to be actualized. Otherwise one could not properly even speak of change.

> Motion, we say, is the actuality of the movable insofar as it is movable. Each kind of motion, therefore, necessarily involve the presence of the things that are capable of that motion. In fact, even apart from the definition of motion, every one would admit that in each kind of motion it is that which is capable of motion that is in motion: thus it is that which is capable of alteration that is altered, and that which is capable of local change that is in locomotion; and so there must be something capable of being burned before there can be a process of being burned, and something capable of burning before there can be a process of burning (*Physics*.VIII, 251a9-16).

Only because of such a referential attachment of any change's description to some substance's change – and because no natural substance endures forever – was any change taken as beginning at one point in time and ending at another. Hence one of the most fundamental limitations of Aristotelian natural philosophy: because for something to change is for some of its potentialities to be actualized, either by nature or by some other cause, the notion of "infinite movement" (really, of any change that lasts forever) simply didn't make sense within that theoretical framework.

Aristotle assumed that we keep our feet on the ground because we are (made of) earth and because, so much as it is of fire's nature to go upwards, it is of earth's do go downwards.

Any movement – any change – that occurred to something which would, on the contrary, *not* be accountable, either by its own nature or by any of its own material cause's nature alone, would be a "violent motion", due at least partially to the nature or to the material cause of an external cause that would manifest while the change in question endured. For instance, if I lift a pebble from the ground up until my eyes' level, what thus externally and "violently" causes the pebble to reach such height is my intention to do so, a potentiality available to me thanks to the structural cohesion of both my hands' and the pebble's materials, plus my physical constitution. Another necessary condition, however, is physical contact between my hand and the pebble: without this, all relevant potentialities in place would remain unactualized. Hence the problem: what would be the cause of such a pebble's going upwards for a while when, instead of just lifting it while still holding it, I would rather throw it in some direction with any upward inclination? It could no longer be anything about myself, since I would no longer be in touch with the pebble. Then what? This was one of the main quarrels that eventually led the whole Aristotelian disciplinary matrix to be abandoned.

In fact, Aristotle's ontology shed little light upon the question of violent, yet free spatial movement. Moreover, the direction it appeared to point towards was a dubious one. Rather than across geometrical space (Euclidean or not), which is logically indifferent to whether it is occupied by something or not, it was *from a place to another* that things were supposed to spatially move themselves. Because there can be no place that is not thereby something's, ultimately a substance's, place, people hardly envisaged what sense could there be in any talk about a location completely devoid of anything, hence it was a common-place in medieval physics to treat as inadmissible any talk of a *vacuum*. For these reasons, some (including Aristotle, by the end of *Physics*.VIII) have thought that the answer to the problem of violent displacement lied precisely in this semantic prohibition of "devoid places". The supposedly illuminating answer was, that what would make the projectile to keep moving for a while would be the forcibly displaced air ahead it, as the latter successively filled the places left behind by the object while it kept forcing such an air displacement. Although the pebble would no longer be in touch with my hand, air displacement towards behind the pebble would generate the necessary impulse for it to follow the observed trajectory.

As already one of Galileo's masters, Francesco Bonamici (1533-1603), would eventually criticize this purported solution, "The nature [of the medium] only wants the *vacuum* to be suppressed. When, therefore, the air, having gone to the place of the stone, makes contact, it is not clear why it should act any longer. So if the air comes into contact after the first movement of the stone, why should the movement continue?" (Bonamici, *De Motu*, 1. V,

XXXV, p. 503, *apud* Koyré, 1986, p. 35) – that is to say, the thrown pebble could as well move no further upwards as perhaps a volume of air equal to its own took its place, from whence the pebble would immediately fall straight downwards to its natural place. This, of course, does not happen. But even assuming that for some unknown reason the movement does not cease from the first change of place between the stone and a certain mass of air, another problem arises. "In fact, if the air succeeds in the place [of the stone] and pushes it in such a way that the succession is continuous, it follows that the propulsion of the stone will continue as far as the air extends…" (*Ibid*). And such an alternative prediction is even worse than the first one. For, as Koyré (1986, p. 77) observes, besides implying empirical oddity with regards to how actual projectile trajectories occur, it also implies contradiction with the assumption that all change must have an ending point. For supposing that "the propulsion of the stone will continue as far as the air extends" allows for the additional supposition that the air, or at least some other medium, extends indefinitely, and thus that the trajectory itself is infinite. In short, once solely guided by the assumption, ontological at root, of there being no place without a place-holder, predictions regarding so simple a kind of event such as the trajectory of a projectile amount to (either empirical or formal) absurdity.

Another solution that was envisaged still in the middle ages – that was "inaugurated, like everything else, by the Greeks, but elaborated above all in the course of the 14th century by the Parisian school of Buridan and Nicolas Oresme" (Koyré, 1989, p. 19) – was the theory of the *impetus*, which consisted in attributing to the medium (e.g., the air) where a projectile advanced the sole role of resistance, while conjecturing that any "movement, be it violent or natural, be always explained by a motive force immanent to the mobile" (Koyré, 1986, p. 60). Such a motive force, the *impetus* would be impressed in the mobile by the cause of a violent movement (by a sling, or a human arm, to a pebble; by a stretched bow, to an arrow, etc.) in varying possible degrees. Once endowed with a certain amount of *impetus*, an object such as a thrown pebble would decreasingly retain it for as much time as the medium's resistance to displacement would take to extinguish it.

"In the treatises and essays on movement that he composed in Pisa, Galileo endeavored to develop the dynamics of *impetus* in a coherent and complete way … and, at the same time, to bring the mathematization of that dynamics to an end" (Koyré, 1986, p.76). In order to explain the *impetus* (both formally and informally), Galileo resorted to the models of heat as it is impressed in a plumber ball, and also that of sound that is made inhere in a bell. Just as these, the *impetus* would be a "quality" which is impressed, for a certain amount of time and with a certain intensity, to an object – thenceforward, a projectile – which latter, by virtue of

such an *impetus*, would be given movement until the medium's resistance extinguished the acquired quality. By the same analogy with heat and sound, several explanations seemed to be achieved. Of how can movement pass from one thing to another; of why denser objects can be launched further than lighter ones; in fact, of why the velocity of different projectiles is different (Bonamici had already observed that air filling-in vacuous places would impinge equal force to any thrown object); of why movement – in a "violent" trajectory – ends at some point.

The "physics" of the *impetus* was *in nuce* already a way of "geometricizing space", of "dissolving the cosmos" lacking plenitude in this respect but from the formalization that it would soon be provided; for what apparently should be cared about in order to understand spatial movement was things like the number and the velocity of revolutions of a sling; how stretched the string of a bow is; how dense (or "grave") is the projectile relative to the medium wherein it travels, which in relation to the observed traveled distance would reveal the amount of *impetus* impinged on the object. *None of these has anything to do with anything's nature*. Therein lied the importance of Galileo's reported work of mathematization of the theory of *impetus*: by means of it, he could show very clearly that Aristotelian conceptual tools had been disposed of in favor of another – unequivocally better – set of tools.

To this day, no infinite movement has ever been observed, but it was from that point onwards, with inquiry left rid of ontologically derived principles like the definition of change as the actualization of a potency latent in some thing's nature, that the pathway became open for someone to first *cogitate* about inertial movement, and hence for modern Physics to develop under the heading of Isaac Newton.[16] Aristotle's ontology, and every bit of common sense it brought along within, began to be seen as an obstacle to most precisely describing – and thus explaining – the natural world.

By way of "geometricizing space" and "dissolving the cosmos" in their judgments, natural philosophers have managed to explain the kinematics of a projectile, not just casually *without* appealing to its nature, but rather *because* they did not make such an appeal. The kinematics of the very sky vault, and with it our own place in the universe, was also explained thanks to the same obliteration of Aristotelian ontology, as well as of accompanying Geocentric and theological intuitions about the universe, along with the Copernican Revolution. All this was happening (and I'm only citing the major, most apprehensive intellectual revolutions

16 Galileo himself did not believe in the possibility of infinite movement because, besides the medium's resistance and extinguishing force, he saw in the very "action" of *impetus* a cause for its own dissolution with time. This additional supposition was apparently the whole tiny distance separating Galileo's construal of *impetus* from the admission of inertial movement.

of the seventeenth century, while their own force arguably depended on that of minor discoveries and technical developments in agriculture, medicine, hydraulics, and ballistics, so much as they contributed to the latter) to the rise of a kind of philosophical perplexity that would continue to be amply fed by an accelerated rate of (what we now call) scientific breakthroughs.

Aristotle was "an ordinary man's philosopher" (Anscombe, 1990). Intuitiveness, therefore, came in aid of his ontology's wide acceptance. But if the natural world – the world in which change occurs – appears to be thus so counterintuitively *explained*; if the actual explanatory factors for what happens in it lie outside the sphere of what is directly grasped by both perception and the regular use of words, then both perception and the meaning of our words seemed to lack any ready explanation, and, their natures, any evident feature. For neither vision could any longer be explained as being "for the sake of knowledge" when belief based solely on it proved itself rather doubtful, nor could the meaning of our words even just partially be explained by the anciently supposed fact that we simply name (kinds of) things that we see, however good or bad our knowledge be of their nature (see again the quote from the end of sec. 1.1.1.1.3) when even *thinking* of stuff's nature seemed generally to lead judgment to err. The starry sky seemed mysterious in more than one sense: not only by being overwhelmingly beautiful and relevant in our lives, but also by there being any connection of it with our lives at all.

1.1.2 Focus on the matter: the rise of the scientific revolution in the minds of philosophers

A profound change in Europe's intellectual environment took place as its protagonists began so dispensing with an ontological take on their fields of inquiry – obtaining, as a result, better results. To put our trust in Alexandre Koyré's (1986, pp. 13-20) reading of those changes, "better results" didn't just mean better predictions, and hence better control over natural phenomena (important as such a consequence in fact was, for a society where capitalist production gauged increasing political dominance). Rather, from a *contemplative* point of view there was also a felt progress, such that the very essence – not of this or that, but rather – of *everything* within the range of geometry seemed to be illuminated, though such lights came at the expanse of explaining away the respective natures of substances across space. In the

Aristotelian sense of ‘matter’, which denoted not necessarily actualized features, possibly underlying substantial differences (either between substances or between the states of one changing substance), one might say that, from Galileo onwards, *all that mattered was matter*: features irrespective to any difference between substances, which had nonetheless always accounted for at least a secondary meaning of the notion of “their nature”. (For remember that, as Aristotle argued, if we regard the nature of anything to be that of which it is made, its matter, then it is *possible* that the transitivity of the “made of” relation leads us to find out a single material substrate for everything, and thus a single nature of everything) Now this secondary meaning of “nature” became the only one, as it apparently should always have been. This was the victory – the renaissance – of Achimedean methodology, as well as of the metaphysics of Empedocles, Democritus, and other pre-socratic philosophers, for whom every necessity in the natural world would be accidental to whichever had occasion to become a manifestation of it. Therefore what made each (kind of) being what it was – together with the very notions of ‘substance’, ‘essence’, ‘accident’, etc. – lost all its importance in inquiry, in favor of all-encompassing taxonomic structures for characterizing the dynamics – the change – of unsubstantialized phenomena.

Refined experiments and rigorous conceptual regimentation of their description – paradigmatic practices of scientists, both then, when they were not yet thus called, and nowadays – brought about both: the prospect of unprecedented increase of knowledge about the world, and the felt illusory character of many previously held intuitions about it. Together, such novelties constitute the form of a predicament that survives to this day, in spite of all its reformulations provided by philosophers ever since. It just appeared that what is *really* constituting the whole of reality (other phrases include “the fundamentals”, “the grounds”, “things themselves”, or even, “what our best theories tell us that exist”) does not show in front of our eyes. Things like men and horses and pebbles do, but guiding research by the attempt to understand what *they* are, case by case, proved a purposeless procedure, while turning our gaze toward kinds of events, discovering kinds of events nested within one another, through descriptions provided with the aid of both, instrumentally enhanced empirical observation and mathematical calculus, proved fruitful. For any x, rigorous thinking about x became synonymous with distrust for intuition regarding x, together with the attempt to embrace x within the logical scaffolding that gave form to the scientific description of everything else besides x.

If the ways things like men and horses and pebbles change – the ways things move, get wet, burn, etc. – over time are better understood by abstracting from their respective natures, by instead attending to the kinds of events they instantiate – movement, humidity, com-

bustion, etc. – within a general taxonomy of kinds of events, then it seemed that what all things named really are is just arbitrarily selected instantiations of local vagaries in a complex general mechanism comprising the whole universe. It may be objected that it has always been kinds of *things*, not of events, to be classified in scientific taxonomies, and that is true to an extent. Do we not, after all, enroll among scientific discoveries, ones such as that whales are mammals, or that a chemical element, with such and such a number of protons and neutrons in its atomic nuclei, exists? However, the role of substances such as whales, atoms, protons, etc., in such taxonomies became merely positional, serving only to mark the formal place of *whatever* presents such and such a kind of dynamics relative to *whatever* presents such and such of another – from whence the holistic character of scientific taxonomies noticed by so many thinkers of rather divergent philosophical stances (thinking here of Carnap, Sellars, Quine, and Kuhn, for instance). Hence the felt difficulty of moving on from a "daily point of view" to, say, a "scientific" one that is always, to some extent, debunking of the former: identifying substances constituting observed phenomena plays but such a disposable role. What we seemingly learn about is everything generally, and yet nothing in particular.

The form of the modern predicament involves not just inattention to substances, though, but also – and thereby – severance between *explanandum* and *explanans*. On the one hand, clearly, disciplined scientific foraging of natural events has provided us with remarkable progress towards ever better explanations of natural events. On the other hand, it just seems that the explanatory factors science points to are explanatory but of things we can only recognize *but through such an explanation*. What I am implying here is that a rather familiar theme for current philosophers of science, at the very least since Thomas Kuhn's work, *that enhancement of scientific explanations seems to change the scientific subject-matter*, was a felt – if not always thoroughly thought of – predicament ever since the dawn of both, modern science and modern philosophy.

This predicament – i.e., what I'm characterizing as modern philosophy's most characteristic predicament – yielded the felt need to provide a theory of knowledge (and thereby what came later to be perceived of as a theory of how words acquire their meaning); a theory that established how such a poorly endowed guessing mind, so naturally distracted with vulgarly named stuff that we daily care about, might yet attain all the wonders newly recognized within and through the scientific "metaphysical attitude" that, so to say, forgets about individual trees, and sees the forest alone. There had arisen, therefore, a newly conceived philosophical task – in the apt words of Alberto Coffa, 1991, p. 10, there emerged a new "ethics of con-

cepts" – seemingly imposing itself upon revolutionized humanity: to understand both the original sin and the scientific redemption of human thought.

One of the manifestations of this predicament, so immediate as to be expressed by Galileo himself at the very dawn on modernity, was the notorious distinction between primary and secondary qualities:

> I say that as soon as I conceive of a corporeal substance or material, I feel […] drawn by the necessity of also conceiving that it is bounded and has this or that shape; that it is large or small in relation to other things; that it is in this or that location and exists at this or that time; that it moves or stands still; that it touches or does not touch another body; and that it is one, a few, or many. Nor can I, by any stretch of the imagination, separate it from these conditions. However, my mind does not feel forced to regard it as necessarily accompanied by such conditions as the following: that it is white or red, bitter or sweet, noisy or quiet, and pleasantly or unpleasantly smelling […]. Thus, from the point of view of the subject in which they seem to inhere, […] tastes, odors, colors, etc., are nothing but empty names; rather they inhere only in the sensitive body, such that if one removes the animal, then all these qualities are taken away and annihilated. (Galileo, 1623/2008, p. 185, *apud* Withagen, 2022, p. 11)

The connection between new discoveries and new ways of describing; between apter and more accurate explanations of phenomena (like spatial movement, like the revolutions in the starry sky) and new ways of construing them, of having certain among their features enhanced in spite of others, must have had its impact in the till recently widespread confusion between the epistemological notion of "conceivability" and the metaphysical notion of "possibility", that is given so eloquent an expression by Galileo's words. It is a confusion nonetheless, so much as what is possible may be deemed inconceivable (as the *vacuum* once was), and what is conceivable be impossible (such as something otherwise resembling a bird's flying beyond atmosphere). But the fallacious piece of reasoning that was most influential to modern philosophy – and that is also present in the quotation above – is the conclusion for the *inwardness* of "secondary qualities" like smell and color: their belonging to "the sensitive body" (or mind) alone.[17] A conclusion drawn from their accidentality, i.e., from the possibility of conceiving – or, simply, from the possibility – of odorless and colorless bodies. By contrast, there was the felt need of conceiving concrete bodies as endowed with qualities like extension and shape. Necessity – the pure, non-hypothetical necessity of the universal mecha-

17 Whereas, remember, any two patches of blue, any two sweet scents, or any two grave tones were deemed by Aristotle as *essentially different* if and only if they belonged to different substances.

nism – would be “out there”, extended, shaped, while contingency would be no more than a colorful figment of subjective experience.

The discovery of natural laws – of what Aristotle (*Physics*.II, 9) called “simple necessity”, irrespective of any particularity – based on ever more rigorous and creative applications of conjoint developments in mathematics was a revolution relative to the study of nature that was practiced before. It was a revolution from both an empirical point of view – isolation of events envisaging types of events, rather than types of entities; progressively refined measurements; multiple testing – and from a formal point of view – algebraic instead of geometrical treatment of magnitudes; birth and application of higher analysis – which yielded an unquestionable epistemic progress about natural events throughout late centuries. It also yielded a revolution from a philosophical point of view.

1.2 THE GUESSING MIND AND THE WORLD OUT THERE

From a philosophical point of view, the revolution consisted, primarily and most of all, in putting centre-stage of philosophical reflection the pursuit of enlightenment regarding the original sin and the scientific redemption of human thought. What *is* thinking, such that it may come about in either condition? The certainty giving birth and *impetus* to modern philosophy was *that there is* an original sin and a scientific redemption of human thought to be enlightened in the first place – and my point in putting it in these dramatic terms of ‘sin’ and ‘redemption’ is no other than implying that *reason* had nothing to do with the following attempts to solve this predicament. What reason did show us was that the ontological categories drawn by Aristotle and abode for by common sense provided no valuable explanation – not even a good conceptual framework for explanations to be formulated – for as candid a natural phenomenon as a pebble’s being thrown in the air, whereas the newly emerging approach of Galileo’s and others’, with all their counter-intuitiveness, did. Once the intuitiveness of the old Aristotelian categories, regardless of the rigour with which they had been thought about, proved insufficient for them to provide a good way of explaining natural phenomena, there had been cast a perennial shadow of doubt over *every* form of intuitive judgment. Hence, there would seem to be at least two ways of representing, telling about, things around us, that would seemingly be “worlds apart” from each other: either through intuitive, common-sense judgments, or through scientific, properly knowledgeable judgments.

Now, so much as natural philosophy was learning to focus on *matter*, as I said, philosophical thinking of the mind – or soul – was focusing on *belief*. Deceptive mental states (as to their doxastic deceptiveness, their prowess in *inducing* us to form and assert false opinions) began to be conceived of as if they *were* themselves beliefs. Representations – arrangements of shapes and colours, sounds, or haptic patterns, which are used with some aim of correspondence with things other than the elements of said arrangements – can be declared true or false by us; we can believe or disbelieve in them, regard them as more or less accurate. And so it was that it might have become intuitive to regard mental states as "mental representations" to which we instantaneously either give or withdraw our assent. Surely we do not *use* every color patch or sound that we experience in order to represent something, the suggestion itself is absurd. However, do not said qualitative elements of experience arrange themselves into patterns which elicit in ourselves beliefs that are sometimes told about (in fact, represented) to other people, or maybe to ourselves in "inner dialogues", sometimes not? Is it not possible to appreciate moments of our own subjective perspectives as if someone had just planned it and put it in front of us, just as in a painting, or in a theatrical piece? Were such an imaginative exercises to be casually enlightening of what the nature of mental events actually is, however, there would seemingly be at least some connection between the "originally sinful" and the "scientifically redeemed" mind that is, after all, one and the same: in either condition it *represents* the world. A broadly speaking *representational account of the mind* has thus provided an available conceptual framework for the modern predicament to be seemingly dealt with, and perhaps explained.

To the aforementioned (sec. 1.1.1.2) primary and secondary qualities dichotomy, others followed: between necessary and contingent properties; "outwardly" and "inwardly" obtaining qualities; between properly knowledgeable representations and common-sense representations; between intellect and sensibility. Trust was of course to be put in the exercise of the *intellect* for obtaining *properly knowledgeable representations* of *primary*, *necessary*, *outwardly* obtaining qualities that permeate the world, with as much disregard as it shows itself feasible for the exercise of *sensibility* in its stubborn delivering of *common-sense representations* of *secondary*, *contingent*, *inwardly* obtaining qualities that infest our inner lives. Common-sense among intellectuals became anyway to conceive of individual perspectives *as* guessing minds – whether in some sense "material" or otherwise – that are faced with the task of seeking out how to well represent the world (that is, the same way that our hearts are "faced with the task" of pumping blood), thus attending to the qualities that are actually *out there*, at the same time guarding themselves against easily suggestive ways of representing it.

Either way, it is (good or bad) representations that are brought about through the exercise of our (good or bad) cognitive faculties and which account for everything that we consciously experience. Treating our own individual conscious perspectives as themselves sorts of life-long series of representations allowed thinkers to import understanding of different ways of forming judgments to the desired explanation of our epistemically defective minds.

René Descartes' work is by no accident regarded as the hallmark of modern philosophy. As Charles Taylor (2006) attests, the malleability of the notion of "representation" in the history of philosophy, ever since Descartes declared himself "certain that I can have no knowledge of that which is outside me except through the medium of the ideas I have had in me"[18], allows us to abstract a persistent way of thinking about the mind's relationship with the world: there is a mediation, "something" constitutive to the mind only *through which* the world reveals itself to us. Descartes himself participated in the process that transformed natural philosophy into what we recognize today as modern science, with contributions in the study of movement, medicine, and, especially, geometry – to which latter he laid the bases for a full algebraic treatment. His were, again, contributions to the process of describing the world independently from Aristotelian categories, by means of taxonomic systems in which kinds of events would be classified and defined in relation to each other. He saw very clearly what such an intellectual revolution meant: abandoning Aristotelian ontology, in favor of scientific taxonomies meant the abandonment of an "originally sinful" ontology (as a theoretical construct) of common sense, in favor of something other than that, something "scientifically redemptive", yet to be clarified by philosophers including himself. This, of course, implied rethinking our own nature.

> Descartes' objective, in *The World* and the *Treatise on Man*, was to replace Aristotelian physics with a mechanistic physics grounded on the notion of matter as extended substance. Its physiological perspective cannot be separated from the need to dispose of Aristotelian substantial forms and real qualities and to explain the sensory world by means of motions of homogeneous matter, even if these motions were inaccessible to the senses. (Pecere, 2020, p. 17)

One thing that quickly came to seem evident was that the "scientific redemption" of human thought was gradually being achieved in the form of increasing *clarity* and *distinction* as to our descriptions of natural phenomena. Clarity and distinction are taken to be qualities of

18 Letter to Gibieuf, January 19, 1642. *The Philosophical Writings of Descartes,* Vol. III; AT III 474, *apud* Taylor, 2006, p. 26

judgments, relative to "the faculty of judging". Take, for example, the judgment (a) "I see a dog barking at me", issued by myself. The judgment's being clearer consists in my being endowed with the ability to infer that a dog is not a cat, nor a tiger, nor a bird; that I am not the dog; that barking is not growling, and so on. A greater distinction, in turn, would be achieved through my knowledge of the characteristic notes of the concepts I use in "I see a dog barking at me", such as, for example, the characteristic notes of the concept of 'dog': animal, quadruped, belonging to such and such a biological taxonomic branch, and so on. Distinction implies clarity; clarity does not imply distinction. Both attributes are, however, *desiderata* of our judgments; it is by means of increasing the clarity and the distinction with which we judge that we manage to *justify* our judgments, hence to obtain properly knowledgeable representations of facts. Thus it is predictable that improvement on our judgments in these directions, which converge into that of scientific knowledge, implies the deployment of a progressively ramified taxonomic structure through which any judgment is to be made. Thus a judgment like

(a) "I see a dog barking at me"

is rendered, at some point, into something like

(a') "there is a featherless biped located at such and such a point and positioned in such a way that the light and sound patterns to which it is instantaneously sensitive and attentive in the time period t-t' come from a four-legged furry canine being that emits sounds of such and such a timbre, pitch and intensity, as it contracts such and such muscles of its body and relaxes such and such others while turning its anterior part towards the biped in question."

Insofar as progress toward conceptual clarity and distinction was (fruitfully) obtained, it became evident that the importance of any predicate – so much as of any name – employed in a description of a natural phenomenon is at most provisional; that that clarity and distinction obtained by science was obtained by the joint development of mathematics and its application; that the further we deepen, by such means, the clarity and the distinction our judgments are endowed with, the further we distance those of our opinions that are rigorously regarded as pieces of *knowledge* from those that are suggested by common sense. On the one hand, an ideal of *precision* that is related to minute understanding of a phenomenon in ever more detailed sub-regularities constituting it led to the belief in an indefinitely fine-grained

conceptual structure that would be continuously achievable through the advancement of scientific theories. The ending point, the most precise conceptual framework achievable by any means, had at least not yet been achieved, and, at most, conceptual refinement could go on *ad infinitum*. (I confess that I do not know whether Descartes in particular tended for one or another view on the limits of conceptual refinement, the point being only that the question, including for him, would appear to make sense.)

On the other hand, and even though everything potentially observable would supposedly be within the range of the purportedly universal – though admittedly provisional – conceptual scaffolding applicable by our minds upon the world, we ourselves, as contemplators of resulting representations would be better treated in a two-fold manner: *either* as further sections, among all others, of the universal mechanism whose regularities the concepts within our judgments aim at apprehending, *or* as the sources of judgments and bearers of individual perspectives from which judgments arise. One way, one is to be treated as occupying a given portion of space, within a given time period, as an extended chunk of matter; the other way, one is to be treated as endowed with a perspective and – therefore – as thinking, judging. As for Descartes' particular take on this dual analysis of ourselves, he seemed to believe that

> everything from basic life-functions to cognitive and locomotive functions had to be explained by mechanical interactions between solid macroscopic organs and currents of particles, named after their different size from the bigger (blood) to the smaller (animal spirits). Descartes' project was to derive anatomical-physiological explanations from his mechanistic physics, based on the concept of matter as an extended and inert continuum, whose parts were subject to the laws of nature established by God. (Pecere, 2020, p. 14)

Everything, that is, *but the capacity to think*, would supposedly be accountable for in terms of the same mechanistic kind of description permitted for the whole universe. Descartes excludes *telos*, purpose, from all previously thought of vegetative and sensorimotor "parts of the soul" and ascribes it to thought alone. Thought alone, therefore, accounts for consciousness. This is why "in Descartes' perspective, … animals display movements like those of men without having consciousness" (Pecere, 2020, p. 17), even though Descartes would maintain (in the Sixth Meditation) that, however in a metaphysically accidental way, such a thought-like-consciousness of ours is effectively bound to think of (thus, be conscious about) properly bodily events, such as pain, pleasure, desire, and sensations – which is, of course, limiting of its freedom. Pecere continues:

> The mechanization advocated by Descartes corresponded to the functions ascribed to the vegetative and the sensitive soul by his [still Aristotelian] contemporaries. "What is commonly called life", "the corporeal soul", and the "organic sensation" could be explained "by means of mechanics". An important consequence of the role of animal spirits in this explanation was the interconnection of all bodily functions: spirits explained vegetative functions, like digestion, but they were also crucial for cognitive processes and emotions, and even determined "humors and natural inclinations" like "kindness" and "courage". To be sure, the thesis that the soul thinks "by means of bodily movements" was recognized in Christian philosophy as an orthodox view dating back to the Church Fathers, due to the unity of mind and body. Yet Descartes provided a new explanation of this fact, arguing that the different functions—with the exception of the intellectual—were operated mechanically by a single system of organs and nerves. (Pecere, 2020, p. 17).

There being two ways of treating – i.e., of describing, explaining, understanding clearly and distinctly – a person, that are respective to ostensibly recognized features of hers, embodiment and the ability to think, whose connection with each other is yet unknown, does not imply that there is no mutual connection between what is described either way: there obviously is, if it is a whole person bearing both features, and modern philosophers ever since Descartes have generally recognized this fact. The problem – the foundational problem for modern philosophy of psychology – is not merely that the connection was far from understood; rather, it is that counter-intuition goes too far when, added to the truism that people's bodies are made of flesh and blood, they are regarded as in themselves just chunks of matter like anything else, especially in the way natural philosophy – or early modern science, call it as you wish – had been learning to conceive of any chunk of matter: as simply part of a single universal mechanism. If it cannot be admitted – or maybe it can – that our thoughts are also but a portion of the universal mechanism determining the dynamics of *all* bodies, then what does it mean to say that this particular feature of ours – our capacity to think – is, *in any sense*, outside the mechanism, and hence disembodied? Is there any relief in the claim that this thought-like consciousness forms "a unity" with our bodies, that they are mutually "intertwined", after the claim that this thought-like consciousness could in principle subsist as a kind of stuff even without such a unity?

These questions gave rise to an entirely new – though often short-lived, and then reborn – discipline, Metaphysics, which was at most merely homonymous with the compendium we mentioned that is within the Aristotelian *corpus*. Those ancient books, as we briefly saw, contain a philosophical investigation on what it means to say of something that it is what it is – and they answer: it is to state what is determinate and actual, by contrast to what is transitory or potential, in it, further important differences having to be taken into account depend-

ing on the subject-matter. In modern times, the term ‘metaphysics’ and derivatives came to be part of a discipline devoted to the attempt at contemplating “fundamental truths about the basic structure of reality” (Hatfield, 2024), a *structure* that should somehow embed, contain, or at least interact with, guessing minds. Metaphysics has thus been thoroughly permeated by the so-called “mind-body problem”, as well as by the scientific spirit of admitting enlightenment but in the abstraction from particularities, in the devising of most general pictures, in the fashion of geometry and the modern sciences themselves. To be sure, many adopted rather agnostic stances, John Locke’s devising of “nominal” and “real” essences and constraining obtained knowledge to that of the former alone being a prominent example. But even Locke’s agnosticism – and late defense of the old concept of ‘substance’ – was completely involved in the modern predicament, and thereby with the abandonment of Aristotelian cosmology and teleology. His distinction between nominal and real essences served to mark this agnosticism of his on whether Descartes was right in asserting that thought is the attribute of a separable substance, or else matter – mechanical, divisible – itself is able to think. Descartes’ identification of consciousness with the intellectual, representational, capacity, was nevertheless endorsed by him. Likewise David Hume, while atemporally recognizing both the fruitfulness and the limitations of scientific knowledge, as well as the importance of advancing knowledge of our own nature (by the same means as those of empirical sciences), precisely in order to gain clarity about knowledge claims concerning all kinds of investigation (Hume, 2009, Introduction), nevertheless proceeded by never abandoning the so widely held construal of qualitative elements of subjective experience as ontologically severed from “the external world”, and as representational in character, relative to it.

The problem of metaphysics was – and is – how to integrate in the all-encompassing explanatory framework promised by science the very kind of thing whose understanding apparently had to stand alone in isolation from the general taxonomies of matter: ourselves. The unsettling – and unsettled – problems of this discipline are the face and the heart of modern philosophy; the modern predicament, its rather perplexing environment.

At the end of the day, a two-fold assimilation is seemingly unavoidable from this starting point of modern philosophy. On the one hand, there is the assimilation of the epistemic clumsiness of our individual perspectives to the bivalence of our individual judgments[19],

19 For my purposes at this point I need only the assumption that for the most part our judgments are generally either true or false, but I know that strict generalization is at least questionable (on the basis, for instance, of our judgments concerning future courses of action). As we shall be appreciating in more detail later, the point of making the aforementioned assimilation holds well, even in spite of the potential non-bivalence of some of our judgments, so long as there remains any basis for comparison between a supposedly representational mental state and the way things stand in the world in terms of some kind of correctness,

whose suggestiveness has been laid down above, and which was taken for granted by modern philosophers ever since Descartes. On the other hand, there is the assimilation of *stuff's properties*, such as they are either perceived or thought of by us, to the supposedly extant counterparts of *concepts* employed in either our best or in our worst *judgments* (as well as those in-between the worst and the best of our judgments). The way in which the latter assimilation is to be spelled out is key to several important differences among modern philosophical accounts of the relationship between our guessing minds and "the world out there", the important point for us here being simply to recognize why such an assimilation represents an ongoing philosophical challenge of this era. Previously to the rise of the modern predicament, arguably for Aristotle himself, the properties of things around us that we attend to would themselves be regarded as (secondary) substances, provided they be essential to substance individuals, or else they would be regarded as accidentals. Either way (i.e., either as substances or as accidentals), such properties would be *named*, they would have *causes* – their own substantial natures, in the former case – whose unveiling would be the ultimate purpose of the (often observation-based) work of "the student of nature". Dependence between substances and accidentals (as well as their definitory traits), on the one hand, and anyone's intellect, on the other, would at most amount to the fact that the properties we actually identify and of which we actually devise essential traits are named, referred to, by us. By contrast, after the rise of the modern predicament and the following-up of the representationalist intuition any property that is to be ascribed to anything (either in the "inside", or in the "outside", domain), whether justifiably through clarity and distinction, or not, is first of all a posit to be represented by some node in a taxonomic system. A system "of ideas", as several early modern philosophers referred to the concept-like compositional elements of their supposedly representational mental states. Any item of the world would thus merely correspond to a compositional element in some set of possible representations of "how things stand" in which an intellect, good or bad, could believe. (This is, so far as I can tell, a problem for Locke too, in his case regarding the connection of "nominally essential" properties of things *qua* known by us, and the real essences of stuff out there.)

So much as basically everything in the world corresponding to terms within true indicative sentences, in either objectual or predicative positions, was taken to have causes – hence, of course, existence – beyond our knowledge of it (e.g., both *Socrates* and *mortality* being thus regarded, based on true sentences like 'Socrates is mortal'), so much now, with the

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fitness, etc., of the representations in question relative to something else. Such representations can then be characterized not only as judgments, but also as photographs, paintings, shadows, or what have you.

representationalist intuition in place (and the alternating of scientific taxonomies in the background), the first-assigned properties of anything whatsoever came to be thought of as the elements, representational in their nature, solely by means of which we think about them. It was because anything we may think about (i.e., may refer to) is supposedly thought about only by means of these representational elements that Galileo, as we saw, could eventually divide, by mere introspection upon the ways he represented stuff around him, what he regarded to be necessary from what he regarded to be contingent properties *of the represented things* in which he was thinking. One important way of knowing what we talk *about* was thus thought of as just paying attention to the way it comes to be represented. As Alberto Coffa (1991, p. 09) explains this, which was a rather pervasive intuition throughout late centuries,

> The picture of meaning dominant since the emergence of rationalism and empiricism took meanings to be inextricably associated with experience. It is plausible to think that in order to know the meaning of pain, love, rivalry, heroism, and so on, one must undergo some experiences and that the more carefully one analyzes these experiences, the better one understands pain, love, and so on. It is but a small step to conclude that the meanings of 'pain', 'love', and so on consist precisely of those psychic phenomena that are the targets of our analysis. The same may be thought to hold for all expressions; they will mean something only insofar as, and to the extent that, they relate to human mental processes. Number expressions, for example, may be thought to derive their meaning from the mental processes in which they are involved – the natural numbers through processes of counting, geometric objects through acts of measurement, and so on.

Not only the meaning – i.e., the referents – of terms such as 'pain', 'love', and 'rivalry' came to be investigated by means of introspection over the supposedly representational experience making up the circumstances of their use. Any term's meaning was thought about thus, and a similar *rationale* as the above's could be given for proceeding in this way. Thus, introspection over the manifold experience had in the circumstances of acquainting with a person, a place, an object, an event, would be the means by which we get the opportunity to refine – to clarify, to distinguish – the concepts utilized to represent said person, place, object, etc., thus to know it.

What else, besides the adjusting of the representations we make of the objects of our experience, is happening when at this or at some other time we state, or explain (to ourselves, to others), *who she is*, *what this is*, *what is that*? If the things *are* not assemblages of representational elements, it seems at least very likely that we can only make reference to them, talk about them, *by means of* said arrangements of representational elements entertained within

our minds. The same intuition holds, as I said, for any kind of reference, therefore including the ones we make through "common names", like 'whale', and 'human', or by means of "mass terms", such as 'gold' and 'water', and indeed such as 'pain' and 'love', as Coffa had these mentioned. In sum, making reference – talking *about* anything whatsoever, whether in our daily lives or in employing scientific taxonomies' terms – seems to be necessarily a mediated process, whereas the medium in question is but the colorful (but perhaps not always so vivid) screen of our minds.

The problem (in which the mind-body problem ramifies) is that compositional elements of representations we make, or else that emerge spontaneously from our own individual perspectives, cannot themselves be features of "the world out there" (regardless of whether they belong to good or bad representations) unless such a world is itself but an idealistic product of our minds. Alternatively there must be some, yet to be explained, *warrant* for there to be some sort of correspondence between such compositional representational elements and stuff "out there" in the world.

The way in which Descartes "explained" what concepts are, which took so little distance from the old scholastic accounts resorting to "ideas in the mind of God" and the like, made most of subsequent thinkers, especially along the following centuries, feel the urge to respond with a more humanist, perhaps scientific, explanation for "the origin of ideas" in our minds. Already in the seventeenth century there emerged a plethora of different accounts on the relationship between mechanistic matter and the representing mind, swinging between reassurance of plain faith in Indo-European religious doctrines, on the one hand, and purported departure from any explanation that conceived of such a relationship as anyhow miraculous, on the other. Thomas Hobbes extended to human beings Descartes' account of other animals as machines (indeed, in foresight relative to contemporary accounts, as computing machines); Pierre Gassendi and Walter Charleton, by contrast, argued for the irreducibility of the spirit inhabiting bodily parts and feeling the latter's contact with the world, only to be responded by Margaret Cavendish and Anne Conway that "matter, self-motion, and self-knowledge, are inseparable from each other" (Cavendish, 2001, Chaps. 35–36, in part. 137, 149, *apud* Pecere, 2020, p. 42; Georgescu, 2020).

What was once a challenge about coming to grips with newly emerging scientific knowledge, defiant as it was against both common sense and millennia of natural philosophy's being inspired by Aristotelian cosmology, has quickly kindled another challenge; namely, to explain the representationalist intuition about the nature of our fallible, yet impressive epistemic outlook upon the world. In the next chapter, we shall be examining some chal-

lenges the representationalist intuition presents as it is *presupposed* for thinking back on the very phenomenon of scientific progress which had once motivated it. Before that, in the next and final section of this chapter, we need but to take note of how the representationalist intuition has gradually turned itself into a properly scientific field of inquiry: the cognitive sciences.

1.2.1 The Science of Something Other than The Mind

The history of scientific investigation of all natural phenomena, apart from the mind, *is* our paramount example of *a* history of progress – however we still lack clarity on the nature of such progress, so much as we do about its constituting epistemic stages. Hence *knowledge* – from all properties that a mind can possibly bear – still appears to be not only the most bewildering of our minds' properties, but also the one in terms of whose conditions of possibility – among them, the representation of facts – the mind is to be defined. As a consequence, as we saw, the modern predicament is not solely about accounting for the perplexingly successful couterintuitiveness of scientific knowledge, but also about accounting for the unfolding of such perplexity into the representationalist intuition we have just explored, leading to Descartes and to the history of modern philosophy to day, as a barely questioned bet towards a way out of confusion regarding our epistemic outlook with respect to the world.

As a contemporary research program, however, the construal of the mind-body relationship that would seem to be the most successful for engendering any discovery with the force of a scientific breakthrough about the natural phenomenon of mentality would consist in doubling the representationalist bet by way of postulating yet an intermediary kind of representations in between mechanical stimuli to bodily surfaces, at the one extreme, and the representations constituting conscious experience, subjectivity, at the other. Such an intermediary kind of representations, the main theme of contemporary cognitive sciences, would be *unconsciously* produced, conveyed, and stockpiled, as a proper function of either the whole organism, or of specialized parts within it. Representations would serve, partly, as the building blocks for the still supposed "representations we consciously experience", such as in either perception or dreams or illusions; partly also, however, for playing the role of Cartesian "animal spirits" in accounting for several key changes happening within the organism without the

latter's attention, from cell reproduction to the autoimmune system's self-regulation to motor reflexes to digestion.

A prototype of such an approach can be found as early as in the work of British anatomist and philosopher Francis Glisson (1597-1677). The latter purported to account for the process of nausea in the stomach by hypothesizing that the latter organ, "by perceiving itself through natural perception, necessarily also perceives the alteration that occurs in it, and by perceiving this, at the same time it becomes fully acquainted with the object that is producing the change" (*apud* Pecere, 2020, p. 48). Three-hundred and thirty years later, Glisson is honored by current research on the enteric nervous system, as the latter attests how "[t]he enteric glia [enteric neuroglial cells population] has an important role in regulating neurotransmission and information processing in the gut" (Benarroch, 2007), which important role is supposedly manifested in gastrointestinal chemo-dynamics. Stomachaches thus allegedly consist in our guts *telling our brains* that something has turned awry, and this traffic of information is no less than what is called 'cognition' nowadays.

In general, so much as the conscious epistemic conditions of ignorance and enlightenment have been connected since early-modern philosophical theories by the representational, judgment-like account of the mind, so nowadays the unperceived, otherwise than consciously controlled, functional dynamics of our living bodies, is supposedly connected to intentional, conscious actions, and in fact to (again, representational) consciousness in general. This connection would obtain by means of, again, representational, now biologically functional, and unconsciously occurring, "information processing" widespread along all the pathways of our bodies' neural circuitry. As contemporary philosopher Daniel Dennett (1994, p. 365) put forward his own declaration of awe before the marked counterintuition of scientific redemption, but together with this nowadays widespread conviction of the cognitive sciences, "*Our brains* have evolved to make sense of the world in ways that are often misleading, and it is only through the hard work of scientific theory-building that we can escape the deceptive shortcuts of common sense" (emphasis added).

Several historians and philosophers of the cognitive sciences point towards early nineteenth century as the time period when the nowadays rather familiar picture of "cognition" as a phenomenon of "information processing" occurring throughout (or at least by means of) the nervous system acquired its enduring momentum as the most attractive hypothesis on the table for building up a scientific investigation of mental phenomena, such as perception, behavior, imagination, and reason (Reed, 1997; Thagard, 2020; Wilson and Keil, 2019; Pecere, 2020). As Pecere (2020, p. 72) explains,

> Groundbreaking experimental and theoretical discoveries revolutionized brain science [in the nineteenth century]. These achievements included: the investigation of reflex action by Marshall Hall, Johannes Müller and others; the first development of cell theory by Theodor Schwann, Robert Remak and Rudolph Virchow; the quantitative study of nerve currents by Emil du Bois-Reymond and Helmholtz, leading to the latter's measurement of the temporal dimension of thought; the discovery of neural inhibition by Ivan Sechenov; psychophysical investigations on the relations of stimulus and intensity of sensation by Wilhelm Weber and Gustav Fechner; pioneering experiments on electrical stimulation of the brain cortex conducted by Gustav Frisch and Eduard Hitzig. All these researches were accompanied by the anatomical investigation of the neural network, eventually leading to the coinage of the terms "neuron" by Santiago Ramón y Cajal and "synapse" by Charles Sherrington.

Undoubtedly the most important factor for consolidating the marriage between neurology and subconscious information processing into the bulk of contemporary construals of cognition, was the previous entrenchment, beginning in Descartes' work, of the representationalist intuition regarding the nature of our minds. That intuition was relevantly elaborated in our direction, however, in the works of David Hume (1711-1776) and Immanuel Kant (1724-1804), the contrast between whose respective philosophical stances has been as important for understanding late modern and contemporary philosophical reflection about mind and cognition (not to mention science, as we shall see in the next chapter) as the contrast between Plato's and Aristotle's ideas has been important for understanding ancient and medieval discussions.

The late contrast, between *empiricism* and *transcendental philosophy*, was developed well before the scientific breakthroughs in neuroanatomy Pecere was cited mentioning above. It developed after the spreading realization of the need to account for both, the "origin of ideas", and the justification of ideas' employment in our explicit intentional judgments. Once it is accepted that any state of mind is a representational state, and that therefore the combination of joint observation and dialogue might promote the desired balancing and enhancement of representational elements deployed in the representations constituting our minds, many questions remain. Questions remain as to (i) how it is that such representations are to have their supposed counterparts, i.e., how – or in which sense – it is that they are in fact *about* anything beyond themselves, as well as to (ii) how it is that, being individuals, with our own perspectives and our own life-histories, we nevertheless come to deploy the *same* representational elements as each other, at any moment at all throughout our lives. The scholastic tradition bequeathed to modernity a very assertive answer to both (i) the question of *aboutness* of our representational mental states and (ii) the question of potential *sameness* of their representational content, in its conception of the essence of truth: *veritas est adaequatio rei et intellec-*

tus. Truth is the adequacy of the thing to "the intellect", that is, to the Divine Intellect, with *Whose* ideas the ones at our disposal – by His grace, of course – would be similar. A direct heir to humanism and deeply involved in the astonishing advances of the natural philosophy of his time, Descartes nevertheless maintained that the divine origin of ideas would satisfactorily account for both the aforementioned questions. First, being parts of Creation themselves, what the representational elements entertained along our guessing lives are *about*, or stand for, is – thanks be given – also parts of Creation. Thus, what we think about is nothing less than the world existing much beyond our own minds. Second, our "ideas" coming from the same divine source, it is obviously possible for us to observe and to cogitate – to entertain said ideas – likewise to each other.

By the time of Enlightenment, such an answer – the kind of which, with explicit appeal to supernatural forces, had also been given by other paramount thinkers of the modern philosophical canon, such as Leibniz, Berkeley, and perhaps Spinoza – to the questions (i) and (ii) would no longer be deemed acceptable. And so it was that empiricism and transcendental philosophy could eventually dominate the scene.

David Hume was not the first, and some would perhaps say neither the most important, representative of empiricism – Thomas Hobbes, George Berkeley, and John Locke, are among other prominent figures that fit the label. But his was not just one of the finest articulations of that position, as it also most strongly prompted Kant's reaction, and, finally, influenced crucial developments in the unfolding of twentieth century philosophy of science that we shall revisit in the next chapter. As Morris et al. (2023, sec. 4) sums it up,

> Every modern philosopher accepted some version of the *theory of ideas* – the view that we immediately perceive certain mental entities called *ideas*, but don't have direct access to physical objects. Hume holds an *empiricist* version of the theory, because he thinks that everything we believe is ultimately traceable to experience.

Being "ultimately traceable to experience" meaning, in this case, that it is *sense*-experience *alone* that is deemed to account for the origin of every representational element within each of our mental states, including those representational elements associated with predicates, or concepts, by means of which we think. Origin-tracing of ideas, for empiricism as well as for any other modern philosophical stance, serves not only to tell where do ideas come

from, but also where do our chains of justification ultimately point towards when we look after justifying our claims of knowledge.

According to Hume, throughout life a person is subject to a constant influx of "impressions": punctual qualitative modifications in all sensory modalities – relative to sound, light, texture, etc. – constituting every (conscious) state of her mind, caused directly by her surrounding's effects on her body's sense-impression-sensitive endings. Besides sense-impressions, impressions would include also desires and emotions. The general quality of one's state of mind would be constituted, however, also by another kind of "perceptions", the "ideas" born out as copies of impressions, accounting for the difference between being acquainted with a certain hue of yellow, for instance, and recalling it. By force of the characteristic dynamics of the mind, *given* its total constant input of impressions and ideas, certain relations would be made obtain among said ideas as the outcome of custom, i.e., as a function of their regular emergence (within one's "inner theater") in either spatial juxtaposition, contiguity, or proximity, or temporal simultaneity, or succession. Relations within a three-dimensional space and a one-dimensional time – among ideas of sense-impressions, desires, and emotions – which form a polynomial relation of copies of impressions. The latter complexes of ideas would be no less than what we express, what we have in mind, with the concepts we regularly employ in our explicit judgments. Hence, the idea – rather, the complex of ideas – corresponding to the concept of 'dog', for instance, would include copies of regularly conjoined punctual sense-impressions of colors, sounds, etc., as well as desires and emotions supposedly enticed by the presence – outside of ourselves – of *that* whose presence entices such a regular pattern of impressions: *that is* what we call 'a dog', for being the cause of a complex of ideas.

Empiricism accomplishes, this way, the spelling out of an answer for each (i) the aboutness, and (ii) the potential sameness of content questions. Our thoughts – and, in general, our mental states – are about whatever it is that impinges its sensible qualities upon our receptive capacities, thus becoming the ultimate sources of every compositional element that is entertained within our mental states. And we communicate thanks to the identity of the source of each of our sets of ideas: the facts out there.

By way of assuming an empiricist account of "the origin of ideas", it seems that we can move forward towards the goal of stating the exact same things as each other by experimenting, attesting how it is that things are in themselves by virtue of thus establishing ever more similar relations of ideas in our minds, relative to each other. Representational similarity requires, thus, not only the identity of stimulating facts, but also homogeneity of stimuli. The connection between the "world out there" and our "inner lives" could, on its turn, be pictured

by empiricist philosophers as as direct a connection as it is seemingly possible for a guessing mind to be in, the continuous and meticulous experimentation of natural philosophers (later to be called "scientists") being appointed as responsible for the gradual scientific redemption of human thought, while lack therewith would amount to delayed common sense, i.e., ignorance. Empiricism's take on the modern predicament is often regarded as the first sprout of modern psychology, because – not to mention lesser reasons – it is an attempt to draw conclusions about the dawning of concepts, and eventually proper – though inexorably incomplete – knowledge in our minds, from people's observable behaviour (including, of course, speech-behavior). Moreover (and most clearly in Hume's articulation of it), it applies to the pursuit of understanding with respect to the guessing mind the same guiding principle of the other sciences, namely, the dictate to increasingly refine the terms with which descriptions are made into smaller elements; in this case, minimally impressive qualitative stimuli.

The empiricist vision on both the work of the philosopher as she tries to understand the guessing mind, and on the guessing mind itself, obviously resonates with the empiricist understanding of human acquiring of scientific knowledge: tentative, fallible, faithful to experience, and yet asymptotically progressive. Often interpreted as implying scepticism, for the empiricist the representational apparatus that every single guessing mind, and humanity as a whole, is equipped with, is an ongoing affair, but nonetheless one that delivers an ever *more precise* conceptual scaffolding relative to the structure of reality itself, and the ability to produce judgments ever *more approximately* true with respect to it. In general, it does not purport itself as a sceptic philosophical stance, but rather as a humbling one.

Notice, however, that as for the task of reassuring philosophers that in spite of our minds' being insulated contemplators of representations of the world, it is features *of the world* that we contemplate in said representations, empiricism succeeds at the expanse of lacking the element of redemptive certainty that is associated with scientific knowledge; what we manage to represent is only progressively alike what is out there to be represented. Transcendental philosophy, which is inaugurated by Kant, has opposite merits: according to it, we are hopelessly insulated within our perspectives; however, our perspectives are those of rational beings, and therefore what we do know we know for certain, not just probably; exactly, not just approximately. But this is to advance discussion that will be had in the second chapter; for now, let me focus on how Kant's philosophy – perhaps more than any other – impacted the development of the cognitive sciences in the nineteenth century.

After his *Critique of Pure Reason*, Kant conceded to Hume, against Descartes, that the soul (i.e., one's own soul), far from being the first and most easily known extant entity, as the

latter had it, cannot in fact be considered as an object of possible experience, hence there being no grounds (i.e., no possible justification) for asserting the existence of a thinking substance – or, at least not without first critically examining what we mean by claiming that something, especially something like that, exists. Hume, an empiricist who admitted but of tracing the origin of ideas to the unfolding of the world's presumed sensory effects (as well as to presumed further effects of these) upon our minds, came to conclude for the unavailability, for each one of us, of "the idea" – the mental representation – of oneself as a thinking subject. He found nowhere in introspection a guessing mind, but rather just experiences – "perceptions", as he put it – which might perhaps be enabled by such a mind's operating in the background, but did not include the mind itself as one of their objects. Kant's pathway towards the same conclusion was a little more cumbersome. For him, the inscrutability of the soul's self-perception resulted with the utmost certainty from his pursuit of "transcendental knowledge", which he himself described as "all knowledge which is occupied not so much with objects as with the mode of our knowledge of objects, insofar as this mode is to be possible *a priori*" (Kant, 1998, A 11/B 25).

Kant's concession to Hume, that all knowledge comes from experience – nowhere along whose course any thinking subject is ever contemplated – was pondered with some additional considerations, all purportedly drawn *a priori* from reflection upon "modes" of our knowledge of objects. First, the same old representationalist intuition regarding every form of experience (which was also held by Hume) entailed, for Kant, the "unity of apperception" for any rational being considered as such. The representationalist intuition was rendered by Kant into the claim that every possible experience would necessarily enable – not necessarily entail – a judgment of the form "I think", to be complemented by an appropriate "such and such", to the effect that one and the same thinking subject's capacity to judge would be responsible for spontaneously[20] connecting into single experiential moments the rather diverse set of "empirical intuitions", such as "the visual representation of a garden with the auditory representation of a piece of music played in that garden, the taste of a meal enjoyed there, etc." (Kant, in a letter to the anatomist Thomas Sömmering, *apud* Pecere, 2020, p. 60). In sum, judgment – and a mind, insofar as it is capable of judging – is possible only if every instant of one's experience can be represented, either as a whole or as analyzed bits of it, as an occasion for applying a concept. However, precisely because every possible experience should in this manner allow

20 The sense of this *Spontaneität des Verstehens* in Kant can indeed be traced back to Aristotle, Physics II, where happenings that are said to come about either "by chance" or "spontaneously" are those whose ultimate explanation resides in no *telos,* no purpose, of an agent. That the faculty of understanding operates "spontaneously" means, then, that such operation is no intentional action.

judgment, Kant has made room for the Cartesian argument, in the latter's *Meditations*, that to recognize anything affecting one's experience (such as piece of wax) as something different from oneself is always to recognize a concept's being instantiated at some point in time and at some point in space. Insofar as we are concept-employers, thinkers, so what we relate to in our experience is concept-instances. (Quite influentially, Kant believed that the only sense in which we may affirm that something *exists* consists in affirming the non-emptiness of a concept, rather than anything about a particular object.)

Notice, then. Although Kant is insisting that all claims of knowledge, including his own claims of transcendental knowledge, must ultimately – though in different ways – be warranted by empirical intuitions (thus, by sense-experience), he is claiming that transcendental knowledge consists in devising the conditions of possibility for empirical intuitions to exist at all, insofar as such conditions reside in empirical intuitions' intelligibility (which *is* an experienced fact insofar as we effectively see things we can describe). The proposal is, more explicitly than ever before, that philosophy should disinvest itself completely from attempting to explain the meaning of our thoughts by means of identifying categories of *being*; for allegedly the most that can be done is devising categories of *understanding*, which are the most general ways for a rational mind, a thinking subject, to render sensitivity's in principle unintelligible deliverance into conceptualized (even if just as "an object") empirical intuitions.

Adding to these considerations – representationalism, the unity of the representing subject, and the conceptual embedding of empirical intuitions – was the fact that theoretical advances in empirical sciences – such as the flourishing Newtonian Physics of Kant's time – were obtained in large measures through *a priori* constructed proofs, i.e., findings within arithmetic and geometry, and the establishment, with the aid of these, of "regulative principles" in dynamics. Again, these kinds of knowledge are *about objects* we are acquainted with empirically, but they are either obtained independently from any particular empirical intuition, as in the case of mathematical "constitutive principles", or, as in the case of dynamics' "regulative principles", they are obtained independently from many empirical intuitions that will nevertheless also "validate" them (B296). According to Kant, this could only be accounted for if it be admitted that *neither* spatial features, such as lengths, depths, or relative distances, *nor* temporal features, such as duration, velocities, successions, etc., were features whose actualizing held independently of a concept-employer's experience: time and space themselves would be the *pure* intuitions rendering every possible experience intelligible to concept-employers like ourselves, insofar as it is on their bases, on the bases of spatio-temporal relations of the

manifold sensibly given, that empirical concepts are constructed in the first place.[21] Time and space would be known but as the *forms* of every possible experience. Thus concepts themselves, as general features of mental states – and only through the spontaneous application of which would sensitivity's deliverance become intelligible – should have their origin traced back, because *not* to the in-itself unintelligible manifold of colors, sounds, textures, etc., of mere sensibility alone, then at least *also* to the "pure intuitions" of time and space as these would imbue the manifold deliverance of sensibility with temporal and spatial forms.[22] Accordingly, while "empirical concepts" like that of 'a dog' (or 'an electron') would be constructed by the "faculty of understanding" upon (i.e., together with) both empirical and pure intuitions, the latter alone would provide the basis for constructing mathematical concepts.

Thus, by his "transcendental method" Kant believed he had achieved a satisfactory – indeed, allegedly unquestionable – explanation of how such a crucial activity of modern science, namely the obtainment of knowledge about "the external world" by means of "pure" intellectual activity (i.e., calculus, formulation of conceptual schemes for systematizing hypotheses), is after all possible.[23] Perhaps most significantly, however, what was achieved by Kant was coming to grips with the *Zeitgeist* of his epoch, the Enlightenment. That is to say, he achieved said consonance not only by participating in the overarching enthusiasm for the political environment's gradually though consistently getting rid, at his time and place, of forms of government led by religion and tradition at reason's spite, but also by providing theoretical bases for thinking of the "abstract human" whose universal normative features relative to ra-

21 The humbling thinker of Königsberg thought of himself as providing for philosophical understanding of our relation with space and time a kind of epistemological revolution comparable only to Copernicus' on our understanding of the universe.

22 Kant's argument for regarding both time and space as intuitions, rather than concepts, is that neither one is to provide us with *instances* of themselves at each sensible manifestation of either. Time – the same time – is an ever present feature of any kind of belief-formation, be it calculus or outward experience, whereas space – the same space – is an ever present feature of belief-formation based on outward experience. Worthy of note is that such a way of construing either time or space is rendered possible – if at all – only after the aforementioned "geometrization of space and dissolution of the cosmos", when *places* became irrelevant.

23 On the one side of the coin, this was Kant's "transcendental idealism", the thesis that spatio-temporal features of things as they are possibly known about and acquainted with by any concept-employer, are ideal, subject-dependent, "inwardly" originated, even though they – i.e., concepts – themselves are supposedly known *as they are constructed* with the aid of the two aspects of experience which are known by means of arithmetic and geometry, the pure intuitions of time and space. What our thoughts are *about* is hence the manner in which the world appears before *a* rational, concept-employer, subject, as such: the "transcendental subject", itself a supposed condition of possibility for any kind of knowledge. On the other side of the coin, it was also Kant's "empirical realism", the thesis that the same range of possible spatio-temporal features of things "outside ourselves", such as the latter are possibly known *by* any concept-employer, are the same *to* all concept-employers, actual coincidence demanding only that they build up the same concepts (the way in which any concept is to be built up is not random, nor arbitrary, or at least not if Kant's devising of the typical procedures of the faculty of understanding, his "categories", is well drawn). Hence objective, shareable knowledge (and, first of all, understanding) can still be deemed possible among concept-employers like ourselves in spite of our insulated representational perspectives.

tionality should thenceforward guide decisions of fairness in any sphere of societal interchange, including self-consciousness construction.

As we saw (sec. 1.1.2), the representationalist intuition regarding the nature of mental phenomena yielded a two-fold assimilation, of, on the one hand, individuals' mental lives to series of representations, and, on the other, of stuff's observed and thought-of properties, to the supposed counterparts of compositional elements – or complexes of such elements – within said representations. This two-fold assimilation accounted not only for the general modern attitude of distrust for intuitiveness and sensation, by contrast to the high praise made for intellectual breakthroughs occasioned by the exercise of reason. It also gave modern philosophers their sole basis for accounting for the *collective character* of the Scientific Revolution: our supposedly "judging" nature. Kant's purportedly "transcendentally deduced" unity of apperception, deemed by him the "supreme principle" of the most praised capacity to think we enjoy, sounded as no less than a proof of Enlightenment's construal of rationality: as an individually grounded, yet collectively binding capacity of ours, whose spontaneous procedures' legitimacy can be figured out *a priori* by anyone of us rational beings.

Kant's philosophy then appeared for his contemporaries as an intellectually savory regimentation of their own intuitions regarding the "autonomy of reason" to be both theoretically asserted and politically defended. In effect, Kant's transcendental investigation onto the powers and limits of pure reason was purportedly conducted by means of "the form of the inner sense", which is "a series", namely the series of the pure intuition of time, which "is indeed the formal condition of all series" (B439), and, as I pointed out above, a precondition for all knowledge, either empirical or *a priori*. However, if in all such transcendental inquiries it is *reason* that is working by itself independently either from "the form of external intuition", i.e., space, or, as a consequence, from anything sensibly given in particular, then it follows an important, rigorously devised, sense in which *reason is autonomous*. If only to the extent of pursuing clarity over the legitimacy of its own modes of gathering knowledge from phenomena (as well as to the extent that we call this clarity a form of "knowledge"), knowledge about the mind would be obtained independently of empirical investigations. In this sense: autonomously. In fact, because an aspect of the mind would be the "transcendental subject's" constantly either contemplating phenomena by means of its own conceptual constructions, or drawing transcendental conclusions *a priori* about its own ways of doing so, it would not even make any sense – we would hereby have *no concepts* in order – to *localize* the thinking subject *anywhere* in space. In space we may contemplate the starry sky and everything under-

neath, while the legitimacy of the mode of our gaze towards it lies entirely within ourselves to be clarified.

Given such a limited, but strenuously argued for, sense in which to proclaim the "autonomy of reason", and certainly because of the considerably justified *frisson* about then (and there) ongoing political emancipation movements, many within nineteenth century centers of power – and opportunity to "dare to know" – were convinced that any empirical investigation of the mind was indeed impossible, or rather, that any purported talk of such an inquiry should be deemed inattentive to the limits of rational understanding. Thus it was that nineteenth-century psychology (and what would later become known as the cognitive sciences) received significant impetus in order to establish themselves as a respected field of empirical research. That is to say, as an empirical investigation of something *other* than the mind.

By the early nineteenth century, empirical investigation of perception, thought, behavior, etc., acquired and maintained its momentum as a participant in the Scientific Revolution by *dismissing* any attempt of establishing the natural laws of the mind, i.e., of mental, consciously lived, phenomena, and by instead pursuing the hypothesis that, by reference to the structure of the brain it would be possible to render empirically comprehensible the (transcendentally necessary, as Kant supposed) ultimate unity of "the infinite manifold of all sensory representations of the mind" (Kant, in the already cited letter to Thomas Sömmering, *apud* Pecere, 2020, p. 60). People thus began to hypothesize that the brain provides the "means of associating … the visual representation of a garden with the auditory representation of a piece of music played in that garden, the taste of a meal enjoyed there, etc." (*Ibid*), while conscious experience would be left aside as the province of *a priori* investigations proper to the transcendental philosopher and his "autonomous reason".

Several anatomists, physiologists, physicists, and philosophers, that began sketching the principles of what would soon be recognized as a scientific investigation of cognition (i.e., of the phenomenal spacial manifestation of the unity of apperception) were in fact attentively convinced by Kant's philosophical arguments that empirical investigation should not meddle into questions such as about "the location of the soul", which would be an unwarranted use of the conceptual apparatus provided by the faculty of understanding. These included Du Bois-Reymond, Helmholtz, Sömmering, and others. Their hypotheses involved a *further* kind of representation, one that would be conveyed by bodily parts themselves, however in a sort of preparatory, yet unconscious way, for properly mental representations to supposedly arise by means of the "syntheses" whose necessity and legitimacy were unveiled by transcendental investigation.

There was no need, however, to be prone to such philosophical heights – nor, for that matter, to compromise with transcendental idealism – in order to participate in a similar research program in the nascent sciences of (something other than) the mind. Provided only that those with a lesser philosophical bent had – just like everyone else – the basic intuition that mental phenomena are representational phenomena, empirical evidence would by itself favor the hypothesis that there is a kind of representations we are not consciously aware of, but that are nonetheless "required" in order to explain either consciousness or behavior. Thus by this route too, empirical investigation with alleged relevance for understanding the mind came to be concerned with something other than the mind. The empirical route for such a growing consensus is explained by Edward Reed (1997, p. 18):

> The problem with putting the spirit*[soul*] in the brain is that doing so doesn't explain all those things that seem to happen in and around bodies or brains without us noticing or being affected by them. (…) The first psychophysicists tried to measure how changes in physical energies corresponded to or affected changes in psychological energies. They would stimulate a sensory organ or part of the body very lightly and see if the stimulus was noticed; they would then intensify the stimulation and see if it was noticed, and so on. It became apparent that a set of stimuli below the thresholds (i.e., imperceptible) could be registered as just a single stimulus and, worse, that various circumstances could alter the thresholds, including repeated experiences of the same stimulus. It began to appear that stimuli below the thresholds were perceived - but by what? Not by the conscious mind in the brain, because in that case they wouldn't be below the thresholds. *So who or what was registering the impressions that were below the thresholds?* (emphasis mine)

Attending to the above kind of consideration, several "theories of the unconscious" flourished, that is, theories about how and, fundamentally, *why* there is "perceived" or "registered" "information" about variations in the properties of things; variations that are not those one might count as related to *conscious* perceptions, simply because they are not noticed, but which nevertheless alter conscious perception, as reports from experimental subjects shew.

The reasoning was as follows:

(H) Hypothesis: the spirit is what captures/produces the information that the body has been stimulated in a certain way, and the spirit is located in the brain.

(1) A stimulus is any variation of physical energy in contact with the nerve endings of experimental subjects to which the experimental subjects respond (by saying "ouch", "yes", "I

felt it", or by saying something more elaborate to describe an event they perceived concurrently with the application of the stimulus).

(2) Stimuli are definable in terms of their resulting intensity (amount *y* of energy of type *e* applied) as having a numerical value greater or lesser than a sensitivity threshold, this being defined for each type of stimulus by the minimum resulting intensity required to generate the experimental subject's response.

(3) Two unexpected variations were noticed:

(3a) Non-unitary sets of stimuli with an intensity lower than the sensitivity threshold were perceived as unitary stimuli.

(3b) Various circumstances, including repeated experiences of the same stimuli, alter sensitivity thresholds.

(4) The conclusion is that if something or someone perceives the stimuli that cause the variations (3a) and (3b), then that something or someone is not the spirit contained in the brain.

If on the one hand human perception and action are clearly dependent on the stimulation of bodily surfaces such as those of our eyes, skin, and ears, by material and energetic patterns around us, on the other hand neither action, nor (conscious) perception are usually directed at the punctually discriminated stimuli set, supposedly caused by individual photons, molecules, waves, etc.. What we regularly perceive (and also imagine and think about) are tables, plates, people, plans, and pieces of wax. Sentences in the indicative, such as "The plate is on the table", or "That person is demonstrating the completeness of the propositional calculus" clearly contain reference to things we can see happening in front of our eyes. If, as the representationalist intuition classically tells us, what is directly perceived by us are the compositional meanings of sentences like these, then we need only to suppose, in order to explain the reasoning from (H) to (4), that our neurophysiological apparatus does its work by conveying meanings as well, just as much as we do through our sentences, by algorithmically operating "inferences" from meanings like that of the sentence "A beam of light of wave frequency X hit the retina" (and others) to "The plate is on the table".[24] For some, who have been con-

24 Current philosophical discussion on the mind and cognition has included defenders of the idea of "non-conceptual" representations, which are supposed by them to lie at the basis of perceptual phenomena. Indeed an algorithm needs no *meaningful* signs in order to be operative, and perhaps someone inclined to such non-conceptualist views on either mental or cognitive representations might yet tell us a story about how meanings relate to basal non-conceptual representations or not. If such a philosopher refrains from attributing any kind of meaning appreciation and proper inferences to cognitive systems, like I suggested above, she can still talk of, say, meaningless representational elements constituting the algorithmically led procedures of such systems. My queries will not concern this discussion.

vinced by Kant's arguments that the mind is nowhere to be found, this supposition, if true, would amount to a merely felicitous empirical manifestation of the unity of subjective apperception within the structure of a person's brain. For the others, the neural pathways of such an inferential processing of information might eventually lead to the discovery of neurophysiological patterns literally embodying the set of representations constituting our conscious mental states. For all of them, the supposition of unconscious information processing appeared to provide a link between the thinking subject and the dynamics of its material body. Led either by transcendental philosophy's conclusions, or by the aforementioned kind of empirical findings, the idea of an unconsciously occurring information processing process across neural circuitry prevailed.

In the first half of the twentieth century, as the reader is plausibly aware, there was in fact some dispute over the correctness of such general guidelines for shedding any empirically sourced light upon the workings of a human mind. By then *behaviorism* temporarily dominated the scene, reshaping research so as to dispense with the postulation of – anyway unobservable – "inner processes" involving either conscious or unconscious sets of representations. Except by the ideas of the most radical among its proponents, such as B.F. Skinner (1904-1990) and (perhaps more contentiously) Gilbert Ryle (1900-1976)[25], who held that the semantics of regular talk of mental events could be analyzed into that of observable comportment and respective dispositions relative to potential stimulatory circumstances, behaviorism was perhaps the farthest psychology ever was of even purporting to provide a scientific explanation of properly mental, consciously lived-through phenomena.

Either according to extreme or moderate trends of behaviorism, psychological research was to focus on the attempt to replace any first-person claim of finding oneself in such and such a mental state into an impersonal description of one's thence ongoing behavior – whereas, importantly, "behavior" meant simply bodily movement in general, no scientific theory of intentional *action* having ever been provided. Laws of said "behavior" – put, then, in terms of deterministic bodily dispositions to move its parts relative to potential physical-chemical stimulation – would be devised, such that any event allegedly involving conscious experience should, at least according to their research designs, be described otherwise. Insofar as descriptive terms deemed acceptable by behaviorists included only those denoting objectively observable entities (bodily dynamics and physical-chemically described stimulatory circumstances), mental and cognitive representations were deemed scientifically irrelevant by behaviorists.

25 It is arguable, however, that Ryle actually withdraws from this full-fledged metaphysical behaviorism.

The mind is hardly *explained* if the ways it is like to go through our actions is neither itself described in other than the usual terms for intentions, feelings, wants, and qualitative impressions relative to our surroundings, nor get attributed any causal, let alone constitutive, relations relative to behavior, while the latter is treated simply as the dynamics of a machine would. But then again, neither was the *mind* explained by competing alternatives to behaviorism: only "cognition" was, whose algorithmically led dynamics would be as mechanical as behaviorists' "behavior". Alas, what behaviorists thought of behavior, with the exception of the note of connection with representational states, was no different from what has subsequently been thought of behavior. Behaviorism emerged in a time when Darwin's theory of natural selection was already well established as the best explanation ever achieved of how the kinds of living beings currently populating the world came into existence. Ever since, there has been one and only one set of features that is deemed respectable for scientific hypotheses to assume relative to behavior, be it human or otherwise. Such a set of features is the ways in which kinds of living organisms – assemblages of certain (not any) kinds of organic components that reproduce themselves into new such assemblages – respond to environmental conditions, this linear dynamics being appreciated relative to a measure of success consisting in the chances it begets to the typical individual of such and such a species of succeeding in self-reproduction. Such a poor, mechanistic substitute for all there is for actual behavior – for habits, for actions – is no pearl of behaviorism; it is what almost the whole history of the cognitive sciences has presented to day.

Several factors competed for the eventual demise of behaviorism as the shortly dominant research program for psychology it in fact was. There were complaints against the most radical and reductionist of its versions' claiming that "the very idea of a mental state or condition is the idea of a behavioral disposition or family of behavioral tendencies, evident in how a person behaves in one situation rather than another", and that, therefore, in attributing a mental state to someone we are but "characterizing the person in terms of what he or she might do [i.e., how will her bodily parts move themselves] in particular situations or environmental interactions" (Graham, 2023, sec. 2). Adding to that, the philosophical stronghold of behaviorism, the Vienna Circle, took the noble and unusual step towards dissolving its own philosophical project after realizing the errs it contained, a theme whose philosophical repercussions into contemporary philosophy of science will be partially appreciated in the next chapter.

Most decisive, however, for behaviorism's demise was the theoretical critiques of behaviorist methodology's insufficiency for explaining certain behavioral phenomena, such as

infants' language acquisition. Noam Chomsky (1959) notoriously – and very influentially – complained that the observed rapid pace of such learning process could not be accounted for by behaviorist hypotheses of mere association and reinforcement of stimuli engendering dispositions to behave (verbally) differently in different situations: a "universal grammar", as an innate capacity to sub-consciously categorize phenomena, should be postulated (once again) in order to explain behavior itself. Chomsky's representationalist analysis of language acquisition processes then motivated other rationalizations for returning to cognitive representations, such as the alleged "poverty of stimulus". Accordingly, in order to be functional behavior must be determined by internally generated representations whose information-content goes well beyond the information contained in any instantaneous state of exogenous stimulation. Devising the "cognitive architecture" that would operate "behind" observable comportment was put back into scientific agenda.

Thus the brief *interregnum* of behaviorism gave place to a renewed belief in "inner" representational processes in-between external stimuli and behavioral response. (Talk of "inwardness", it is always useful to remember, is ambiguous: it is opposed to the "exterior" comprising what is spatially outside an agent's organic body, but also to the "exterior" comprising none the less than the concrete world of physical matter and energy) When the formal establishment of the abstract notion of 'computation' and the actual construction of computer devices were achieved (both notoriously owing much to the genius of Alan Turing) still in the first half of the twentieth century, and also Claude Shannon's (1948) making it possible to quantify the concept of 'information' and to apply this concept to the dynamics of electronic devices (such as to allow the invention of optic fibers cables), the intellectual environment could hardly be more receptive to the idea of attributing representational states even to these very devices. Finally, by about the same time period, neurology had advanced to the point of knowing that individual neurons alternate between "active" and "inactive" states according to whether electric currents are running through their axons or not, which allowed – as argued, in 1948, by Warren McCulloch and Walter Pitts (Cummins, 1985, p. 05) – for neurons' firing or not being marked with binary code signs '1' and '0' respectively. This, of course, was interpreted as a clear sign that nervous cells are the basic units of cognitive systems' information processing processes.

Computers receive and send forward information we give them; they storage information in their memory; they make calculations; they take some time to process information; they erase information, they forget; they are spatio-temporally limited, material, physical calculators. We say these things on a regular basis. We use words thus. The magical answer – we

are our brains, our brains are computers – was blowing in the wind, and such a wind blew with sweet nostalgia. The third quarter of the twentieth century thus saw the rise of the "cognitive revolution" and the establishment of what is nowadays remembered as "classical computationalism" in the cognitive sciences. As two of its most prominent proponents explained,

> The current *Establishment* theory (which is usually called the "information processing" view) is that perception depends (...) on inferences. Because inference is a process in which premises are conveyed and consequences are derived, and given that this takes time, part of the information processing view is that there is an intrinsic connection between perception and memory. And because, finally, the *Establishment* holds that the psychological mechanism of inference is the transformation of mental representations, it follows that perception is, in relevant respects, a computational process. (FODOR AND PYLYSHYN, 1981, pp. 139-40)

Like computers, our nervous systems were thus conceived of as sets of functional structures displaying the roles of producing, transmitting, manipulating, and storing (in "memory") information about the world in representational form. More precisely, each state of a cognitive system, which would be at least a substructure within the nervous system, was modeled as the result of three factors: (i) the instantaneous disturbances in the relevant nerve endings, caused by the matter and energy surrounding the body, (ii) the discrete state in which the system was at the previous instant, and (iii) the laws of transition between cognitive states, which are definable as algebraic functions whose arguments are values of the variables that make up (i) and (ii) and whose possible values within a determinate range will compose the next states of the system. Accordingly, then, cognition occurs linearly, in three stages: first, (A) the reception of punctual physical-chemical stimuli (*input*); then, (B) transduction of said stimuli into symbolic values (processing) and, finally, (C) bodily movement (*output*), with or without accompanying conscious states. Part or parts of the cognitive system should therefore be understood as internal data processors, responsible for making the appropriate transitions from one cognitive state to another, as the kernel of an operational system would.

While classical computationalism is perhaps not as exciting among cognitive scientists today as it has been in its golden years, more broadly construed, simply put, *computationalism* about cognition (and speculatively so about the mind) is alive and kicking. Information technology is arguably today the peak of technical advancement that is being both developed and operated with within human productive affairs (*sensu* Karl Marx). If it is to render research on cognition a reverse engineering business, where the dynamics of human comport-

ment – in all its evolutionarily biological aspects and scales – is to be taken as evidence of an operating algorithmic design produced by, say, natural selection, then information processing devices still provide better models to fit not only the vocabulary we use, but also the sense of bewildering complexity felt relative to our minds, than any other thing we can build.

As a practical entailment of such a context, at each formal development in the search for new algorithms for the construction of new computing machines architecture, novel models for *cognitive* architecture – for the algorithmic architecture of the supposedly operating cognitive system in our brains – *can* be developed too, provided there is any empirical evidence on the appropriateness of projecting said algorithms on observed neurophysiological dynamics. A neat back-and-forth model for the flux of supposedly occurrent information processing within the organism, with the mediation of the central nervous system's (i.e., the brain's) control, is representative but of the earliest prevailing approaches of cognitive sciences from the 1960's to the 1980's. But the last decade of the twentieth testified what is often described as "remarkable advances" in (not casually) both computing and cognitive sciences. As to the latter, said scientific breakthroughs were due to the use of models whereby the dynamics of information processing is supposed to be distributed along globally emerging connectionist networks without clear ascending or descending directions, and therefore without distinctive "control systems", such as the brain, operating linearly over (and from) the periphery of the nervous system (Mcclelland, 2010). Even more recently, the "Free Energy Principle" theory (Friston, 2009; 2013) advocates that nervous systems are to be modeled as if both circumscribed by and sub-divided into a hierarchy of Markov-blankets (an abstract boundary enveloping any non-equilibrium steady state system) inside which everything should be treated, however again, as constituting "predictive representational states" aimed at functional global behavior by "suppressing surprise over time" via Bayesian modeled re-calibration of overall brain activity, resulting in a constantly re-adjusted "sampling of sensory data that is consistent with the current representation" (Friston, 2009, p. 294-5).

None of the aforementioned proposals, nor any other in the cognitive sciences until now, has yet afforded an effectively unifying disciplinary matrix for studying cognition. The cognitive sciences are in a "pre-paradigmatic" state, in Kuhn's (1962) sense, with different, often incompatible "cognitive architectures" being hypothesized for explaining different phenomena, such as decision making, psychological development, text processing, creativity, mathematical psychology, causal reasoning, communication, visual attention, and face perception (examples taken from Rothe, Rich, and Li, 2018, p. 981). Even behaviorist modeling is still a live option for conducting research (e.g., Janiszewski and Laran, 2024). That being said,

the history that I have been telling along most of this chapter is no mere commonality between currently diverging perspectives on this or that cognitive phenomenon. This shared history has provided the cognitive sciences with three guiding procedural and theoretical *principles* out of which any empirical research program can hardly be considered to bear any relevance to the study of mind and cognition.

Principle of Individuality (PI): to forage and describe individuals, be they persons, animals, or machines, regarding said individuals as exhaustively constitutive nuclei of particular cognitive or mental phenomena, thus seeking to identify and characterize the structures within the bodies of these individuals that provide them with the ability to relate cognitively to the world.

Principle of Representationality (PR): to take a state of the specialized structures of an individual as constituting either a cognitive or a mental state, if and only if it be one that identifies, or naturally correlates with, the representation of a state of affairs distinct from itself.

Principle of Functionality (PF): to categorize a kind of state of the specialized structures of an individual as a kind of cognitive or mental state only when the existence of such a kind be accountable in terms of the favorable probability-variation its implementation begets to typical individuals of the species under scrutiny, for them to succeed in the generation of another individual of the same species.

From the point of view of developing testable models for approaching the phenomenon of cognition, there is no shortage of *prima facie* cogent – and, anyway, evidently convincing – motivations for complying with these three principles. With regards to PI, there are indeed, at any time, as many mental states as there are individuals endowed with consciousness, although several parts of these individuals' bodies are functionally differentiated accordingly as to provide them with capabilities that are not usually regarded as essentially cognitive, such as digestion, blood circulation, breathing, etc. Therefore, it seems at least possible that the material basis for the emergence of either cognitive or mental activity as a natural phenomenon is made up of further specialized structures located inside the bodies of individuals, the brain and nervous system having had great empirical support for their candidacy. PF appears, then, as a theoretical principle lending cognitive phenomena the same character as every other be-

havioral and physiological dynamics observable within a living organism; namely, that of a naturally selected trace across evolutionary history. As for PR, as already noticed, symbolic logic has been developed to the point of facilitating the construction of ever more elaborate models for kinds of dynamics of the brain, and insofar as said models are analogues of the very algorithms that run physical computing machines we build, PR allows us to render the task of the cognitive sciences into one of reverse engineering concerning the computing machines we have been used to suppose ourselves to *be* for a few centuries so far.

Taking individuals to be "exhaustively constitutive nuclei" of cognitive phenomena (PI) means, however, little more than recycling into current understanding the same intuition that was once had by Galileo (sec. 1.1.1.2), that some events in the whole of reality occur but "inwardly" relative to an individual, except that nowadays some more individuals are taken to bear such inward states besides humans.[26] PI amounts also to taking all the properties of the surrounding concrete situations the individual's body finds itself in at each moment as accidental, non-constitutive elements of any state of such an individual that is to be possibly deemed as either cognitive or mental. To take but one illustration of the entrenchment of PI in current cognitive sciences (and respective philosophies thereby), bear in mind the already classical thesis by Andy Clark and David Chalmers (1998), the "extended mind" thesis. At first sight, it might appear that that thesis is contravening PI by stating that, sometimes, "a part of the world functions as a process which, were it done in the head, we would have no hesitation in recognizing as part of the cognitive process, then that part of the world is (for that time) part of the cognitive process" (Clark and Chalmers, 1998, p. 08). However, the "extension of the mind" proposed by them (among others who followed) is far less revolutionary than it might seem at first. First, the mind is only "extended" to the extent that said cognitive processes involving structures outside an individual's body perform, in some cases, the same supposed functions for the course of cognitive information processing that neurophysiological (and representational, of course) processes would supposedly be able to carry on for themselves. Hence *no* accordingly extended cognitive process *is* necessarily extended. Second, and restrained to this sense of 'extension' it is only cognitive (unconscious) processes that they argue to be "extended", conscious experience being still regarded in every sense as supervening on brain properties alone.[27]

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26 Such "inwardness" of mental states was obviously never conceived of *solely* in the physical sense of "within certain physical boundaries", but always *also* in a sense that has been proper to its application to mental states alone, *by contrast* to physical properties either within or outside of our bodies. Now this special sense of the term applies also to supposed cognitive phenomena, which are likewise "not observable properties of the brain" (McGinn, 1993, p. 10).

In other words, for most of cognitive sciences and philosophers of mind today everything outside an individual's body relate to cognitive and mental phenomena but as accidental causes of punctual and proximate alterings in the periphery of cognitive systems, and cognition is what happens by natural law – the natural laws of biological function – within the specialized organic structures that are either directly or indirectly stimulated, when such specialized structures "transduce" physical stimulation into "representational values" to be anyhow manipulated by the cognitive system.

In the case of PR, it is usually less relevant for cognitive scientists than for philosophers to decide whether the states of (portions of) a cognitive system *are*, or merely *convey* representations. What matters in any case is to associate certain neurophysiological states with a respective representational value, in other words: to take certain *discrete neurophysiological states*, first, as *comparable* to concrete states of affairs that are distinct from themselves; second, as *correct or incorrect*, depending on the existence or non-existence of the specific state of affairs they are to be compared to, at a time *t*.[28, 29] It is in this broad sense that PR can be considered as a widely accepted principle in the otherwise diverse scientific community of the cognitive sciences, as well as in the philosophy of mind. The question is, with what right? For, although widely accepted, the notion of 'representation' in the cognitive sciences is far from unique: it is neither uniformly understood among cognitive scientists, nor does it "provide models from which spring [a] particular coherent tradition of scientific research". models that anywhere in the world will be recognized and legitimated equally as "normal science" (*sensu* Kuhn, 1962, p. 10). Therefore, the concept of 'representation' is no *paradigm* (either in theory, or in practice) giving cohesion to a matured research tradition. It is mere shared prejudice among scientists who still lack any better substitute, or at least the knowledge of it.

As William Ramsey (2007, p. xi) attests, "there have been many different kinds of representational theories. But they all share at their core the assumption that mental processes involve internal states imbued with content, and that a correct explanation of these processes must invoke structures that serve to stand for something else." Ramsey (2017, p. 03) also di-

27 For closer analyses of the conservativeness of the extended-mind thesis, see Di Paolo, 2009 and Vergara, 2019.

28 Authors such as José Bermúdez, Tim Crane, Fred Dretske, Gareth Evans, Susan Harley, Christopher Peacocke, and Michael Tye (Peacocke 2001; Leclerc 2015) seek to elucidate a certain notion of "non-conceptual", though still representational, "content" in order to safeguard the empiricist intuition that not every aspect of cognitive or mental events (such as perception) is a *logical* compositional element of a thereby *propositional* representation. I shall not here be the least interested in such a debate.

29 As for the temporal element that I add to this characterization of said representations, I already mentioned one currently popular trend in the cognitive sciences that is tellingly called "predictive processing theory" which proposes that information processing is as (evolutionarily) functional for the organism as it provides informational foresight into the latter's immediate environmental tendencies.

agnoses the *conceptual demarcation of* cognitive phenomena under the circumscription of systems whose function (in the sense of PF) is to represent states of affairs, based on passages such as the following from both recent and current researchers on the subject:

> it is on the architecture of states and representational processes that discussions on cognitive architecture turn. Put another way, the architecture of the cognitive system consists of the basic set of operations, resources, functions, principles, etc... whose domain and scope are the representational states of the organism (Fodor and Pylyshyn, 1988, p. 10).

> The idea of cognition without representations or computation is almost a contradiction in terms (Bermúdez 2010, p. 415).

> The central hypothesis of cognitive science is that thought can best be understood in terms of representational structures in the mind and computational procedures that operate on these structures. While there is much disagreement about the nature of the representations and computations that constitute thought, the central hypothesis is general enough to encompass the current scope of thought in cognitive science... (Thagard 2014)

Unsurprisingly, the metaphysical mind-body problem was never solved by this peculiar sort of pursuit for clarity and distinction concerning the concept of "mental representation" advanced by the emergence of cognitive sciences. Just as the connection between the guessing mind and the body has seemed puzzling to thinkers ever since the seventeenth century, so much has the postulation of unconscious information processing by bodily parts produced the also seemingly puzzling problem of *how* do these bodily parts connect with such an "information processing" or acquire their supposed "representational character", whether said bodily parts are whole guts or distributed enteric neural circuitry, non-equilibrium steady state systems within a Markov Blanket, or individual neurons. Just what mental representations, cognitive representations, etc., *are*, is an ever postponed question.

> Despite all this attention (or perhaps because of it), there is not anything remotely like a consensus on the nature of mental representation. On the contrary, the current state of the art is possibly best described as one of disarray and uncertainty. There are disagreements about how we should think about mental representations, about why representations are important for psychological and neurological processes, about what role they should play in a physical system, about how they are endowed with intentional content, and even about whether or not they actually exist. (RAMSEY, 2007, p. xi)

Honoring discussions held in early modern times, current philosophical discussion abounds us with "options" going from physicalism and functionalism to panpsychism and property dualism, all asking and answering about the explanatory gap between neurology and cognition, so much as before, and now still, the problem has *also* consisted in explaining the link between the whole body and the (guessing) soul. Because – as it should be clear by now – the problem I am going to identify is not in *how* do mental or cognitive representations relate to either our bodies or the rest of the world, but rather *that they are supposed to exist* in the first place, such quarrels are not going to be delved into.

All in all, the fact is that research itself has taken up what is sometimes seemingly a scientifically respectful pitch by focusing on a kind of event whose supposed form is structurally similar to what would be a "material cause" of any phenomenon that is scientifically interesting aside from the mind. Assumption of a separation between cognitive phenomena and mental phenomena, the former being regarded as the building blocks of the latter, was seemingly necessary for conceiving of an empirical investigation that purported to shed any light, as feeble as it may be, upon the nature of the mind, for in relation to the mind such an investigation would then be concerned with mechanistic, material (and therefore scientifically accountable) necessity alone. So-called "cognitive" phenomena of information-processing are supposed to be structurally underlying every lived-through *mental* phenomenon, in more or less the same way that molecules of H_2O are supposed to be structurally underlying every glass of water. In spite of seemingly monotonous debates extending for centuries, this *must* be the right track for nailing it, right?

2 CHAPTER II: THE REPRESENTATIONALIST INTUITION, AND THE PHILOSOPHIES OF SENSE, REFERENCE, AND SCIENCE

The representationalist intuition first became as intuitive as it now seems to us with the rise of modern science, in the context of a perplexing appearance that basal elements of an ancient worldview ought to be dismantled and purged from the hearts and minds of persons, generally, but especially of those in charge of the "redemptive" task of advancing human understanding of reality through scientific work. Because such an understanding was not ideal, but rather actual and ensuing quite palpable results, the almost immediately upcoming intellectual shift giving birth to modern philosophy came to be praised as an achievement integral to the achievements credited to the sciences. A rare feat for a change of mind prompting so many previously unheard of obscurities as the modern entrenchment of the representationalist intuition did.

Part and parcel of what the representationalist intuition is is, as we saw, a view of cognizable reality as what Aristotle deemed *matter*: the universal clockwork functioning irrespective of particularities, from which purposes are wholly excluded. Not only a purposeless reality (a reality without God, a reality without a Good of its own as a whole), but a reality devoid of any *particular* purposeful moves, seemed (and often still seems) all about which we can learn anything, anyhow, by respectable, i.e., scientific, means. After all, as anciently recognized, what particular purposeful moves amount to is events concerning a complex material whole that are not explainable through the features of its material composition alone. The *causa finalis* is an irreducible *explanandum*, and it thereby implies a level of autonomy of complex material systems *within* the universal mechanism *with respect to* its universal laws.

It was a mistake, however, to think that a detained study of matter (*sensu* Aristotle) such as it has been promoted since the rise of modern sciences, implied the necessity to convince ourselves that purposes lie outside the horizon of natural events. That it was somehow a form of obscurantism or contra-revolutionary conservatism to insist that some pebble was thrown, *ultimately*, because somebody wanted to throw it, not (ultimately) because the universal mechanism happened to produce such whimsical events as our actions within it.

2.1 A TENSED REVOLUTION

One thing that was seemingly accomplished by relatively recent, some sixty years long, philosophical discussion on scientific knowledge – which latter has, as I argued, been the *de facto* historical source of the modern predicament – is the realization that in order to understand scientific knowledge we are required to understand its history. Now, this "requirement" has not the force of a mere recommendation, otherwise it would be trivial: no one who has ever said something philosophically noteworthy about scientific knowledge was a complete ignorant of the histories of scientific development. Rather, the nowadays widely legitimized requirement of understanding the history of science is due to the realization that we shall not anyhow be talking *about* science otherwise than as a historically emergent phenomenon. In terms of Aristotle's, we thought for a long time that this history was an accidental property of science, and now we think of it as essential.

Given the assumption of such an inherently historical nature of the sciences, attempting to understand what the sciences consist in without attending to their histories becomes an exercise in philosophical fantasy, rather than simply a poorly supported investigation. Such an assumption's having become widespread since the second half of the twentieth century is the reason why there are virtually no contemporary debates on the definition of "the scientific method" (Cowles, 2020): whatever virtues science is to be credited with are the virtues of its historical development, not the virtues of the redemptive rule for knowledge-obtainment.

As a result, there is no clear-cut, categorical distinction between what once used to be called the "context of discovery" and the "context of justification" of scientific statements and scientific theories (which is *not* to say that such a distinction is never, or anyhow, to be legitimately evoked for special purposes). Thinking otherwise was typical of attempts in the early twentieth century, much in the mood and fashion of modern Enlightenment, to demarcate the indexes of scientific rationality apart from either metaphysics, common-sense, or pseudo-science, so as to provide a neat characterization of scientific rationality as an intellectual and/or behavioral directive for individual epistemic redemption.

The context of discovery of a scientific claim consists in the historical vagaries leading to its time period, when this and that experiment was made, this and that hypothesis proposed, this and that phenomenon first observed, taking scientists to actually make such a claim. The context of justification of the same claim, on its turn, consists in the features of the moment in which it is made that *authorize* us there to identify a moment of properly grounded *discovery*, hence of the kind of epistemic achievements that are expected of – and credited to – science. One of Einstein's most fortunate sleep's nights has allegedly provided some of the context of

discovery for the theory of relativity; the latter's tremendous explanatory power, some of its context of justification.

A clear-cut dichotomy comes out between these two otherwise unproblematic aspects of scientific claims, when we conceive of the context of discovery as the "matters of fact" regarding them, and the context of justification as the "scientific method" that scientists are generally expected to follow as individuals before any claim. Even then, however, the distinction becomes problematic but when we attempt to categorically separate, generally, what are methods, as rules, directives, or norms, on the one hand, from what are the facts, on the other. This way, as philosophers such as Ludwig Wittgenstein and Nelson Goodman have convincingly argued, we are seemingly unable to justify the reasonableness – not to mention the factuality – of the rules we follow, among these being the rules we would follow in order to undertake as simple tasks as ascribing colors to the stuff we see. Only from the moment when this sort of problem was clearly devised (and expounded in the guise of "paradoxes", as we shall see), speculation on the way in which the factual historical background of our practices might actually *constitute* (be essential properties of) the rules, directives, and norms that we follow, gained currency within philosophical discussion about science.

Clarity about that, however, is still on its way. A first difficulty of attempting to point out "facts that constitute rules" is that often such a fact must itself be described in order to be pointed out, so that any rules underlying our usage of descriptions must be presupposed in order for us to point out the facts supposedly constituting – hence, enabling – such rules. This creates the difficulty that the sense of the used description is allegedly contingent upon the actual obtainment of the fact in question, and sometimes the fact in question can only be pointed out by description. The facts in question being past ones, such as facts concerning the history of science, other difficulties add. We cannot look directly into the past, so we must rely on descriptions. However, when looking into past records of a science's history, we are also required the ability to navigate along whole different uses that were previously, and are not anymore, made of words for describing the facts. Only thus may we hope to understand how whatever Lavoisier called "dephlogisticated air", or what Niehls Bohr referred to as "atoms", have contributed to our current ways of describing events, such as combustion and nuclear fission. That is to say, even though in any reconstruction of chemistry's or physics' *current* state of the art neither Lavoisier's nor Bohr's descriptions of their own experiments and discoveries will be *used* (at most, they will be mentioned) as they were in their respective times and places. What precisely is the relationship between past and current stages of science's history, provided a crucial part of such history, its subsequent discursive practices, are often so alien to

one another, and such that the past ones not only explain, but also *justify* current ones, lending the followed pathway the character – not only the impression – of epistemic progress. This is a question posed to philosophers of science ever since history's normative relevance began to be speculated upon.

The problem that Thomas Kuhn has called attention to already in his most celebrated essay, *The Structure of Scientific Revolutions*, and which he has struggled with for the rest of his life, was that of figuring out in which terms should we describe any past historical context while seeking to characterize the epistemic achievements that are nested within such an historical context in a way that is essential for what we regard as *our current* epistemic achievements in science. After all, if history of science is essential to the latter's epistemic value, then there must be some continuity to be traced between past and present research, however differently they have been verbalized.

On the one hand, the histories of the sciences are part of the histories of collective, localized, and often organized struggles for achieving reason, understanding, and thinking straight on various phenomena. One point that is very much stressed by Kuhn is that these epistemic struggles, at least since the obtainment of the circumstances that characterize the rise of modernity in Europe, tend to mature themselves into traditions of disciplined investigation that we know of as current scientific fields. This is not to deny that, as philosophers like Michela Massimi (2022) often emphasize, the pursuit of knowledge almost invariably lead to the sedimentation of traditions involving discourse, technique, and bias, but actually this is part of the point. Tradition unites persons who belong to it, and so it facilitates cooperation, epistemic cooperation included. When it comes to the latter, traditions provide us with our social paradigms of reason, understanding, and thinking. On the other hand, however (and herein lies the source of Kuhn's headaches), when we look at past stages of current traditions and try to understand them, we perceive them as, in an important sense, *incommensurable* relative to each other. A current chemist that recognizes in Lavoisier a forefather to herself and her peers is unable to translate, in terms of her own taxonomy for chemical events, the taxonomic system used by Lavoisier to sort out the events he studied. She must learn quite another language, so to speak, in order to understand Lavoisier's original works. In general, given the normative character of what is established at each stage of intellectual history as sound reason, proper understanding, and straight thinking, we may seem to lack a common ground for evaluating what is correct and what is incorrect in each tradition from another one's perspective. As Alsdair MacIntyre (1977, p. 461) put it, two traditions will necessarily "disagree as to what constitutes appropriate reasoning, decisive evidence, conclusive proof" insofar as they

are two different traditions. Under such an impression, the very idea of "scientific progress" (say, from Lavoisier's to up to date's chemistry) may seem like a symptom of atavistic (and revisionist) prejudice for the present. If things like appropriate reasoning, decisive evidence, conclusive proof, in their evidently normative character always constitute themselves relatively to *some* one framework for classifying phenomena, then cases like Lavoisier's relative to modern chemistry seem to reveal that there are too many and conflicting ways of measuring progress. There is no single tradition linking the stages of what we call "the history of chemistry". To use a phrase of fashion, "there is no view from nowhere" in the pursuit of historical understanding, hence neither in the pursuit of understanding in general. But then what? Should we simply give up the idea of scientific progress – or, what amounts to the same, make it thus atavistic, nominal, conventional?

The considerations adduced by Kuhn, especially in his writings after *The Structure*, to characterize and to show the relevancy of incommensurability across scientific revolutions, have produced the compelling impression, among philosophers including Kuhn, that throughout the history of such revolutions epistemic development has paradoxically *not* been cumulative, but rather disruptive, in *topic* so much as in determining what either reasoning or evidence is. Instead of learning more about the same kinds of stuff, we[30] would seemingly set ourselves up for starting to learn about *other* things; instead of ameliorating our practices with respect to both experimental procedures and verbal exposition of hypotheses and findings, we would seemingly set ourselves up for redefining standards that *are* not comparable and therefore *should not be compared* to past ones. We do not stand on the shoulders of giants. Rather, at each scientific revolution we create new giants we simply *prefer* over the old ones. Once incommensurability gets brought up to mind and accepted, there seems to be no way back into thinking that epistemic development is continuous as to its topic, that is to say, that we learn *more* and we learn *better* about the *same* kinds of stuff across intellectual revolutions. For it is the very traditions – only within which and relative to which there can be any thinking – that are deemed to be often widely incommensurable with one another.

In this chapter, I will argue that there is a tension in Kuhn's early account of scientific practice and progress. On the one side of the rope, by building upon the failures of a preceding philosophical and historiographical tradition with respect to scientific knowledge, Kuhn has demurred in *The Structure of Scientific Revolutions* the philosophical view according to which scientific theories and rules (their basic sets of concepts, axioms, and definitions in-

30 We, that is to say, who are either scientists or prompt to deferring to, and learning from, scientists on matters in which scientists are endowed with authority.

cluded) constitute the primary elements of science. The "historical view" would instead prioritize a scientific community's historically emergent, paradigmatic practices, as the basal element to be devised, *over* scientists' explicit beliefs and theories, in order to understand how it is that knowledge is built by science. Accordingly, then, by *contrast* to scientific taxonomies and formulated theories, primacy is to be given to scientific practices as to the latter's collective and historical emergence into traditions, which is to say that traditions, theory-involving or not, were not to be put in terms of their theories alone (otherwise the very distinction would fail, let alone any relation of primacy of one over another).

On the other side of the rope, however, Kuhn was driven by the respectable, widely accepted prescription, of deferring any assumptions one is led to make about the psychological aspects of things such as "appropriate reasoning, decisive evidence, conclusive proof" to what be contemporarily taken as the established view in the cognitive sciences and the philosophy of mind. For such an established view, as we saw in the first chapter, there is no question that any cognitively relevant event (including any sort of "paradigmatic practice") will be so relevant only thanks to its representational outlook before our minds: thanks to the rules that our cognitive systems follow to represent the world. It is (admittedly) on the basis of such a reliance on the established view of cognition that Kuhn's philosophically concerning characterization of incommensurability arises. Given such a basis, scientific revolutions get described in terms of structural substitutions of the rules and algorithms that the cognitive systems of scientists deploy, and by means of which they live and work with the kinds of things that come before their minds.

Hence, the tension: what is in fact more important for us to understand scientific revolutions, scientists' paradigmatic practices or the representation-based algorithms of their brains? Is not the latter option rather a withdrawal from the "historical view" back into old-fashioned attempts to define the sciences according to the rules (for description) they follow?

In the first chapter, I have reviewed a bit of the history leading to the current state of the art of the cognitive sciences and the philosophy of mind. I have portrayed that history as, fundamentally, the history of a confusion, yielded by overwhelming perplexity after the progress displayed by scientific endeavor generally, since the seventeenth century. As I pointed out earlier, Kuhn's worries about theoretical incommensurabilities and the puzzling "new-world effect" it causes over our attempts to understand scientific progress was already felt, even if not articulated, ever since the modern predicament itself was. Scientific theories were not merely added to, they were rather put in place of, common sense, and successively so. Substituting scientific categorization of all phenomena surrounding us for common, regu-

larly used names that are learned with our mother-tongues, moreover with the expectancy of further substitutions by ever more refined taxonomic systems, has provided the circumstance for the modern predicament to emerge, for the fleetingness of our affective links to, and the epistemic relevance of, the kinds of beings that we both live with, and learn about, to be felt.

It is time, now, to look after some consequences of this confusion for our understanding of scientific progress – but not only that: for our understanding of appropriate reasoning, decisive evidence, conclusive proof, and understanding itself. First, I will revise the establishment of the historical view of science, not without distinguishing the two strained pathways leading to it in Kuhn's early work, which are both connected to Wittgenstein's philosophical development. Then, I shall present both, Wittgenstein's and Saul Kripke's arguments against two consequences of the representationalist intuition about minds that bear on our views on propositional sense, on the one hand, and singular terms' reference, on the other. One consequence of the representationalist intuition (say, *p*), which was mainly explored and criticized by Wittgenstein, is that thinking (anyhow to state "how things stand" aiming at truth) is made possible, can be explained, by the fact that we "bear in our minds" the meanings that turn our phrases into more than just noises or marks on paper, and that, accordingly, is why the latter are *not* mere noises and marks on paper. The other consequence (say, *r*), whose debunking is to be credited to Kripke, is that any act of reference to something is mediated by a non-empty set of representations of the corresponding referent, to the effect that the referents of our thoughts are always necessarily the subjects of such "bore in mind" representations. To be sure, neither Wittgenstein, nor Kripke assert the conditional, "if the representationalist intuition holds true, then *p* and *r*". Together, they simply criticize both *p* and *r* and offer some rough "images" of sense and reference in their stead. Through their critiques, however, they provide the premises for a *modus tollens* argument against the representationalist intuition.

The problem is, both in Wittgenstein's and in Kripke's cases, that they hardly present any positive view on what thinking and making reference consist in, except by rather vaguely presenting such things as both *historical* and *communal* institutions. They are clear (and reason) enough, however, as to what sense and reference are *not*. For this reason, the chapter presents what I think is a current stalemate in the philosophy of science leading us back, once again, to talk about minds. On the one hand, we may be tempted to regard Wittgenstein's and Kripke's reflections on propositional sense and singular terms' reference as nothing but amusing paradoxes to be, in practice, ignored. Actual trust, then, is to be kept onto the representationalist intuition in order to guide our thinking about cognition and the mind, and Kuhn's queries about incommensurability remain pressing. On the other hand, we may appreciate

Wittgenstein's and Kripke's reflections as sound, and, accordingly, recognize that our ways of thinking about mental events – as of any other kind of event that involves the latter – have gone remarkably awry along the centuries that separate us from the modern scientific revolution, to the point of demanding an extensive replacement of those ways of thinking about mental events by novel ones.

While lacking such novel ways of thinking about mental events, treading the latter path would mean not only to stick to two admittedly poor, though hereby allegedly right-headed, philosophical accounts: of propositional sense, by Wittgenstein, and of reference, by Kripke, but also to abide for an equally featured philosophical account of science, namely the one provided by all in Kuhn's work which does not rely on the representationalist intuition. Reasons for going in this direction (aside from the reasons *not* to go in the opposite one) form part of the subject matter of the last chapter. The main virtue, for our purposes, of the novel ways of thinking about mental events thereby presented is the capacity they provide of answering a very sensible question for contemporary philosophies of logic and science: what is it for any phenomenon – but, in particular, for phenomena like propositional sense and reference, as well as science – to be inherently *historical*?

2.1.1 Symbols and Sensations: the rise and fall of empiricism in early twentieth century

2.1.1.1 The Math for The Rise

What was there before the gradual consolidation – to be secured after Kuhn's work – of a historical view of science was, without any surprise, a predominantly *un*historical view of science. Accordingly (and in accordance with all that we saw in the first chapter), science was to be seen as the enlightening path that our fallible intellects were given permission to follow out of their natural, intuitive, errant, condition. Once agreement was set over our intellects' defining capacity to, in better or worse ways, represent how things stand, science was seen as, in essence, an epistemological marvel, "the method" for optimizing the exercise of that defin-

ing capacity of ours with respect to its function of producing true, or at least maximally adequate, representations of the world.

Disputes between philosophical theories of knowledge and the mind that bent towards either empiricism or transcendental philosophy, not to speak of unfolding discussions on whether it was the empirical testing of scientific claims or the theoretical perspicacity of hypothesis-formulation that most accounted for scientific success (Cowles, 2020), were a common place among intellectuals by the turn of the twentieth century. Even so, the first and second quarters of the twentieth century were occasion for a largely empiricist tide in the way philosophers thought of scientific methodology and knowledge-construction.[31] For any form of empiricism pronouncing itself on the nature of science and scientific progress, what the history of science is made of is "the piecemeal process" of the "ever growing stockpile that constitutes scientific technique and knowledge" (Kuhn, 1962, p. 2), the task at hand for the historian of science being that of merely separating the wheat from the chaff in such history based on the wheat that is currently consumed. By her side, the empiricist philosopher of science may well disregard the work of her colleagues in the history department. Instead, she will occupy herself in most clearly spelling out objective criteria, valid for hers as well as for any other time in history, for the assessment of knowledge claims against contemporarily available evidence.

Before gaining *momentum* in this time period, however, empiricism had to wait for aid coming from other quarters of philosophy. Throughout the nineteenth century, "Achilles' heel" meant for empiricism an essential part of scientific knowledge-construction: mathematical knowledge. This was a subject-matter to which Kant had offered (had one liked it or not) a neat explanation. According to Kant, knowledge, in both arithmetic and geometry, advanced by means of *conceptual construction* upon the "materials" of pure intuitions (Casanave, 2012). Mathematical knowledge would be obtained through "syntheses" made *a priori* of either general representations of temporal relations, or of general representations of spatial relations. Accordingly, moreover, such a process of conceptual construction would not only produce mathematical knowledge in this "synthetic *a priori*" way, but, consequentially, would restructure phenomena by determining the temporal and spatial relations of the sensibly given

31 I am thinking here of philosophers (and their respective webs of influence) like Bertrand Russell, William Ramsey, William James, Rudolph Carnap, Otto von Neurath, A.J. Ayer, Karl Popper, and Willard van Orman Quine. However I take these – especially due to the prominence of the Vienna Circle and logical empiricism from the 1920's to the 1950's – to have defined, as I said, a "largely empiricist" trend for the philosophy of science in the first half of the twentieth century, mention is due to the persistent, Kantian-veined, opposition, the latter having been made throughout the time period, perhaps most notoriously in the works of Henri Poincaré, the early Ludwig Wittgenstein, L.E.J Brouwer, Hans Reichenbach, and Wilfrid Sellars.

objects – the empirical intuitions – of any possible experience. Kant's framework thus purportedly resolved three fundamental issues in the philosophy of mathematics: (1) the objectivity of mathematical truths, attributed to the transcendental subject' categories of understanding; (2) the necessity of mathematical truths, based on the claim that both arithmetical and geometrical truths are about pure intuitions and are knowable *a priori*; and (3) their applicability to empirical judgments, rooted in their direct application to spatial relations and the temporal series that underpin empirical intuitions.

Meanwhile, empiricists could not manage to offer any more down-to-earth explanation of mathematics – nor, crucially, for mathematics' applicability to the empirical sciences – while insisting that even mathematical knowledge be *a posteriori* (as, for instance, John Stuart Mill had in the mid-nineteenth century). In philosophy the search for better explanations seldom succeeds by replacing what it is that we desire to explain for something else. In the case of philosophy of mathematics, the fact that mathematical knowledge is justified independently from particular empirical observations cannot be denied without inadvertently operating just such a replacement. Hence, Kantian "pure intuitions" – in the willful absence of Cartesian "ideas in the mind of God" – remained, for a while, the seemingly sole option for explaining what anyone could recognize as the obtainment of mathematical knowledge. And, what was worse for empiricists, pure intuition was not simply a powerful explanatory device for mathematics, such as to account for the latter while leaving room for empiricist explanations of other kinds of knowledge. Rather, pure intuitions' explanatory power is tyrannical: accept it for mathematics, and you have to accept it that the source and ultimate justification-basis for applying any empirical concept lies partially in the operation of categories of understanding's providing such a particular mental representation with its temporal and spatial forms. In other words, either there is a non-Kantian philosophy of mathematics to embrace, or empiricism is a dead end.

By the end of the nineteenth century, however, central tenets of Kant's philosophy of mathematics and logic were significantly challenged. By that time period, key advancements in mathematics had sensibly strengthened intellectual anxiety around, to use a phrase of the time, the "foundations of mathematics". Cantor's diagonal argument revealed the existence of transfinite numbers, directly contradicting Kant's claim that for a magnitude to be infinite is for there to be no way to construct a greater one (CPR, B458). This result undermined the notion that arithmetical knowledge depends on constructed conceptualization of pure intuition. Earlier in the nineteenth century, mathematicians like Carl Friedrich Gauss (1777–1855) and Nikolai Lobachevsky (1792–1856) demonstrated that the Euclidean parallel postulate was not

necessary, leading to the development of non-Euclidean geometries. These breakthroughs, later foundational to Einsteinian physics, disrupted a very important link that Kant supposed to exist, between empirical conceivability and empirical possibility regarding spatial relations. Finally, the work of Karl Weierstraß and others demonstrated that some branches of mathematics (e.g., the real numbers) could be defined in terms of basic arithmetical relations, allowing speculation on the possibility of thus defining other, if not all branches of mathematics in such terms, and thus allowing the centering of philosophical attention around arithmetic. On its turn, the serial relation of natural numbers was independently axiomatized by Giuseppe Peano and Richard Dedekind by the end of the nineteenth century. With axioms and symbolic rules in place, the theorems (which amount to arithmetical truths) one can derive by employing the resulting formal system are arguably a matter of *discovery*, rather than construction. Finally, if such axioms and definitions are but essential characteristic notes of the concepts of arithmetic, then knowledge in this area is obtained by conceptual *analysis*, not synthesis, and the mediating role of pure intuition is dismissed.

These cumulative developments significantly challenged Kant's explanations for the aforementioned (1-3) questions, prompting a reevaluation of the nature and foundations of mathematical knowledge and mathematical truth. By "foundations" philosophers and mathematicians of the time were asking at least two questions.[32] First, how do we justify judgments in pure mathematics (through deductive proofs, generally, only by constructive proofs, etc.). Second, what sort of fact of the matter is there that makes mathematical statements true, or false (is there an ideal world of mathematical objects; are there truths of logic to which mathematical truths are reducible; are mathematical truths simply about the use of mathematical signs…). To be sure, the intellectual climate surrounding the foundations of mathematics was one of dispute, with thinkers presenting diverging alternatives – and also attempting at different accommodations for Kantian philosophy, after the aforementioned challenges to it – rather than agreeing on some foreseeable solution. If the concepts constituting the basis of mathematical reasoning, such as those of "number", "addition", "line", etc., were not by-products of the rational-but-intuitive kernel of our minds, then what are they? What do they describe? If not pure intuitions, then about what sorts of things do we discover arithmetical and geometrical truths as we do, i.e., *a priori*? At the end of the day, the impression was that pure intuitions had turned from seemingly providing a sound philosophical explanation for such foundational questions, to becoming one further source of confusion to be clarified, or else be left behind.

32 A more dedicated treatment (such as Coffa, 1991, and Shapiro, 2012) would mention further ones.

This scenario, of serious dispute over the foundations of mathematics, nonetheless built, as it was, upon relative agreement that the role of pure intuitions on said foundations was to be either dismissed, perhaps replaced by something else, or else at least reformulated, offered a plethora of alternative explanations for mathematical knowledge-construction and the latter's application to the empirical sciences. It was a variety of alternative bases for a new form of empiricist philosophical stance on scientific knowledge to flourish. Whichever of several such philosophical alternatives with respect to mathematics was adopted – the first two of the "big three" ideas that were advanced at the time (Shapiro, 2012): logicism, formalism, and intuitionism, for instance – would allow advancement of an empiricist picture of the foundations of empirical knowledge well equipped with the required non-Kantian, though also non-distorting, explanation of the role of mathematics in its construction.

2.1.1.2 The Rise of Empiricism in Early Twentieth Century

Wittgenstein once said, "Not empiricism, and yet realism in philosophy, that is the hardest thing" (*Remarks on the Foundations of Mathematics*, p. 325). I agree with Cora Diamond's (1996) reading of this passage, that in it Wittgenstein was not evoking any one of the several, more or less technical meanings, that the word 'realism' has often been used with in philosophy, but one that is rather aesthetic, as in calling a novel *realistic*, instead of fantastic, childish, or mild. In this sense, the word 'realism' also contrasts with the words I myself have been using to describe transcendental philosophy, often when I mention it: as a perhaps too philosophical, too far-fetched, theory of the rational subject. Were it not for the modern predicament (in conjunction with other, temporally and spatially situated, phenomena), hardly anyone would have ever accepted – let alone, come up with the idea – that the temporal-spatial location of anything (together with all attributes presupposing such a location) is only ideal. Yet empiricism too, just like transcendental philosophy, has historically been in the issue of providing epistemic reassurance, after the modern construal of a severance of our minds from "the external world", by abidance of the representationalist intuition. Empiricism is yet another attempt to restore lost confidence in our epistemic links with reality by appeal to the (inter-)subjectively represented external world with which, supposedly, we are acquainted but by means of sensation. It has long been regarded as the "realist" option on the table because, while it reassures philosophers that what we learn about – though approximately,

tentatively – is "things out there", transcendental philosophy provides said reassurance in an absolute, apodictic, way, by stressing it that the phenomena that we perceive are not only representational, but also constitutively made amenable to our guessing minds. What I think Wittgenstein would eventually realize and teach us is that the problem did not lie in what kind of epistemic reassurance was purportedly given after the impact of the modern predicament, but rather in the lack of sense that the different expressions of this shared goal have likewise presented.

But let us try to avoid haste. What philosophers that were bent towards empiricist lines of reassurance against the modern predicament found at the dawn of the twentieth century was, as I said, several explanations of mathematical knowledge that were not incompatible with those lines (as Kant's philosophy of mathematics had been). It was time for the rise of a rather diffuse group of philosophers which came to be known as "logical empiricists", and also as "logical positivists"[33], who rose to the fore of Western philosophical debate in the 1920's, most notably in Vienna's and Berlin's respective discussion groups (or "circles").

> The Vienna Circle was a group of early twentieth-century philosophers who sought to reconceptualize empiricism by means of their interpretation of then recent advances in the physical and formal sciences. Their radically anti-metaphysical stance was supported by an empiricist criterion of meaningfulness and a broadly logicist conception of mathematics. They denied that any principle or claim was synthetic *a priori*. Moreover, they sought to account for the presuppositions of scientific theories by regimenting such theories within a logical framework so that the important role played by conventions, either in the form of definitions or of other analytical framework principles, became evident. (Uebel, 2024, Introduction)

Under the aforementioned variety of diversely impacting influences, it is often not clear what exact view on logic and mathematics some logical-empiricist philosophers upheld. Scholars today occasionally emphasize diversity (Uebel, 2024); occasionally, obscurity (Coffa, 1991) in such interpretive matters. For the sake of economy (which is necessary, given both the scope of this work and the scarcity of my competences) I opt here for the middle-way of stating, though not exploring, the group's diversity, while at the same time examining more closely the roots of a few shared philosophical stances upheld by its members. The latter implies understanding the group's "anti-metaphysical stance" and its "broadly logicist conception of mathematics", both of which inform their "empiricist criterion of meaningfulness",

33 For the reason of keeping in mind the contrast, which is relevant to day, between empiricism and transcendental philosophy, I will prefer throughout to refer to them as "logical empiricists" and talk of "logical empiricism", in spite of the alternatives.

their theories of propositional sense. Such an understanding will hopefully shed some light on the compelling view of rationality and scientific progress that they advanced at their time and place. The downfall of such a view has also been the downfall, in the history of ideas, of attempts at an unhistorical understanding of scientific knowledge.

Uebel (2024, sec. 2.3) explains that one of the views that united the members of the Vienna Circle and allowed them to deny "that any principle or claim was synthetic *a priori*" was a certain interpretation of the previous works of Gottlob Frege, Bertrand Russell, and Ludwig Wittgenstein.

> Following the logicism of Frege and Russell, the [Vienna] Circle considered logic and mathematics to be analytic in nature. Extending Wittgenstein's insight about logical truths to mathematical ones as well, the Circle considered both to be tautological. … Thus defanged of appeals to rational intuition, the contribution of pure reason to human knowledge (in the form of logic and mathematics) was thought easily integrated into the empiricist framework.

For anyone well versed in early analytic philosophy today, hearing that a philosopher has *followed* logicism *and* extended "Wittgenstein's insight about logical truths to mathematical ones" knows, for sure, that such a philosopher has either misinterpreted logicism, or misinterpreted Wittgenstein, or both[34]. Even so, as a matter of fact, for many among logical empiricists and within the Vienna Circle that has been a reasonable interpretation, if only for them to develop their own original stances on rationality, in general, and on scientific rationality, in particular.

One first surprise in logical empiricists reclaiming logicism is that logicism was far from being "anti-metaphysical". According to Frege – the first one to fully develop an attempt to restate the axioms of Peano for arithmetic purely in terms of logic – arithmetical knowledge would not be either about the pure intuition of time, as Kant had it, nor would it be about collections of perceivable objects, as Mill (and empiricists generally had hitherto) had it. Rather, for Frege (and, as already suggested when Peano and Dedekind devised axioms that defined the serial relation between natural numbers, not to mention Boole's, Weierstraß', and even Leibniz' precedents), arithmetical knowledge would be knowledge about objectively construed *concepts*, and obtained through conceptual *analysis* rather than by *a priori* synthesis.

34 For a very summarized exposition of Wittgenstein's consistent denial of logicism, see my Noguez (2022).

From the start, it is important to stress that, while speaking about *concepts* as bearers of numerical properties, Frege *was not speaking about judgments*, for judgments were understood by him as stemming from subjects (as we might call them, "judging minds"), by contrast to the objective world. According to Frege, neither concepts belong to our minds, nor do their properties hold of any mental entity, state, or process. According to Frege's definitions of 'number', '0', and 'successor', it is in terms of the *truth* of every thought that *is* true, that the numerical properties of any concept are determined. Truth – and, as both Frege had insisted, and Wittgenstein would, the *possibility* of truth – cannot depend on the laws reigning over our minds' *taking* anything to be true. Nor, to be clear, on the transcendental conditions for any subject to take any representation as true. Therefore, concepts cannot be what they are as a function of what it is for our minds to *take* any proposition to be true.

"The business of pure logic is to arrive at such laws, just as the business of physics is to arrive at physical laws. Logical laws are as descriptive as physical laws, but they are more general" (Goldfarb, 2010, p. 68) The science of logic is, for Frege, the most general science: it purportedly investigates the *laws* that govern a realm occupied by the sense of any proposition, insofar as this sense can *be* (not insofar as it can be judged as) true (*Wahrsein*). Hence, again, the science of logic is to be held autonomous from the science of psychology, the laws of the former are not a subset of the laws of the latter, because the laws of truth cannot depend on the laws concerning the ways we *take* any propositional sense to be true (*Fürwahrhalten*).

> With regard to the question, why and by what right do we recognize the truth of a logical law, logic can only answer it by reducing it to other logical laws. Where this is not possible, [logic] cannot answer it. Leaving the sphere of logic, someone might say that our nature and external circumstances force us to judge, and when we judge, this cannot be discarded – the law of identity, for example – but must first be recognized if we don't want to lead our thinking into confusion and finally give up all forms of judging. I don't even want to dispute or endorse this opinion, but I just want to point out that what we have here is not a logical conclusion. What is offered here is not a foundation of being true [*Wahrsein*], but of taking to be true [*Fürwahrhalten*]. (FREGE, 2013, p. xvii)

If the laws of *Wahrsein* depended, anyhow, on the laws of *Fürwahrhalten*, then "there would be no science, there would be no mistake and mistake's rectification, there would be nothing properly true in the usual sense of the word" (Frege, *Nachgelaßene Schriften und Wißenschaftlicher Briefwechsel*, p. 144, *apud* Lopes dos Santos, 2008, p. 39). The reason why such a stance on logic was called "anti-psychologism" is clear: the representational, guessing,

nature, by then already quite traditionally ascribed to our minds, *was* construed as, precisely, the nature of *Fürwahrhalten*.

> The metaphors that underlie the expressions we use when we speak of grasping a thought, of conceiving, laying hold of, seizing, understanding, of *capere*, *percipere*, *comprehendere*, *intelligere* put the matter in essentially the right perspective. What is grasped, taken hold of, is already there and all we do is take possession of it (Frege 1979, p. 137)

It was from this anti-psychologistic sense, then, that Frege argued that arithmetical truth is about (thus) objectively construed concepts. Mental states would only *relate* to concepts insofar as our minds "grasped", not concepts themselves, but rather the (objective, non-mental) *sense* of sentences to which a truth-value could at least in principle be ascribed. He treated truth-values, the True and the False, in the simplest possible terms: as simply *objects denoted*, referred to, by meaningful sentences, and any meaningful sentence as denoting at most one truth-value, or else none (he would regard some sentences, such as "The present King of France is bald", as having a sense, and yet failing to denote any truth-value). What would determine which, if any, truth-value, is denoted by a given sentence, would be the propositional sense that is grasped by the mind of the sentence-user (speaker, thinker) in question. Hence, every propositional sense would be an objective "mode of presentation" of either the True, the False, or of no truth-value at all. One speaks truly when she expresses through her sentence what is, by itself, an objective mode of presentation of the True. Concepts, in turn, get into Frege's picture of logic when we *analyze* some one sentence's sense: if we take the sentences "X is thus and so" and "Y is thus and so", then presumably they are expressing the same thing to hold true of both, X and Y: the same concept. In doing a *logical analysis* of propositions, what we do is, for Frege, to analyze modes of presentation of truth-values into modes of presentation of, on the one hand, worldly objects, such as X and Y, and, on the other hand, modes of presentation of concepts, such as "is thus and so". From analyses of the diverse modes of presentation of the True – which modes of presentation are expressed by true sentences – we may grasp the modes of presentation of objects, on the one hand, and modes of presentation of concepts, on the other. So much as (some) sentences denote the True *because* they express modes of presentation of the True, names and concept-expressions respec-

tively denote objects and concepts *because* they partake in the linguistic expression of modes of presentation of the True.[35]

In this way, it was possible for Frege to get at the notion of the *extension* of a concept: it is the set of all objects whose own modes of presentation actually partake in modes of presentation of the True as subsumed by (as falling under) the concept in question. Any concept, then, would be ascribed a number according to how many objects belong to its extension, so that, e.g., the number of the concept "is a natural satellite of the Earth" is 1, and the number of the concept "is a natural satellite of Jupiter" is 4. Numbers' being properties of concepts means, as expected, that arithmetical truths are actually *logical* truths; arithmetical theorems, theorems that reveal relations of logical entailment between the sense of one sentence and the sense of another, by virtue of the cardinalities of the concepts therein respectively expressed. In sum, arithmetic would be a branch of logic, in a very relevant sense: the aspects of reality existing independently of *Fürwahrhalten* over which the truth (or falsity) of any proposition of arithmetic would be determined would be *logical* aspects of reality, aspects of concepts.[36] This is, I dare say, the main claim in which the idea of logicism about arithmetic consists.

In order to demonstrate his theses, Frege began, in 1879, by developing a symbolic system, his *Begriffsschrift* (Frege, 1879), which allowed the expression of the sense of any sentence as at least symbolically to be analyzed as the application of a concept to an object; a system which, at the same time, possessed rules for the manipulation of its symbols, so that relations of logical entailment, once expressed by means of the system, became reflected in allowed symbolic substitutions of each expression's components. The resulting achievement was nothing short of modern predicate calculus (with which, I assume, the reader is sufficiently familiar), with concepts being expressed as functions whose only two possible values would be the True and the False, and objects being expressed as arguments for these functions. Its inventor, Frege, purported with it to render the task of drawing any logical inference made in natural languages a matter of translating the relevant statements into, and then following the rules governing substitution of, the resulting *Begriffsschrift* expressions. The goal, then, was to allow the expression of any logical entailment the means of a new form of calculus, much as it had been, and is, regularly done in arithmetical calculus when we go, say, from

35 This common feature of names and concept-expressions does not obliterate the distinction, which is fundamental for Frege, between objects and concepts. Apart from some strange entities that Frege postulates, such as the True and the False, objects are just any object in the world: chairs, leafs, people, atoms. Concepts, on the other hand, are "unsaturated entities", they are aspects of the modes of presentation of the True and the False that are noticeable when we abstract objects' modes of presentation from them.

36 Also, ideally at least, Frege (and later Russell) thought that the justification of arithmetical proofs could be traced back onto logical axioms and definitions.

"x+1=4x5" to "x+1=20", then to "x=20-1", then to "x=19". If inferences in arithmetic can be drawn like that (just by knowing the rules that govern the symbols by which we express arithmetical equations), and arithmetic is, as supposed, just a branch of logic, then the possibility of Frege's *Begriffsschrift* would indeed be foreseeable. With it, purportedly, every *logical* inference (the recognition and display of logical entailment relations), including those supposedly grounding arithmetical ones, could be drawn by us by merely following, *a priori*, the rules of the system.

Putting his *Begriffsschrift* at the service of logicism required of Frege the additional step of defining the non-logical primitive notions of Giuseppe Peano's precedent axiomatization of arithmetic[37], which were the notions of '0', 'number', and 'successor'. Frege took this step informally, in his 1884 *Grundlagen der Arithmetik*, by arguing that (1) numbers are properties of concepts relative to the multiplicity of concepts' extensions: two concepts are ascribed the same number if an only if every object each one is true of can be paired with one object the other is true of, without rest on the part of either set; (2) the number 0 is the property of all concepts whose extension is the null class; (3) the *successor* of each number, call it 'n+1' is (a number) the property of all concepts whose extensions possess one and only one member more than the extensions of all concepts whose number is n.

Long story short, Frege's *Begriffsschrift* did not do the job (as little as did the further developed symbolic system of his 1893 *Grundgesetze der Arithmetik*, wherein the definitions of *Grundlagen* were properly formalized). In 1901, the like-minded (insofar as logicism goes) mathematician and philosopher Bertrand Russell drew a contradiction from Frege's system.

Crucial for the logicist idea that numbers are properties of concepts is the possibility of ascribing to every concept a definite *extension*: for every "being thus and so" (which, remember, is part of a self-subsisting, non-mental, entity), there must be some set, maybe even the empty set, of things that *are* thus and so. Russell found out that some restrictions ought to be imposed on what sorts of apparently well formed symbolic expressions are indeed expressive of concepts (or "propositional functions", as in the latter's jargon, and with technical differences that will not bother us here). Were there not any such restrictions, we would have to admit that there is such a concept – hence, that there is an extension for such a concept – as

37 Peano's five axioms:

1. 0 is a number.
2. For any x, if x is a number, then the successor of x is a number.
3. For any x, if x is a number, then the successor of x is not 0.
4. For any x and y, if the successor of x equals the successor of y, then x equals y.
5. For any property P, if P holds for 0 and for the successor of any number for which P holds, then P holds for all numbers.

would be expressed by the phrase, 'the class of all classes that do not belong to themselves' ('ß', for short). Suppose that 'ß' denotes a concept, so much as it appears to do. Then, ß belongs to itself, i.e., it *is* a class that does not belong to itself, if and only if it does not belong to itself, and it does not belong to itself, i.e., it is *not* a class that does not belong to itself, if and only if it does belong to itself. This is *not* the same as a concept's being contradictory, as in the case of the concept of "a round square", or of "a married bachelor"; the extension of the latter two is the same, namely, the null class, their number is 0. By contrast, attributing an extension identical to the null class to ß would imply that ß *does not* belong to itself, which in turn would imply that it *does* belong to itself, which in turn would imply that it doesn't belong to itself, and so on. A difference between contradiction, on the one hand, and nonsense, on the other, had clearly been drawn. With it, the difference between applying a rule without reaching the goals you aimed at while doing it (as in contradiction, falsity), by contrast to failing to apply any rule (as in speaking nonsense). It is, therefore, not the initially supposed concept (in the end, there is *no* concept ß), but rather the whole *system* legitimizing under its rules an expression like 'ß' as the expression a concept, that is contradictory and hence collapses.

What the restrictions in formal systems of logic – known as type-theoretical restrictions – proposed between 1903 and 1910 by Russell and Whitehead revealed, therefore, was more than the mere possibility of moving on with the project, the idea, of logicism (a live question, by the way), let alone the need to discuss whether self-referential predicates can sometimes be legitimate or not.[38] The need to impose such restrictions on the formation of legitimate expressions for concepts might itself be interpreted as evidence that "the logician" (rather, the philosopher of logic) must pay attention not only to the rules governing logical entailment relative to propositional form, but also – perhaps, primarily – to the conditions determining situations in which an expression is propositionally *meaningful* in the first place. That is to say, sometimes attention must be payed not to *which* logical relations hold of a meaningful proposition, but rather to whether something *is* a meaningful proposition at all.

The answers provided by Frege and Russell for this question, i.e., what is it that renders anything a means of expressing propositional sense (rather simply, if you will, what ren-

38 Said restrictions, which amounted to subsequent versions of the *theory of types*, were elaborated initially by Russell alone (1903), and later by himself in collaboration with Alfred Whitehead (1910). By virtue of the rules of the ensuing symbolic system (the latter of which is that of the monumental *Principia Mathematica*), the authors aimed at revoking the legitimacy of certain apparent concept-expressions, such as 'ß'. Roughly, what the type (and order) of a predicate determined was the range of objects (or predicates) it *made sense* to attribute it to, as well as the range of predicates it made sense to attribute to itself, such that, for instance, a type 1 predicate's being applied to another type 1 predicate (and, consequentially, "belonging to itself", as in ß) would in general be strictly impossible. See Jourdan (2009) for a dedicated reading of this question, known as that of impredicativity.

ders anything into a proposition), were far from satisfactory. The first was a Platonist, in the sense that the modes of presentation of truth-values, later to be called simply as "thoughts" (*Gedanken*), in the aforementioned anti-psychologistic, logically relevant, construal, would be something else besides either, mental entities, on the one hand, or concrete facts, on the other. Frege could only explain what are these (what *is* propositional sense) with metaphors, such as that of the "Third Realm" (Frege, 1918) in between the facts and the mind. Russell, in turn, was a rather ingenious empiricist, who (in a spirit later to be much praised by logical empiricists) denied Frege's "Third Realm" of propositional sense and deemed its constituents "to be part of the ultimate furniture of the world" to be "known by acquaintance" (Coffa, 1991, pp. 92-93) through some rather mysterious sensitivity of rational beings. He thought that we somehow *perceive* not only symbols, but also their meaning.

For both, Frege and Russell, meanings – or, as Wittgenstein would put it in *Philosophical Investigations*, §432, "what gives life to signs" – would be things, entities, that are "out there" and that are "grasped" somehow by us being in such and such a mental state, then expressed (portrayed, as it were) by means of a linguistic expression. To be *realistic*, and yet disagree with either Frege or Russell with respect to what they said about the meanings of words, is *not* the hardest thing in philosophy. Truth be said, neither Frege, nor Russell purported to talk about language, symbols, semantics (*pace* Alberto Coffa's 1991 otherwise venerable portrait of their ideas). Nor, for that matter, did they directly deepen, in a realistic direction, philosophical reflection about the relation between symbols and what they symbolize (the relation in virtue of which, either through natural languages or by means of formal systems, we express propositions). They purported to talk about *numbers* and about the specific kinds of logical properties in which they thought numbers would consist. Providing numbers an ontological grounding in the sets of cases wherein concepts are true of objects; providing arithmetical statements an ultimate basis of justification in "the laws of truth", was to provide satisfactorily solid, rigorous, foundations for mathematics. Symbolically systematizing logical relations' display was their means for advancing *this* idea: numbers are nothing but logical properties, properties of concepts.

Whereas Russell believed it was sane for a philosopher to think about the relation between symbols and what they symbolize once in every six months[39] (and Frege barely thought of it), Wittgenstein – who is famous for having been brilliant, not sane – obsessed with this relation throughout the whole of his philosophical development. Hence the question Wittgenstein would be obsessed with for such a considerable part of his life: which are the conditions

39 As he states, in his characteristic sense of humor, in his (1918) Lectures on Logical Atomism.

that must be in place for something to be a proposition (hence, for there to be propositional sense; for there to be any relation of logical entailment; for there to be the *possibility of* truth; for there to be reason)? It is not a question that is directly concerned with the foundations of mathematics, but rather a question about the foundations of logic itself.

2.1.1.2.1 The Logical Syntactical View of Propositional Sense

To repeat, then: Russell's discovery that rules should be devised for the use of symbols of a *Begriffschrift*, with the purpose of halting any nonsensical string of words to be taken as meaningful, signaled to Wittgenstein the need of an investigation of what characterized the conditions under which our words have meaning, by contrast to those in which they don't. In addition to this, an illuminating fact for Wittgenstein was that, ordinary language's ambiguities and redundancies notwithstanding, "all the propositions of our everyday language, just as they stand, are in perfect logical order", which implied that the problems to be dealt with in philosophy of logic "are not abstract, but perhaps the most concrete that there are" (TLP, 5.5563). That is to say, however meshed within various other purposes we use words with, the rules we follow for employing words while aiming to say that this or that is thus and so, *are* logically sound rules indeed; propositional sense *is* an actual achievement of ours that is concretized in the manners we use symbols. Perhaps, therefore, meaning itself is not something to which we connect somehow, so that it be in virtue of such a connection that our thoughts and sentences have the meaning they do; perhaps Frege's and Russell's elucubrations about self-standing entities grounding logic are nothing but chimeras, and the difference between sense and nonsense is simply a difference in how symbols are used.

Hence it was that, in sharp contrast to Frege's and Russell's suggestions about it, Wittgenstein's reflections on the foundations of logic were always conditioned upon the fact that the reasoning we, living human organisms, are capable of, *is* thus well founded.[40] This led him to the assumption that the content of a possible judgment, that Frege had reasonably distinguished from acts of judging, might nonetheless be accordingly distinguished from the latter not as a separate entity would be, but rather as an aspect *of* something can be distinguished from itself, which in this case would be the *use* we make of symbols. If only there can be such

40 What I am implying is obviously not that either Frege or Russell fell short of thinking about the fact that we think. I am just stating that their thoughts on this this were far from having been among the greatest of their contributions for the history of ideas.

an aspect which, though belonging to individual symbolic enactments, be as it is only in virtue of individuals' *equally* relating to the same world, then maybe such an aspect is just what the contents of possible judgments amount to, by contrast to whatever subjectively conjoins with it in each case to form an individual's judgment. Maybe, then, no resource to reified contents (or propositional functions and logical objects) will seem to be required in order to explain how we can agree and disagree as to the truth of what we say to one another.

Effectively, as early as when he wrote the *Tractatus Logico-Philosophicus* (TLP), Wittgenstein didn't just assume that propositions are logically composite (though he held, in TLP, 3.3, with Frege, that "only in the context of a proposition has a name meaning"); that propositions are either true or false; that the sense of each proposition is ultimately a function of the reference of the names it contains. All such features of his Tractarian construal of propositions were inherited from Russell, so much as the fact that there is a specifically *propositional* aspect of thought and language to be devised by philosophers was an object of Frege's transmitted realizations. Wittgenstein's most forceful *reaction* was against logicism's rather exuberant, unrealistic, metaphysics of propositional sense (Floyd, 2002), and its consequent failure to account in a non-mythical manner for the place of reason in our lives.

The kernel of his youthful reaction consisted, therefore, in the insistence that propositions are, in their essence, *possibilities for acting* that are given us within certain constraints. Just as there are constraints to follow when baking a cake, there must also be constraints when formulating a proposition. And just as some of those baking constraints hold objectively and universally for all individual cakes, so too must the constraints on propositions hold objectively and universally for every truth-valuable way of acting. Respect for such constraints would accordingly demarcate, among all our possibilities for acting, those that amount to propositionally meaningful uses of signs, by contrast to those that do not. The constraints in question would then be the "subject-matter" of logic: not otherworldly *Gedanken*; not "logical objects" of any sort, but rules within whose jurisdiction alone any depiction of facts is to be constructed.

Featuring propositions as (occasionally actualized, made factual) possibilities for acting allowed some intuitively welcomed conclusions about our knowledge of the sense of propositions. Under certain descriptions, any actualized possibility for acting is known by the agent without the need to observe anything, any further, in order to know, at least under such descriptions, what is being, or has been, done (Anscombe, 1957). Propositions would therefore be known by those who are capable of producing them just as anything that is done intentionally: without the need to observe anything, any further, in order to know, at least under

such descriptions, what is being, or has been, done. Constructing a proposition was equated by Wittgenstein to "making ourselves pictures of facts" (TLP, 2.1), hence representing, either truly or falsely, how it is that things stand in the world. It is the kind of action that is valuable as true: truth is a value we aim at that pertains, if only, to the kind of action that a proposition is, and falsity is the other value it can nevertheless possess. The value – the truth-value – of a proposition is determined by whether the situation it depicts exists in reality, but which situation it depicts depends exclusively on how the propositional sign is being *used* by whoever says (thinks) that such and such is the case. Hence, there are descriptions under which whatever we do say to be the case is known by us without observing ourselves saying it, while observation is only required for us to know the truth-value of what we say. In other words, we know the sense of propositions *a priori*,[41] and therefore it is *a priori* that any claim concerning logical relations between propositions shall be justified.

> Our fundamental principle is that every question that can be decided at all by logic can be decided off-hand. (And if we get into a situation where we need to answer such a problem by looking at the world, this shows that we are on a fundamentally wrong track) (TLP, 5.551)

By the time Wittgenstein wrote the *Tractatus*, only what could be known without observation by the person who intentionally says something (insofar as she did) seemed to him to have any relevance for logic; moreover, of human intentional actions, only those that consist in *saying* (i.e., constructing propositions, making pictures of facts) would be logically relevant. Apparently, as possibilities for acting, propositions would constitute a theoretically isolable repertoire of ours. For the latter reason, although already there we find Wittgenstein taking the grounds of propositional sense to consist in the *use* we make of propositional signs, the sole characterization of such grounding activity found in the *Tractatus Logico-Philosophicus* is as the "logical syntactical" use (TLP, 3.326-3.327) it would be.

That twofold assumption, that (i) propositional sense is the use we make of signs to represent the facts, and (ii) that the use we make of signs to represent the facts is a self-con-

41 Although Anscombe herself makes no explicit mention at all to *a priori* knowledge throughout the whole of her 1957 *Intention*, the consequence of her therein had insight is clear: intentional actions are, under some of their descriptions, known *a priori* by their performers. Stating *p*, whatever situation proposition '*p*' depicts, is an intentional action: it is to (intentionally) *use* the propositional sign of '*p*' for stating (depicting it) that something is the case. Therefore, that a subject S states that *p* is known *a priori* by S under some descriptions of the fact that S states that *p*: precisely, those that are descriptions of the intentional use that is made by S of a propositional sign in order to say something. The sense of a proposition is known, under some descriptions, *a priori*.

tained purpose of ours (only accidentally having jointly with other human purposes made part of the history of natural languages), is also the reason why he thought at the time that logical relations between propositions might eventually be made to show themselves, to be recognized without observation, *am Symbol allein* (TLP, 6.113), i.e., alone in a symbolism which perspicuously display all legitimate sign-uses we may enact to represent the facts. Herein would lie the purpose (the usefulness) of a perfect notation, of a *Begriffsschrift*. All that would be necessary for reaching the complete level of symbolic perspicuity that a perfect notation might offer would be for there to be as many propositional signs available as there are uses (i.e., propositions) to be made of them. Again, if the whole of propositional sense is contained in the *use* we make of signs we have at our disposal for building propositions, which we *know* without observing anything else, then an unambiguous system of signs – to be, of course, intentionally used by us – would presumably enable us to express and understand any propositional sense already expressible in ordinary languages, but transparently, without risking misinterpretation (or misuse).

Take the following as an illustration of this idea. If I say, for instance, "I am getting ready to go to the gym" (p), I am justified *a priori* in saying, "I am changing my clothes" (q).[42] However, the implication ($p \rightarrow q$) has not yet been made recognizable in the symbol alone (*am Symbol allein*). It would take us the effort to *analyze p* as, say, "I am changing my clothes in order to go to the gym", which we might put as, say, '$q\&g$'. In this way we render, as desired, symbolically perspicuous the entailment from p – now analyzed as $q\&g$ – to q.

Although English, just as any other natural language, is one "in which every [propositional] sense can be expressed", it also "disguises thought, so that from the external form of the clothes one cannot infer the form of the thought they clothe" (TLP, 4.002); that is to say, we often make inferences *in spite of* our usual symbols' semantic opacity (we can do it because, again: generally we know how to use these symbols). Still, the same way we can render a bit more perspicuous the logical form (or, what would supposedly amount to the same, the logical-syntactical uses) of p and q, so as, as above, to allow the recognition *in the symbols* used to express the sense of p and q, of the logical entailment between the two, Wittgenstein regarded the (ideal) task of the logician and the philosopher to render symbolically perspicuous the expression of every propositional sense. This task – what amounts to nothing less than logical analysis of language – would consist in the fixation (*Festgesetzung*) of a notation, as well as definitions: "rules for translating from one language into another" (TLP, 3.343). In

42 If asked "Why do you *say* that you're getting ready to go to the gym?", one might answer: "Because I am changing my clothes for doing so."

this, accordingly, every truth-relation (logical entailment, contradiction, or independence) already in place in natural languages would be made plain in the new *Begriffsschrift*. Such a resulting symbolic system, whose range of feasible propositional expression would in the end remain identical to that of any natural language, would nevertheless be the *clearest* means of expression of every propositional sense, and any sentence that revealed itself untranslatable in its terms would thereby be proven to be nonsense.

Every step in the logical analysis of language – which is this rewriting of propositional signs for rendering truth-relations between propositions symbolically transparent – begets new depictions, in a bit more detailed form, of the situations that must obtain for the analyzed propositions to be true. In the example above, we saw the analysis of *p* into *q*&*g* revealing that my getting ready to go to the gym (*p*) involves my changing clothes (*q*) and my going to the gym (*g*), and both *q* and *g* could be analyzed even further into propositional signs that expressed ever more minutely the details of the very situation that is being depicted since the making – the construction, the assertion, the thinking – of *p*. Generally speaking, the truth of any proposition is a function of the truth of those propositions into which it is analyzed, or, equivalently, every proposition is a truth-function of those into which it is analyzed (where x's being a truth-function of y is a transitive, asymmetric relation). It is good to keep in mind, however, that such a "revealing of" truth-functional relations never amounts to an actual discovery of propositional sense; we knew from the start that my "getting ready" to go to the gym implied that I was going to change clothes in order to work out; by analyzing the expression of the proposition, we just made the implication symbolically transparent (or, again, we have rendered it recognizable *am Symbol allein*).

The assumption that the sense of any proposition is always already completely known *a priori* is what supports the conclusion that there must be a final stage for the logical analysis of language; one in which every single detail of the representation that is made is rendered maximally transparent, so that what I do be completely shown in the symbol I use, to anyone else who knows how to use it. In the final stage of logical analysis, the symbolic structure of every proposition would be that of an elementary proposition, a "concatenation of names" (TLP, 4.22) corresponding, name by name, to every object constituting a particular "atomic fact" (TLP, 4.1), and the logician would accordingly dispose of the means for rendering the expression of any proposition of natural language (such as *p* and *q* above) into an explicit display of how its truth and falsity are determined by the existence and inexistence of the atomic fact perspicuously represented by such and such a concatenation of names.

Importantly, the "logical atoms", the "objects" Wittgenstein talks about, imply no choice of his with respect to the finitude of physical or chemical analysis of matter, they are *logical* atoms relative to *logical* analysis. While the "totality of facts" the world is made of (TLP, 1) is a totality of arrangements of worldly objects, each arrangement of which may or may not actually occur (as each proposition may or may not be true), each object composing any possible such arrangement *subsists* whatever be the actually occurring arrangements in the world. Hence, that the signs constituting the elementary concatenations of names denote, one by one, a different object, is a truth-function of no proposition, which is another way of saying that whether a proposition has sense does not depend on whether any proposition is true (TLP, 2.0211). It is the way names are put relative to one other in the propositional sign that determines what precisely the sense of the proposition is (TLP, 2.1515, 3.23).

Independence from whatever be the case is the only feature rendering such logically simple objects "the substance of the world" (TLP, 2.02-2.021). In and of themselves, objects are characterized simply through the whole set of situations (*Sachlagen*) in which they *can* occur as constituents (TLP, 2.01-2.063). This space of possibilities of taking part into configurations with other simple objects is all there is to each simple object's "nature" (TLP, 2.0123), but all such a "nature" amounts to is the whole set of situations wherein it *can* be depicted in a proposition. Therefore, *of* said substance of the world "[a] proposition can only say *how* [it] is, not *what* it is" (TLP, 3.221).

The reason for Wittgenstein's having postulated this final stage of logical analysis – and the corresponding "subsistence" of objects – is nothing short of transcendental. Objects' subsistence is what implies that propositional sense – the *possibility* that a representation of facts be true – be completely determined *a priori* (TLP, 3.23, 5.551). *Because* otherwise we would have to walk into the "fundamentally wrong track" (5.551) of observing the world in order to know what is the representation that we ourselves are making, the sense of any proposition cannot not depend on the obtainment of any fact; it must be *completely* shown in the course of logical analysis. Seemingly, then, either there are elementary propositions or making any such representation in the first place is impossible (TLP, 2.0212).[43]

43 "Russell's greatest merit", Wittgenstein writes, "is to have shown that the apparent logical form of the proposition need not be its real form" (TLP, 4.0031). Russell (1905) shew that apparently "denoting phrases" – such as 'the teacher of Aristotle', but also regular names, such as 'Plato' – might, despite appearances, contribute to the sense of a proposition as a quantified existential statement regarding some predicates, plus a uniqueness clause; *not*, therefore, as a properly *denoting* symbol, a tag, a name. The "logically proper names" would appear not in the natural languages, but only in the rendering of the latter's propositions into their completely analyzed forms. Importantly, while the empiricist Russell thought that "logically proper" names would finally denote things whose inexistence cannot be *conceived* (Russell, 1905; 1918), Wittgenstein took the care of letting this epistemological caveat out of his own construal of simple objects (even though, as I have been arguing in the text, epistemological considerations regarding propositional

This is certainly among the most important ideas of Wittgenstein's (the *Tractatus* considered alone) to the nascent empiricist enterprise of the 1920's. Wittgenstein's characterization of propositions as possible actions to be performed according to "logical syntax" amounted to his (explicitly argued for) construal of a proposition's *possible truth* as its mere availability in the legitimate logical syntactical repertoire, in the completely determined system of symbols whose use obey a logical syntactical order, and are thus reducible to truth-functions of elementary propositions (TLP, 5; 5.555). Elementary propositions are concatenations of elementary symbols, names, which stand directly for things whose existence is transcendentally warranted, and each such concatenation represents one among all possible configurations that subsisting objects can assume with one another. There would be an isomorphism between language, thought, and the world itself, which would define the only logically admissible construal of "possibility" philosophers should be concerned with: the possibility for a constructed representation of facts to be true (thus, for a given arrangement of objects to obtain). Whereas whatever is said or thought to be the case can be either true or false, this is matched by the world by the *a priori* unknown existence or non-existence, of each state of affairs that "the substance of the world", whatever this is, can constitute as an atomic element, a named object (TLP, 4.023, 4.032, 4.1, 4.2). Consequentially, whether a proposition *can* be true is a meaningless question; if it *is* a proposition, then we already know, it *shows* itself, what is the case if it is true (TLP, 4.12-4.1212, 4.2; 5.525). No fact's obtainment would be knowable *a priori*, but every state of affairs should be representable; every proposition, *doable* independently of what is actually the case. The logician's activity should, without looking at how things actually stand in the world, "take care of itself" (TLP, 5.473). She should carry out her activity in the certainty that, in her doing so, she would do no less (and no more) than to pay attention to the reflection in language of everything that *can* be the case in the world. The task of such an intellectual endeavor is not, therefore, to *state* any proposition, to *say* anything; there are no "logical facts" to be represented. Rather, its function is to make clear – i.e. symbolically perspicuous – the interconnections between members of a peculiar set of possible intentional actions: propositions, so as to systematize, and thus to elucidate their expression (TLP, 4.112). If all there is to logic is to regiment and elucidate the symbolic expression of propositions as to their truth-functional relations, then "logical constants [i.e., symbols for quantification, conjunction, disjunction, material implication, etc.] do not represent" (TLP, 4.0312): they are mere punctuation marks (TLP, 5.4611) that appear in such a rewriting of our propositions into a perspicuous symbolic system.

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sense were absolutely central to him as well).

Wittgenstein's philosophies of logic and mathematics were thus clearly distinguishable from, and in fact utterly opposed to, that of logicism. The latter pictured logic precisely as the *science* of logical facts; logical facts, as are determined by the extensions of concepts (or propositional functions), among which would be the concepts (or propositional functions) represented by logical constants. Arithmetical truths, in turn, would be of a kind with logical facts. As Wittgenstein would explain to one of the members of the Vienna Circle, Friedrich Waismann, in the late 1920's, what he himself was putting in place of the logicist construal of logic and mathematics,

> Frege rightly opposed the view [hereby referred to as "formalism", which was the mathematician David Hilbert's view on the foundations of mathematics] that the numbers of arithmetic are signs. The sign '0', after all, does not have the property that when added to the sign '1' it gives the sign '1' as a result. In this critique Frege was right. But he did not see what is justified in formalism, that the symbols of mathematics are not signs, and yet they have no 'meaning' (*Bedeutung*). For Frege the choice was as follows: either we are dealing with ink marks on paper, or else these ink marks are signs *of something*, and what they represent is their meaning. That these alternatives are wrongly conceived is shown by the game of chess: here we are not dealing with the wooden pieces, and yet these pieces do not represent anything – in Frege's sense, they have no meaning. There is still a third possibility; the signs can be used as in a game. (Waismann, *Wiener Kreis*, p. 105, *apud* Coffa, 1991, p. 312)

For Wittgenstein, neither logic, nor mathematics would be (properly called) sciences, i.e., neither one would consist in an inquiry into any domain of facts. It would be right to call them studies of symbolic properties, if only after the caveat that symbols (in particular, propositions) are studied *qua* possible actions, not actual facts, so "symbolic properties" in question must refer to the manners of correct propositional comportment, as in a game. Hence the centrality for Wittgenstein, in the *Tractatus*, of symbolic *operations* (instead of conceptual extensions) when dealing with logic and mathematics. In general, for him, an operation simply characterizes an iterable difference between symbolic forms (TLP, 5.241). Accordingly, numbers would be exponents of the (potentially infinitely iterated) application of any kind of formal (i.e., symbolic) operation (TLP, 6.021), such as the operation of adding one more variable to the scope of an existential quantifier, as in "$\exists(x, y, z, \ldots)$". Mathematical propositions would be equations, hence pseudo-propositions that would merely *display* (not represent) an abstract identical exponentiality of formal-operation applications flanking the identity-sign. For instance, "2+1=3" would abbreviate "Ω^2'Ω'# = Ω^3#"; that is, simply put, a display of how

iterating once more an operation already twice iterated upon some one expression is the same as iterating thrice the same operation upon said expression. Equations would express *no* thoughts, *no* pictures of facts, at all (TLP, 6.2-6.21), hence falling short of, strictly speaking, actual candidacy to either truth or falsity. The propositions of logic, on their turn, would be necessarily true, though not by virtue of representing any necessarily obtaining facts, but rather simply by displaying the logical sum of the only two possible truth-values of any proposition, true and false. They would be tautologies (TLP, 6.1), all equivalent to p V $\sim p$: the outcome of applying not just any kind of operation, but rather specifically a *truth*-operation, which is applicable but to legitimate, bipolar, propositional signs, in such a way as to render the resulting expression a representation of the entire logical space, the "scaffolding of the world" (6.124).[44] It is not by the experience of comparing a tautology to the facts, but rather by the operational inspection of the logical properties of the *symbol*, that we verify it (TLP, 6.1222; 6.126); therefore, the necessity with which a tautology is true falls short of being informative about *how* the world is, if only (because it presupposes that the propositions they are constructed upon have sense, and the names composing the latter have reference) *that* the world is (TLP, 6.124; 6.44). For Wittgenstein "mathematics is a method of logic" (TLP, 6.234), not because in his opinion there would be any sense in which logicism is true, but rather because mathematics is a method for obtaining operational, hence practical, knowledge, concerning the application of any kind of formal operation, whereas logic is a method for obtaining practical knowledge concerning the application of a *truth*-operation to propositions.[45]

And yet, Wittgenstein's philosophies of logic and mathematics were also clearly distinguishable from Kant's. That is, if only in the (crucial, for empiricists) respect that Wittgenstein did not rely on pure intuitions to explain mathematical knowledge-construction. "To the question whether we need intuition for the solution of mathematical problems it must be answered that language itself here supplies the necessary intuition." (TLP, 6.233). It is just the experienced intentional action of calculating that we need to build up mathematical knowledge. And this is done in order to obtain, from propositions that do not belong to mathematics, others that lie equally outside of it (TLP, 6.211). Hence, there is no function to be played by the transcendental (and often sub-personally operating) categories of the faculty of understanding, that bring about the required intuition for mathematical understanding (TLP,

44 Wittgenstein conceived of a single truth-operation, of the form $N(\bar{\xi})$, whose application is equivalent to the joint denial of all of a specified set ($\bar{\xi}$) of propositions. He also demonstrated how classical logical connectives for expressing conjunction, disjunction, classical negation, and conditional, can be dispensed with for the use of the N operator alone. Thus, for instance, 'p V $\sim p$' can be expressed as 'N'((N'p), p))'.

45 For a thorough treatment of Wittgenstein's account of numbers as exponents of operations, and his reduction of logical connectives to one truth-operation, see Frascolla (2004), as well as Cuter (2005).

6.2331). Moreover, Wittgenstein severed questions about the foundations of logic from questions about "the origin of ideas", relegating all theory of knowledge to the philosophy of psychology (TLP, 4.1121): the essence of any proposition is that it be ultimately analyzable into a concatenation of names (TLP, 4.22), and in a concatenation of names concept-expressions (something like 'Fx') do not even appear. Therefore, there is no beckoning in the TLP at the idea that experience is anyhow informed, constituted, by concepts; on the contrary, experience is to be *compared* to symbolic representations *only within which* concepts can be devised, simply, as variable symbolic expressions (TLP, 3.3-3.318), the empirical sciences providing the most developed paradigms of well-formed, *Sinvoll*, propositions (TLP, 6.53).

If a question remains as to how could logicism and the Tractarian philosophies of logic and mathematics be integrated as logical empiricists purported to do, the answer is that there is a way to construe Wittgenstein's Tractarian views on logic and mathematics as, broadly speaking, of activities that are simply *likewise regulative* over the representational use of signs. This is, of course, to disregard the differences delineated by Wittgenstein himself between logic and mathematics in their respectively appointed regulative roles over the expression of propositions. Still, in the end, the important thing for philosophers of an already empiricist vein was to integrate "the contribution of pure reason to human knowledge (in the form of logic and mathematics) … into the empiricist framework" (Uebel, 2024, sec. 2.3), preferably in the spirit of disavowing any kind of metaphysical speculation. Just that is achieved by stressing it that it is one thing to state a proposition, whose sense lies in its possibilities of agreeing and disagreeing with the facts, and *another* to display (to teach, to learn, to train in) the symbolic rules that are to be followed if a proposition is to be constructed at all. For Wittgenstein, stating that "John has five, and Paul has seven grapes in his hands, so together they have ten grapes in their hands" is *nonsense*, not false, because it cannot be expressed as a truth-function of any set of elementary propositions. It is analogous to stating that John is one of those barbers who shave all those, and only those, who do not shave themselves[46], it is *not* analogous to stating that John is an unmarried bachelor. Accordingly, the making of a merely contradictory representation, such as the latter, *is* to comply with the rules of logic (it is, in fact, to make a representation, except that there can be no situation whose occurrence would render it a true one, and therefore it is necessarily a false representation, senseless, but not nonsense). For the rules of logic do not rule out the possibility of making false representations; what the transgression of these rules ensue is that no representation at

46 The pseudo-concept of a barber "who shaves all those, and only those, who do not shave themselves" is an illustration of Russell's aforementioned paradox concerning ß.

all be made, the same holding for the transgression of mathematical rules in an attempt to build a proposition.

"Only *lawful* connections are *thinkable*" (TLP, 6.361), there can be no such thing as an illogical thought (TLP, 3.02-03, 5.4731). In its logical syntactical view of propositional sense, Wittgenstein's *Tractatus* would resonate with twentieth-century empiricism's *values*, if only as to the promotion of a *Wißenschaftliche Weltauffaßung* (a scientific world-conception) freed from all metaphysical speculation, charged with the single task of clarifying the symbolic means of expression of empirically attestable facts. If "there is only *logical* necessity" (TLP, 6.37), and by such it is meant that the only necessity there is is that of complying with the logical-syntactical rules for the use of propositional signs, then there is nothing to be meant by any notion of "metaphysical necessity", let alone the apodictic certitudes of Kantian transcendental philosophy.[47]

As Michael Friedman (2012) explains, the Vienna Circle echoed an opposition made much earlier, in the mid-nineteenth century, against the German Idealist tradition that, in the works of Fichte, Schelling, and Hegel, succeeded Kant's transcendental philosophy, but detached itself from the latter's praise for, and attention to, scientific knowledge. Hermann von Helmholtz (already mentioned in sec. 1.1.3 as one of the great-fathers of the cognitive sciences) defended, at the time, a return to Kant's praise of science, and put forward the idea of erecting a "scientific philosophy". However this time at the expanse of transcendental philosophy, and in line with middle- to late-nineteenth century attempts at prioritizing experimentation over hypotheses-formulation as the main trait of "the scientific method" (Cowles, 2020), a defense of philosophy's approximation to (if not of philosophy's putting itself entirely at the service of) the work of the empirical sciences was once again in the agenda proposed by the Vienna Circle.

47 Both Wittgenstein and (as we see below) the logical positivists have purportedly delimited the sphere of propositional sense, of reason, inside the activity of depicting possible arrangements of things into facts; both have identified in scientific discourse (and notation) the clearest means for the conveyance of propositional sense thus construed. So much so for how they resonate with each other, however, Wittgenstein and the logical positivists. As Paul Engelmann (1968, p. 97) vividly summarized the contrast between them,

> "A whole generation of disciples was able to take Wittgenstein for a positivist because he has something of enormous importance in common with the positivists: he draws the line between what we can speak about and what we must be silent about just as they do. The difference is only that they have nothing to be silent about. Positivism holds — and this is its essence — that what we can speak about is all that matters in life. *Whereas Wittgenstein passionately believes that all that really matters in human life is precisely what, in his view, we must be silent about*. When he nevertheless takes immense pains to delimit the unimportant, it is not the coastline of that island which he is bent on surveying with such meticulous accuracy, but the boundary of the ocean." (emphasis in the original).

> In 1921, the centenary year of his birth, Helmholtz's scientific achievements, in energetics, physiological psychology, the foundations of geometry, electrodynamics, and epistemology, were celebrated in a variety of memorial addresses, journal issues, and monographs. One especially important address, entitled "*Helmholtz als Erkenntnistheoritiker*," was presented by Moritz Schlick at the University of Berlin. Schlick had earlier earned a doctorate in theoretical physics under Max Planck at Berlin, but soon thereafter decided to pursue a career in philosophy instead. Schlick then became the leading philosophical proponent and expositor of Einstein's new theory of relativity with the publication of his extremely influential monograph, *Space and Time in Contemporary Physics*, which went through four editions between 1917 and 1922. In 1922, largely on the strength of his work on the philosophical significance of the theory of relativity, which had been enthusiastically endorsed by Einstein himself, Schlick was named in 1922 to the Chair for the Philosophy of the Inductive Sciences previously occupied by the scientists Ernst Mach and Ludwig Boltzmann at the University of Vienna, where he became the leader and guiding spirit of what we now know as the Vienna Circle of logical positivists. (Friedman, 2012, p. 2)

Much inspired by Wittgenstein's closing remark, "Whereof one cannot speak, thereof one must be silent" (TLP, 7), the official *manifesto* of the Vienna Circle, published in 1929, was a call to (philosophical) arms in defense of such a scientific world-conception, "not only free from metaphysics, but *opposed to* metaphysics" (p. 304, emphasis added). Rudolph Carnap, Hans Hahn, and Otto von Neurath, in their *manifesto* expressed rather distaste for foundational questions than disposition to settle them anyhow. They clearly purported to comply with Wittgenstein's proposed *method* for sound philosophical thinking.

> TLP, 6.53. The correct method in philosophy would really be the following: to say nothing except what can be said, i.e. propositions of natural science – i.e. something that has nothing to do with philosophy – and then, whenever someone else wanted to say something metaphysical, to demonstrate to him that he had failed to give a meaning to certain signs in his propositions. Although it would not be satisfying to the other person—he would not have the feeling that we were teaching him philosophy – *this* method would be the only strictly correct one.

For one, Carnap's (1932) *Überwindung der Metaphysik durch Logische Analyse der Sprache* ("Elimination of Metaphysics through Logical Analysis of Language") was as faithful an application of this method as we might have got. In it, Carnap famously questions his contemporaneous, the phenomenologist Martin Heidegger's, treatment of the word 'nothing' as a *name* for an assumed entity, "the Nothing", which has amounted to the latter's ludicrous assertion that "the Nothing nothings" (*das Nichts selbst nichtet*) (Heidegger, 1929, *apud* Carnap, 1932, p. 984). Carnap critiques this assertion, not by questioning its truth-value, i.e., by

denying it (for it can only be denied that which has a propositional sense), but rather by purportedly demonstrating that "he had given no meaning to certain signs in his propositions." Carnap's way of demonstrating this was the following, simple one. Since regularly meaningful uses of the word 'nothing' (as well as '*nichts*', '*niente*' '*rien*', '*nada*'…) in natural languages always translate into predicate-calculus symbolism – thought of by him as the absolutely clearest, ideal symbolism – as the employment of a quantifier and a sign for negation (if not, as in the TLP, by joint-negation operators), then Heidegger's intention to treat 'nothing' ('*Nichts*') as a denoting phrase is doomed to failure as propositionally meaningful discourse. According to Carnap, if anything be felt to be lacking in the propositional sense conveyed by "$\sim\exists(x)P(x)$" relative to, say, "I hate nothing", then the missing part can only be some "attitude" or "sentiment" towards life (*Lebenseinstellung*, *Lebensgefühl*) therein perhaps indeed expressed, but that no cognitively valuable – hence, accordingly, propositionally meaningful – linguistic expression could convey.

> Our claim that the statements of metaphysics are entirely meaningless, that they do not assert anything, will leave even those who agree intellectually with our results with a painful feeling of strangeness: how could it be explained that so many men in all ages and nations, among them eminent minds, spent so much energy, nay veritable fervor, on metaphysics if the latter consisted of nothing but mere words, nonsensically juxtaposed? And how could one account for the fact that metaphysical books have exerted such a strong influence on readers up to the present day, if they contained not even errors, but nothing at all? These doubts are justified since metaphysics does indeed have a content; only it is not theoretical [i.e., propositional] content. The (pseudo) statements of metaphysics do not serve for the *description of states of affairs*, neither existing ones (in that case they would be true statements) nor non-existing ones (in that case they would be at least false statements). They serve for the *expression of the general attitude of a person towards life* ("*Lebenseinstellung, Lebensgefühl*"). (Carnap, 1937, p. 988, emphases in the original)

Metaphysics, then, does not provide us with either true descriptions (of extant states of affairs), or false descriptions (of non-extant states of affairs). Interestingly, the contrast with propositionally meaningful discourse (description of either existing or non-existing states of affairs) is made against *attitudes towards life* ("*Lebenseinstellung, Lebensgefühl*"), implying it that the latter is *not* subject to propositionally meaningful discourse. Indeed, one page after the excerpt quoted above, Carnap describes metaphysicians as "musicians without musical ability": attitudes towards life, sentiments, aesthetic appreciations, were all deemed by logical empiricists as of another kind of thing than states of affairs would be; expressing them would not amount either to true or to false statements. Inheriting (and, in fact, reinsufflating) the

modern predicament of "having realized" that the intuitive ontology of natural purposes, substantial entities, essential and accidental properties, and the like, was as a whole to be left aside (as expressions of the "original sin" of human intellect) in favor of all-encompassing taxonomic structures that scientific endeavor advanced in order to describe and explain what they supposed to be the unique general mechanism of the whole of reality, the logical empiricists, together with a centuries-old philosophical tradition preceding them until Wittgenstein's *Tractatus*, continued the effort to bring about a worldview that was distilled from all rests of an intuitive manner of describing reality. For them, however, the touchstone with the right-headed way of thinking provided by science was avowal by the sensibly – not sentimentally – given, which is never to ground any such phrasing as "*das Nichts selbst nichtet*"[48].

Carnap's (1937, §17) "*Principle of Tolerance: it is not our business to set up prohibitions, but to arrive at conventions*", in spite of suggesting the contrary, is illustrative of this resolute rejection of "philosophical gibberish" (Coffa, 1991, p. 307), and, at the same time, the expression of one of the most significant breaches of Carnap's and others in Central Europe's circles of discussion, relative to the ideas of Frege, Russell, *and* Wittgenstein about propositional sense. Carnap held fast to Wittgenstein's neat severance between the exclusively symbolically regulative, hence non-representational, role of equations and tautologies, on the one hand, and meaningful, contingently-either true or false, propositions, on the other. He *did not* abide, however, for Wittgenstein's distinction between the respective regulative roles of logic and mathematics, treating them instead as equally tautological, hence senseless (*sensu* TLP), and, only in an unrecognizable fashion (for logicist standards), as equally analytic, true, propositions. Finally, at the core of his Principle of Tolerance, Carnap appears to have rejected Wittgenstein's distinction between what is arbitrary (hence, contingent) and what is essential (hence, necessary) *in* logic (TLP, 6.1232, 6.124). He agreed with Wittgenstein that "where we can build symbols according to a system, there the system is the logically important thing and not the single symbols" (TLP, 5.555), but seemingly accepted, contrary to Wittgenstein, that we "have to deal with forms in logic that [we] can invent", no question about "that which makes it possible for [us] to invent them" (*Ibid*).

48 Because I tend to agree that "*das Nichts selbst nichtet*" can hardly be the clearest manner of expressing any thought, it should be clear that the criticism I am implying in the text, with respect to the strictures of logical empiricism, regards their purported reasons for devising meaningfulness from meaninglessness across instances of word-usage. As will become clear below in this chapter (sections about the *Philosophical Investigations* and *On Certainty*), there are some "metaphysical statements" that indeed stretch the use of words beyond the limits only within which this use is made amenable to response in an interaction. It is precisely on the basis of affects and attitudes that are enacted collectively, though, and not on the basis of logical syntactical rules and "sense-data", that the dividing line is to be imagined between meaningfulness and meaninglessness across different instances of word-usage.

> *In logic, there are no morals*. Everyone is at liberty to build up his own logic, i.e., his own form of language, as he wishes. All that is required of him is that, if he wishes to discuss it, he must state his methods clearly, and give syntactical rules instead of philosophical arguments. (Carnap, 1937, §17)

With such a conventionalist view of logic (hence, it is good to keep in mind, of propositional sense), Carnap was far from considering the possibility of accepting the logical legitimacy of any sort of "metaphysical systems" that proliferated around Europe after German Idealism. Any legitimate convention would acquire its credentials from the role – if any – it played in the work of scientists. Rather, therefore, Carnap's "tolerance" was intended to make room for *changes of linguistic framework* in the empirical sciences. These were taking place in a dazzling form in the 1920s and 1930s, in scientific revolutions such as the Einsteinian revolution, and that of quantum-mechanics, in Physics, the Darwinian-Mendelian synthesis in Biology, and behaviorist Psychology.

Let us take an example of a scientific term, say, 'mass', as it is used in Physics. According to the logical-syntactical use-doctrine of meaning, the reference of scientific terms, such as 'mass', is surrogate to the definitions of that term that are upheld concomitantly with their use. As a consequence, it is impossible to hold it that the uses of 'mass' that are made while assuming either, Newtonian or Einsteinian dynamics, will be co-referential. Since 'mass' is, in each case, inter-defined together with other theoretical terms, such as 'space', 'time', etc., and differently so in each case, reference-substitution in scientific revolutions like that one would be a phenomenon that spreads throughout the entire substituting network of theoretical terms that happens to share some of the latter with the replaced network. In a word, for a logical-syntactical use-doctrine of meaning "it is the system that matters"… for determining reference.

Carnap's serves here but as an illustration of a reflection that has been attentive to this problem since already before Kuhn's. Lost in time, already by the 1920's, had become the (Kantian) age in which the *a priori* exercise of reason might have been thought to beget general principles that be necessarily validated by all possible experience (in fact, as seen, the weakening of such a fantastic worldview having begun already with the development of non-Euclidean geometries in the previous century). In general, philosophers had now to account for the fact that the best examples we have of scientific taxonomic systems for describing natural phenomena, with the highest symbolic perspicuity that predicate calculus can offer, were

also, just as any taxonomic system we may ever build, subject to potential *replacement* dictated by the uncovering of facts.

For Carnap, what this amounted to was, first, that there is no meaningful way to speculate over the truth-value of a proposition considered apart from any particular linguistic framework, any particular "system of symbols" with its own "logical syntactical" rules. Second, he saw himself compelled to the conclusion that there is no feature, either of the world as it presents itself to us, or of the symbolic systems that scientific communities employ, which determines which of any two linguistic frameworks is the best one to adopt.

The grounds of convention – any thus "tolerated" linguistic convention – lie in convenience: a sentiment, or attitude, that is therefore beyond the scope of meaningful reflection. The sense of any proposition is relative to the taxonomic system to which it belongs; the validity of any argument, to the rules of substitution for statements that be formulated by means of said system. Legitimacy of any such system – and, by consequence, of its employment's motivating attitude – stems from its usefulness in conducting empirical work, whereas empirical work does not include comparison between linguistic frameworks and respectively upheld emotional attachments. Therefore, there is seemingly no valid argument to the effect that Einstein, not Newton, is absolutely *right* in his answering what the mass of a body is, however incompatible their answers would be from each other's point of view. "What the mass of a body is" is a question possessing one definitely right answer in the Einsteinian linguistic framework, and *another* definitely right answer in the Newtonian linguistic framework.

For the same reason that Carnap's framework-relative understanding of propositional sense can be distinguished from the later problem of theoretical incommensurabilities introduced by Kuhn (1962), the shift represented by the Principle of Tolerance, particularly in relation to Wittgenstein's philosophy regarding the essence of logic (TLP, 5.555), might also be interpreted as a superficial difference. This shift reflects Carnap's emphasis on a pragmatic, rather than strictly philosophical, approach. At bottom, as an empiricist, however, Carnap regarded the cognitively valuable input of sense-experience to be (at least regardable as) homogeneous across individuals; hence, irrespective of the linguistic frameworks these individuals adopted. Therefore, successive linguistic frameworks in the history of the same field of inquiry, as in the Newtonian-Einsteinian transition, would in fact be the ameliorations of the linguistic means scientists develop for organizing and systematizing the expression of the whole amount of facts that are observable, by all those who comply with and apply the linguistic conventions in force at each moment. Hence, at least with respect to the total record of scientific experimental efforts, framework-substitution did not obscure scientific progress so as to

make it seem like a succession of disruptive substitutions of observed phenomena. As a consequence of presupposing such a bottom-line homogeneity of experience, empiricists envisaged be the possibility, to be worked on by philosophers concomitantly to the experimental work of scientists, of constructing a *single* linguistic framework for *all* scientific fields. Such would be the linguistic framework for most meticulously describing the sense-experience that is ultimately targeted by all different scientific taxonomies either paralleling or succeeding each other. It is ultimately in *these* terms, empiricists believed, that the specifically propositional, properly representational, aspect of language should hopefully get to be expressed. The expectancy of a forthcoming unification of all sciences was thus ingrained in the Vienna Circle's proclaimed scientific world-conception.

> The scientific world-conception is characterized not so much by theses of its own, but rather by its basic attitude, its points of view and direction of research. The goal ahead is *unified science*. The endeavor is to link and harmonize the achievements of individual investigators in their various fields of science. From this aim follows the emphasis on *collective efforts*, and also the emphasis on what can be grasped intersubjectively; from this springs the search for a neutral system of formulae, for a symbolism freed from the slag of historical languages; and also the search for a total system of concepts. Neatness and clarity are striven for, and dark distances and unfathomable depths rejected. In science there are no "depths"; there is surface everywhere: all experience forms a complex network, which cannot always be surveyed and can often be grasped only in parts. Everything is accessible to man; and man is the measure of all things. Here is an affinity with the Sophists, not with the Platonists; with the Epicureans, not with the Pythagoreans; with all those who stand for earthly being and the here and now. The scientific world-conception knows *no unsolvable riddle*. Clarification of the traditional philosophical problems leads us partly to unmask them as pseudo-problems, and partly to transform them into empirical problems and thereby subject them to the judgment of experimental science. The task of philosophical work lies in this clarification of problems and assertions, not in the propounding of special "philosophical" pronouncements. The method of this clarification is that of *logical analysis*. (Carnap, Neurath, and Hahn, 1929, p. 306, emphases in the original)

With the exception of the reference to the *collective efforts* of scientific communities, which were of no particular interest to Wittgenstein, all the (originally) emphasized phrases in the above excerpt – *unified science*, *no unsolvable riddle*, and *logical analysis* – are traceable to the thoughts contained in the *Tractatus Logico-Philosophicus*. There would be rest, however, in any attempt to reduce logical empiricists' broadly shared doctrines to mere consequences of those thoughts. For Wittgenstein, the sense of a proposition would be the depiction it made, or, equivalently, the fact that obtains *if* it be *true* (TLP, 4.024).

His criterion of propositional meaningfulness being that of a symbolic construction's representing the obtainment of a fact, the direction of logical analysis envisaged by Wittgenstein was one of devising ever more detailed forms of constructing depictions of exactly the same fact's obtaining, a *truth*-functional analysis, until we end up with the symbolic means of constructing all possible concatenations of names as elementary propositions (and in *this* sense also "unifying" *the* propositional repertoire). No *evidence* supporting the truth (or falsity) of a proposition was taken by Wittgenstein to bear any relevance to clarify the sense – nor, thereby, the logical relations – of any proposition (TLP, 5.1362).

Empiricists, by contrast, saw themselves as going pragmatic – realistic, perhaps – with regards to Wittgenstein's Tractarian elucidation of the ultimate logical structure of propositions, so as to account for elementary – also called "atomic" – propositions as nothing but the most detailed depictions of every possible instantaneous *observation of* a fact. Speaking of the reading of the *Tractatus* he shared with his comrades, Carnap (1932, p. 19) explained that "Their modifications can be summarized as the rejection of the substratum of atomic facts while preserving Wittgenstein's insistence of the importance of logical structure. The theory of atomic statements is replaced … by the theory of the … direct record of experience."

Such a modification was not so easily explicated, however. One of the Vienna Circle's most central, and yet also most internally debated and revised philosophical projects consisted precisely in elucidating the "empiricist criterion of meaningfulness" – also readable as: the empiricist criterion of propositional sense – to sharply divide, in an empiricist fashion, meaningful statements from either "metaphysical nonsense" or analytic statements.

First, there was verificationism: the empiricist criterion of meaningfulness for a statement outside either logic or mathematics was conceived as that such a statement be ultimately reducible to conjunctions and disjunctions of other statements (the latter being variably called "protocol statements", "observational statements", and the like) that be immediately *verifiable*, confidently taken to be true, by anyone finding herself in identical instantaneous experimental circumstances. The ultimate grounds of propositional sense would be statements such as "here, now, blue; there, red" (Carnap, 1932, p. 46), and it was believed by logical empiricists – as, again, exemplified in Carnap's (1928) *Der Logische Aufbau Der Welt* – that, if only the verification-relations between statements belonging to any extant scientific theory were sufficiently analyzed, the necessary outcome would be the demonstration of the unity of all scientific fields. Such a unity would be grounded in a unique form of elementary, "protocol" statements: detailed reports of minimal qualitative elements of a moment's experience.

That is to say, Carnap and many other logical empiricists complied with the Tractarian proposal of delimiting at least two neatly separated repertoires in the total range of uses of signs that we can make: the propositional, bipolar, repertoire, on the one hand, and the regimenting, non-representational, repertoire, on the other. But the propositional repertoire was taken by the empiricists to be grounded, not in the mere "existence and non-existence of atomic facts" (TLP, 4.1), but rather in the availability of methods of conclusively *attesting* the truth, as well as of methods for conclusively *attesting* the falsity, of statements picturing the (chromatic, sonorous, etc.) qualities of a moment's experience in maximally detailed form. This implied that "in order to have sense, a statement must be verifiable in (my) experience, i.e., the words of which it is composed must be definable in terms of words which refer to (my) *immediate* experience" (Carnap, 1932, p. 15, emphasis in the original).

Later, however, verifiability came to be seen as too stringent a criterion for meaningfulness; after all, it kept making sense to echo Hume's *Enquiry Concerning Human Understanding*: "That the sun will not rise tomorrow is no less intelligible a proposition, and implies no more contradiction, than the affirmation that it will rise." The new, "logical", empiricism of the twentieth century did not rectify its old father's realization regarding the logical illegitimacy of drawing conclusions about the general subordination of predicates ($\forall x(Fx \rightarrow Gx)$) after observing their regular co-instantiation (Fa&Ga; Fb&Gb; Fc&Gc; …). And the expression of the problem with modern predicate-calculus symbolism did not hold the problem concerning general predicate subordination from spreading over even singular statements. Not only the general subordination of predicates in scientific law-like statements would be unverifiable (because not all space-time points over which the latter range are observable), but, since any predicate's correct application (save atomic ones') could only be established by means of definitions constructed by means of universally quantified statements, even the sense of singular statements like "there is a white sheet of paper on this table" would be reliant on unverifiable hypotheses, and hence be, strictly speaking, unverifiable themselves (Carnap, 1937, §3).

The supposition, as always, was that whatever there is of cognitively meaningful in even a singular statement like this can only be transparently recognized in the course of logical analysis. The "camouflaged" rationality of regular propositional discourse which is to be justified on the basis of sense-experience lies in the implicit, yet to be philosophically elucidated, general subordination of predicates like "to be a sheet of paper", to others, and these to further ones, so that uncertainty with respect to inductive inferences spreads onto the verification of un-analyzed singular statements as well.

Finally, then, *possibility of conclusively verifying* a statement was replaced as the empiricist criterion of meaningfulness by *possibility of increasingly confirming* it. The respective direction of logical analysis for any supposedly truth-valuable statement would, by then (such as in Carnap's 1937, *Testability and Meaning*), be taken as going towards further truth-valuable statements, the latter of which describing the experiential conditions in which the former would be successfully *tested*, even if inconclusively so. The measure of the test's success, as well as the measure to which the statement is to be regarded as either confirmed or disconfirmed, would be the degree of confidence in such variable testing conditions for indicating the truth and the falsity of the statement. Just as before, with Wittgenstein's truth-functional analysis, and later, with the verification-conditions analysis, what the purported direction of logical analysis indicates in the case of the confirmation-conditions theory of meaning is the kind of statement to whose meaning the meaning of others can be *reduced*.[49]

In the *Tractatus*, logical analysis of any natural-language proposition was supposed to end in an elementary proposition, the representation of a way certain objects would be configured relative to one another, quite independently of methods for either verifying or confirming it. Both in the *Aufbau* and in *Testability and Meaning*, logical analysis allegedly had to end in representations of maximally detailed phenomenological features – sentiments and attitudes apart – of an instantaneous observation of facts. What changed from the one to the other in this respect was that such a final stage of logical analysis came to be conceived of as the ultimate confirmation-bases, not verification ones, for all less analyzed forms of propositional discourse. In *Testability and Meaning*, "if confirmation is to be feasible at all, this process of referring back to other predicates must terminate at some point. The reduction must finally come to predicates for which we can come to a confirmation directly, i.e., without reference to other predicates" (Carnap, 1937, §12).[50]

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49 Carnap's (1937, §12) *Definition 16* (corrected according to the author's wishes as expressed in an added note from 1950) would read: "A *sentence* S is called *confirmable* (or completely confirmable, or incompletely confirmable) if every descriptive predicate that occurs in S is reducible (or completely reducible, or incompletely reducible, respectively) to a class of observable predicates", where the notion of "an observable predicate" is explained (§11) thus: "A predicate 'P' of a language L is called *observable* for an organism (e.g. a person) N, if, for suitable arguments, e.g., 'b', N is able under suitable circumstances to come to a decision with the help of few observations about a full sentence, say 'P(b)', i.e. to a confirmation of either 'P(b)' or '~P(b)' of such a high degree that he will either accept or reject 'P(b)'"

50 There is a question that would that would seem too pressing not to be at least mentioned by the end of this section, given the stated overview of the context of emergence of logical empiricism. After the works of Frege, Russell, and Wittgenstein, to what extent did logical empiricists deliberately bypass the former thinkers' care to avoid psychologism in their respective theories of propositional sense. Is it not obvious that, by purporting to show the grounds of propositional sense – hence, of any relation of logical entailment – as lying in observation, which is a psychological event, logical empiricists were taking the laws of *Wahrsein* to be subordinated to the laws of *Fürwahrhalten*? I guess not. For, by representationalist parameters, observation is a psychological event alright, but a psychological event is an *observational* one if, and only if, it is the *correct* representation of a fact one is acquainted with by means of her senses. I can only be properly

Empirical confirmation of the appropriate conditions for applying a predicate thus appeared to provide the most adequate grounds for a logical-syntactical, yet also empiricist construal of propositional sense. The notion appeared to confirm, so to say, logical empiricists' conviction that philosophy's place in cognitively valuable human activities should be subordinate to scientific work. The collective work of scientific communities, devoted as it is to the production of ever more refined experiments, and ever more rigorous conceptual regimentation of corresponding descriptions, could seemingly be straightforwardly depicted as *the* work producing what would be the core aim of philosophy: the elucidation of propositional sense. After all, propositional sense would accordingly be based on just these two things, which are paradigmatically done by the empirical sciences: observation of facts, and observance to symbolic rules. Upon elaborating their general theories of propositional sense – so much as in delving deeper into more specific philosophical conundrums thereafter devised – logical empiricists could seemingly depict themselves as remaining within the boundaries of scientific endeavor. For the generations to come, they could depict philosophical work done under their strictures as a work that, whenever valuable, is done in the benefit of the sciences.

2.1.1.3 The Fall into Paradoxes

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said to *observe* a blue dot here and now if *there is* a blue dot here and now for me to observe it. Therefore, by being grounded in observation, the empiricist construal of propositional sense is grounded on truth and facts, not on judgment. To the extent, however, to which the rules of logic (or what Frege had called "the laws of truth") are dependent on the conventions that establish linguistic frameworks, on the one hand, as well as on the limited resources of human sensibility, on the other, one can hardly avoid to diagnose a form of psychologism about logic on the part of logical empiricists. Indeed, according to Carnap (1937), mathematical truths themselves can vary, several forms of calculi (intuitionist, finitist, classic) can be operated with and be used to formulate the rules of a linguistic framework; *in logic there are no morals*. As for the limits of human sensibility's demarcating the limits of propositional sense, again, the consequence could be accepted: there is no kind of propositional sense standing over and above the possibilities we have for operating with signs in order to represent how it is that things (we can be aware of) stand in the world.

Another, perhaps more interesting question, is that of how – according to the main and common tenets of logical empiricism – does the propositional meaningfulness of any language relate to "the totality of facts" (TLP, 1.1), as well as to "the scaffolding of the world" (TLP, 6.124), both of which would, if anything, be independent of what we could ever observe. Here two answers would seem plausible. The shorter one would be simply that this question is metaphysical. It is "external", rather than "internal" to the linguistic frameworks we manage to build underscored by our limited powers of observation, and a question is meaningful but internally to a linguistic framework (Carnap, 1956). The lengthier answer would appeal to the notion of progress that would be admitted by logical empiricists to be proper to the scientific endeavor in general, which is a progress consisting in the serial elaboration of further linguistic frameworks for systematizing the expression of the total record of experimental findings. The "unity of science", the empiricist response to Kant's "unity of apperception" accounting for the possibility of encounter between rational minds, lies, supposedly, not in homogeneity of conceptualizing powers across rational individuals, but rather in the homogeneity of the ultimate sense-data they are able to gather each by themselves.

Having hopefully explained in the last section the centrality of the notion of 'confirmation' for the logical empiricist construal of propositional sense, I move forward in the present one to explaining how this very notion came to be seen as itself an ill-founded one, by logical empiricists' own standards. That is to say, the root of the malady, as I hope to make clear, is not that we cannot confirm a hypothesis, nor that it makes no sense to think that we do. Rather, it is that we cannot understand what it means *to confirm a hypothesis* while upholding a logical-syntactical construal of propositional sense, in general, or, in particular, if we assume any of the aforementioned empiricist criteria of meaningfulness. Hence, if the notion of 'confirmation' serves any philosophical purpose this is not, in the end, that of grounding an empiricist criterion of meaningfulness. Nothing does.

2.1.1.3.1 Goodman's pragmatic skepticism

As seen (and however there is, admittedly, much that was not seen), there is an overarching philosophical view on the propositional aspect of our linguistic practices linking the different proposals – in essence, they were all different *methods of logical analysis* – found in the *Tractatus Logico-Philosophicus* and the minutely various, early-twentieth century attempts at establishing an empiricist criterion of propositional sense. A generally shared aspect of those views was one I called attention to in the middle of my exposition of Wittgenstein's reaction to logicism, and now I return to it.

The view according to which the whole set of our possible intentional uses of symbols in order to state that this or that is the case, language *qua* propositional, is *isolable* from the rest of our lives, generally speaking, and, in particular, from the rest of our language. According to such a view our ordinary, natural languages are the ongoing result of a casual admixture of motivations for symbolic comportment, some of whose features relate to the purpose of stating propositions, while others do not. Consequentially, the task at hand for the logician and the philosopher alike would be that of ameliorating our means of expressing propositions through the invention of new, specialized, symbols that serve this purpose alone, therewith embodying an ongoing – but finite – analysis of the logical form of any potential truth-valuable comportment. Fortuitously for these special types of inquirers, the sole aspect of our lives that would require attention from them would be this supposedly isolable one, of language in-

sofar as it be composed of systematically related truth-telling abilities, hence the "logical syntactical" construal of propositional sense.

Accordingly, as we saw, accomplishing the task of stating a proposition could be taken as intentionally following the rules governing no more, no less, than the combination and substitution of symbols comprising a symbolic system that is a mirror-image of every representable fact. We are led to conceive, on the one side, of an individual, an agent endowed with the ability to comply with such rules, and, on the other side, of the worldly situations that could be put in comparison with each of those rules' possible applications. These two – the rules and the worldly situations – must be independent from each other. All the defining logical relations of every proposition with each other must be reachable *a priori*, as ways of intentionally arranging certain symbolic arrays that are representative of possible worldly situations. All possible worldly situations, on their turn, must obtain or not independently from any such symbolic productions of ours.

This is true of both, Wittgenstein's (in the *Tractatus*) and Carnap's (in the *Aufbau* and in *Testability and Meaning*) construals of propositional sense; both are, broadly speaking, "logical syntactical" such construals. They differed in that, for the latter, *manners of assessing* truth and falsity (aiming at either verification or confirmation) replaced truth and falsity *per se* as the touchstones of symbolic rules with their propositional applications.

Importantly, readers of Carnap might object that the latter admitted, among rules for thinking, empirically justified natural laws; these would be assumed within a linguistic framework as valid (they were called "P-valid" instead of "valid" *simpliciter*), hence necessarily true statements, even though they would not be analytic. If raised at all, such an objection would miss the point that such a possibility of "logical ascension" of certain well-confirmed universally quantified statements to the status of rules is in fact a change in their status. Such an ascension, which is indeed allowed by Carnap (1936), ultimately leaves untouched the distinction – and alleged independence – between the rules of a linguistic framework (which include P-valid statements) and (all) the facts. Once a symbol is regarded as a rule's expression, it is no longer a hypothesis to be confirmed or disconfirmed by direct experience, it is rather a part of a linguistic framework's set of directives for the formulation of hypotheses.

Given the similarity under such an aspect between the Tractarian and the logical empiricist construals of propositional sense, it should come as no surprise that what was perhaps the most significant blow in logical empiricism's strength as a dominant set of ideas about logic, science, and knowledge (such a blow was Nelson Goodman's 1954 argument in *Fact, Fiction, and Forecast*) could later be read by Saul Kripke (1982) as a logical consequence of

Wittgenstein's late arguments against his own earlier presuppositions regarding the regimented use of signs to construct propositions.

Wittgenstein's whole thoughts on this will be taken into account later in this chapter. For the moment we shall concentrate, first, on Goodman's attack on the theoretical endeavor that was most specific to logical empiricism, the notion of "empirical confirmation" itself, and, second, on how Goodman's argument can be read as instantiating Wittgenstein's further reaching argument (as exposed by Kripke) affecting the whole logical syntactical construal of propositional sense.

A project that paradigmatically exemplified the legitimately philosophical, *hence* (accordingly) scientific work led by logical empiricists was the formal regimentation of scientific confirmatory reports relative to scientific hypotheses. Without entering into the details of a discussion that spanned at least from the work of Jean Nicod to that of Carl Gustav Hempel (1945), the intuitive aim of logical empiricists in this regard was to characterize in terms of predicate calculus what relations – among confirmation, disconfirmation, or irrelevance – would hypothetical scientific statements, of a form like '$\forall x(Fx \rightarrow Gx)$', bear relative to observable singular statements representing their testing circumstances, such as "This is both an F and a G", or "This is an F, but is not a G". That is to say, roughly, what precisely is the logical relation of *confirmation* that is supposedly obtainable between a hypothesis and each evidence that is found in favor of it.

The stakes involved for logical empiricists in providing a solid theory of confirmation were obviously particularly high. First, of course, a theory of confirmation would have been an achievement regarding the centuries-old problem of induction. Logical empiricists did not question the non-deductive character of inductive arguments, but their hope was that even in such less than logically indubitable affairs as of inductively reached conclusions reason would at least point towards some definite direction, as opposite to none. Second, however, logical empiricists were aiming at a rather more substantive issue, that of the very meaningfulness of thought and of speech. Their belief, accordingly, was that such meaningfulness reside in the expression – the representation – by public means of what there is to be experienced by an individual, among worldly facts to which she be as sensitive in her actual position as any other person would have been in it. The sense of any statement being reducible to the sense of all statements representing the would-be direct experience of assessing its truth-value, a theory of confirmation would in fact, thought the logical empiricists, bear on our understanding of the factuality of meaning.

While the problem of induction is the problem of reassuring ourselves philosophically of the righteousness of the predictions we make based on observation, the problem of the factuality of meaning is that of reassuring ourselves philosophically of the meaningfulness of any actually meaningful statement, whether it embodies prediction or not. As noted by Ian Hacking (1993a), herein the typical modern quest for reassurance splits against at least two demoniac adversaries that deserve discernment, a *pragmatic* skepticism – inspiring uncertainties about tomorrow's sunrise and some other common expectations of ours – and an *existential* skepticism – worrisome, on its turn, of the very meaningfulness of our sayings, our thoughts, and our speculations.

These, then, would be the stakes involved in the development of a theory of confirmation, i.e., of what reason can tell about induction, and supposedly therefore about meaning itself. But reason, for logical empiricists, was supposed to be the mastery of the symbolic rules for the formation (and combination, and substitution) of propositions. Consequently, the relation between any hypothesized scientific law and each evidence in favor of it – that is confirmation – should be expressible as a formal normative relation between every universally quantified statement expressing a scientific hypothesis and each of the singular statements expressing a corresponding evidence.

Examples give an apparently obvious suggestion about what relation that would be: every singular statement serving as an observation report of evidence in favor of a given hypothesis is *deductively implied* by the universally quantified hypothesis in question. Thus, "Socrates is a man and is mortal" follows from "all men are mortal" and "this pinch of salt is soluble in water" follows from "salt is soluble in water". So apparently every singular statement that deductively follows from a hypothesis is the expression of a confirmatory evidence for the latter, so much as counterexamples (an immortal man, an insoluble pinch of salt) would disconfirm it.

Precising this seeming triviality in terms of predicate calculus – with all due adjustments in its formulation – was the task undertaken by those who embarked into the project of establishing a logic of confirmation (Crupi, 2025). One of these was Hempel. Eventually he (Hempel, 1945) called attention to the fact that the set of singular statements a universally quantified hypothesis implies includes all singular statements implied by logically equivalent general hypotheses. Hence, "all men are mortal" implies every singular statement that is implied by "no immortal being is a man", and "salt is soluble in water" implies every singular statement that is implied by "nothing insoluble in water is salt". Both, that the first hypothesis might get confirmed by the observation of a non-mortal being that is not a man, and that the

second be confirmed by any insoluble substance that is not salt, are at the very least unexpected conclusions given our intuitions about hypotheses' confirmatory experiments. No one expects to confirm the hypothesis that salt is soluble in water by observing floating leafs on a lake's surface. But Hempel embraced such a strange kind of consequence of formalizing the notion of 'confirmation'. He sternly maintained that counterintuitiveness here is only due to our psychological lack of propensity to look for confirmation of hypotheses where they are most easily found. That all F's are G's would indeed be confirmed by observation of any non-G that is not an F, even though what we *care* to see when we do empirical research is whether any F's we can find are not G's.

While some may have leaned toward accepting these conclusions, Hempel's most relevant contribution for the debate on the logic of confirmation came arguably to be further fueling it, which eventually invited the contribution of Nelson Goodman. The latter was a philosopher of science that was especially concerned with the prospects of, and the methods for developing a, logic of confirmation. Among classical modern concerns, his were with the problem of induction, as opposed to the larger question of the factuality of meaning (that logical empiricists' answer to either question stemmed from the notion of 'confirmation' was incidental, as it were, so much as Goodman was concerned). His inquiry was simply into what *is* the relation holding in general between universally quantified, unexhausted, and unviolated hypotheses, on the one hand, and each evidence *confirming* them, on the other hand. In other words, "which hypotheses are confirmed by, or which projections are validly made from, any given evidence" (Goodman, 1954, p. 87).

By contrast to more cumbersome – and generally regarded as more interesting – cases, at its simplest confirmation was not at all thought of as a relation between universally quantified and singular statements. More precisely, at the level of observation statements, it would rather be the relation obtaining between a *singular* statement – of a form like 'P(b)' – and an experimenter's direct experience itself. Only direct experience – or, to keep within behavioristically respectable terminology, only "suitable circumstances" an experimenter be found at – could confirm statements such as, for instance, "This is green", or "This is blue", and thus provide the logical basis for confirmation of more elaborate sentences. The subject of such a confirmatory experience would presumably be "able under suitable circumstances to come to … a confirmation of either 'P(b)' or '~P(b)' of such a high degree that he will either accept or reject 'P(b)'" (Carnap, 1937, §11).

Before establishing the formal rules of a whole logic of confirmation, therefore, lay the task of elucidating the simplest kind of rule, which roughly commands: state "I see a blue

dot here and now" only if you see a blue dot there and now. As basic intuition would tell both, the logical empiricists and Goodman, the use of predicates as "observable" as 'green' and 'blue' in observation sentences was learned by each of us by participating in our respective or shared linguistic communities from past situations in which these were already applied by other people; from supervised attempts at applying them ourselves, with subsequent social avowals and disavowals of said applications, etc.. Similar training in context-response (input-output) among individuals leading to similar behavior in similar circumstances among them. Thus, such a picture tells us, we eventually learn how to say, when appropriate: "This is green", "That is blue", and in such a learning process increase how much we partake in our linguistic communities.

Goodman, who was not questioning this general picture of how language-learning proceeds, proposed that another linguistic community was imaginable besides ours. Accordingly, people who participated in the latter would use the predicates 'grue' and 'bleen' instead of our 'green' and 'blue', whereas the use of the former pair of predicates might be taught to us by the following definitions:

$grue_x =_{Def} green_x$ when x is observed before time t_0, and $blue_x$ otherwise.

and the use of 'bleen' by the further definition:

$bleen_x =_{Def} blue_x$ when x is observed before time t_0, and $green_x$ otherwise.

Supposing t_0 to lie in the future, and all previous suppositions remaining in place, we arrive at the following paradox. All past and present circumstances having, up to now, given us the opportunity to correctly employ our usual "observable predicates" like 'green' and 'blue' have also been circumstances which have actually given us the opportunity to use, with equal right, such other linguistic community's "observable predicates", like 'grue' and 'bleen'. Notice, then, that one of such linguistic communities – ours or "theirs" – will, after time t_0, be proven *wrong* in its respective set of assumptions about the observable world (for, thereafter, things will neither be, nor appear to be, both green and blue at the same time).[51] Nevertheless, at present, (and, as usual, assuming the prevalent intuition that we are rule-fol-

51 Shoemaker argues that the discrepant linguistic communities in question would be unable to *agree* on which one is wrong. In fact, the "grue-ified" community might possess the predicates 'gwrong' and 'gright', such that to be *right* would be explained to someone pertaining to that community as being gwrong unitil some point in time and gright afterwards. Since I do not endorse the view on rules that leads to such paradoxes, I feel free to use (and claim to use) 'wrong' as we usually do above.

lowers put against worldly contexts for acting according to our rules) there is nothing in our past usage of terms, nor in the total amount of evidence we have gathered so far, rendering better confirmed the "projections" (i.e., the uses in universally quantified, unexhausted, and unviolated hypotheses) of predicates like 'green' and 'blue' on stuff. Indeed, we would seem to lack any grounds for assuming that things in the world *are* green or blue, instead of *being* grue or bleen.

Contrary to the initial reaction of many, the argument is unobjectionable on the grounds that 'grue' be a complex predicate combining a qualitative and a temporal characteristic note. As Goodman explained,

> True enough, if we start with "blue" and "green", then "grue" and "bleen" will be explained in terms of "blue" and "green" and a temporal term. But equally truly, if we start with "grue" and "bleen", then "blue" and "green" will be explained in terms of "grue" and "bleen" and a temporal term. (Goodman, 1955, 80).

Neither do we get anywhere near a solution by insisting that, letting alone such apparently symmetrical translation complications, only one of the linguistic communities under consideration would live and work under the supposition that kinds of things like leafs and emeralds will suddenly start being instantiated by objects of other colors than the usual ones. For, as argued by Shoemaker (1975), the community that is strange for us might actually be so strange as to take us to live and work under the supposition that new instances to some of our concepts will suddenly start appearing in different *schmolors*, whereas things possess the same *schmolor* if and only if they possess the same color before time t_0, and different colors afterwards.

Strange as it righteously seems, subsequent "grue-ification" of all language is no transgression of the logical-syntactical construal of propositional sense. Assuming the latter, therefore, propositions (scientific hypotheses included, if any) in grue-ified languages are not nonsense. Paradoxically, then, grue-like oddities like the aforementioned ones threaten any predicate's application whose legitimacy we usually take as firmly rooted in sensible circumstances. For, if sensible circumstances legitimate the use we make of *our* predicates *so much as* they do relative to predicates whose projection would be incompatible with our actual projections, then sensible circumstances legitimate nothing, and nothing is left for the project of formally regimenting the notion of 'confirmation'. Thus, in general, "there appears to be no

unique description that is either ‘inductively best,’ or ‘most appropriate given our (meaning) intentions.’ There are just too many ways in which words or mental symbols can be mapped onto the world” (Kowalenko, 2022, p. 15).

There is at least one philosophical reason, and another that is rather rhetorical, for Goodman to have called this “the new riddle of induction”. The one is that, like Hume’s “old riddle”, this one produces the effect of making it appear that there is no rational basis for stating anything of the form ‘Vx(Fx → Gx)’ after establishing any amount of unexhausting empirical evidence for it, even if none is against it. The other is that, like Hume (and Hempel, for another one we mentioned), Goodman responded to the paradoxical conclusions he reached by embracing them, and consequentially by sacrificing our irreconcilable common sense in its stead. He whom Goodman regarded “the greatest of modern philosophers” (that was Hume) stopped short of considering the revision of some presuppositions he perhaps made, concluding instead that inductive reasoning is, generally speaking, ultimately unjustified, and, particularly, that even in the absence of evidence to the contrary the sunrise can rationally be expected not to occur the day after careful pondering. On his turn, Goodman concluded that there are no rational grounds for us to continue to participate in ours, and not in some of infinitely many other linguistic communities imaginable with grue-like predicates – and corresponding grue-like predictions – in their stead. Instead of *concluding* that our ways are the most reasonable ones, we simply keep *choosing* them.

> To say that valid predictions are those based on past regularities, without being able to say which regularities, is thus quite pointless. Regularities are where you find them, and you can find them anywhere. … When the time comes, the hypothesis that all emeralds are green may prove to be false, and the hypothesis that all are grue prove to be true. We have no guarantees. (Goodman, 1954, pp. 82, 98)

The authors of both “riddles of induction”, once confronted with their respective paradoxes concerning the legitimacy of generally complied with ways of thinking, limited themselves to simply pointing out our entrenched habits, the regularities *we, as a matter of fact, came up with*, rather than regularities *found* that were in themselves compelling.[52] Resembling the elder, Goodman’s “principle for eliminating unprojectible projections”, such as that of the predicate ‘grue’ into corresponding hypotheses, “is that a projection is to be ruled out if it con-

52 To be true to his word, David Hume did state in his *Treatise* (2009, section 2.3.3) that “Reason is, and ought only to be the slave of the passions, and can never pretend to any other office than to serve and obey them”. Its meaning being slightly distorted, I find this an excellent sign.

flicts with the projection of *a much better entrenched* predicate" (Goodman, 1954, p. 96, emphasis added). As he explicitly admitted, the author of *Fact, Fiction, and Forecast* (which years later would also be writing *Ways of Worldmaking*) denied that we must "explain why, in cases of conflict like those illustrated, the really projectible predicate happens to have been the earlier and more often projected". We should resume the search for elucidating our initial intuition: that every predicate that is, as a matter of fact, more entrenched than its strange fabricated competitors, gets "projected *because* its projection was so often obviously legitimate" (Goodman, 1954, p. 98). We should rather rest content, *by principle*, with an ungrounded conservative stance if we want to defend ourselves in our usual "projection" of 'green' from the wildest conflicting suggestions a philosopher may come up with.

Combined with the centuries-old intuition that rule-followers and contexts for rule-applications must be strictly devised from one another, what Hume's and Goodman's disavowals of sensible circumstances' legitimating power over hypotheses suggest is that the correctness of our usual applications of predicates like 'sunrise' and 'green' in predictions is contingent upon rule-followers themselves. It is known, but worthy to remember, our *habits* regarding word-usage, which both authors invoked in their sceptical responses, were thought of by either as properties of living individuals as taken by themselves; they would at least be patterned dynamics of our bodies alone, and at most of our disembodied spirits. Nothing properly legitimizing regarding opinions on "the external world" comes out of this, and this is why those were likewise sceptical responses. Welcoming the sophisticated uncertainties their reasoning led them to, they did not even purport explain *why* we should proceed as we have regularly done in matters so ordinary as those they treated about, they simply restated that we *do* witness certain things happening in quite a predictable manner given our standards of predictability, and that we *do* praise our standards above any other.

2.1.1.3.2 Generalizing the paradox

The role Goodman's (1954) argument in *Fact, Fiction and Forecast* played in the history of ideas was not that of debunking inadequacies in the logical-syntactical construal of propositional sense. Neither was it Goodman's intent, to revise the widespread intuition that rule-following procedures in general be independent from rule-following contexts – so much as, in particular, a mental state's exact representational content should be deemed independent

from the actual facts of the represented world (and vice-versa). In fact, much aligned that he was with this widely dominant credence (the general and the particular), he occupied himself with the question of the "projection" of predicates, and ended up elaborating a pragmatic way out of allegedly unsolvable metaphysical conundrums.

Goodman assumed, in harmony with modern philosophy's most entrenched ideas – and thereby in harmony with the logical empiricists themselves – that there was a relation, the projection of compositional elements of truth-valuable representations of facts, to be clarified with respect to individually self-sufficient sources of worldviews, i.e., the perspectives of guessing minds, relative to the world. Accordingly, then, public language itself – and all predicates and hypotheses formulated "inside it" – should be rooted in the rule-following procedures whose outcomes prove themselves legitimately "projectible" upon reality. Within the general modern agenda of tracing the origin of ideas, this was the specific task of devising a general method for devising the right ones. A task which, as we saw before, logical empiricists fully embraced, and one upon which Goodman shed further doubts.

As late as in 1982, Saul Kripke has usefully isolated and pictured the negative part of Wittgenstein's maturing reflections as a sceptical paradox at this comprehensive view of rules – and meaning – the latter himself had championed in his youth. More precisely, such a paradox has been directed at a twofold presumption, on the one hand: that *we know completely* the rules that we either have been, or are currently following, and, on the other: that *there is* some matter of fact (an instantaneous obtaining of a state of affairs) concerning ourselves individually and the world, which determines our having been, or being currently, following any rule whatsoever. This is precisely the move Goodman fell short of making: generalizing the absurdity stemming from the logical syntactical view of propositional sense not only to predictions, but rather to meaning itself insofar as meaning something with a sign be following rules with respect to its use. No one better suited than Wittgenstein himself for proving the roots of the problems with the empiricist criteria of meaningfulness to lie in the conception of logic that was erected in the *Tractatus Logico-Philosophicus*.

Assuming that the reasoning that leads to it is sound, Wittgenstein's paradox concerning rule-following (or, rather, a way of conceiving it) is a challenge to any view on propositional sense that resembles the logical syntactical one enough to postulate *the independence between a subject's following a rule and a context's being appropriate for applying this rule*.

Any such view takes acting according to rules as the most fundamental (instead of just another) prerequisite for any sort of thing anyhow to convey propositional sense.[53]

The sceptical argument articulated in 1982 by Kripke in *Wittgenstein On Rules and Private Language* runs clearly against common sense – but it is two kinds of common sense. One is the kind according to which we can tell, often unhesitatingly and for sure, how we ourselves and our peers mean (use) words. The other kind of common sense that shows askew in Kripke's sceptical picture of logical possibilities is no other than what has become of the representationalist intuition about minds. The paradox articulated by Wittgenstein, later to be plainly spelled out by Kripke, did not directly concern the representationalist intuition about minds (and this is why, after all, behaviorist conceptions of mental phenomena would also be affected by it), but rather the aforementioned independence between rule-followers and contexts for rule-applications. The latter is the belief that no matter of fact that is not itself a material constituent of a rule-following event necessarily obtains if such an event occurs. There is arguably a direct implication from the acquiescence to the representationalist intuition to the belief such an independence. For one, remember the set of principles underscoring the investigation of mental phenomena, as well as their supposed material bases, cognitive phenomena, seen in section 1.1.3.

Principle of Individuality (PI): to forage and describe individuals, be they persons, animals, or machines, regarding said individuals as exhaustively constitutive nuclei of particular cognitive or mental phenomena, thus seeking to identify and characterize the structures within the bodies of these individuals that provide them with the ability to relate cognitively to the world.

Principle of Representationality (PR): to take a state of the specialized structures of an individual as constituting either a cognitive or a mental state, if and only if it be one that identifies, or naturally correlates with, the representation of a state of affairs distinct from itself.

Principle of Functionality (PF): to categorize a kind of state of the specialized structures of an individual as a kind of cognitive or mental state only when the existence of such a

53 And, by "any sort of thing" I mean either a conscious human being, a Cartesian mind, the transcendental subject, God, angels, demons, as well as a set of individuals, a sentence, a string of sings, a bodily movement's pattern, a computing machine, or a neural network. Choose at will: insofar as any sort of thing's following (or changing accordingly to) a rule be deemed independent from what they supposedly apply the rule to, Wittgenstein's paradox (as exposed by Kripke) applies.

kind be accountable in terms of the favorable probability-variation its implementation begets to typical individuals of the species under scrutiny, for them to succeed in the generation of another individual of the same species.

Take these (PI, PF, PR) as defining what *our* representationalist intuition is (and simply subtract PF if you want the characterization to be comprehensive enough to range over the intuition's historical roots in early modern philosophy). If making a representation implies following certain rules, and the representationalist intuition has it that the rule-following procedures in question occur in the isolated context of a mind or a brain, which is nevertheless deemed sufficient for producing a representation, *then* the relation that holds between such intuitions is that

the representationalist intuition → the (accordingly intuitive) independence between rule-following and contexts for rule-applications,

so that, if upholding such an independence leads to paradox, then the representationalist intuition does as well. The importance of Kripke's (1982) work is therefore to have put forward an open challenge to contemporary philosophers. Is reason telling us to give up on certain intuitions regarding rule-following behavior, or is it rather that we have inadvertently lost the thread of reason *before* arriving at such sceptical conclusions – namely, when accepting it that rule-following events are characterized by the independence between rule-following (and rule-followers) and factual contexts for rule-applications?

As a starting point, Kripke states what he takes to be common sense on the subject-matter of following rules, and he starts by the "purest" kind of rule that we know of, mathematical ones.

> I, like almost all English speakers, use the word 'plus' and the symbol '+' to denote a well-known mathematical function, addition. The function is defined for all pairs of positive integers. By means of my external symbolic representation and my internal mental representation, I 'grasp' the rule for addition. One point is crucial for my 'grasp' of this rule. Although I myself have computed only finitely many sums in the past, the rule determines my answer for indefinitely many new sums that I have never previously considered. This is the whole point of the notion that in learning to add I grasp a rule: my past intentions regarding addition determine a unique answer for indefinitely many new cases in the future. (WRPL, p. 07)

There are at least two intuitions mentioned above – besides, of course, the representationalist intuition – that are specifically about rules. The first one concerns the identity of a rule relative to the cases of its possible (allowed) application. Although any rule one may think of has been applied for at most some finitely many cases, for some rules (not just the ones defining mathematical functions, such as addition) there are infinitely many contexts for which its correct application is defined. Hence no matter how extended is its domain, divergence as to the result of applying a rule in just one case would yield the fact that *another* rule has been applied, if at all. To use one of Wittgenstein's famous examples (*Philosophical Investigations*, §185), if one is given the order "to continue the series (say, +2) beyond 1000" and goes on writing "1004, 1008, 1012…" instead of "1002, 1004, 1006", then one did not apply the rule we would usually mean by '+2', but rather another rule. But the same holds for rules concerning the use of expressions like 'chair' – if two people (both in regular conditions) disagree as to some one object's being or not being a chair, then the rules they follow for applying the term are different. This is one intuition.

The second intuition concerns the *learning of* a rule governing the use of a given symbol. In order for us to learn to use a symbol correctly we have to grasp the rule that restrains the manners in which the symbol is to be used[54]. Grasping a rule (learning it) thus means, on its turn, to have applied it in some finite set of cases which, however finite, instantiate some possibly infinite set of applications anyone of which might also, one day or another, be performed by the one who grasps the rule. This is why "how I applied the rule in the past" is important, however "how my teacher applied (or applies) the rule", e.g., might be given the same importance. For the important thing is that, from the moment one grasps a rule onwards, one starts being able to do *the same as* she (or someone else, e.g., the teacher) did *before* (e.g., adding). It is, then, by remembering either how I myself correctly applied the rule in the past, or how someone else did, that I now suppose myself to be able to apply it.

Now, the paradox is the following. Take a mathematical function called 'quus,' denoted by '$\oplus$,' such that

$$\text{for all } x, y < 57,\ x \oplus y = x + y,$$

and

54 I deliberately put the matter in terms of "restraining" – not "determining" – because, despite there being restrictions which, as intuition has it, are determined by the rule we grasp, there usually remains some space for adding new contexts in which *the same* symbol's (hence, the same rule's) application will be allowed.

for all x, y ≥ 57, x ⊕ y = 5 (Kripke, 1982, p. 9).

Assume, further, that you have never previously added numbers as great as 68 or 57. If you were asked to compute the problem '68+57=?' now, and uttered '125' in response, you would do so without justification. Or, at least you would if you took the bases for justifying your response to consist in the individual mental state you found yourself in – which is enabled by the learning process you went through before, etc. – when giving this response. Such a mental state – together with all other supposedly constituting your mental history – would be at most a finite set of facts that, under the aforementioned assumptions, accord with the rule for using '+' ('plus') so much as with the rule for using '⊕' ('*quus*'). Neither do your mental states entitle you to deny that you have all along been "*quadding*", instead of *adding* numbers, nor do they constitute any matter of fact establishing it that you have followed either rule, the usual one for addition or the abstruse one for quaddition (and it is noteworthy that the case of adding an arithmetical position into the definition of 'quaddition' is perfectly analogous to adding a temporal position into the definition of 'grue', and subsequent talk of a possible "quaddification" of language could likewise be evoked by the sceptic in order to avoid analogous objections based on the anomalous complexity of the strange operation).

As aptly put by Kowalenko (2022, p. 05), the paradox applies whenever we treat "meaning something by a word as a kind of *projection* that fastens a singular instance of word use by a speaker onto an infinite object, the set of truths about how she ought to apply the term", for any finite set of cases can be made to accord with infinitely many different rules. No better answer to the sceptical challenge is provided by substituting the set of behavioral (or neural) dispositions holding at the moment of the calculation for your mental states. The exact same insufficiency for answering the sceptical challenge holds of appeals to your dispositions if you suppose them to be as they actually are, i.e., finite, by contrast to the infiniteness of grasped rules. However, even if you idealize your dispositions to infinity such an appeal to them would present the further problem of dispositions' possessing no normative character *per se*, while rules in general (and meanings, in particular) do possess such a normative character: it is following them, not just acting accordingly, that is in question. You will mean precisely nothing in Chinese if by play-mimicking Chinese language sounds you are led by your dispositions to perfectly pronounce some existing Chinese phrases.

So, to repeat. Kripke states what our intuitions seem to be regarding both, the identity of a rule (that it is determined by every possible context of application of it), and what happens when we learn how to follow it (we learn to act in a way, the way the rule dictates, which

shall be the same thereafter whenever we mean to follow it again). Intuitive, these seem to be unproblematic assumptions until the sceptical genius named after Wittgenstein shows us that, all our intuitions considered, we have no clarity at all about what is it for anyone to follow any rule. It seems that "no course of action could be determined by a rule, because every course of action can be made out to accord with the rule" (PU, §201)[55].

This, then, is the paradox we are led into if we assume either a logical-syntactical construal of propositional sense, or if we assume any version of the representationalist intuition about our minds. For, by assuming so much, we are left with no means of pointing out a matter of fact which, regarding ourselves individually and worldly contexts in general, determines which rule is followed at any given occasion, hence which representation of facts be thereby constructed. As a consequence, neither have we any justification for claiming that we or someone else has meant something instead of nothing, or anything instead of anything else.

As I remarked while starting this section, Nelson Goodman's (1955) argument against the legitimacy of the logical empiricist construal of the notion of "observable predicate" was later to be read as an instance of Wittgenstein's "rule-following paradox" (Kripke, 1982; Kowalenko, 2022). If a skeptic person – such as the one imagined by Kripke – asked us what grounds do we have for claiming that we have never meant to describe anything as being grue, but several times green, we could not cite evidence concerning the green color of things presently around us, nor the way we and other people have regularly called things "green" only when they were green: all this would have happened if we meant grue all the time, even if the sign we used has always been 'green', not 'grue': the rule governing our use of 'green' might have always been the one defined above for 'grue' anyway.

Reminding the problem of induction led logical empiricists to substitute "confirmation" for "verification" as their empiricist criterion of meaning. However, in order to *confirm* the possibility of applying any predicate in general – in particular, and, supposedly, fundamentally, in order to confirm the possibility of correctly applying an observational predicate – one is supposed to be sufficiently warranted that the situation to which she *now* applies the predicate resembles enough, is sufficiently similar to, the situations to which application of the same predicate has been socially avowed in the learning process leading to her mastering of the use of the predicate. Recognition of said "sufficient similarity" – that which exists among green things – has always been the empiricist conceived grounds of propositional sense; of *rationality* itself, beyond mere symbolic manipulation (as in logic and mathematics

55 I shall hitherto always abbreviate the name of this much to be cited work according to its German spelling as '*Philosophische Untersuchungen*', mostly to avoid any ambiguity with my abbreviation of 'Principle of Individuality' as made in the first chapter.

as accordingly conceived of by logical empiricists). However, what Goodman shew, and Kripke (using Wittgenstein) reinforced, was that stating something like "This is green, because it is sufficiently similar to things observed in the past that I correctly applied the predicate 'green' to" is no more rational – insofar as the logical syntactical construal of rationality goes – than stating something like "This is grue, because it is sufficiently similar to things observed in the past that I correctly applied the predicate 'grue' to".

Whether someone, like Hume, the logical empiricists, and Goodman, is concerned with accounting for scientific success as to the prediction of natural events (such as the color of the next observed emerald), or else, like again the logical empiricists, and Wittgenstein, and Kripke, is concerned with accounting for the factuality of meaning, confirmation is a dead end. By either a pragmatic or an existential reading of the paradox of grue emeralds (Hacking, 1993a), logical empiricism falls into it. As mildly described by Goodman (1955, p. 80), the argument contained in *Fact, Fiction, and Forecast* was "a major obstacle to the development of a satisfactory theory of confirmation": an obstacle that served, in the history of ideas, as the prime intellectual breakthrough opening space for the establishment of a historical view of scientific knowledge-construction. Inasmuch as it instantiates Wittgenstein's paradox, Goodman's reasoning serves too (as Wittgenstein's does) as an argument for a historical view of propositional sense.

To summarize what the relation between Wittgenstein's and Goodman's destructive arguments is. So much as, generally speaking, there is no pair of facts (instantaneous configurations of objects, sense-data, or what have you) respectively about one person and any other portion of the world, whose obtainment implies that any rule has been, or must be followed, so much, in particular, there is no such pair of facts implying that such and such an "observable predicate" (such as, for instance, 'green') has been, or can be, projected.

Now, the sceptical response to either difficulty is to simply attest the fact that we, as a set of individuals, do what we do, though (supposedly) unjustifiably so. When a philosopher encounters a paradox and doesn't simply stop philosophizing to let herself wonder about her (our) lack of understanding about the subject-matter that the paradox concerns, she has two mutually exclusive options: either she accepts the paradox and adapts her whole worldview around it, or she keeps faithful to her current worldview and tries to demonstrate that the paradox is an illusion caused by wrong assumptions she left pass. The stance I intend to work on in this and following chapters is the latter. Goodman has adopted the former attitude instead, and by doing so he fruitfully demonstrated how detached from reality the assumption of a logical syntactical view of propositional sense (which he did not abandon) is.

Unlike Kripke's (1982) eponymous character, however, Wittgenstein, in his mature thinking, did not become prone to embracing his own philosophical riddles in order to support counterintuitive philosophical theses. As a "bewitchment of intelligence by means of our language" (PU, §109), any philosophical paradox should rather alert us to the fact that something obvious is hiding right under our noses. Of the possible readings of Kuhn's (1962) work that I claim to be in tension with one another, the one that is explicitly supported by Wittgenstein's renewed position on rules and propositional sense (which Kuhn came limitedly to learn about, besides perhaps by other means, thanks to his friendship with Stanley Cavell) is the only one that escapes the very same paradoxes that caused the demise of logical empiricism, however at the price of evoking a rather tentative (though insightful) set of considerations about habits, actions, experience, and history in its stead.

2.1.2 Thomas Kuhn: novel ideas, old predicaments

"Traditional empiricist approaches to philosophy of science", as Thomas Kuhn would call them in his 1987 *Shearman Lectures* (Kuhn, 2022), had for decades provided philosophers with a seemingly clear view of the cumulative process of scientific knowledge-construction throughout history. Language – as an applied predicate calculus for the construction of propositions – would be our means of ever more minutely coordinating reactions to the partial, sensibly given manifestations of natural phenomena. Our linguistic means of representing these manifest aspects of the sensible world would evolve, according to empiricists, by asymptotically mimicking in its own structure of inter-defined predicates the structure in which the whole of nature finds itself both synchronically and diachronically patterned, if at least insofar as natural phenomena be sensibly presented to us (and, thanks to ever ameliorated measuring instruments) in increasing levels of detail. Such a piecemeal, continuous process, would amount to an ever growing stockpile of options within our symbolically rule-governed repertoires for telling ourselves what is the case.

What is probably Kuhn's most notorious, most contentious, and by himself most thoroughly worked upon philosophical thesis about science, is that across several time periods of its historical development, scientific knowledge-construction is rather a disruptive intellectual process with respect to its topic, not – as empiricists held – an always continuous one. This was part and parcel of his historical view of science; a view according to which there is no

such thing as an independence between rules governing the use (hence, the meaning) of symbols, and historically embedded circumstances of symbolic enactment.

As Kuhn himself recounted in different occasions, his incursion into the philosophy of science began by reflecting upon his own difficulties as he, then a grad student of Physics, undertook the task of drawing a history of his discipline. He went all the way through the reading of Aristotle's *Physics* in order to "prepare a case study on the development of mechanics for a course in science for nonscientists", only to discover "that Aristotle had known almost no mechanics at all" (Kuhn, 2022, p. 30). Instead of lending himself to dismay or deciding to start his narrative on the history of mechanics from a more familiar stage in the nearer past, he fortunately asked himself "why had [Aristotle's] writings in physics been taken so seriously for so many centuries after his death" (*Ibid*), and eventually realized that it was he, Kuhn, who was misreading Aristotelian notions. Perhaps unsurprisingly for the twenty-first century reader, Kuhn's understanding of what had happened while he was disappointed with Aristotle's thoughts on mechanics, was that he had been reading Aristotle's text under the light of what *we* know about what *we* call, e.g., "matter", "motion", and "quality".

> I was sitting at my desk with the text of Aristotle's *Physics* open in front of me and with a four-colored pencil in my hand. Looking up, I gazed abstractedly out of the window of my room – the visual image is one I can still recall. Suddenly the fragments in my head sorted themselves out in a new way, and fell into place together. My jaw dropped, for all at once Aristotle seemed a very good physicist indeed, but of a sort I'd never dreamed possible. Now I could see why he said what he'd said, and why he had been believed. Statements that I had previously taken for egregious mistakes now seemed to me, at worst, near misses within a powerful and generally successful tradition. That sort of experience – an increasing puzzlement and malaise suddenly resolved by redescription, a resorting, and a reassembling of parts – often characterizes an early stage in the recovery of the past. Always it leaves much piecemeal mopping to do, but the central change cannot be experienced piecemeal, one step at a time. Instead, it involves some relatively sudden and unstructured transformation in which some aspects of the ideas and behaviors under study sort themselves out differently and display patterns different from those visible before. (Kuhn, 2022, p. 31)

What that experience would eventually lead him to conclude, as I said, is that scientific knowledge-construction is disruptive across certain time periods of its development, wherein scientists' interests, techniques, and even word-usage undergo "revolutionary" transformations. Kuhn argued that after such time-consuming events, e.g., when, by the time of Galileo's, those long believed-in Aristotelian explanations for objects' displacement were substituted by geometrical analyses of spatial movement irrespective of things' natures, re-

searchers of the revolutionized field of research no longer forage the same kinds of things as they did before. For all effects, Kuhn believed, "we may want to say that after a revolution scientists are responding to a different world" (Kuhn, 1970, p. 111).

As I will argue below, part of Kuhn's reasoning for this claim does form the basis for understanding scientific knowledge-construction as a phenomenon deeply rooted in history – and, as these reasons demonstrate, the histories of the sciences do seem to have been marked by revolutionary periods. However, another part of those reasons has little to do with historical considerations. It is precisely this latter part that gives the phrase "*working in a different world*" a far stronger function than that of a mere dramatic gloss over what is, in reality, a much more nuanced phenomenon.

By generalizing over the difficulties and solutions he found when dealing with Aristotle's texts, in the Introduction to *The Structure of Scientific Revolutions* (Kuhn, 1970) Kuhn presented a dilemma which, albeit philosophical, stemmed from a difficulty to be first dealt with by historians of science. The most usual way to do their work at the time Kuhn was writing (1962) allegedly consisted in attempting to devise among past scientific practices the ones that embodied (the historian's conception of) a, if not the, sound method of scientific research. Such a way of proceeding would allow the historian to tell the history of "the piecemeal process by which [the constellation of facts, theories, and methods collected in current texts] have been added, singly and in combination, to the ever growing stockpile that constitutes scientific technique and knowledge" (Kuhn, 1970, p. 2). According to such a traditional way of recounting the histories of the sciences, the procedures, experiments, and theoretical developments that contributed to the growing stockpile of scientific knowledge should be distinguished, as right from wrong, from the erratic deviations whose epistemic deliverance has with time proved to be null, if not entirely misleading, that is also within those histories – astrology, alchemy, phlogiston and caloric theories of combustion and heat, phrenology, among so many others.

The task at hand for the once traditional historian of science was made difficult by the undeniable plethora of scientific chimeras and misleading suppositions abounding in science's history. For, as a consequence, together with scientifically – hence, legitimately – well grounded knowledge claims, it must be admitted that there are rather ill-grounded knowledge claims which, though effectively based on what would appear to be ongoing prejudice and enduring superstition, are occasionally made in unison by people who most strictly follow scientific methods, scientists themselves.

Given that much of what people in past times whom *we* call scientists did, *qua* scientists (not, say, *qua* the priests, philosophers, mystics, or simple "men in the street" they were too), is inadmissible as presently legitimated claims of knowledge, the dilemma consists in choosing between two incompatible portraits of scientific activity. The one, according to which the ways scientists proceed can so much produce knowledge as they can yield myth, enlightenment or obscurity, because the right method for obtaining knowledge is not always so easily devised, not even by them. The other, according to which those nowadays inadmissible bodies of belief were somehow, at a time, as legitimate scientific beliefs as today's are (because scientists produced them, after all), even though they should not be endorsed as such anymore.

The philosophical dilemma follows straightforward. According to its first horn (and following the former, historiographical dilemma's, first horn) science is to be considered abstractly as a general, rule-like, method, one that is suitable for both investigating nature and producing well grounded knowledge-claims about its phenomena, while scientists are the persons who fallibly follow such a method[56]. Alternatively, science is what scientists have been doing; it is what even people in the past who would not identify themselves as "scientists" (but rather, say, as "natural philosophers") did, just insofar as they jointly and rigorously traced investigative procedures and drew theories with respect to the natural world's furniture, however different their manners were from today's.

Hardly would the question whether science consists in a truth-conducing methodology that along history has fallibly been followed by scientists, or, rather simply, science is what scientists have been doing, be considered a pressing one – let alone a dilemma – by philosophers of science before the mid-1950's. The history of twentieth-century philosophy of science, stemming from the foundational crisis in mathematics, passing through Wittgenstein's reaction to logicism in the *Tractatus* and the rise of logical empiricism, until Goodman's compelling argument to the effect that the notion of 'confirmation' was inapt for formal regimentation – this history made Kuhn's questioning of long-held presumptions about "the scientific method" timely pressing.[57] The shift that was provoked by this questioning, though still

56 To be clear, it is indifferent, for one to assume the option expressed in this first horn, whether one expects to devise one single scientific method, or rather several scientific methods, one for each scientific field she considers.

57 I chose not to mention it in the main text, but shall hereby at least make noticed to those who may have been unaware, that what I called "the fall of logical empiricism" was also greatly prompted by the arguments of other philosophers whose influence and renown have certainly reached Kuhn. Among such arguments was Willard van Orman Quine's (1951) that logical empiricists – and Carnap, in particular – had dogmatically held at least two philosophical theses that were ultimately unsustainable: reductionism (in that the sense of natural-language propositions would reduce to that of observable sentences) and the analytic-synthetic distinction. Another that deserves mention is Wilfrid Sellars' argument, put forward in a 1956 lecture entitled

largely unfinished, lay the bases for current discussions in the philosophy of science, with explicit repercussions in the philosophy of logic.

The picture of science as essentially a fallibly followed *method* (or *rule*) for producing ever improved representations of reality being put into question, the second horn's, previously seldom conceived portrait of scientific activity gained space among discussants and brought philosophical reflection a bit closer to the rough ground. Could not our understanding of science be best illuminated by comprehending the dynamics of concrete historical phenomena of scientific investigation, rather than by channeling our gaze into idealized representational directives supposedly guiding it? Following the first steps trod by Goodman, in the latter's insertion of historical considerations (entrenchment) into philosophical reflection on scientific rationality, Kuhn has masterfully explored the opportunity to more forcibly promote just such a turn of the axis in the philosophy of science. Instead of Goodman, however, he did so mostly by using – and thereby interpreting – Wittgenstein's lately developed historical view of propositional sense.

Before exploring this path, I think it worth pausing to appreciate what its main obstacle was, and to some extent is, in my opinion. When characterizing a historical phenomenon, by contrast to characterizing events as, say, physical, but not historical ones, some considerations appear to be forcibly drawn with respect to the role of persons' *agency* in the development of the phenomenon in question, *besides* appeal to our understanding (or even prospects of understanding) of the "universal mechanism" described by Physics. Such a need represents an enduring tension to be faced by any "historical account" of this or that phenomenon. Aristotle would have taken the need for building up a specialized understanding of agency for granted, since he insisted, as we saw earlier, in the irreducibility of purposeful actions to the material composition of agents (though he did not at all dismiss the explanatory power of analyses of matter). We, instead, have learned to hesitate, if not to completely dismiss from the outset, any talk of natural purposes. As if beckoning at a theory of natural purposes and its place in knowledge-construction (or anywhere else) should remind us of the dark ages. On our behalf, truth be said, nowhere in the Aristotelian *corpus* – whose study was evidently undertaken by Kuhn – may we find a proper *theory* of agency as a natural phenomenon (so as to explain, e.g., what turns a bunch of molecules into an agent), as neither can we find it, for more

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"The Myth of the Given: Three Lectures on Empiricism and the Philosophy of Mind" (Sellars, 1963), wherein he questioned the widely held presumption (or at least acceptance) that entities outside logic, i.e., sense-data, which are no names, concepts, or propositions, could nonetheless provide justification-bases for propositional knowledge-claims. My choice to omit these arguments in the text, despite their relevance for twentieth-century philosophy of science, is that they lack – while Goodman's don't – the intimate connection to Wittgenstein's rule-following considerations which are crucial for my concerns.

obvious reasons, in the modern philosophical tradition that ran continuously throughout late centuries.

Be as it may, if not simply obvious, history's connection to human acts, customs, and purposes, is something that has at least been repeatedly hinted at by all different "historical views" that we shall occupy ourselves with in the remaining of this dissertation. Kuhn's, with respect to science; Wittgenstein's, with respect to propositional sense; Kripke's, with respect to reference. It was inexorably tentative a hint in each case; they did not quite understand agency, and, as a consequence, they did not quite understand historical events as such. In their own ways Kuhn, Wittgenstein, and Kripke have each nevertheless showed awareness that our understanding of historical phenomena is at best something we still have a lot to work on. And each of them insisted, respectively, that scientific knowledge, propositional sense, and any singular term's reference, can only be viewed correctly as historical phenomena. They have each accordingly given our agency central roles in their accounts, although none was able to develop precisely how these roles are fulfilled. Clearer, perhaps, were their criticisms of a-historical competing accounts of their respective subject matters. What all three of them substituted agency – and historically embedded agency – with, was the specification of necessary and sufficient conditions to be met for the obtainment of each of their objects of interest: scientific knowledge, propositional sense, a singular term's reference. In the reading of all three we are led to attend to our direct, purposeful, and fallible engagement with aspects of our surroundings, an engagement that is unwarranted by any set of necessary and sufficient conditions the intentional compliance with which would yield the desired accomplishment: either to know, to think, or to refer. We can only do these things in the ways we do now because we are, at this time, historically situated agents.

So, to repeat, one lesson to be taken from these three philosophers appears to be that to fully develop our understanding of things like scientific knowledge, propositional sense, and singular terms' reference, we are obliged to explain what part does our agency play (that is not reducible to the physical part) in the essence of such things. Little was done regarding this obligation by Wittgenstein, who among them was perhaps the one who most emphasized the importance of such an understanding, or even by G.E.M. Anscombe, the mother of contemporary philosophy of action, who mourningly attested to the lack of any full-blown theory of action (and thus, of agency) with respect to her 1958 context.[58]

58 The lack of a theory of action was attested by her in her (1958) *Modern Moral Philosoophy*. Even so, some philosophers appear to have treated Anscombe's classical (1957) *Intention* as containing just such a theory. Most notably for our purposes, as we shall shortly see, Ian Hacking (1993b; 2007) has repeatedly made use of Anscombe's grammatical reminder about when we talk of each other's intentional actions, as if it was a statement of necessary and sufficient conditions for an event to qualify as an intentional action. This is a

As we shall appreciate in the third chapter, only by the turn of the century could some researchers start seriously defending that a (purportedly scientific) theory of action actually took form in the contemporary scene, at least to the effect of proposing empirical models for investigating conditions that hypothetically enable certain specifiable kinds of action to occur. The third chapter will appear, therefore, as a path's clearance to developing the aforementioned historical accounts. For an unproblematic appropriation of Kuhn's philosophy of science, it will be particularly helpful: it will clear the way towards a recognition of the profound changes he identifies in the histories of the sciences, and, at the same time, allow a non-empiricist account of their continuous accumulation of knowledge of the world.

As I said above, one of the characteristic marks of Kuhn's early work was the opposition he mounted against thinking of science as essentially a fallibly followed *method* (or *rule*) for producing ever improved symbolic representations of facts. In fact, according to both the historiographical and the philosophical establishments of the first half of the twentieth century (honorable exceptions made to the likes of Alexandre Koyré), scientific fields of inquiry would consist essentially in their theories, i.e., on what scientists are able to verbally *state*, as well as *explain*, about what they investigate. Accordingly, then, on the one hand, the scientists' work would be characterized essentially by the formulation of hypotheses, which in turn would be legitimized based on theoretical principles, and finally confirmed or disconfirmed against the punctual myriad of immediate sensations. On the other hand, what would unify a group of people at any given time period around a scientific community would be the beliefs – the theories – that individual scientists shared among themselves, so much as abidance for the same logical syntactical rules, and experience's being supposed to be *ceteris paribus* homogeneous across empirical subjects. It was, as we saw before, around the prospect of regimenting the symbolic systems in which scientific theories are expressed, that logical empiricists foresaw the unification of all sciences' being made transparent. To them, the historical embedding of persons and their commonly enacted linguistic frameworks was of purely literary significance. What would enable humans – above all, scientists – to express propositions would be logical syntactical rules, plus the normal functioning of sensible organs.

Providing several historical examples in support, Kuhn has counteracted these traditional assumptions about scientific work, so much as corresponding expectations about

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crucial point. Taken as a grammatical reminder (as I do), Anscombe's caveat that intentional actions are known without observation *under a description* means that it is not under any description that an action is known by its (human, linguistically competent) agent without observation. Taken as part of a definition, however, the caveat implies that every intentional action is necessarily tied to some specific descriptive content, which would be a wildly stronger claim (though fortuitously fitting in the representationalist intuition).

demonstrating its unity. He did so by arguing, as a historian himself, that a prominent aspect of the history of science is "the insufficiency of methodological directives, by themselves, to dictate a unique substantive conclusion to many sorts of scientific questions" (Kuhn, 1970, p. 03). This was not primarily to question the prospects of regimenting the notion of 'confirmation' or any particular "methodological directive" elsewhere conceived, but rather to point out that methodological directives by themselves fall short of *actually* directing scientific procedures, scientific answers included; hence, what he was pointing out was a distortion caused by thereto traditional ways of depicting scientific work.

In place of methodological directives, and indispensably even after the establishment of any, what Kuhn noticed to be the primary guiding forces of scientific investigation was "*achievements* that *some particular scientific community* acknowledges for a time as supplying the foundation for its further practice" (Kuhn, 1970, p. 10, emphases added). Actual past achievements, not abstract rules, guide today's collective work. As he continues, in the same page,

> I mean … that some accepted examples of actual scientific practice – examples which include law, theory, application, and instrumentation together – provide models from which spring particular coherent traditions of scientific research. These are the traditions which the historian describes under such rubrics as 'Ptolemaic astronomy' (or 'Copernican'), 'Aristotelian dynamics' (or 'Newtonian'), 'corpuscular optics' (or 'wave optics'), and so on.

Thus, for nearly half of *The Structure* Kuhn argued for an inversion of priority between paradigmatic, but often verbally unarticulated practical achievements and concerns of scientific communities, on behalf of the explicit theories and rules respectively upheld. If anything, this inversion of priority would be advised with respect to historical research, in the guise of an imperative: search for the *paradigms*, these guiding exemplars of scientific research, before you search for its methodological directives. But it is also a theoretical statement about the history under scrutiny: such and such a scientific field *is*, first and foremost, a paradigm-induced set of practices, even though, incidentally, it can also (sometimes, and for special purposes) show as a methodologically directed activity.

> Close historical investigation of a given specialty at a given time discloses a set of recurrent and quasi-standard illustrations of various theories in their conceptual, ob-

> servational, and instrumental *applications* [emphasis added]. These are the community's paradigms, revealed in textbooks, lectures, and laboratory exercises. By studying them and by practicing with them, the members of the corresponding scientific community learn their trade. … The determination of shared paradigms is not, however, the determination of shared rules. That demands a second step and one of a somewhat different kind. When undertaking it, the historian must compare the community's paradigms with each other and with its current research reports. In doing so, his object is to discover what isolable elements, explicit or implicit, the members of that community may have *abstracted* from their more global paradigms and deployed as rules in their research. But, if his experience has been at all like my own, he will have found the search for rules both more difficult and less satisfying than the search for paradigms. (Kuhn, 1970, p. 43)

This renders the raising of theories, the formulation of hypotheses, and agreement with respect to several rules, no less indelible marks of the sciences. Hardly any epistemic achievement relative to the understanding of a natural phenomenon will go undescribed, or fall short of provoking at least attempts at providing articulate and systematic explanations almost uniformly put forward by professional practitioners. Still, insists Kuhn, normally "science can be determined in part by the direct inspection of paradigms, a process that is often aided by but does not depend upon the formulation of rules and assumptions" (Kuhn, 1970, p. 44).

One of the things this inversion of priority allowed Kuhn to do was to give a realistic account of the *historical maturing* of scientific investigation into a coherent research tradition, the kind of process that began in the sixteenth century for some such traditions, such as Physics, and for others has been going on to date. As a matter of fact, Kuhn observes, no area of scientific research was born out of someone's sudden insight into methodological designs for research. The often involved conceptual engineering, and the clear, stepwise reporting of novel procedures were (are) fundamental *aids* in supporting the communication, and thus the very rendering into paradigms, of notable experiments throughout history. But no amount of brilliance in experimental reports, nor any maximally rigorous their theoretical embedding, would have ever been of any use while the experiments themselves did not call for the moving *interest* of others. Roughly put, for Kuhn the history of sciences' maturing processes is the history of foraging communities' cohesion formation, around the collective elevation of achievements they find interesting enough to the status of common guides for further inquiry. One of his many examples is the history of the scientific investigation of light.

> No period between remote antiquity and the end of the seventeenth century exhibited a single generally accepted view about the nature of light. Instead there were a number of competing schools and sub-schools, most of them espousing one variant

> or another of Epicurean, Aristotelian, or Platonic theory. One group took light to be particles emanating from material bodies; for another it was a modification of the medium that intervened between the body and the eye; still another explained light in terms of interaction of the medium with an emanation from the eye; and there were other combinations and modifications besides. Each of the corresponding schools derived strength from its relation to some particular metaphysics, and each emphasized, as paradigmatic observations, the particular cluster of optical phenomena that its own theory could do most to explain. Other elaborations were dealt with by *ad hoc* elaborations or they remained as outstanding problems for further research. (Kuhn, 1970, pp. 12-13)

The pattern that repeats, according to Kuhn, from pre-seventeenth century optics to pre-Franklian studies of electricity to pre-modern-synthesis in studies of genetic heredity, and so on (that is to say, generally put, at scientific investigations' "immature" phases), is that "the dialogue of the resulting books [produced by each still competing school of investigation of a kind of phenomenon] was [a dialogue] often directed as much to the members of other schools as it was to nature" (Kuhn, 1970, p. 13). While there be no general confluence on the choice of events to be studied, which instruments to be used, or how to use them, discussion is required among researchers as to why proceed as one does in these respects before doing so, and thus before coming to explain anything about the phenomenon itself.[59]

Hence, what the achievements of all as yet immature scientific fields have lacked thus far is a set of scientific achievements sharing "two essential characteristics" that the achievements of mature sciences, such as physics, chemistry, and biology, (and correspondent ramifications) do present. First, the founding achievements of maturing research communities are to be "sufficiently unprecedented to attract an enduring group of adherents away from competing modes of scientific activity"; second, they need to be "sufficiently open-ended to leave all sorts of problems for the redefined group of practitioners to resolve" (Kuhn, 1970, p. 10). It is only the force of thus sufficiently revealing and stimulating foraging achievements that, in modeling the conduct of virtually anyone interested in devoting herself professionally to the investigation a certain kind of phenomenon, become the paradigms of a mature research tradi-

59 Such a lack of confluence, and consequent need for reiterated argument, is familiar as of today in any science that presents one or another construal of things like behavior, action, consciousness, and cognition, such as political science, economy, sociology, history, psychology, and – of course – the cognitive sciences. Traditionally, and sometimes even today, the gap between so called "hard sciences" and the "humanities" (and generally, the gap between undoubtedly scientific and *arguably* scientific investigation) would have been accounted for by a certain admixture of excessively subjective considerations in the latter, with a still insufficient theoretical development of the former (to whose terms a reduction of the humanities would ultimately to be expected). The problem, thought most of Kuhn's predecessors, would be our relationship to the right method: we haven't yet developed it enough, and we let ourselves go astray by things like sentiments and preferences that further delay scientific (i.e., methodological) development. Kuhn invites another understanding of the difference, according to which what the humanities lack is simply (as it were) collective cohesion around paradigmatic models for how to do their research.

tion. It is such achievements that give a community of researchers *a shared disciplinary matrix*, which include (i) paradigmatic achievements themselves, as exemplars of successful modes of inquiry, (ii) some preferred analogies for understanding studied phenomena (electric circuits as hydrodynamic systems, gas dynamics as the movement of billard balls hitting each other), and, finally, (iii) symbolic generalizations establishing functional conceptual relations to guide theoretical articulation.

To be clear, there *is* such a thing as it may righteously be called "scientific investigation", even if it lacks a cohesive research tradition to be a part of. The point is that a qualitative gap is surmounted when a set of practices and ways of describing phenomena – by way of sharing certain degrees of the aforementioned features, of revealingness and stimulation – become paradigmatic achievements for the whole research community. For it is only when most, if not all involved in the investigation of a natural phenomenon agree, so to say, in the "form of life" they will lead with respect to such a kind of research, that there will be an end to "the constant reiteration of fundamentals" among them, which is to be replaced by encouragement "to undertake more precise, esoteric, and consuming sorts of work" (Kuhn 1970, p. 18).[60]

The resulting standardized research comportment of mature normal science will be a coordination that will to some extent always be tacit (Kuhn explicitly mentions the work of Michael Polanyi on tacit knowledge), and that will be sedimented in the community by means of years of standardized training, with repeated exposure to research paradigms indelibly constituting the formation of each student. Thus it is that, according to Kuhn, a mature scientific disciplinary matrix is based more on the patterns displayed by what members of the community regularly *do* than on what they should discursively understand *about* what they do: whether it is the use of instruments, laboratory conditions to be created, situational aspects to be investigated, or hypotheses to be deemed legitimate by all (or most) of such a scientific community. In sum,

> Scientists can agree that a Newton, Lavoisier, Maxwell or Einstein produced an apparently permanent solution to a group of outstanding problems and still disagree, sometimes without being aware of it, about the particular abstract characteristics that make those solutions permanent. They can, that is, agree in the *identification* of a

60 One would be entitled to question such an implied low level of "consumption" undertaken by professionals in less than mature scientific areas, such as those mentioned in the preceding note. The work of an experimental physicist can only be regarded as "more consuming" than the analogous work of a psychologist insofar as just the foraging of natural phenomena be considered, by contrast to debates over fundamentals. I take Kuhn to have meant nothing beyond this point: more energy can be spent on piecemeal observation and measurement of natural phenomena when there is no need to reiterate and discuss fundamentals.

> paradigm without agreeing on, or even attempting to produce, a full *interpretation* or *rationalization* of it. Lack of a standard interpretation or of an agreed reduction to rules will not prevent a paradigm from guiding research. Normal science can be partially determined through direct inspection of paradigms, a process that is often aided but does not depend upon the formulation of rules and assumptions. Indeed, the existence of a paradigm need not even imply that any full set of rules exists. (KUHN, 1970, p. 44, emphases in the original).

Paraphrasing *On Certainty*, §14, that a scientist knows what she's talking about takes some *shewing* – and, of course, *for* a scientist to know what she's talking about she must learn how to look at what shows before her, before she learns how to think about it. As I have anticipated more than once, Wittgenstein's late philosophy of logic had a considerable impact upon Kuhn's early philosophy of science. Not as a result of a dedicated partaking of his in Wittgensteinian scholarship, perhaps.[61] But still, it was an impact that shows very much aligned with the reading of Wittgenstein's reflections (and directions in which the latter changed) that is hitherto being conveyed. In order to set forth on paper his proposed inversion of priority with respect to scientific work, between rules and actions, methodologies and paradigms, Kuhn resorted to Wittgenstein's concept of "language-games", in particular, and of "games", in general, mostly as these were presented by Wittgenstein in his posthumously published (in 1953) *Philosophical Investigations*. In ending this chapter I shall give a more comprehensive account of the philosophical development that yielded these concepts but, for now, we shall concentrate on just the take on it that Kuhn deployed in *The Structure of Scientific Revolutions*.

It is precisely in order to elucidate the phrase "direct inspection of paradigms" that Kuhn resorts to Wittgenstein in asking: "What do we need to know (...) in order to use terms like 'chair', 'leaf' or 'game' unequivocally and without provoking argument?" (Kuhn, 1970, p. 45). – Answer: *denk nicht, sodern schau!* (PU, §66). Don't think, but look. That is to say, a sure way to provoke argument when answering as simple a question as "what is a chair", "what is a leaf", or "what is a game" is by attempting to abstract, from particularities of everything that might reasonably be taken as a chair, a leaf, or a game, only the features that apply to all of, and only to the things of the same kind. To the person who is genuinely in doubt as to what a game is, for instance, the best service one can provide is to describe some games – or, better yet, to show some – and add: "*These* and similar things we call 'games'" (PU, §69, emphasis added). The "direct inspection of paradigms" that Kuhn is evoking above means

61 As widely known, Kuhn's understanding of Wittgenstein was mostly mediated by the former's friendship with Stanley Cavell. The reader should be advised that, this fact notwithstanding, my reading of Wittgenstein has no connection with that of Cavell that I could tell about, or at least not from my no more than cursory reading of the latter.

precisely this: in order to characterize a given scientific field, or else to work on it, one needs to examine the paradigmatic instances of such work, independently of reaching a complete agreement with others about how to enunciate and explain theories about these paradigms. Precisely under the aspects of games that are stressed by Wittgenstein to elucidate the workings of language, Kuhn is characterizing normal scientific research as a game.

As should be clear from my exposition of Wittgenstein's early thought in the preceding section, the centrality of intentional *uses* we make of propositional signs in his philosophy of logic was no novelty emerging at some later point in his philosophical development. It was there all along. Whence novelty lies in that development, especially if we simply contrast Wittgenstein's views in the *Tractatus* with those he would arrive at by the time of the *Philosophical Investigations*, is in what he came to regard as *logically relevant* features of our propositional uses of signs, by contrast to what he deemed thus relevant before. At first having held a logical-syntactical construal of propositional sense, he came later to elaborate on a contextually embedded, *historical* construal of propositional sense. At first having believed in the autonomy and isolability of logical-syntactical symbolic rules relative to any other sphere of our lives and any matter of fact, he came later to regard as *essential* for the meaningfulness of any kind of symbol-use that it be historically embedded in our (likewise generally embedded) forms of life. This was effectively the abandonment TLP, 2.0211, where it was implied that whether a proposition has sense *cannot* depend on whether another proposition is true – after all, the truth-value of the representation of a historical context is anything but indeterminate.

This is where the notion of "game" comes in in Wittgenstein's renewed philosophy of logic. Being used to characterize the socio-historical embeddedness of any feasible propositional sense (insofar as any propositional sign came now to be deemed meaningful by Wittgenstein inasmuch as it partakes in language-*games*), it highlights for language, in general, what Kuhn was attempting to stress with respect to scientific language, in particular.

> PU, §66: Consider, for example, the activities that we call "games". I mean board-games, card-games, ball-games, athletic games, and so on. What is common to them all? – Don't say: "They must have something in common, or they would not be called 'games'" –but *look and see* whether there is anything common to all. – For if you look at them, you won't see something that is common to *all*, but similarities, affinities, and a whole series of them at that. To repeat: don't think, but look!

By "looking" at the sorted out examples that are referred to thereafter in §66 – board-games, card-games, ball-games, athletic games, child clapping-games, solitary games (patience), singing and dancing games – we are invited to "see a complicated network of similarities overlapping and criss-crossing: similarities in the large and in the small" in different groupings of games, just as in different groupings of members of a family (PU, §67). We find no such similarity that (non-trivially, such as in "game=game") logically syntactically defines what 'a game' means. To be sure, we can give useful definitions of several general terms – say, "chess is a game that is played with such and such rules, etc." – so that all and only objects that can bear particular applications of it be correctly described. At some point, however – say, when the stranger asks what "a game" means in our definition – we shall resort to *paradigms* of appropriate word-usage situations, not definitions (PU, §29). "Explanations come to an end somewhere" (PU, §1), and such an end-place is in our direct relationship to the situations of word-usage themselves, not in abstract symbolic relations above them.

Such a turn of ideas carried with it a crucial consequence (one that fit nicely with Kuhn's proposed historical view of science), that we do not know *a priori* everything there is to know about every propositional sense we ourselves can convey through our own propositional uses of signs (Wittgenstein rejects, therefore, not only TLP, 2.0211, but also TLP, 5.551). Uses of signs acquire and embody their meaningfulness through factors that lie beyond *a priori* surveyability (and which often constitute themselves historically), such as gestural vagaries, interaction ambience, tones of voice, a moment's handling objects, interactors' moods and humors relative to each other (and each other's social kinds), among other kinds of situational specificity whose obtainment may import into the logically relevant characterization of a symbol's enactment (what is *said* or *thought* to be true therewith). Symbols are meaningful, therefore, not only insofar as their descriptions "known without observation" be regarded, but rather as full concrete historical events, some of whose features do need observation in order to become more clearly viewed. Logical syntactical definitions shed little light on the way the use of a given sign has historically emerged and currently participates in our forms of life. As a consequence of Wittgenstein's localizing part of the meaningfulness of our symbol-uses in their historical context, he could no longer expect the semantic contribution of each term deployed in a proposition to be completely elucidated by definitional analysis.

Notice, then, that Wittgenstein has effectively operated a prioritization of paradigms with respect to rules, not only to call in for the logical relevance of non-symbolic circumstantial elements of symbolic enactments, but also to reconceptualize symbols themselves as "paradigm-induced" products of our acting. Kuhn has done the same by treating as paradigms not

only past notable scientific handling of instruments and samples in experiments, but also rather intellectual items, such as "Aristotle's analysis of motion, Ptolemy's computations of planetary position, Lavoisier's application of the balance, or Maxwell's mathematization of the electromagnetic field" (Kuhn, 1970, p. 23). So much as Wittgenstein urged philosophers to treat propositions as of an ordinary kind of thing (PU, §§93-97), Kuhn has made a more specific urge as to scientific symbolic enactments. The latter should accordingly be treated as themselves sets of paradigmatic achievements of a scientific community, alongside its paradigmatic achievements of a non-symbolic character.[62]

Hence, as to both, the work of a historian of science and the learnship process of a student, *identification* and *direct inspection* of paradigms is prior to *interpretation* or *rationalization* of statements (Kuhn, 1970, p. 44, cited above). As to the nature of normal scientific work itself, paradigms are prior to rules.

> Though there obviously are rules to which all the practitioners of a scientific specialty adhere at a given time, those rules may not by themselves specify all that the practice of those specialists has in common. Normal science is a highly determined activity, but it need not be entirely determined by rules. That is why, at the start of this essay, I introduced shared paradigms rather than shared rules, assumptions, and points of view as the source of coherence for normal research traditions. Rules, I suggest, derive from paradigms, but such paradigms can guide research even in the absence of rules. (Kuhn, 1970, p. 42)

Now that we have sufficiently stressed Kuhn's conceived relationship between paradigms and rules within normal scientific research, we can move on to the rather intricate subject matter of scientific revolutions. Two things about them, especially. First, how it is that their dynamics can explained by developing the consequences of Kuhn's characterization of

62 In his *Second Thoughts On Paradigms* (1977) Kuhn, answering to critics, admitted he had deployed in *The Structure* at least two usages of the term 'paradigm' "which require both different names and separate discussion", one being "global, embracing all the shared commitments of a scientific group; the other … a particularly important sort of commitment and thus a subset of the first" (Kuhn, 1977, p. 294). Disambiguating the term 'paradigm' thus amounted to distinguishing between, on the one hand, a scientific community's "disciplinary matrix", which included "symbolic generalizations, models, and exemplars" and, on the other hand, only the exemplars. Symbolic generalizations are to be taken as universally quantified statements (e.g., "every whale is a mammal") or equations (e.g., "$f = m.a$") attesting generally recognized conceptual relations that are part of scientific theories; models, as the community's "preferred analogies", like regarding electric circuits as hydrodynamic systems, or gas-molecules' dynamics as that of randomly moving billiard balls (Kuhn, 1970, pp. 298-300). "Exemplars, finally, are concrete problem solutions, accepted by the group as, in a quite usual sense, paradigmatic" (*Ibid*, p. 300). What I am implying above in the text is that symbolic generalizations and models too, especially if we follow Wittgenstein's lead, can be viewed as exemplars with which a scientific community works. Once they are no longer seen as abstract autonomous directives, but rather as further moves within concrete language-games, both symbolic generalizations and models can be conceived as just further things scientists do.

normal scientific work: a work that is based on paradigms and that, thanks to these, is essentially collective and allows for high levels of disciplined cohesion. Second, how it is that a revolutionary change in otherwise stabilized scientific traditions impacts on both, the actual views of scientists on phenomena they are interested in before and after the revolution, and, given the nature of such an impact, what do scientists – and we, by deferring to their knowledge – learn about once a revolutionary process is complete.

The especially rigid nature of the language-games that compose every mature research tradition makes it especially difficult for a revolutionary transition to occur. Difficulty to change here is surely not due to tradition alone, but emerges also by virtue of the fact that the paradigms having ensued the maturing (or else, the latest revolution) of a certain kind of investigation have actually earned their place in the community's past. They are, by supposition, interesting and stimulating past achievements, which induce further interesting and stimulating achievements. Paradigm-induced expectations prove in fact to be fruitful, and paradigm-induced theories show as correct, often throughout long time periods. The outcome is a kind of conservativeness, expressed in the "strenuous and devoted attempt to force nature into the conceptual boxes supplied by professional education" (Kuhn, 1970, p. 05). Often years, sometimes decades, are spent – alongside great sums of financial resources – to build and run eccentric instruments, specialized laboratories, and astronomically costing field-research routines in order to meet paradigm-stimulated expectations.[63]

> Perhaps these are defects. The areas investigated by normal science are, of course, minuscule; the enterprise … has drastically restricted vision [relative to still immature scientific inquiries]. But those restrictions, born from confidence in a paradigm, turn out to be essential to the development of science. By focusing attention upon a small range of relatively esoteric problems, the paradigm forces scientists to investigate some part of nature in a detail and depth that would otherwise be unimaginable. … In the interim [between scientific revolutions], during the period when the paradigm is successful, the profession will have solved problems that its members could scarcely have imagined and would never have undertaken without commitment to the paradigm. And at least part of that achievement always proves to be permanent. (Kuhn, 1970, p. 25)[64]

63 It is in this spirit that things like the Super-Kamiokande neutrino detection experiment are made (similar experiments are cited by Kuhn, 1970, p. 26). It "is located 1,000 m (3,300 ft) underground in the Mozumi Mine in Hida's Kamioka area. It consists of a cylindrical stainless steel tank that is 41.4 m (136 ft) tall and 39.3 m (129 ft) in diameter holding 50,220 tonnes (55,360 US tons) of ultrapure water. The tank volume is divided by a stainless steel superstructure into an inner detector (ID) region, which is 36.2 m (119 ft) in height and 33.8 m (111 ft) in diameter, and outer detector (OD) which consists of the remaining tank volume." (Super-Kamiokande - Wikipedia)

64 The phrasing of 'paradigm' in the singular implies Kuhn is referring in this passage, more precisely, to disciplinary matrices.

While they keep unshattered, the common trace of paradigms-induced research traditions is not the bold unraveling of scientific breakthroughs (either as an aim or as a fact), but rather (as both, an aim and a fact) the piecemeal, meticulous testing of patterns that are extracted from well known and habitually entrenched models, against phenomena's yet untested properties, in the expectancy of recognition of those patterns in investigated phenomena that will only confirm the adequacy of a community's current paradigms.[65]

> Normal science … is a highly cumulative enterprise, eminently successful in its aim, the steady extension of the scope and precision of scientific knowledge. … Normal science does not aim at novelties of fact or theory and, when successful, it finds none. (Kuhn, 1970, p. 52)

Revolutionary transitions do occur, nevertheless, by force of the anomalies inevitably eventually found by scientific communities while expanding the reach of their conservative methods of research, when attempting to solve the usual "puzzles" of daily work. Scientific revolutions are the "tradition-shattering complements to the tradition-bound activity of normal science" (Kuhn, 1970, p. 06). A community accustomed to the geocentric astronomical model of circular planetary orbits is forced, after centuries of increased confidence and development in their methods, to admit anomalous occurrences in nature with respect to its expectations, such as the apparently helical trajectories of certain celestial bodies. Another, which used to describe – with equally increasing confidence – combustion as the loss of phlogiston previously retained in flammable bodies, suddenly starts to wonder why repeatedly observation reveals some sort of "air absorption" while some burning processes occur. When anomalies like these recur to the point of distressing the usual confidence their inherited routines are performed with, scientists may individually for the first time confront themselves with the challenge of reconsidering their communities' established practices, theories, and aspects that are looked for in their objects of study. But the rigidity of their past training ensures this will seldom be the most suggestive response to such found anomalies, with both convoluted adaptations of old models, and simple foreshadowing of recalcitrant difficulties, serving as two powerful competing suggestions. In the history of astronomy, for instance, both these anti-revolu-

65 Nancy Cartwright (1999) refers to this process as "concretization" of (more) abstract models into (more) concrete ones, by means of which, for instance, Newton's Second Law of Motion begets Hooke's Law. Kuhn's own characterization here resonates. "In its established usage, a paradigm is an accepted model or pattern, and that aspect of its meaning has enabled me, lacking a better word, to appropriate 'paradigm' here … like an accepted judicial decision in the common law, it is an object for further articulation and specification under new or more stringent conditions" (Kuhn, 1970, p. 23).

tionary alternatives have at some point been undertaken, respectively in the centuries of overwhelmingly growing complexity of geocentric models of the celestial vault, and later, in the ever postponed problem of the precession of the orbit of Mercury around the sun *vis-à-vis* Newtonian models.

But scientific traditions' conservativeness can be rationalized not only (as above) by appeal to the epistemic gifts of trusting that nature will often reflect patterns encountered in past paradigmatic achievements, but also as science's most fruitful strategy for obtaining revolutionary discoveries. This is precisely how Kuhn explains – not the structure, but – the rational *dynamics* by which a paradigm-bound professional community undergoes a revolutionary phase.[66]

> [Scientific] professionalization leads, on the one hand, to an immense restriction of the scientist's vision and to a considerable resistance to paradigm change. The science has become increasingly rigid. On the other hand, within those areas to which the paradigm directs the attention of the group, normal science leads to a detail of information and to a precision of the observation-theory match that could be achieved in no other way. Furthermore, that detail and precision-of-match have a value that transcends their not always very high intrinsic interest. Without the special apparatus that is constructed mainly for anticipated functions, the results that lead ultimately to novelty could not occur. And even when the apparatus exists, novelty ordinarily emerges only for the man who, knowing *with precision* what he should expect, is able to recognize that something has gone wrong. Anomaly appears only against the background provided by the paradigm. The more precise and far-reaching that paradigm is, the more sensitive an indicator it provides for paradigm change. By ensuring that the paradigm will not be too easily surrendered, resistance guarantees that scientists will not be lightly distracted and that the anomalies that lead to paradigm change will penetrate existing knowledge to the core. The very fact that a significant scientific novelty so often emerges simultaneously from several laboratories is an index both to the strongly traditional nature of normal science and to the completeness

66 The conservativeness of mature scientific research that is depicted by Kuhn as part and parcel of what explains the epistemological virtuousness of that collective effort, must not be confounded with the conservativeness of extra-scientific social forces that doubtlessly impinge on scientific communities and their research-agendas as well. On several fronts the latter sort of conservativeness shows much more hazardous than beneficial, and not only for knowledge construction. A blatant example is medical research on female bodies, that has been amply criticized for dismissing both, women's and transgender men's physiology within research and data collection for producing medicines that are sold to the public in general, and this public included (Fox, 1998). Similar with respect to prevalent forms of dehumanization which certain forms of political conservativeness makes reflect on scientific routines and outcomes is the great amount of cultural, racial, and gender-based noxious discrimination that perpetuates with the current widespread commercialization of AI devices (Hofmann et al., 2024). Finally, assimilation by structured scientific fields of indigenous, also paradigm-induced, but differently articulated knowledge, partakes in the systematic cultural erasure that peoples around the world suffer (Massimi, 2022). By these, as well as by a herewith unfitting list of reasons, political conservativeness is no good, either for the advancement of scientific knowledge, or for the application we make of the latter to all human and non-human forms of life. By contrast with it, as I try to show by restating Kuhn's 1962 argument, the specifically paradigm-induced conservativeness that pulls a scientific community together in its foraging work shows a functional dynamics for the unveiling of natural facts and regularities, both in normal and revolutionary circumstances. One form of stubbornness should not be mistaken by the other.

> with which that traditional pursuit prepares the way for its own change. (Kuhn, 1970, p. 65)

It is thus that only from within the very community whose sedimented and developed *modus operandi* has become frustrating that speculations – both practical and theoretical – can emerge that are sufficiently qualified to give rise to achievements of a reorienting force upon scientific work, legitimate contenders for the status of substituting guiding paradigms to scientific education. The greater the precision and scope of a well-sedimented, mature tradition, the more sensitive it is as a producer of anomalies, and, consequently, of an occasion for revolutionary change. When efforts start to proliferate in this direction – that is, when the scientific community enters into a period of *crisis* – is when the abstraction of rules, the comparison between differently articulated methodologies, and the explicitation of fine theoretical assumptions become most indispensable and characteristic of a mature scientific environment. Tradition-shattering is essentially, even if not exhaustively, a matter of argument.

> Normal science can proceed without rules only so long as the relevant scientific community accepts without question the particular problem-solutions already achieved. Rules should therefore become important and the characteristic unconcern about them should vanish whenever paradigms or models are felt to be insecure. (Kuhn, 1970, p. 47)

Now, herein lie the seeds of tension in the account offered by Kuhn, of both, normal and revolutionary scientific enterprise. Concerned with offering a historical account of scientific rationality, Kuhn has coherently given central place to scientists' practice and interests around collectively binding paradigmatic achievements, and explicitly argued that these cannot be determined – either epistemologically or metaphysically speaking – by rules and assumptions taken by the individuals of a scientific community. In critical, prerevolutionary time periods, however, explicitation of theoretical principles of both, traditional and dissident currents dividing the ensuing debate come prominently to the fore. As they should; for, if tenured professionals just suddenly started to counter the manuals, searching for never heard-of variables, and proposing the manufacture of new eccentric instruments without even attempting to explicitly justify such oddities, they would be righteously taken as less than scientists. "Once a first paradigm through which to view nature has been found, there is no such

thing as research in the absence of any paradigm. To reject one paradigm without simultaneously substituting another is to reject science itself" (Kuhn 1970, p. 79).

In order to effectively substitute other paradigms for the old, no longer satisfactory ones, so that new achievements become paradigmatic to a restructured disciplinary matrix, scientists start attempting new concepts, to accordingly use old terminology differently, as well as adding new terminology as they concomitantly begin to foresee and promote new experimental designs for themselves and their peers. Thus, as again can be illustrated with several historical examples, any successfully orchestrated change in the hard-die ways of a scientific community comes intertwined with a forced reform in the group's paradigmatic manners of using words.

This reflects most clearly, perhaps, in the time-consuming process at some point of which a revolutionary scientific discovery obtains. One such illustrative discovery was that of oxygen, by the end of the eighteenth century, which came about not only as the revealing of a new chemical substance, but also as a novel theory of (and consequently a novel set of paradigmatic research routines with regards to) combustion. As Kuhn argues, because of the necessarily time-consuming process of argument and conceptual assimilation involved in a change of paradigms like this, there is no precise day and time in history that is the point when the revolutionary discovery of oxygen (or X-rays, or the Leyden jar, etc.) occurred, and, once this whole process is taken into consideration, even its authorship shows dubious.

> Priestley's claim to the discovery of oxygen is based upon his priority in isolating a gas that was later recognized as a distinct species. But Priestley's sample was not pure, and, if holding impure oxygen in one's hands is to discover it, that had been done by everyone who ever bottled atmospheric air. Besides, if Priestley was the discoverer, when was the discovery made? In 1774 he thought he had obtained nitrous oxide, a species he already knew; in 1775 he saw the gas as dephlogisticated air, which is still not oxygen or even, for phlogistic chemists, a quite unexpected sort of gas. Lavoisier's claim may be stronger, but it presents the same problems. If we refuse the palm to Priestley, we cannot award it to Lavoisier for the work of 1775 which led him to identify the gas as the "air itself entire". Presumably we wait for the work of 1776 and 1777 which led Lavoisier to see not merely the gas but what the gas was. Yet even this award could be questioned, for in 1777 and to the end of his life Lavoisier insisted that oxygen was an atomic "principle of acidity" and that oxygen gas was formed only when that "principle" united with caloric, the matter of heat. Shall we therefore say that oxygen had not yet been discovered in 1777? Some may be tempted to do so. But the principle of acidity was not banished from chemistry until after 1810, and caloric lingered until the 1860s. Oxygen had become a standard chemical substance before either of those dates. (Kuhn, 1970, pp. 54-55)

Conceptual assimilation is thus an intrinsic feature of revolutionary scientific discoveries. Each one of such discoveries "is necessarily a complex event, one which involves recognizing both *that* something is and *what* it is", so that in it "both observation and conceptualization, fact and assimilation to theory, are inseparably linked" (Kuhn, 1970, p. 55).

What blooms here is the kind of historical phenomenon that provokes difficulties such as those that were encountered by Kuhn when he first tried to interpret Aristotle's ideas. The problem is that the conceptual tools required for advancing the justification efforts involved in a scientific revolution have to be invented, and this implies that the groups standing for revolutionary change will, at least so far as their adopted symbolic rules can tell, not *reason* the same way as the groups defending any kind of mere conservative reform. They will necessarily "disagree as to what constitutes appropriate reasoning, decisive evidence, conclusive proof" (MacIntyre, 1977, p. 461). Hence, as Wittgenstein wrote in *On Certainty*, §§611-612, "Where two principles really do meet which cannot be reconciled with one another, then each man declares the other a fool and heretic. … At the end of reasons comes *persuasion*".

> The proponents of competing paradigms are always at least slightly at cross-purposes. Neither side will grant all the non-empirical assumptions that the other needs in order to make its case. … Though each may hope to convert the other to his way of seeing his science and its problems, neither may hope to prove his case. The competition between paradigms is not the sort of battle that can be resolved by proofs. (Kuhn, 1970, p. 148)

Now, notice how Kuhn has already given a reasonable, even if incipient, response to the difficulties engendered by such "deep disagreements" occurring across scientific revolutions.[67] The language-game of *persuading*, not that syntactically formalizable reason-exchange, is involved in both, the maturing process of a research tradition and the tradition-shattering process of a scientific revolution. Therein, in both, what determines the steady cohesion of a scientific community, whether unprecedented or renewed, is the commonly felt *interest* in living and working a certain way, and not generally accepted demonstration, by any means, of the greater adequacy of linguistic frameworks to express the same things. If that comes to one as a surprise is because one is still not convinced that a logical syntactical construal of logic is a philosophical fantasy, and that, if "the nature and authority of scientific knowledge" is anywhere to be found, it is neither in some framework-neutral empirical evidence, nor in the con-

67 A rich literature has been flourishing on this topic since Folgelin's (1985) *The Logic of Deep Disagreements,* to which both Kuhn and Wittgenstein provide stimulating source material.

sistency (simplicity, comprehensiveness, etc.) of the symbolic system to which its expression belongs.[68] It is in the fruitfulness of its practical achievements with respect to the goal of unveiling properties of natural phenomena. Which properties shall be unveiled (both actually and potentially) by future scientific work will necessarily vary according to which customs and purposes are embodied in scientists' work, and only thereafter those properties will lend themselves to be mentioned in scientists' esoteric language-games. What ensues with a scientific revolution is not so much a disagreement as it is a practical divergence, that, forming part of the bases for scientists' language-games, renders some usual argumentative procedures simply useless.

Kuhn has therefore produced a coherent and realistic picture of the dynamics of scientific revolutions. A mature scientific community, much accustomed to the paradigmatic practices, models, and symbolic generalizations through which it achieved maturity at some point in the past, suddenly starts to split by the unequally exerting force of recalcitrant anomalies in ongoing research. Such a splitting process takes form as some of the community members start behaving as if they were foreigners, making experiments that no one would intuit from shared traditional customs to their own agendas. And, by force of their standing commitment to science, these dissidents start talking about strange things, like "dephlogisticated air" and "air itself entire", until at some point more researchers start to recognize not only how interesting, but also deserving of a new vocabulary those novel experimental results are. Eventually, the result is a new stabilized and shared cluster of manners not only of doing, but also of telling what is going on in daily experimental research.

The main philosophical difficulties that were to be faced by Kuhn rose to the forefront inasmuch as he attempted to account for revolutionary processes of the kind just described as transformations in the lived experience of researchers. That these transformations occur in scientific revolutions is a corollary of the paradigm-induced attention that characterizes scientific work: that attention, "the perceptual features that a paradigm so highlights that they surrender their regularities almost upon inspection … must obviously change with the scientist's commitments to [different] paradigms" (Kuhn, 1970, p. 125). The scientist's eyes, Kuhn ponders, stubbornly refuse to see the phenomena they are interested in otherwise than as they have learned to see them. Before thinking and in crisis rethinking, scientists are still looking, and they are doing so in well trained habitual manners. The hardship to look at phenomena in other ways than the usual ones is one of the main factors forcing the scientific community,

68 Through the phrase "the nature and authority of scientific knowledge" is how Kuhn would characterize the topic of his reflections in *The Structure* some twenty-five years later, in his *Shearman Lectures* (1987) (Kuhn, 2022, p. 27).

when faced with a crisis, to make its own rules and assumptions finally explicit. Only then – by stopping to look in order to think, so to say – can normal procedures be argued about, so as to identify where exactly lie the roots of already attested difficulties. Still, however relatively rich in theoretical discussion such critical periods of science be, the arguments therewith produced can only be legitimized in practice, i.e., by producing new paradigms for future research.

Revolutionary change consists, then, in the "rejection of one-time honored scientific theory in favor of another incompatible with it", but also shifts "the standards by which the profession determine[s] what should count as an admissible problem or a legitimate problem-solution", thus "transform[ing] the scientific imagination" (Kuhn, 1970, p. 06). If any change in how scientists come to experience their objects of research is necessarily accompanied by changes in how their words are made use of to describe what experience reveals, then the next problem for Kuhn would be figuring out what the relationship is between those phenomenological changes and these conceptual structure-substitutions.

This question's importance cannot be overstated. By themselves the conceptual structure-substitutions undergone by scientific communities was already a well acknowledged fact, and effectively the motivating feature of scientific development behind Carnap's "reduction sentences" and his "Principle of Tolerance". At the same time, as we saw, logical empiricists generally upheld a conception of experience as *ceteris paribus* homogeneous across adepts of different linguistic frameworks, including across members of succeeding linguistic frameworks in the history of a given scientific field. This, we should remember, gave them the basis to foreseeing the "unity of science" once they rejected transcendental subjectivity, a unity they envisioned to demonstrate by tracing the supposedly logical relations of scientific statements until obtaining the symbolic tools for expressing fully analyzed, theory-neutral sense-data reports. Kuhn had learned to distrust that "vision": to see it rather as an ill-grounded distortion of scientific work. That expectancy made scientific work appear as a confrontation between symbolic generalizations and punctual, framework-independent given sensations, the latter of which a maximally perspicuous symbolic system would be able to express and relate to actually deployed scientific concepts. But the paradigmatic exemplars of research routines are not only identifiable and workable with independently of scientific concepts and theories; it is they – *their* observation, measurement, and manipulation, not punctual sensations' – which directly give meaning to scientific concepts and theories, so that it becomes pointless to expect

the roots of latter's meaningfulness to trespass paradigm-induced experience into paradigm-neutral punctual sensations.[69]

Kuhn was thus led to view every scientific term's possibly extant syntactical definitions, not as "full logical specifications of meaning (if there are such), but more nearly as pedagogic aids. The scientific concepts to which they point gain full significance only when related, within a text or other systematic presentation, to other scientific concepts, to manipulative procedures, and to paradigm applications" (Kuhn, 1970, p. 142). Very much resonating with Wittgenstein's remarks in the *Philosophical Investigations*, §60 (and elsewhere), against the illusory prospects of elucidation through logical-syntactical analysis, Kuhn asseverates in his *Second Thoughts on Paradigms* (1974):

> In addition, … formalists [i.e., upholders of a logical-syntactical construal of propositional sense] have frequently conflated the task of *improving* the clarity and structure of the formal elements of a scientific theory with the quite different job of *analyzing* scientific knowledge, [but they] may not take for granted that [they] emerge with the same theory with which [they] began nor that the formal elements of either version of the theory are coextensive with the theory itself.

More precisely, then, what the question is asking for when coming from Kuhn is the relationship between phenomenological changes and conceptual structure-substitutions, *given the priority of paradigms*, i.e., their theory-independent identifiability and their agency-related nature.

> If, as I have already urged, there can be no scientifically or empirically neutral system of language or concepts, then the proposed construction of alternate tests and theories must proceed from within one or another paradigm-based tradition. Thus restricted it would have no access to all possible experiences or to all possible theories. (Kuhn, 1970, p. 146)[70]

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69 Tellingly, though, Kuhn did not think that the philosophical project of a paradigm-neutral language had been proved impossible. "Philosophical investigation has not yet provided even a hint of what a language able to do that would be like", but "perhaps one will yet be devised", and there "can be no question that efforts of this sort are worth pursuing" (Kuhn, 1970, pp. 126-127).

70 Notice that, although Kuhn was not at all concerned with the old project of formalizing the notion of 'confirmation', by conceiving of a paradigm-induced empirical grounding of theories' meaningfulness he did give intelligibility to at least its intuitive usage, in a way much resounding of Goodman's, which he cites: "It is fortunate that nothing more [than phenomena known to exist] is in question; for the notion of 'possible' cases, of cases that do not exist but might have existed, is far from clear" (Goodman, *Structure of Appearence*, *apud* Kuhn, 1970, p. 127).

Scientific rationality works not by comparison and choice among every possible linguistic framework with respect to how well they fit available neutral sense-data. Rather, it works by comparison and choice among different agent-environment relationships already considered interesting enough for consideration. Wittgenstein would express the same, but more generally than with respect to scientists' forms of life. He attempted to show how rationality as such depends on discriminating different ways of relating to stuff (with and without words) that are already part of our forms of life among themselves, not on comparing our imagined artifacts of word-usage, such as "grue", or "quaddition", with our actual word-usage. His "more elementary and more familiar" reflections (that is Kuhn's 1970, p. 44 description of them), which were on logic, generally, and not just on the logic of scientific discourse, in particular, also hinted at an answer to the phenomenological-conceptual changes question, *given the priority of paradigms*.

And Wittgenstein's answer to that question had a virtue that was regrettably neglected by Kuhn's; namely, a resolute and explicit rejection of the representationalist intuition made on the same grounds that inspired Kuhn's own talk of paradigms as prior to rules. As we briefly saw (and will shortly be expanding on), Wittgenstein came lately to urge philosophers to *look* at, and *see* the language-games the meaningfulness of our sayings is embedded in, therewith upholding for language, in general, very nearly the same "priority of paradigms" Kuhn upheld with respect to scientific work, in particular. The formerly postulated independence between rules governing propositionally meaningful symbol-usage, and the corresponding contexts of symbolic enactment (TLP, 2.0211), was no longer. The reason why I take it as regrettable that Kuhn did not reject the representationalist intuition is that it is exactly from the premise (which was very much appreciated by Kuhn, as we saw), that the meaningfulness of any sign, order, rule, etc. is rooted in the history-laden circumstances of symbolic enactment, that Wittgenstein argues for both the vacuity of postulating mental or otherwise "internal" representations for explaining anything. Not only they are vacuous as explanatory posits, however, the very concept of "a mental representation" is a wheel turning idly in our forms of expressing ourselves.

Wittgenstein showed – and Kripke, as we saw in the last section, explained the paradoxes we fall in when thinking otherwise – that "a rule for interpreting another rule" explains nothing when the rule used for interpreting the other one does not, on its turn, serve as a direct index of how one is supposed to act (PU, §§198-201). Things like obeying a rule, understanding a proposition, "are *customs* (uses, institutions)" (PU, §199), things that necessarily involve whole socio-historically embedded circumstances. Therefore, any thread of explanation must

ultimately terminate in the (so to say, paradigm-induced) recognition of the *customs* giving rules their different purposes in our lives. In particular, the ultimate explanation for our customs (whether rule-guided or not) cannot lie in the particular kind of rules one inadvertently may suppose to be operated with in the generation of mental representations. There is literally no *use* to those (nobody *uses* them), and yet, if any phenomenological particularities were indeed representational in character, then some rule – hence, some use, some custom – should explain such a character.

So much so for the *concept* of "a mental representation". Like Cora Diamond's (1996) "great riddles", which are mostly present in religious discourse, it is entirely based on an unproblematic, regularly applied, concept, in its case the concept of "a representation". But it is also deployed with a cluster of artificially imposed prohibitive clauses that must be simply accepted by anyone willing to adhere to the language-games formed with it. No participant in the language-games intertwined with the concept of "a mental representation" is allowed to ask *who* makes them, what her *culture* and *customs* is, to *whom* are they addressed, and with what *purpose* are they made. (Needless to say, such prohibitions apply to discourse about "representations" that supposedly are produced by cognitive systems as well). So much as the concept of "creation" undertakes similar prohibitive clauses when entering language-games wherein talk of "Creation" reigns, and as in any purported description of "life after death" – the significance of word-usages in these language-games stems, like any other's, from rather mundane contexts of symbolic enactment, but therein they are supposed to play another, necessarily riddling function, with some features of their regular usage being vetoed.

But even assuming, for the sake of the argument, that the concept of "a mental representation" is just as clear and unproblematic as any other, the explanatory role it supposedly plays can be easily debunked as a non-existent one, in particular when the *explanans* in question be the change of worldview scientists undergo across revolutions. If there is a difference between two uses of the word 'see', as Wittgenstein remarks in *Philosophy of Psychology – a Fragment* (hitherto, PP), §xi (The one: "What do you see there?" – "I see this" (and then a description, a drawing, a copy). The other: "I see a likeness in these two faces"), then there would still be a question as to *how* does any "mental representation" would be *seen* in the second sense. That is to say, which aspects of the so called "mental representation" are consciously met? (Or, if you will, how is it that the physical means through which "information" is "transmitted" to some neural tissue is "seen" by such a tissue, so that the latter can recover the information in question?) "The concept of an 'inner picture' is misleading, since the model for this concept is the 'outer picture'" (PP, §xi), and outer pictures themselves only represent

something specific inasmuch as they are used in a specific manner. Since what it means is what is important, the question for the consciously salient aspects of a representation, mental or otherwise, is equivalent to asking: which rule is being followed when the mental representation is supposedly understood (seen) in this or that manner. Once a rule is evoked to explain something, however, under pain of an infinite regress, explanation must eventually end at some point that is not another rule.

Because thus positing mental representations to account for the varieties of experience just hopelessly postpones the question as to the sense in which, for *signs* in general, paradigms are prior to rules, Wittgenstein resorts to speculation about the direct relationship between *actions* – purposes, intentions, attitudes, customs, abilities, etc. – and the varieties of experience, with explicit consideration to the embeddedness of our agency within "custom and upbringing" (PP, §xi) factors, so much as in "extremely general facts of nature" (PU, §142), to that effect. As we shall see in the third chapter, though speculative, Wittgenstein's thoughts on such a direct relationship between ways of acting and ways of seeing very much anticipated currently extant full-blown theories of action – according to which actions, understood as environmentally constituted, *are identical with* experiences – that entirely dispose of the representationalist intuition. Such theories to be examined very clearly propose an instance of conceptual structure-substitution in the so called sciences of the mind (aside, of course, from proposing novel experimental settings, attending to previously ignored variables, etc.). Instead of the traditionally postulated representational relation between neurophysiological states and the circumstantial causes of neuronal stimulation, perception, for instance, is thought of as an active and affect-laden involvement with the aspects of our surroundings that in turn afford us to act according to our acquired abilities; it is thought of as a phenomenon irreducibly constituted by living agents and their environments together, so that everything we perceive is aspects of what we are able to act upon, given things like our bodily morphology, properties of our environments, and, of course, custom and upbringing. As Wittgenstein would put his own tentative speculations about this,

> In the triangle I can see now *this* as apex, *that* as base – now *this* as apex, *that* as base. – Clearly the words "Now I am seeing *this* as the apex" cannot so far mean anything to a learner who has only just met the concepts of apex, base, and so on. – But I do not mean this as an empirical proposition.
>
> Only of someone *capable* of making certain applications of the figure with facility would one say that he saw it now *this* way, now *that* way. The substratum of this experience is the mastery of a technique.

> But how queer for this to be the logical condition of someone's having such-and-such an *experience*! After all, you don't say that one 'has toothache' only if one is capable of doing such-and-such. —— From this it follows that we cannot be dealing with the same concept of experience here. It is a different though related concept.
>
> It is only if someone *can do*, has learnt, is master of, such-and-such, that it makes sense to say that he has *this* experience. (PP, §xi)

Coherently with respect to his claim that the identification and direct inspection of paradigms is prior to both, the interpretation and the rationalization of scientific findings, Kuhn raises arguments in *The Structure* that are partly very similar to Wittgenstein's above, to the effect that, *contra* what empiricists had thought, immediate conscious experience cannot be taken to be homogeneous irrespective of the tradition to which a person, in general, or a scientist, in particular, belongs. Accordingly, for Kuhn, Lavoisier did not at all *interpret* differently the same data that were encountered by Pristley, he *saw* some dynamic patterns in his experiments with combustion that Pristley did not, and *that* is why he formulated a new theory of combustion thereafter, whereas Pristley remained for much more time a believer in the old theory. Vision, which is required for directly identifying and inspecting anything, changes so that new paradigmatic exemplars, models, and symbolic generalizations can be proposed for communitary endorsement.

But, as seen, the order of priority between paradigms and rules that has so much been stressed by Kuhn is a logical order, not necessarily a temporal one. While *normal* scientific experiments, led by the expectation that nature will exhibit the very same patterns of paradigmatic models already possessed, yield for the first times a surprising sort of outcome, this "reflects not on nature but on the scientist" and add to the collection of "*mere* facts, unrelated and unrelatable to the continuing progress [of normal research]" (Kuhn, 1970, p. 35, emphasis in the original). It is only after undertaking the effort to articulate new ways of describing such "mere facts" that the scientist will be in a position to propose a revolutionary alternative to normal research, to tell what those *interesting* facts are. Finally, with the aid of such a conceptual articulation of novelty, and novel ways of dealing with newly looked upon facts are effectively communicated, there is a chance of occurring an actual substitution of the whole disciplinary matrix of a group of researchers: a substitution which, *because* of the logical priority of *identification* relative to the interpretation of paradigms, imply that "scientists see the world of their research-engagement differently", to the point that "we may want to say that after a scientific revolution scientists are responding to a different world" (Kuhn, 1970, p. 111).

By contrast to Wittgenstein's, however, Kuhn's argument was based not only on phenomenological observations and philosophical attempts to attain at a "different concept of experience" (PP, §xi, cited above). Instead, he (Kuhn, 1970, p. 112) cites "a rich body of psychological literature, much of it stemming from the pioneering work of the Hannover Institute" to the effect even in identical experimental sets the *Gestalten* that compose a subject's immediate conscious experience may vary according to training (hence, according to succeeding traditions across scientific revolutions), and continues:

> An experimental subject who puts on goggles fitted with inverting lenses initially sees the entire world upside down. At the start his perceptual apparatus functions as it had been trained to function in the absence of the goggles, and the result is extreme disorientation, an acute personal crisis. But after the subject has begun to learn to deal with his new world, his entire visual field flips over, usually after an intervening period in which vision is simply confused. Thereafter, objects are again seen as they had been before the goggles were put on. The assimilation of a previously anomalous visual field has reacted upon and changed the field itself. Literally as well as metaphorically, the man accustomed to inverting lenses has undergone a revolutionary transformation of vision. … Still other experiments demonstrate that the perceived size, color, and so on, of experimentally displayed objects also varies with the subject's previous training and experience. Surveying the rich experimental literature from which these examples are drawn makes one suspect that something like a paradigm is prerequisite to perception itself.

That is to say, something like a disciplined, regular training with respect to symbolic generalizations, the use of models in experimental settings, and the recognition of patterns encountered in exemplary past achievements is required for the scientist to see the world as she does. What the surveyed experiments of gestalt psychologists suggested, in Kuhn's view – especially by evidencing intermediary adaptation or "critical" periods between gestalt-switches, wherein experimental subjects report "extreme disorientation, an acute personal crisis" – was the anti-empiricist point made above, that the immediate conscious experience language was supposed to be grounded in actually varies across scientific revolutions.

> It is as elementary prototypes for these transformations of the scientist's world that the familiar demonstrations of a switch in visual gestalt prove so suggestive. What were ducks in the scientist's world before the revolution are rabbits afterwards. The man who first saw the exterior of the box from above later sees its interior from below. Transformations like these, though usually more gradual and almost always irreversible, are common concomitants of scientific training. Looking at a contour map, the student sees lines on paper, the cartographer a picture of a terrain. Looking at a bubble-chamber photograph, the student sees confused and broken lines, the

> physicist a record of familiar subnuclear events. Only after a number of such transformations of vision does the student become an inhabitant of the scientist's world, seeing what the scientist sees and responding as the scientist does. (Kuhn, 1970, p. 111)

Looking at a bubble-chamber photograph and seeing a record of subnuclear events differs from looking at the duck-rabbit picture and seeing the duck, in that the former alone is the outcome of an almost irreversible process of active perceptual learning, and one that is most obviously linked to the acquisition of abilities, expectations, customs. This is the kernel of Kuhn's explanation for "the invisibility of revolutions" (Kuhn, 1970, p. 136); for the scientist, by contrast to experimental subject of gestalt psychologists, "can have no recourse above or beyond what he sees with his eyes and instruments" (Kuhn, 1970, p. 114), so that, if examining the past history of their disciplines, scientists will only make sense of findings and routines that are relatable to the aspects of the world and foraging practices they are sensitive to. Once trained (or, after a scientific revolution, retrained) in the paradigm-induced manners of a scientific community the student becomes thus stably sensitive to aspects of what is in front of her she would not otherwise be able to note. Another Kuhnian example, which the reader will maybe find more familiar, is Galileo's with respect to pendulums.

> To the Aristotelians, who believed that a heavy body is moved by its own nature from a higher position to a state of natural rest at a lower one, the swinging body was simply falling with difficulty. Constrained by the chain, it could achieve rest at its low point only after a tortuous motion and a considerable time. Galileo, on the other hand, looking at the swinging body, saw a pendulum, a body that almost succeeded in repeating the same motion over and over again ad infinitum. And having seen that much, Galileo observed other properties of the pendulum as well and constructed many of the most significant and original parts of his new dynamics around them. From the properties of the pendulum, for example, Galileo derived his only full and sound arguments for the independence of weight and rate of fall, as well as for the relationship between vertical height and terminal velocity of motions down inclined planes. … Rather [than solely Galileo's genius], what seems to have been involved [in that shift of vision] was the exploitation by genius of perceptual possibilities made available by a medieval paradigm shift. Galileo was not raised completely as an Aristotelian. On the contrary, he was trained to analyze motions in terms of the impetus theory, a late medieval paradigm which held that the continuing motion of a heavy body is due to an internal power implanted in it by the projector that initiated its motion. (Kuhn, 1970, p. 119)

Had Kuhn attended more carefully to the very reflections of Wittgenstein's that inspired his account of the emergence and dynamics of scientific communities as primarily

based on paradigms, he would plausibly see himself forced to conclude that every revolutionary "integral shift in the scientist's vision" (Kuhn, 1970, p. 129), at the end of which scientists *see* heliocentric planetary orbits where they previously saw geocentric ones, and *see* oxygenation where they previously saw phlogiston release, cannot be explained as a "displacement of the conceptual network *through which* scientists view the world" (Kuhn, 1970, p. 102, emphasis added). Instead, they should be explained by novel concepts of experience; ones that explicitated the non-representational, direct connection between acting (intentionally, purposefully, affectively) and accordingly experiencing these or those aspects of stuff forcibly constituting unfolding courses of actions.

Lacking that attention, however, Kuhn was caught prey of a dichotomous choice – if dichotomous only "in his world", as it were. On the one hand, it was clear to him that the project once envisioned by logical empiricists had shewn askew; that scientific revolutions are not simple replacements of linguistic frameworks over a "'fixed' vision" (Kuhn, 1970, p. 128), and that scientific terms' meaningfulness was rather paradigm-induced, hence agency-based. On the other hand, since psychological evidence showed him that we do not at all *interpret* any raw sense-data, but rather visualize immediately what is already a structured array of sensible *Gestalten*, what seemed to him to be the sole remaining, non-empiricist philosophical stance to be adopted with respect to the relationship between phenomenology and concept-acquisition, was the one he would later be calling "post-Darwinian Kantianism" (Kuhn, 2000c, p. 104). Already in *The Structure* he saw himself led to feature experience, generally speaking, as "visual-conceptual experience" (Kuhn, 1970, p. 113), and, conversely, to speak of "a world already perceptually and conceptually subdivided in a certain way" (Kuhn, 1970, p. 129). But, since a full-blown appeal to the categories of understanding was already outdated at the time, and would anyway contradict the idea of heterogeneity of cross-subjects' phenomenological *Gestalten* he had been arguing for, the conceptualizing operations apparently required underneath immediate conscious experience were ascribed to the emerging protagonist of the 1960s' cognitive sciences: neurophysiological processing of information. It would accordingly be such an information-processing process that would potentially vary from a subject to another, so that "two men with the same retinal impressions can see different things" (Kuhn, 1970, p. 127). Even if either receives the same stimuli, what is *consciously given* them – in the form of a mental representation – can differ. As the already post-Darwinian Kantian philosopher would make clear in his 1974 paper, *Second Thoughts On Paradigms* (p. 309, note 18),

> In *The Structure of Scientific Revolutions*, particularly chap. 10, I repeatedly insist that members of different scientific communities live in different worlds and that scientific revolutions change the world in which a scientist works. I would now want to say that members of different communities are presented with different data by the same stimuli. Notice, however, that that change does not make phrases like "a different world" inappropriate. The given world, whether everyday or scientific, is not a world of stimuli.

Thus, Kuhn distinguished between, on the one hand, the conscious awareness of phenomena, and *this* he maintained would be prior to any (again, conscious) process of interpretation or rationalization, and, on the other hand, the unconscious neurophysiological processes of representational classification of stimuli, the latter giving rise to consciousness' "primary" structuring of appearance. In other words, however getting in tension with his thereto Wittgensteinian opposition to empiricism, Kuhn was yet unwilling to speculate over new, non-representational concepts of experience, so as to concede an exhausting explanatory role to the active and affective engagement with one's environment with respect to phenomenological outlooks and their transformations. On the contrary, he ended up "explaining" the priority of paradigms through the (by then renewed) talk of a neurophysiological automatism in the subconscious structuring of *Gestalten* delivered to the eyes of the mind.

> Ought we say that what has been acquired from exemplars is rules and the ability to apply them? That description is tempting because our seeing a situation as like ones we have encountered before must be the result of neural processing, fully governed by physical and chemical laws. In this sense, once we have learned to do it, recognition of similarity must be as fully systematic as the beating of our hearts. But that very parallel suggests that recognition may also be involuntary, a process over which we have no control. If it is, then we may not properly conceive it as something we manage by applying rules and criteria. To speak of it in those terms implies that we have disobeyed a rule, or misapplied a criterion, or experimented with some other way of seeing. Those, I take it, are just the sorts of things we cannot do. (Kuhn, 1970, p. 194)

From then on, Kuhn's philosophy of science becomes a Kantian response to logical empiricism. And problems quite familiar to the reader of Kant's recalcitrate in his post-*Structure* works to the end of his life.[71] In particular, for instance, the problem of loosing sight from any sound philosophical explanation for the grounding of knowledge (either propositional, practical, or by acquaintance) in the kinds of worldly things we care for and suppose to learn about, by contrast to their phenomenal, representationally mediated modes of appearance.

71 This is shown in the recently published *The Last Writings of Thomas Kuhn* (2022).

Adding to this rather familiar loss, however, is the specifically "post-Darwinian" loss of any grounds for thinking that, after some "reprogramming" of our brains into a different way of generating data from stimuli, we keep to any extent referring to, thinking of, and learning about, the same kinds of stuff as we did before.[72] Rather, since what make reference to, think of, and learn about, are accordingly *not* the *an sich* (in themselves) unknowable causes of structured *Gestalten* "immediately" presented to consciousness, *and the structure of their appearance is fully representationally determined*, then after a revolution scientists refer to, think of, and learn about things of a different, otherwise determined, domain. Hence the almost literal force Kuhn ends up lending to the "working in a new world" phrase. The "priority of paradigms" thesis converts into the old (but now evolutionarily accountable) moldy struggle to flesh-out the epistemological consequences of our incapacity to interfere with the representational functioning of our brains.

> By now it may be clear that the position I'm developing is a sort of post-Darwinian Kantianism. Like the Kantian categories, the lexicon supplies preconditions of possible experience. But lexical categories, unlike their Kantian forebears, can and do change, both with time and with the passage from one community to another. … Underlying all these processes of differentiation and change, there must, of course, be something permanent, fixed and stable. But, like Kant's *Ding an sich*, it is ineffable, undescribable, undiscussable. Located outside of space and time, this Kantian source of stability is the whole from which have been fabricated both creatures and their niches, both the "internal" and the "external" worlds. Experience and description are possible only with the described and describer separated, and the lexical structure which marks that separation can do so in different ways, each resulting in a different, though never wholly different, form of life. Some ways are better suited to some purposes, some to others. But none is to be accepted as true or rejected as false; none gives privileged access to a real, as against an invented, world. (Kuhn, 2000c, p. 104)

72 The computational metaphor is no rhetorical mannerism of mine, it is Kuhn's (1974, p. 310): "A process of this sort can readily be modeled on a computer; I am in the early stages of such an experiment myself. A stimulus, in the form of a string of *n* ordered digits, is fed to the machine. There it is transformed to a datum by the application of a preselected transformation to each of the *n* digits, a different transformation being applied to each position in the string. Every datum thus obtained is a string of *n* numbers, a position in what I shall call an *n*-dimensional quality space. In this space the distance between two data, measured with a euclidean or suitable noneuclidean metric, represents their similarity. Which stimuli transform to similar or nearby data depends, of course, on the choice of transformation functions. Different sets of functions produce different clusters of data, different patterns of similarity and difference, in perceptual space. But the transformation functions need not be manmade. If the machine is given stimuli which can be grouped in clusters and if it is informed which stimuli must be placed in the same and which in different clusters, it can design an appropriate set of transformation functions for itself. Note that both conditions are essential. Not all stimuli can be transformed to form data clusters. Even when they can, the machine … must be told at first which ones belong together and which apart."

Not by any chance, Kuhn's philosophical work since *The Structure* (though partly already there) focused almost exclusively on the theme of "the nature and consequences of conceptual change" (Kuhn, 2022, p. 28), the *incommensurability* between the conceptual frameworks, or "lexicons" (as he came to call these) adopted before and after by members of a revolutionized area of science (Kuhn, 2000a; 2000b; 2000c; 2022). The classifications of natural phenomena scientists consciously and publicly report – and the rules they accordingly follow – rise to prominence throughout Kuhn's late writings, but as indices of scientists' subconsciously operating cognitive taxonomies. This way he saw himself managing to conciliate a "historical view" of science, wherein collectively established practices and institutions are determining factors of knowledge construction, with an a-historical view of symbols' meaningfulness, especially when symbols are taken to emerge inside of our heads.

> I have described [my] views as concerned with words and with *lexical* taxonomy, and I shall continue in that mode: the sorts of knowledge I deal with come in explicit verbal or related symbolic forms. But it may clarify what I have in mind to suggest that I might more appropriately speak of concepts than of words. What I have been calling a lexical taxonomy might, that is, better be called a conceptual scheme, where the "very notion" of a conceptual scheme is not that of a set of beliefs but of a particular operating mode of a mental module prerequisite to having beliefs, a mode that at once supplies and bounds the set of beliefs it is possible to conceive. Some such taxonomic module I take to be prelinguistic and possessed by animals. Presumably it evolved originally for the sensory, most obviously for the visual, system. (Kuhn, 2000c, p. 94, emphasis in the original)[73]

Again, a certain gloss of reasonableness (theoretical, rather than merely literary) is seemingly lent to the "working in a different world" phrase, once the things and events argued to be perceived and worked with by trained scientists, and thus to be the roots scientific theories' meaningfulness, come to be conceived as partially extra-mental cutouts determined entirely by neurophysiological lexicons. Replace these taxonomic frameworks by new and incommensurable ones, then, and you replace the ultimate determining factor of what scientists are talking *about* and working *with* at each revolutionary transition (what we usually call "the world"). And notice, in this context, how focusing on scientific taxonomies for natural phenomena does not impede Kuhn from regarding his "mature", self-consciously neo-Kantian stance, as if it were simply a clarification of his earlier focus on paradigmatic, and often tacit

73 Kuhn repeats the same point right at the beginning of another famous article, *Dubbing and Redubbing: The Vulnerability of Rigid Designation* (1986): *"Throughout this paper I shall continue to speak of the lexicon, of terms, and of statements. My concern, however, is actually with conceptual or intensional categories more generally, e.g., with those that may reasonably be attributed to animals or to the perceptual system."*

practices of scientists, and not – as I tried to show they are – as in tension with the conceived priority of these relative to rules, that he drew from Wittgenstein. Ian Hacking (1993b) fleshed-out an important intuition, in all derived from the work of G.E.M. Anscombe (1957) on intentional actions, which appear to compatibilize these things without even appealing to psychological theories of any sort.

> This is because *all action, all doing, all working is under a description*. All choices of what to do, what to make, how to interact with the world, how to predict its motions or explain its vagaries is action under a description: all these are choices under descriptions current in the community in which we work and act and speak. Descriptions require classification, the grouping of individuals into kinds. And that is what changes with a change in paradigm: the world of kinds in which, with which, and on which the scientist works. (Hacking, 1993b, p. 277, emphasis added)

If "all action, all doing, all working is under a description" (that is, a description the agent in question is prompt to make of her own action), then a substitution of taxonomic terms we use to describe what we do – whether following the paradigmatic practices of a scientific community, or not – yields a substitution of our possible actions, and, in the case of a scientific community, of the kinds of things that are (intentionally) worked with in the exercise of their profession. But the antecedent is simply not true. It is not true that "being under a description" is a necessary property of all action, all doing, all working, or else mastering the use of descriptions would be a prerequisite, for us humans at least, to walking, eating, playing, for instance; and no other kind of being would be able to act intentionally, something Hacking presents no reason to assume. Perhaps Hacking *was* in fact thinking of descriptions in the "mental modules" of our heads, just as Kuhn. If this is the case, my objection to his argument has already been presented. With Wittgenstein, the same philosopher that Kuhn once followed, I maintain that a symbol can only be anyhow significant in the historically embedded context of its language-game. There being no such context, there is simply no symbol. Hence, since in the case of postulated "mental representations" no such context obtains, what I have been arguing for is that *there are no such things as mental representations*.

Anscombe, on her turn, bequeathed us a clear way of telling what the intentions of others and our own are, based on the ways we are indeed ready to claim knowledge, under some descriptions, about many of our own intentional actions, without basing such a claim of knowledge in any *a posteriori* observation of the action's event. But she did not, and could not, claim to have understood the nature of agency, what intention is, so as to point out any

necessary property of intentional actions, not even "being under a description". Hers was a genius' philosophical reminder, though not a theory. In fact, she denied that *we* were anywhere near a theory of action a year *after* she wrote her famous work on intention (Anscombe, 1958), and she did make the observation that talk of a bird's intentions "does not presuppose that the bird has any thoughts about descriptions" (Anscombe, 1979, p. 209). Furthermore, a point already repeatedly emphasized here, which she was very apt to reckon with concerning her own explanation of agency on the basis of descriptions, is that descriptions only acquire a status different from random vocalizations or marks on paper by virtue of their mode of use: the postulation of mental representations (or neurophysiological ones) to explain the nature of agency is therefore the postulation of *sui generis* representations, themselves independent of ulterior practical knowledge (Anscombe, 1957, §§27-32).

The reason why I say there is a *tension*, not a *contradiction* in Kuhn's work, is that there is no contradiction in thinking that customary practices are both undertaken and recognized by us primarily to the rules we follow intentionally, while holding at the same time that some rules we have no intentional trade with – the rules that specify which representations our neurophysiological states embody – are prior to those paradigmatic customs. There is a tension, however, between arguing for the priority of paradigms relative to intentionally followed rules (and implying a dubious contrast between these and rules that are intentionally followed by no one), while the arguments adduced (from Wittgenstein) actually apply to any sort of rule.

Back when he inaugurated his proposal to view scientific knowledge-construction through historical lenses, Kuhn has introduced the notion of a "priority of paradigms" relative to the symbolic articulation of rules and theories in science, though only for retrieving it for the priority of neurophysiological processing of stimuli relative to paradigms. Had he withdrawn from such a last move, he would have had little reason to insist – except, perhaps, for lending a rather dramatic, but not at all inappropriate tone to his account – that "though the world does not change with a change of paradigm, the scientist afterward works in a different world" (Kuhn, 1970, p. 121). After all, were it not for the postulation of a representational mediation between experience and action, including descriptive actions, we might refrain from conceiving of our *perceived* ongoing relationship to the material patterns constituting objects, properties, and events within our actions' environments as mere phenomenal indices to the "source of stability" that would "apodictically" exist.

Experience and description could, as they must, be deemed possible only with the described and describer *united*. We might, as we should, unproblematically conceive of our-

selves as learning, through scientific revolutions and other kinds of custom-change, to perceive novel aspects of, and to be differently concerned for, *the same* kinds of things, however novel kinds of things be also thankfully unveiled, referred to, and thought about, in the process. Why not say, for instance, that astronomers of today's refer to, think of, and learn about properties of the kind of stuff Ptolemy called "planets", exactly insofar as the material patterns involved in Ptolemy's paradigmatic achievements, and constitutive of his experience, were *the same* involved and constitutive of ours? To say so would not in the least conflict with abiding for Kuhn's presented historical evidence that, as the Copernican revolution settled among Europeans, many kinds of events they had previously left pass were finally brought to their attention; for they were still sensitive to (they perceived) everything they had previously called "planets" and "stars". This to say: abandoning the representationalist intuition for good may provide us with a solid and non-empiricist understanding of epistemic progress with regards to *the* world "*an sich*" across scientific revolutions. What all this requires, however, as I said before, is a theory of action, among other ends to articulate some other concept of "experience" than the one the representationalist intuition has been suggesting to us for so long. As Wittgenstein (PP, §xi) said, "We find certain things about seeing puzzling, because we do not find the whole business of seeing puzzling enough".

2.2 *DENK NICHT, SODERN SCHAU*: WITTGENSTEIN, KRIPKE, AND HISTORICAL VIEWS OF SENSE AND REFERENCE

I have two objectives in this chapter's closing section. First, I wish to substantiate the reading I've been announcing of Wittgenstein's philosophical development, that I suggested in the last section to lend support to Kuhn's historical view of scientific knowledge-construction. That is, the (lengthy) road beginning with his realization that the *Tractatus Logico-Philosophicus* had not explained all there is to be explained with respect to logic, until Wittgenstein's elaboration and defense of what I am deeming a historical view of propositional sense. Second, I wish to present what I view as a corollary of Wittgenstein's developed philosophical stance with respect to logic, as it applies specifically to the role of *reference* in the sense of propositions. This second objective is, on its turn, little more than a defense of Kripke's view on reference, with special attention to the consequential thesis of his about sci-

entific knowledge-construction, namely, that its progress can be appreciated as the unveilment of essential properties of kinds of stuff.

The road since the *Tractatus Logico-Philosophicus*

> Human beings possess the capacity to construct languages in which every sense can be expressed, without having an idea how and what each word means – just as one speaks about how the single sounds are produced. Colloquial language is a part of the human organism and is no less complicated than it. (*Tractatus Logico-Philosophicus*, 4.002)

Wittgenstein's philosophical development was thoroughly guided by the quest for understanding the nature of, and devising ways of elucidating, propositional sense. Starting with the *Tractatus Logico-Philosophicus*, and ending with *On Certainty* (OC). If, on the one hand, Wittgenstein was a "philosopher's philosopher" (Anscombe, 1981), hence one that responded to questionings only philosophers would normally take an interest in, on the other, his was an understanding of philosophical questionings, generally, as something that sprouts from a habit that any person, so long as she has learned to trade with words, can be a victim of: to deviate from the regular but multifarious usages of symbols she has once mastered, and yet to feel that, and to speak as if, such deviations preserve her words' meaningfulness, when in fact they do not.

> PU, §116. When philosophers use a word – "knowledge", "being", "object", "I", "proposition/sentence", "name" – and try to grasp the essence of the thing, one must always ask oneself: is the word ever actually used in this way in the language in which it is at home? – What *we* do is to bring words back from their metaphysical to their everyday use.

This is the reason why every phase of his thinking was characterized by different attempts to trace methods, hints, and warnings regarding the elucidation of the sense – the homely sense – of propositions. He thereby embodied, though variously so, the "realistic

spirit" (Diamond, 1996) of always attending to the fact that propositions – anything we value as a *true*, or else demean as a *false*, representation of any portion of reality – are but intentional actions we perform in specific manners, some deviations from which, whether we easily notice it or not, amount to nonsense. Crucial, accordingly, has always been for him the importance of noticing *differences* in the ways we use signs in meaningful ways.

As we have seen, especially in section 2.1.1.2.1, the first "failure to understand the logic of our language" (TLP, 4.003) Wittgenstein tried to oppose to was logicism, the idea, coming from Frege and Russell, that what makes propositions of arithmetic true are the same sorts of facts that make logical propositions true. That idea implied, of course, that there *are* logical facts (some of which would be the arithmetical ones) to be represented in the first place, so much as there are facts we represent that are only empirically verifiable, if at all. This is the first *difference* in the ways we use signs Wittgenstein called attention to: although we prosaically call equations "true" (and we may keep on calling them thus), this should not lead us into thinking that there are arithmetical facts being represented by equations, so much as there can be a cat on the mat's being represented by an empirical proposition. The latter sort of representation, Wittgenstein noticed, *can* only be true or false with respect to some specific possible state of affairs (can only have sense) if it be constructed so as not to conflict with the symbolic rules displayed by equations. "There is only one pebble in each of my two pockets, and there are in total five pebbles in my pockets" fails to *be* a representation of facts, before failing to be a true one. Were it the case that there are arithmetical *facts*, then it would be possible to represent such facts, and their being representable would imply that these representations could, as any other, be false: not senseless, but false, *because* such and such a state of affairs did not obtain. We would reach the absurdity of taking as meaningful the representation of the unobtainment of some necessary conditions of the meaningfulness of any proposition. Hence, arithmetical "propositions" do not represent: they are abstract expressions of symbolic norms that are constitutive of the logical syntactical use we make of signs in order to represent worldly states of affairs. Everything seemed to be solved.

Eventually, however, Wittgenstein started realizing that there are further impediments for philosophical thinking to follow the straight pathway of sobriety and enlightenment it is expected of, besides the tendency, so well counteracted by himself in his youth, "to assume a pure intermediary between the propositional *signs* and the facts" (PU, §94). The latter tendency was, as seen, what led to Frege's construal of propositional sense as otherworldly "modes of presentation" of either one of two "objects," the True and the False. However, yet another invitation to the heights of empty speculation is manifest – that was what he finally

realized – in the still delusional attempt "to purify, to sublime, the signs themselves" (*Ibid*), and this is how he came to characterize the particular lift from the ground that the logical syntactical construal of propositional sense (i.e., his own) had instantiated.

As already pointed out (section 2.1.1.3.2), and as will hopefully be explained below, Wittgenstein's continued reclaiming, for himself and others, of a realistic attitude regarding philosophical problems did not amount to mere criticism of his earlier positions. In fact, most of the criticisms we saw in the previous sections were elaborated long after Wittgenstein renounced to the thoughts he had expressed in the *Tractatus*. The problems he first identified, still in the 1920's, regarding logical analysis as envisaged in that work, were what drew him back to philosophical work after having initially believed the *Tractatus* had settled all philosophical problems once and for all (TLP, Preface). Yet his return to Cambridge in 1929 was to be since moved in the same direction as before: one that was now unmistakably still unfinished, of avoiding philosophical hypotheses and postulates about meaning, stating philosophical "theses" only to the extent that calling them "trivial reminders" would seem more appropriate (PU, §128). Hopefully an overview on his progress thereafter will throw some light on this often underappreciated, *positive* outlook, of his mature philosophy of logic.

2.2.1.1 THE AUTONOMOUS GRAMMAR AND ITS INEXPUGNABLE LIMITS

Attention had to be brought to Wittgenstein as to the limitations of his earlier construal of propositions, which eventually did happen.[74] The first time he himself shew some articulate awareness that he had perhaps idealized propositions to the point of elaborating an ultimately innocuous method of philosophical elucidation (i.e., the logical-syntactical analysis of propositions) was in 1929, when in *Some Remarks on Logical Form* – and in some manuscripts from the same period (Nakano, 2017; Silva, 2023) – he admitted that there are propositions that we appear to know *a priori* to be false, but are, at the same time, not contradictions. Such

74 After finally publishing the *Tractatus* (concluded in 1918, first published in 1922), Wittgenstein retired in Austria's countryside, working as a schoolteacher, with an interlude in Vienna designing his sister's house. During this period, he was visited by a few people who wanted (and managed) to discuss his work with him. Among these was Frank Ramsey, of which Wittgenstein tells (in *Philosophical Investigations*, Preface): "I have been forced to recognize grave mistakes in what I wrote in that first book [i.e., the *Tractatus Logico-Philosophicus*]. I was helped to realize these mistakes – to a degree which I myself am hardly able to estimate – by the criticism which my ideas encountered from Frank Ramsey, with whom I discussed them in innumerable conversations during the last two years of his life." (see also Engelmann, 2013; Nakano, 2017).

was the case of propositions that represent, for instance, more than one color, or more than one size, or more than one temporal duration, as belonging to the same object.

In light of his earlier account, Wittgenstein believed that the simple, logically subsisting objects of reality should be ascribed no such features in and of themselves; "objects are colorless" (TLP, 2.0232) in the sense that ascribing them any property is not to tell *what* any of them *is*, but only *how* they contingently configure themselves with one another in a state of affairs (TLP, 3.221). Hence, by the same reasoning, we might also say that objects are, in and of themselves, of no size, they last for no time period. Finally, then, ascription of some one color (size, duration) to an object should ultimately be analyzed into the construction of an elementary proposition, the same going for the ascription of any other color (size, duration) to the same object (as, anyway, the same goes for any proposition at all: according to the *Tractatus*, every proposition is a truth-function of, and therefore is logically reducible to, an elementary proposition). If each color-ascription corresponded to a different elementary proposition, however, they should be logically independent from one another. But they aren't: it is *logically* impossible, makes no sense, that "two colors be at one place in the visual field simultaneously" and, therefore, Wittgenstein presumed, a "statement that a point in the visual field has two different colors at the same time is a contradiction" (TLP, 6.3751). Except it is not.

The apparently harmless problem Wittgenstein came to grips with in 1929 was that the relation between certain groups of predicates, such as {'blue', 'green', 'red', …}, is not analogous to the one holding between predicates like 'married' and 'bachelor', or, generally speaking, between pairs of predicates that can be respectively analyzed into "being an X" and "not being an X". For one, contradictory logical products end up excluding the *whole* of logical space. Supposing that *o is* an object in the Tractarian sense, there is *no* alternative besides "*o* is an X" and "*o* is not an X". By contrast, there are *several* alternative propositions that can be true besides "*o* is blue" and "*o* is red", such as "*o* is green", "*o* is pink", etc., so that, unlike any two contradictory propositions, "*o* is blue" and "*o* is red" can *both* be false. Thus, generally speaking there cannot be a *contradiction* between any two propositions respectively ascribing one different color to *o*, however unobtainable a situation is wherein *o* is, e.g., blue and red at the same time. Finally, it is easy to see how the same reasoning goes for any set of predicates representing *degrees* of a kind (size and duration, for instance): ascription of one such degree is incompatible with the ascription of any other one, and this is not due to said ascriptions' being contradictory with one another.

Still, if all such incompatibilities are known *a priori* by us, then what they indicate must be some features of our intentional *use* of sings to build propositions which had hitherto

passed unnoticed. If the idea that "there is only *logical* impossibility" (TLP, 6.375) was to be retained, then it should immediately follow from the above reasoning that not all logical impossibilities amount to contradictions. And this means that some such impossibilities had to be due to something other than that which gets revealed through a truth-functional analysis alone. Just what sorts of features of our making of propositions would explain the kind of incompatibility there is between gradable predicates of a same gradation, was far from obvious from the moment Wittgenstein realized that such features had not yet been taken into account. And yet, some explanation had to be found.

The first candidate features to be considered by Wittgenstein, who in 1929 was still thinking that a perfect notation for expressing propositions was the right philosophical tool to be aimed at, were certain aspects of the phenomenology of our uses of signs. Knowing *a priori* how we use a propositional sign means that we are not required to *observe* our own uses of signs in order to know at least some, precisely the intended, features of it, which is not to say that there is no such thing as *experiencing* our own actions as they happen. If to "understand a proposition means to know what is the case if it is true" (TLP, 4.024), then the answer to the problem exposed in *Some Remarks on Logical Form* could perhaps lie in some of the phenomenological qualities of the *a priori* knowledge of the sense of each proposition. Accordingly, then, one would still know in advance just which objects would configure in which manner, in order to render a proposition one understands a true one. When it came to the making of a representation of facts, Wittgenstein pondered, perhaps we would *also* know in advance the precise positioning of every denoted object within the several spectra of phenomenological qualities they can find themselves within insofar as they can be *recognized* by us. Such a positioning within this and that spectrum could not, such a new picture would tell us, characterize the object's "external" properties (its contingent, factual properties, that always result from their actual, contingent, configurations with other objects within states of affairs); rather, these phenomenological features would constitute their *forms*, and therefore their *logical possibilities* of coming to constitute states of affairs.

Given such an assumption, the truth-functional notation of the *Tractatus* would need no replacement, but only supplementation by notations other than it, each one of which would embody the rules of exclusion specific for cases of gradable predication, such as the exclusion that occurs between '*o* is red' and '*o* is blue' in the chromatic phenomenological space, or that between 'A is bigger than B' and 'B is bigger than A' in the spatial phenomenological space. Logical analysis would still be expected to reach an ultimate level of logically independent elementary propositions, but the elementary propositions would only be reached – their logical

independence, perspicuously displayed in the propositional sign – after specification of all gradable predicates that would apply to the logical forms of their names. That is to say, the names constituting elementary propositions would still be foreseen as the simplest expressions resulting from logical analysis. However, they would no longer be ascribed the unique semantic role of "feelers" (*Fühler*) of propositions, the symbolic elements by means of which every proposition "touches" reality (TLP, 2.1515); for they would also – and, therefore, *logic itself* would also – display how the situations that obtain if propositions representing them are true would get *experienced* by us. This is the same as advancing a verificationist criterion of meaningfulness: a certain use of signs could only bear a propositional sense that we would know how the situation would *look* like, how the world would *appear*, if such a use of signs amounted to a true proposition.[75]

> Considering what Wittgenstein says in [his manuscripts] from the first half of 1929 … and in *Some Remarks On Logical Form*, we can see what kind of analysis … he had in mind at the beginning of 1929 … for color statements. The intended analysis will indicate why the *particular* forms of objects (color and space, but also time) need to be taken into account, why they need to be introduced in the conceptual notation. That is, the logical forms, the logical symbols, of function and argument will not be enough for the analysis. (Engelmann, 2013, p. 10)

The possibility of (analyzing propositions into concatenations of) simple signs equaled, for the author of the *Tractatus*, to the complete determinateness of propositional sense (TLP, 3.23); this "single" postulate was, on its turn, what Wittgenstein took as the transcendental entailment of the supposition he made, that the sense of a proposition is completely known *a priori*. That being said, the problem Wittgenstein quickly found in his belief in the auspices of a phenomenological notation for a philosophical elucidation of propositions was directly related to his still (as ever) standing anti-psychologistic attitude with respect to the sense of propositions, and also to his belief in the autonomy of logic: in the independence between the sense of any proposition and any matter of fact.

For him, the phenomenological spaces with whose forms the Tractarian notation was to be supplemented should *either* consist of sets of possible configurations of subjective (mental, interior) elements, *or* they would be sets of possible configurations of objective (material, external) elements. Color, space, and time, *qua* phenomenological spaces, should be

75 Not by any chance, the time period wherein this idea was taken in, around 1929 and 1930, was that in which Wittgenstein's conversations with members of the Vienna Circle, such as Moritz Schlick, Friedrich Waismann, and Rudolph Carnap, were most intense and fruitful.

placed either inside or outside the mind. Now, on the one hand, if subjective, they could hold no relation at all to logic, but only to epistemology. The laws of *Wahrsein* cannot be subject, in any sense, to the laws of *Fürwahrhalten*.

If, on the other hand, phenomenological spaces were taken as objective, then some analogue of the distinction between appearance and reality would seemingly have to apply for them as well. For we do talk of appearances' misleading us *about* colors, shapes, and time. Do I see a straight line or a curved one when I look at a small segment of a circle? What about when I look at a chiliagon (a polygon with a thousand sides)? The reader is also plausibly familiarized with some of the several cases where parts of a picture are painted with determinate colors, and such colors, once juxtaposed in the picture, look the same when in fact they are different, or else different when in fact they are the same. There is also the case of the famous Müller-Lyer illusion, whence two lines with an equal length appear to be of different lengths; of an hour which feels like three, etc., etc.. What all such cases point to is the fact that the features that are most often associated with "pure experience" – colors, shapes, sensations, time passing – must, if they are to be regarded as further *objective* grounds for logical relations, themselves admit of a distinction between fact and appearance: they themselves can be verified or falsified *a posteriori*. The forms (the possibilities of actual structures) of appearance could only be determinate and doubtless, as *everything* essential to propositional sense was supposed to be, insofar as they were regarded as purely subjective (as in, right or wrong, I am subjectively certain that I see two given lines as having different lengths), as though *nothing* essential to propositional sense was supposed to be. If, on the contrary, phenomenological spaces were conceived as objective, independent from any subject, then both indeterminateness and (worse) liability to falsity should get into the picture that the supplemented logical notation now being elaborated would need to make of them.

At this juncture of Wittgenstein's philosophical development we might imagine him taking a quick bounce forward onto his late philosophy of logic (as I read it, at least). In such an exegetical fantasy, the philosopher would immediately abandon the postulate that the sense of a proposition cannot depend on any contingency with respect to how things stand, which though he upheld ever since he wrote the *Tractatus* (TLP, 2.0211), and which he would indeed abandon later on. Instead, however, from the end of 1929 until at least the beginning of the second half of the 1930s, what he did was to maintain both, the restrain from subordinating his search for the foundations of logic to psychological research, *and* the belief that those foundations, the rules demarcating meaningful from nonsensical uses of signs, were absolutely autonomous from any factual contingency.

For a while, that is to say, the result of his having realized that neither a subjective, nor an objective construal of phenomenological spaces would be adequate, was merely the abandonment of the Tractarian project of conceiving a *Begriffsschrift*. According to Engelmann (2013, pp. 35-43), in the "more or less six months" of his cogitating with the idea of a phenomenological supplement to the conceptual notation of the *Tractatus*, Wittgenstein even came to consider dealing with the aforementioned problems regarding appearances' mischief by introducing the expression of inexactness into the notation for phenomenological spaces. Presumably the purported outcome would have been to further complicate the envisaged phenomenological notation by adding to it the means of expressing exactly *how uncertain* (inexact) an appearance (of a color, a size, a time period) was expected to be. But how reasonable would it be to expect that one would be able to find absolutely general rules for the ways in which every such inexactness (chromatic, geometrical, temporal, etc.) might occur? Would they be stochastic rules? Further, do we actually think in such terms when we construct empirically verifiable propositions, do we actually expect these uncertainties whenever they can in principle be sound? As Wittgenstein would take note, in October 15th, 1929, "here I bump into the biggest difficulty, for it seems as though even the exact circumscription of the inexactness would be impossible" (*apud* Engelmann, 2013, p. 41). Three days later, the passage is found that arguably marks the end of Wittgenstein's pursuit for a perfect notation, Tractarian or otherwise:

> The assumption that a phenomenological language would be possible and that it would first say what we have to/want to express in philosophy is – I believe – absurd. We have to manage with our ordinary language and just understand it correctly. i.e., we are not allowed to be inclined by it to talk nonsense. I mean: what I call a sign must be that which one calls a sign in grammar. (*Ibid*)

This was an important turning point in Wittgenstein's philosophical development, though it was by no means the end of the story. The "grammar" he would from then on lean his attention towards consisted, once again, in the rules the following of which is required for our uses of signs to convey bipolar representations; logical rules, therefore. These would include the rules of truth-functional calculus, arithmetic, as well as the rules for exclusions of gradable predicates pertaining to the same "phenomenological space" – except this time there would be room, also, for as much vagueness in the expression of such rules as inevitably yields their sometimes required expression in vernacular.

"When Wittgenstein abandons the phenomenological language, *he thereby abandons the idea that notations (symbolisms) have a fundamental role in philosophy*" (Engelmann, 2013, p. 43; emphasis in the original). The ways in which we manage to employ English (German, Portuguese, Italian, etc.), on the one hand, for the *remembrance of rules* for stating meaningful propositions (e.g., "no simple object can have two colors at the same time"), and, on the other hand, for the *stating of* meaningful propositions, were now at least partly unaided by any foreseeable complete *Begriffsschrift*. These rules, concerned with nothing else besides closed symbolic relations, would establish which symbolic articulations are equivalent to which others; which can be derived from each one; which are, and which are not, incompatible with each one. Such a system of rules is the "autonomous grammar" that retained, in adapted form, the Tractarian requirement that logic must "take care of itself" (TLP, 5.473) and be independent from any matter of fact (TLP, 2.0211).

> We need to call to mind how we actually talk about rules in philosophy, i.e., when we are clarifying grammatical questions; so that we keep our feet on the ground and don't construct castles in the air. For example, I set up rules such as: (∃x).Fx : *V* : Fa : *V* Fb = (∃x).Fx or ~~p=p, or I say that it makes no sense to speak about a 'reddish green' or about a 'blackish black', or I say that a=a makes no sense, or I describe a notation that avoids this formation, as well as '(∃x).x=x', or I say that it makes no sense to say that something 'seems to seem red', or that it makes sense to say that in the visual field a curved line is made up of straight pieces, or that it makes equally good sense to say 'The stone *has to* fall because it… by the earth', etc. (*Big Typescript*, 243-4, *apud* Engelmann, 2013, p. 142)

Wittgenstein's reminders quoted above are far from trivially being known *a priori*, as were tautologies in the *Tractatus*. This was convergent with the briefly mentioned assumption (section 2.1.1.3), made contemporaneously by Carnap and others, of logical ascension of certain "well confirmed" universally quantified statements to the (quite different) status of rules within a given linguistic framework. But Wittgenstein was not trying to give a blueprint for the perfect notation anymore; not even by conceiving of such a blueprint as but one among many acceptable ones, as Carnap did. Rather pedestrian and colloquially put grammatical reminders, such as "it makes no sense to speak about a 'reddish green'", and "it makes no sense to say that something 'seems to seem red", would be part of the official philosophical repertoire for avoiding the usual metaphysical heights of philosophy. On the positive side, it would also be by means of vernacular that adequate elucidations should often be pursued; not, that is, necessarily through formalization. And the ways we dispose of for elucidating what we

mean outside (or, before doing) philosophy was increasingly to be made a focal point of Wittgenstein's attention. An obvious such pre-philosophical, elucidating, kind of routine, is ostension: to say "what I mean by 'X' is *that* kind of thing" while pointing to some X. The importance of ostensive definitions for Wittgenstein at the time went beyond its widespread usage, however; it was also important for him to accommodate ostensive definitions into his preconceived view of logic as autonomous from anything external to what is known *a priori*, hence even from the things we point to in order to teach what a term means.

> One always have the false idea that the important thing concerning the meaning of a word is an object, i.e., a thing, in the sense that the sword Nothung was the meaning of the word 'Nothung.' But there is something wrong here, for I can say, "Nothung doesn't exist anymore"; and is 'Nothung' meaningless here because the sword doesn't exist anymore? (Manuscript 109, 140, *apud* Engelmann, 2013, p. 96)

At first (and at last), it might seem that in ostensive definitions the *things* pointed to for elucidating what certain words mean – words like 'stone', 'book', 'dog', 'tree' – play an irreplaceable role in these clarifications (if anything shows the meaning of a word in ostensive definitions, it is not our finger-tips, we might say). Thus, accordingly, things like stones, books, dogs, and trees would appear to be part of grammar. Were this the case, however, then things' natural dynamics would dictate at least some aspects of the general norms which regulate propositional uses of signs; grammar would not at all be autonomous anymore. As yet, however, Wittgenstein blocked this conclusion. Such a partaking of "what is the case" within the *a priori* known rules of logic would therefore come about only *under an aspect*: namely, only insofar as any purportedly clarifying act of ostension could be seamlessly substituted by a symbolically articulated directive as to how to use the signs eventually thus defined. The *system* was still regarded as what is important for logic and not its single, replaceable constituents (TLP, 5.555). Ostensive definitions could *only* be admitted as a part of the philosophical repertoire for clarifying propositions (i.e., grammar) inasmuch as they were regarded as *equivalent* to descriptively articulate definitions already considered as belonging to it. "What I mean by 'book' is *that* kind of thing" would only work if regarded as strictly equivalent to "I call 'a book' everything and only those things that are thus and so". We would always again be "translating", or – to use a phrase of Wittgenstein's later work – using a rule for understanding another rule.

> The ostensive definition … is a rule among others; for "meaning is fixed *inside* language" (WLC30-32, 62), and not by objects outside it. … The object, as the fact, is only "outside" language … in the determination of the truth, in the application of language. In the interpretation of language, it is part of language, for ostensive definitions are part of the rules, which we must understand before the application of language takes place. (Engelmann, 2013, p. 96)[76]

It therefore *cannot* be said, at this point, that the monolithic system of rules of philosophical grammar is in any sense responsive to the ways in which worldly facts happen to obtain, nor to the nature of things which participate in our clarifications of meaningful word-uses, no matter how often they do. Paradoxically, however intention be the element without which language's whole function "collapses" (*Philosophical Remarks*, §21), logic would not be the outcome of any purpose of ours whose enactment required attending to features of things related to it.

> Couldn't I look at language as a social institution that is subject to certain rules because otherwise it wouldn't be effective? But here's the problem: I cannot make this claim; I cannot give any justification of the rules, not even like this. I can only describe them as a game people play. … Inventing a language does not mean inventing a device for a particular purpose on the basis of laws of nature, or in agreement with them. (*Big Typescript*, 191, 193)

Admitting that (the propositional aspect of) language serves any purpose would amount to allowing for some kind or degree of heteronomy upon grammar, its normativity with regards to propositional sense being pictured, even if just partially, as due to things (say, facts of natural history) we can only know by observation, and worse: contingent facts. Since the assumption in force was that all features of grammar we can anyhow increase clarity upon are seen – if at all – from the inside of it, and outside one "cannot breathe" (PU, §103), then reasons – either doxastic or practical reasons – could only be given *through* grammar, not *for* it. As ever since the *Tractatus* (2.0211), whether a proposition has sense *cannot* depend on whether another proposition is true.

While grammar was still conceived by Wittgenstein as thus markedly autonomous from the facts, he kept thinking that the empirical origin of many of its rules "falls out of the present" – i.e., out of the moment when the sense of the proposition is understood – "as *mere*

76 The reference Engelmann makes, in the beginning of this quote (WLC30-32, 62) is to *Wittgenstein's Lectures in Cambridge* (1930-1932).

cause, history" (*Big Typescript*, 5; emphasis added), so that, as Engelmann (2013, p. 149) points out, "[t]he actual learning of language, something that [would] be tremendously important for him later, [was] not one of his concerns." There certainly *are* facts outside grammar, Wittgenstein would admit, but they would only determine truth (and falsity), not sense (and nonsense). "Understanding correlates with explanation; and in so far as it doesn't, it is unarticulated and therefore does not interest us" (*Big Typescript*, 11), and, as he would later depict *that* view of logic, "if anyone utters a sentence and *means* or *understands* it he is operating a calculus according to definite rules" (PU, §81).

Once and again, while autonomous from observed facts, grammar's connection with reality seems unaccountable; for, if every possible account is internal to grammar, then everything we have is grammatical rules for explaining further grammatical rules. To be sure, Wittgenstein did not accept this; he was *troubled* by it. As he says in Manuscript 109 of the *Nachlass* (cited by Engelmann, 2013, p. 103), "I don't need another model that shows me how the first model has to be used, for otherwise I would need a model to show me the use of the second and so on *ad infinitum*. … *I have to* act *at some point without a model*" (emphasis mine). But, however he did not accept the conclusion, he still had devised no way of explaining how such an *act* is to be performed *because* of the rules of grammar, and not just accidentally according to these. In the same Manuscript 109 (*apud* Engelmann, 2013, p. 101), we read:

> Does "to follow the rules of grammar mean to think, in any sense, about these rules while thinking? No. – Does it mean, always to talk according to certain rules? No. – It means to follow rules. – But anyone who does *anything at all*, does this; for there will be a rule that corresponds to what he does.

If the rule that is followed by anyone who thinks a proposition belongs to a system of rules that is autonomously self-standing, "independently of any future experience" (PU, §92), then the question as to what makes her act be the following of any one rule among these, and which rule that is, remains mysterious. For "every interpretation, together with what is being interpreted, hangs in the air; the former cannot give the latter any support. Interpretations by themselves do not determine meaning." (PU, §198).

A corollary of such a lack of accountable connection between grammar and reality would be the problem of the specificity of the sense of each proposition. As Engelmann

(2013, p. 86) points out, "[t]he difficulty of finding a connection [between intention and reality] is aggravated by the lack of understanding of *how one refers to the objects* present in a specific fact" (emphasis added). By the time he wrote the *Tractatus*, Wittgenstein relied on the *Fühler* of propositions, the simple names, as transcendental objective determinants of *which*, among all elementary propositions there be, is the picture that is in fact being built. Having given up the project of completely analyzing propositions into concatenations of these ultimate *determinants* of sense (TLP, 3.23), he had so long provided no other purported clarification of the way each proposition represents specifically what it represents.

> Thus, the general problem, after the abandonment of the Tractarian ideas of general modes of representation and analysis, is the following: if analysis does not reveal self-explanatory logically independent elementary propositions and the simple [names], how do we understand that 'p' describes exactly the fact p? (Engelmann, 2013, p. 83)

With reference (*Bedeutung*) being left in the dark, all Wittgenstein could seemingly point to as a tool for philosophical clarification was the free-floating variety of symbolic expressions together with their insulated, exclusively mutually oriented relations of either equivalence or contrast with each other as to their use in propositions. As the reader may already have realized, it is here, in such an especially convoluted phase of his thinking, that the rule-following paradox we saw in section 2.1.1.3 would indeed be an unsolved problem for Wittgenstein. If the essence of a rule (of what is to follow it, not just fortuitously to act according to it) be independent of any matter of fact (so, say, that the rule-following in question may occur in the anything-else-independent medium of a mind), then, no matter how sure we are that there is such a thing as our meaning something with our words, there is no matter of fact we can point to whose description implies that a (let alone which) rule has been followed, hence that we do mean anything with our words. Following the doctrine of autonomous grammar, we would know that if we think that *o* is green, then we do not think that *o* is grue, but, while holding such "a mythological description of the use of a rule" (PU, §221) we would not be able to tell what the matter of fact is, which renders a thought a thought that *o* is green rather that a thought that *o* is grue.

2.2.1.2 The World within Grammar

It would be precisely by abandoning this long held (and long unseen as) "requirement" (PU, §§94, 107) that the rules of propositional sense – hence, of understanding and explaining – enjoyed a crystalline autonomy from the factual circumstances of their enactment, that Wittgenstein would finally come to grips with his difficulties regarding both, the end of explanations and interpretations, and the specificity of the sense of every proposition. This, however, would involve a profound transformation in his philosophy of logic as a whole. One by which he would finally "see that what we call 'sentence' and 'language' have not the formal unity that [he] imagined, but are families of structures more or less related to one another", so that "[t]he *preconceived idea* of crystalline purity can only be removed by turning our whole examination round. (One might say: the axis of reference of our examination must be rotated, but about the fixed point of our real need)" (PU, §108).

As Wittgenstein recognized in the Preface to the *Philosophical Investigations*, his late "turn of the axis" has been largely indebted to the consistent and forceful criticism made after some of lectures of his in Cambridge, by the Italian economist Piero Sraffa. Sraffa's critiques were especially directed at none other than Wittgenstein's then still unyielding construal of propositional sense as grounded in an autonomous system of symbolic rules.

So runs the anecdote, Sraffa had Wittgenstein asked what the "grammar" would be of a gesture, very usual in Italy, which is expressive of a lack of interest in what the interlocutor is talking about. The gesture consisted "of brushing the underneath of his chin with an outward sweep of the finger-tips of one hand" (Malcom, 1989, p. 58, *apud* Engelman, 2013, p. 151). Sraffa's point in asking for the grammar of this – or, at least, the point that Wittgenstein at last started to take in – was that understanding a sign is not necessarily linked to the capacity to provide an articulate explanation of its meaning, a rule to be followed for *that* symbol to be enacted.

It does seem immediately artificial that the understanding of a gesture like Sraffa's should imply the mastery of a system of contrasting and equivalent propositional alternatives, such as Wittgenstein's purported philosophical grammar, or any previously conceived symbolic system. Even if the gesture does perhaps *allow* translation into some grammatically available symbolic arrangement (say, "*Chi se ne frega*", or "I had eggs for breakfast"), still, understanding it does not appear to *require* the availability of any such a translation.

To take another example besides that gesture from Sraffa's. While conversing with someone, you get yourself unable to recall the phrase that would precisely describe how you (or someone else, or a building, or a painting, or a situation) are. Instead of pausing to look downwards, or nailing your forefront, or in any other way halting the dialogue in order to try

to remember the adequate expression, you just fluidly make some gesture under your interlocutor's attention, to the effect that, *without herself remembering* what word you wanted, your interlocutor understands perfectly what you meant, and the conversation just moves on. (Suppose the word you looked after was 'exasperation', and the gesture you then make consists in moving rapidly, back and fro, one of your forearms with the hand stretched-open in front of your chest, wide-eyes in the face) This is understanding (it is knowing what someone *means*) obtaining in spite of the lack of explainability at the site.

The potential existence of meaningful signs outside grammar, such as Sraffa's gesture, would have an impact on Wittgenstein's philosophy of logic that was well deserving of being described as a "turn of the axis" (about the "fixed point" of the same interests). It implied that *understanding may occur without verbal explanations being available*, i.e, that our proficiency in about telling each other how (some determinate) things stand is something other, if only when generally characterized, than the mastery of sentence-substitution in a rule-governed symbolic system (again, either everyday languages or formal ones).

Thence what Wittgenstein recognizes in his notes in 1937, that "this and this [were] signs (Sraffa) and [he, Wittgenstein] could not, however, give a *grammar* for them" (*apud* Engelmann, 2013, p. 152). Sraffa's and other gestures were taken as instances of a kind of representationally meaningful human comportment that can be fully understood as to what it tells – as to "how things are" according to it – by an observer whose sole means of explaining, if asked, what she understood, consist in the description or reenactment *of circumstantial aspects* normally concomitant, preceding, or following such a comportment.[77] Once the interactional or introspective scene of the use of a symbol is depicted wherein typically someone behaves in such and such a way (whether or not being responded somehow), her comportment's significance can be attained as that of a move in familiar, collectively enacted, and dynamic circumstances, such as a game. As it often happens when we play some games, we play *language*-games, often without knowing the rules someone might abstract from a number of similar performances. "So how am I to determine the rule according to which he is playing? He does not know it himself. – Or, more correctly, what is left for the expression "the rule according to which he proceeds" to say?" (PU, §82).

Confronted with the a-grammatical rootedness of the meaning of certain signs, while at the same time upholding the same, openly therapeutic attitude before philosophical problems he had ever had, Wittgenstein naturally turned his (and his reader's) attention towards

77 When I say "concomitant, preceding, or following" I *do not* mean *immediately* concomitant, preceding, or following; for timely considerations about the circumstances of a symbolic enactment may enter a purportedly enlightening description of the latter with regards to several time-scales.

simpler, a-grammatical ways of intelligibly deploying signs. The kinds of language-games Wittgenstein termed "primitive languages", whether actual or invented, thus became for him a crucial social landscape to be examined as to our intuitions about it, in order to show both, others' and his own mistakes in philosophizing about meaning. As he saw it, it "disperses the fog to study the phenomena of language in primitive kinds of application in which one can command a clear view of the aim and functioning of the words" (PU, §5).

In §1 of *Philosophical Investigations*, his illustration of a shopkeeper fulfilling a written request for "five red apples" (using a drawer labeled with the sign 'apples', a memorized number sequence, and a color-reference chart with the word 'red' opposite to a sample of the corresponding color) already encapsulates his emerging view: understanding can obtain in this "primitive" manner without requiring support from of an all-encompassing symbolic system.[78] "It is in this and similar ways that one operates with words", he says there. This is not to characterize primitive forms of communication alone, but rather to feature our own language, including propositions, theories, and calculi, as understandable on the basis of the circumstances (*die Umstände*) wherein these uses of symbols are normally – i.e., not philosophically – enacted. It is to finally abandon the thesis of the autonomy of grammar relative to the facts, and, more precisely, it is to state the rootedness of the sense of any proposition we may come to build in the facts that constitute our (various) forms of life. As Danièlle Moyal Sharrock (2004, pp. 19-20) aptly comments on this point,

> Animals will not develop the ability to command, to question, to recount, to chat; whereas these 'are as much a part of our natural history as walking, eating, drinking, playing' [(PU, §25)]. Our potential to develop these abilities is an endowment of nature; the actualization of that potential is ensured by nurture, and furthered by culture. This potential given to humans will find no actualization outside the context of a human community: 'to imagine a language means to imagine a form of life' [(PU,§19)]. A *form of life*; that is: living organisms engaged in a complex web of activities and practices. For a language to emerge or be possible, there has to be something shared. What is shared is a distinct *form* of life: the particular biosocial conditions and activities that make particular languages possible.

More than just an isolated case of inarticulate understanding that is grounded in the observed circumstances of the sign's enactment, the "primitive" forms of understanding iden-

78 And, as is well known, he immediately goes even further – towards absence of grammar – by the example of the "complete primitive language" of §2, which counts with no more than four terms that are used by one of two builders in order to get the other to bring either a block, a pillar, a slab, or a beam for continuing his work.

tifiable in the simplest, almost animal-like, language-games, opened Wittgenstein's eyes to the fact that *every* sign's meaningfulness is thus historically emergent, and circumstantially constituted, *before* rules be established. What happened with the discovery of meaningful, and yet unregimented signs, was a turn of attention to the circumstances of application of rules; the (spatio-temporal, geographical, historical, circumstantial) whereabouts of our stating that this or that is the case. Correspondingly, then, our following of rules gets an extended analysis: we are not to be seen as the isolable *sources* of those of our actions that are rule-guided, or "regimented;" rather, we are to be seen as constitutive *parts* of such actions, together with certain variable features of our surrounding circumstances that participate in determining our customs.

Such an idea, that the sense of any proposition we may come up with is thus rooted in our environmentally extended forms of life – which implies at least some partial *heteronomy* of grammar – could immediately strike Wittgenstein as a plausible one, for the problems of denying it had already troubled him for a while. Among the many examples of partial heteronomy of grammar, after all, is the meaningfulness of color-words. The very problem that took Wittgenstein out of his ephemeral retirement as a philosopher – the problem of synthetic incompatibilities we saw in the previous section – is only a problem from the moment propositional symbols are deemed, as they were at first, as essentially independent from the facts. Especially, when they are deemed independent from facts of our natural and customary concerns.

Once we abandon the requirement that the rules governing the enactment of propositions be autonomous from any matter of fact, the meaningfulness of predicates denoting a position in any given gradation, not only chromatic ones, may readily appear to us as having been established by *direct comparison* of concrete observed facts and occurring events to measuring instruments, such as chromatic paradigms, rods, or clocks, which are themselves concrete facts and occurring events we (care to) observe. Paradigms, if you will. It is accordingly in a direct perceptual contact with some of the factually obtaining aspects of the world around us that the meaningfulness of expressions denoting some of such aspects' possible features is first enabled to be born out from our forms of life. It is only via such a direct contact, therefore, that the *rules* governing the use of such expressions are made feasible in the first place, and not contrariwise. What this implies, in turn, is the existence of a conceptually unregimented perceptual discernment of factual aspects of our circumstances. Only afterwards, if at all, said aspects are to be made into parts of the circumstances for the application of rules.

The uses we (intentionally) make of signs in order to say how things instantiate degrees of qualities – e.g., to say that that cloud is white, is approximately 150m high and is moving at a speed of 15km/h – depend, in order to make sense, on facts that have to be collectively recognized – such as, for example, that this object has the same color (or, alternatively, the same size; the same duration) as that other object. It is, of course, not anyone's individual knowledge of color-samples or wavelength-measurement instruments that establishes the meaning of a term like 'green'. Neither does talk of "collective recognition" imply any sort of semantic "division of labor" leading once again to the requisite of an individual knowledge to be possessed by at least a few educated people[79]. Rather, what is necessary for there to be meaning to a term like 'green' (or 'table' or 'person' or 'electron' or 'number') is that people have historically and to day *cared for* distinguishing green stuff from non-green stuff, and they have variously and with various purposes done so in, quite simply, their ways of living throughout human history.

This is what leads Wittgenstein to search for novel ways of thinking of experience, in a marked rejection (as we saw previously) of the representationalist intuition to provide an explanation for how perception, thinking, and understanding, can variously come about. It is also where the learning processes involved in the mastery of linguistic practices, so much as the human histories enabling them to be presently performed, become crucial for the understanding of logic, of propositional sense. Take, for instance, Wittgenstein's (1953, §xi) reflections on our talk of sentiments. "One can imagine an animal angry, frightened, unhappy, happy, startled. But hopeful? And why not?" – *Because*, we may say, in order to be *hopeful* one must master at least some of the various regular uses of phrases like "the day after tomorrow", "the next year", or "some time in the near future" and must also be capable of being restrainedly joyful, moderately anxious, and occasionally excited about a possible event that, one knows, may perhaps fail to occur by the times thus described. But again, it is a whole collective history that backs anyone's learning to use phrases like these and to care for the times *thus described*, hence anyone's *hope* itself. To be hopeful is not the same as to predict, or to expect that such and such an event will happen, so that its non-occurrence would come as a surprise: expectancy is a sentiment we may reasonably attribute to non-human animals so much as to humans, but hope is not. And the unreasonableness – the nonsense – of attributing *hope* to a dog is something we clarify by looking at the sort of contingencies listed above, about natural and cultural facts.

79 As, at some point at least, Hillary Putnam believed that the meaning of words would be established. More on this position will be told when we talk about Kripke.

Now, as Wittgenstein often stresses, and I have been occasionally recalling, human forms of life are *various* (not only there are relevantly different human forms of life: each one changes along a life time). And, if propositional sense is bound to the multifarious circumstances of symbolic enactment, then, like every linguistic phenomenon, they "have no one thing in common in virtue of which we use the same word for all" (PU, §65)[80]. The multifariousness of said circumstances – many, hardly all, of whose features can lead one to *ask* for clarification in the first place – may include place of usage, tone of voice, societal relations between interlocutors, facial expressions, and many other aspects whose recognition – and ability to react to – can arguably only be brought about by shared custom and upbringing (*Philosophy of Psychology – A Fragment*, §xi). Attention to language-games is attention to "families of structures more or less related to one another"; it means to look for a variegated domain of different circumstantial aspects' participating in the meaningfulness of everything we specifically think or say. As a consequence, if such a broad and nuanced weaving of the contexts in which words are used and their use is taught were different, the meanings of the words that are used would be different (PU, §6); what is primarily involved in both, the understanding of the sense of a proposition and the expression of it is no rule, but rather attention to these differences.

> PU, §23 But how many kinds of sentence are there? Say assertion, question and command? – There are *countless* kinds; countless different kinds of use of all the things we call "signs", "words", "sentences". And this diversity is not something fixed, given once for all; but new types of language, new language-games, as we may say, come into existence, and others become obsolete and get forgotten. (We can get a rough picture of this from the changes in mathematics.)
>
> The word "language-game" is used here to emphasize the fact that the speaking of language is part of an activity, or of a form of life. Consider the variety of language-games in the following examples, and in others:
>
> > Giving orders, and acting on them –
> > Describing an object by its appearance, or by its measurements –
> > Constructing an object from a description (a drawing) –
> > Reporting an event –
> > Speculating about the event –
> > Forming and testing a hypothesis –
> > Presenting the results of an experiment in tables and diagrams –
> > Making up a story; and reading one –
> > Acting in a play –
> > Singing rounds –
> > Guessing riddles –

80 Surely every phenomenon of language we know of have more than one thing in common – they all partake in our forms of life, for instance. The point of §65 is that no such thing in common is true of linguistic phenomena generally *and exclusively* considered, as, e.g., the general form of propositions was once thought of propositions.

> Cracking a joke; telling one –
> Solving a problem in applied arithmetic –
> Translating from one language into another –
> Requesting, thanking, cursing, greeting, praying.
>
> – It is interesting to compare the diversity of the tools of language and of the ways they are used, the diversity of kinds of word and sentence, with what logicians have said about the structure of language. (This includes the author of the *Tractatus Logico-Philosophicus*.)

Previously rejected by principle (see the quotation, in the last section, of *Big Typescript*, 191, 193), the grounding of logic in not just one, but rather a myriad of different purposes in the ways we may come to live and use words, was now to be emphasized. We should accordingly pursue "a radical break with the idea that language always functions in one way, always serves the same purpose: to convey thoughts – which may be about houses, pains, good and evil, or whatever" (PU, §304). As Engelmann (2013, p. 148) says, "Sraffa's criticism helped Wittgenstein to finally break with the project of the *Tractatus* of establishing the limits of sense". It was to break with the project of devising a "formal unity" of language (PU, §108), to the effect that there would be no general, necessary and sufficient conditions for any two sentences to convey the same propositional sense. Or, as Goldfarb (1983, p. 279) put it:

> To ascribe sameness of sense to two sentences is to say that they have features of their application in common. What features might be essential is not given beforehand, for that depends on our aims in the classification, on the reasons we are talking – in the particular context – of sense at all. Indeed, I would argue that there is *no* general notion of use, and would claim that Wittgenstein agrees.

In a word, once philosophy of logic turns to the rough ground of the (as it were, paradigmatic) circumstances of symbolic enactment, this must be recognized as a diverse ground. And the consequence of such a radical break was clear enough.

> PU, §138. [I]f things were quite different from what they actually are – if there were, for instance, no characteristic expression of pain, of fear, of joy; if rule became exception, and exception rule; or if both became phenomena of roughly equal frequency – our normal language-games would thereby lose their point. … What we have to mention in order to explain the significance, I mean the importance, of a concept are often extremely general facts of nature.

If a proposition, as a kind of intentional action, has its significance understood only thanks to its being embedded within its enactment circumstances, then it immediately follows, as Goldfarb suggests, that there is no unique set of explicit directives and allowances one can (even if only ideally) formulate for *every* performance to amount to a (or to some specific) proposition. For the circumstances cannot be known *a priori*, as explicit directives must. The project of drawing a normative boundary to the expression of thoughts, either by means of, or independently from the pursuit of a perfect *Begriffsschrift*, was reliant on a presupposed complete autonomy of grammar, except grammar was revealed as *not* completely autonomous from the facts. Consequently that old project was at last to be put aside as a misguided attempt "to purify, to sublime, the signs themselves" (PU, §94).

The axis of philosophical examination should rotate, in effect, from an inward attention to the transcendental subject, crystal-clearly mastering a cohesive, world-mirroring representational ability, to the essentially scattered, diverse, concrete circumstances (*Umständen*) – which are variously similar but, most importantly, different from each other – wherein each meaningful use of signs, backed by specific historical factors, presently partakes in extant language-games. Games, that, as any other game, are in this or that way learned by people given certain enabling conditions, and played neither with anyone, nor anywhere. This being said, the "real need" of philosophical examination would be the same as before: to find our way about when our intelligence seems bewitched by means of our own language (PU, §§109, 123), but this would be now a goal to be attained by close *observation* of *everything* belonging to the descriptions of our language-games (PU, §52; OC, §628). Such, as I gather it, is "the very nature of the investigation" that forces Wittgenstein's late philosophy to be put, not as a systematic and well partitioned argument, but rather as "a number of sketches of landscapes" illustrating our several, not to be confused with each other, possible uses of signs (PU, Preface).

2.2.2 Facts to be certain of

The course of Wittgenstein's maturing view of propositional sense naturally led him to draw attention to the "fine shades of behavior" that, throughout life and in the material, interpersonal contexts in which "the custom and upbringing" of each one of us take place, constitute habits learned in participatory ways of living (PP, §xi). It is these habits that make up the

kaleidoscopic variety of language-games that permeate our (economically, geographically, culturally, communitarily, and, in the end, personally) varied ways of living (PU, §7). And our ways of playing language-games, which are greatly learned with others, are reflected back in each one of us, even in the behavioral subtleties that are most idiosyncratic to each (PP, §xi).[81] There is no shortage in human history of collective concerns for grounding the establishment of an "agreement in language" that "is not agreement in opinions but in form of life" (PU,§241).

Finally, then, the whole of Anscombe's (1957) philosophical elucidation of the concept of "intentional actions", not only that part regarding the peculiar kind of knowledge we have of them, and only of them in the world, had been had in mind by her most esteemed professor, L. Wittgenstein, for thinking about the use of symbols. Accordingly, actions are – first and foremost – concrete events of which we participate. They are such events as to be often marked by a very distinguishing feature: we master some ways of describing them without having to look at them, or investigate them anyhow. Still, they are concrete events. They are *also* known by descriptions we can only get at, not only verify, through observation. Whereas initially Wittgenstein thought that no empirically established description could be of any use to understand logical relations among propositions we make, hence the sense of propositions, now he had every reason to think otherwise.

As Warren Goldfarb (1997) points out, Wittgenstein's coining of the notion of "family resemblance" serves not only to speak against his, as well as Frege's and Russell's tendency (not to mention the logical empiricists') to look after the shared features of objects falling under a given concept in order to define the latter in terms of said features – i.e., of the concepts that express them. It serves, much more importantly, the task of making us realize that *very often* the parameters delimiting the scope of situations wherein a concept (a rule) correctly applies lie beyond what is reached by the *a priori* knowledge we have of the acts in which we apply the concept.

From the point of view that takes, to use Moyal-Sharrock's expression, *words as deeds* in a non-idealized, non-isolatable, construal of such deeds, *every purpose* that is either directly or indirectly involved in our uses of words *can* be fruitfully appealed to in order to explain what we – or others – mean by this or that proposition. Paradigms and samples of gra-

81 Iris Murdoch, here, should be remembered: there *is* such a thing as a "personal use of concepts" (Murdoch, 2012, p. 40) that we deploy in order to self-regulate in soliloquy our own actions and concerns, singular as they are, even if the abilities thus deployed were acquired through socialization. There is no way to embrace historicity with respect to propositional sense without admitting it that each person has a unique insertion in it, hence that every use of words that is ever made is, to a certain extent, strictly personal. We will return to this theme in the third chapter.

dation predicates, for instance, whose use imply measurements and other sorts of fact-comparison, imply also the disjunction of the not exactly linguistic purposes of measurements and fact-comparisons themselves, from housing to playing to distributing to curiosity. The latter *can* be appealed to in order to explain what we – or others – mean by this or that proposition. They matter for us to explain several uses of such predicates, whereas "to explain the use" means to describe the language-games within which they are employed.

The myriad of conditions supporting the meaningfulness of what we think or say to each other lends any attempt to devise *all* necessary conditions for *any* sign to mean something an obvious character of philosophical delusion. This is something that does position Wittgenstein as a not only a "philosopher's philosopher" (Anscombe, 1990) but, especially perhaps, a modern philosopher's philosopher. The development of a distinct way of doing philosophy after the rise of modern science yielded a host of philosophical explanations – of philosophical theories – of how meaning gets attached to our words, and the "models" philosophers have ever had for elaborating this kind of explanation, a supposedly universal explanation, could be no other than the mundane, actually successful explanations of meaning that we give each other without yet calling what we do in such occasions any bit of philosophy.

Given this, we may readily appreciate what Goldfarb (1997) calls the "third blush" reading of Wittgenstein's talk of "family resemblance", as the latter is introduced in §67 of *Philosophical Investigations*.[82]As Goldfarb notes, Wittgenstein was moving against the usual philosophical assumption that there is "something that lies beneath the surface" (PU, §92) as we manage to mean anything with our words, whence this hidden factor "provides in an unconditioned and self-sufficient way the full story about the use of the general term in particular cases" (Goldfarb, 1997, p. 80). Such a warrant, which has so often been treated as if it were the Holy Grail to be philosophically devised, would accordingly prevent our identification of new instances of a general term (such as 'chair', 'leaf', or 'game') from being seemingly arbitrary or irrational.

Along the early 1930s, as we saw, Wittgenstein was forced to resort to the scattered and often informal means we have of elucidating what we mean when it shows necessary to do so. What was at that time regarded as the left-over method to be engaged with in philosophy – the limitations philosophical uses of formalization having been revealed – could now be seen as the consequential attitude to be taken before the goal of clarity, given the varied circumstantial rootedness of meaning.

82 Though the idea is already present before, as in, e.g., the *Blue Book*.

> PU, §75. What does it mean to know what a game is? What does it mean to know it and not be able to say it? Is this knowledge somehow equivalent to an unformulated definition? So that if it were formulated, I'd be able to recognize it as the expression of my knowledge? Isn't my knowledge, my concept of a game, completely expressed in the explanations that I could give? That is, in my describing examples of various kinds of game, showing how all sorts of other games can be constructed on the analogy of these, saying that I would hardly call this or that a game, and so on.

What is being questioned with the example of the word 'game' is the assumption that non-arbitrariness, or, rationality, as to the use of general terms, can be philosophically warranted by appeal to some sort of process or state of affairs that be equivalent to the complete squaring off – all the way down, to the point of exhaustion – of a concept's characteristic notes, so that the term's application be absolutely unequivocal. By questioning the explanatory power of real-life devising of the characteristic notes that are proper to a concept, in response to demands for elucidation, Wittgenstein was purportedly debunking the explanatory power of a great many philosophical theories. Theories of meaning, which consisted in the attempt to mirror, except that in an idealized form, this real-life, actually variegated, kind of procedure we call "elucidation" or "explaining the meaning", in the very nature of concepts, whether assuming it to be a mental, transcendental, or objective a nature. For "special purposes" – i.e., in particular circumstances – some conceptual boundaries can indeed be drawn with definitions, even to a measure that we deem *exact* (PU, §69). But the exactness we ascribe to such a delimitation will only be a measure of our circumstantial *praise* for its satisfying said special purposes (PU, §78). One can know, we may say, *exactly* what she means when she says "the ground was quite covered with plants", even if one be unable to give a definition of 'plant' (§70). Conversely, although for some purposes one might reasonably come to explain to someone else what the phrase 'one second' means by stating it that it is the time a cesium atom takes to oscillate between emitting and absorbing microwave radiation 9.192.631.770 times, it would be purposeless, perhaps absurd, to resort to such a definition for explaining what "he took just one second to figure it out" means – hence, any supposed praise involved in calling the latter attempt at elucidation "exact" would be completely out of place.

The extent to which the aim of *every* philosophical theory of meaning (from Cartesian ideas in the mind of God, to post-Darwinian Kantianism) seems comprehensible to us depends entirely on the neat and unproblematic touch we have with our regular, and actually quite dissimilar, circumstantial attempts to explain what this or that word means, *when we are not* stating any philosophical theories. In these mundane attempts to achieve clarity, which are "the materials from which we construct [a] picture of reality" (PU, §59), what we do is simply

to teach how to use the words whose meaning is, by any chance, not being well understood. There are several ways to do this teaching, and these are are variously not just aided, but rather constitutively enabled, by contextual features of our shared, historically emergent environments.

Consequentially (this is the point that I take to be most emphasized in *On Certainty*), the kind of familiarity that must be acquired in order to achieve clarity, either in being taught or in teaching the meaning of a word, is not the kind of thing that can only happen by virtue or by force of any condition of possibility for ideally complete, spelled out, elucidation, whatever that means. On the contrary, any possible elucidation – any possible concept – is made on the basis of familiarity with several aspects of our circumstances (which implies that some concepts, say, of a very different form of life, will not be easily understood). *Logic* itself is built upon familiarity with several aspects of our circumstances, which of course, must be to a certain extent a common, shared, familiarity.

It is the precariousness of collective alignment to shared circumstances – so much as its instability – that makes real-life understanding between people, very often, quite a precarious endeavor. But, *pace* modern philosophers' most urgent concerns, the same precariousness also shows real-life understanding to be unhindered by any threats of irreconcilability, either between thoughts and the world, or among speakers of the most diverse cultural backgrounds and traditions. As much the Wittgensteinian picture of language suggests an inexorably ongoing conflict between individual idiosyncrasies and collective concerns constituting live human linguistic practices, under all its forms, it trades the cheap modern groundings of rationality, based on homogeneity (of either sense-impressions, sense-stimuli, transcendental subjectivity, or reified objective meanings) for the admission that rationality, whether in calculi, experimentation, or philosophy, is an ever unfinished historical achievement of human communities. Importantly, precarious as it is, understanding is *not* a matter of (quite miraculously) organizing signs in our heads (or minds) only by means of which any context can be deemed a shared one with other people. Primarily and most of all, understanding is a concrete, niche-involving event, which consists in actively relating to given circumstances of (potential) symbolic enactment. Whereof people happen to use words very differently, thereof the circumstances they ground their respective language-games upon are always in a considerable measure *actually* shared circumstances: they all walk, eat, and play; they all breast their children, they all hear a thunder stroke coming from above. Communicability is granted, not by the adoption of the same taxonomy for describing stuff around us, but rather by the effort of adding – on top of those already existing – layers of commonality to our forms of relating to our surroundings.

Importantly, to close this rehearsing of Wittgenstein's late philosophy of logic, it should be noticed that from the moment when he realized that the historically emergent circumstances of enactment of language-games are constitutive of the rules we follow, and thereby of the sense of our propositions, he had already dealt with the rule-following paradox of PU, §§198-201: environmentally embedded usages, customs, acting, are prior to any rule. Later on, in *On Certainty* (§120), Wittgenstein asks what would happen if someone were to doubt whether a table everyone is aware of is still there when no one is looking at it. He asks "how would their doubt come to light *in practice*" (emphasis mine). Doubts that we put forward in words, in general, imply that there are propositions – there is propositional sense – whose truth-value we don't know yet. But doubts themselves require circumstances – language-games – wherein they may be meaningfully put forward, and in the absence of said circumstances the corresponding propositional signs loose their purpose, and henceforth their sense. Dependency of something's being a proposition on its having a propositional sense, on the one hand, and dependency on something's having a propositional sense on its being a move within a language-game, on the other, imply that the circumstances wherein any symbolic rule whose being followed amount to an action's being a proposition are themselves necessary for propositional sense. This is the sense in which the concrete circumstances of symbolic enactment are constitutive of the rules we follow in order to use symbols. (And this is *not* to state necessary *and sufficient* conditions, it is *not* to devise a "general form", for there to be propositional sense; it is to state one necessary condition for something to be a proposition.)

As an example of how such a circumstantial constitution of propositions displays, so as to mark Wittgenstein's envisaged distinction between sense and nonsense, consider that a person can genuinely doubt whether a table "is still there when no one is looking at it" if, say, the table in question is the kitchen-table that furnishes a friend's restaurant located at a quite perilous quarter of some periphery neighborhood of a big city, and, although usually there is someone sleeping in in that restaurant in a room right next to the kitchen, just that night, unfortunately, nobody was able to do that. This is the kind of context wherein it is reasonable (sound, sane, lucid, and possibly meaningful) to ask whether the table "is still there when no one is looking at it". If, however, the doubt-behavior in question be that of a philosopher that cheerfully asks his audience in the dinning room whether the very table at which they are having dinner – as an instance of the general kind denoted by 'table', as *any* table whatsoever – "is still there when no one is looking at it", *then*, Wittgenstein asks: "couldn't we placidly leave him in doubt, since it makes no difference?" – Yes, we could: and, if it "makes no differ-

ence", then it is not a move within a language-game; if it is not such a move, then it fails to embody – to show – any propositional sense. And, for the same reasons, we could also placidly leave the philosopher "in doubt" who cheerfully asks whether emeralds are green, are they not grue. Differentiating – or, more precisely put, *living by* the difference – between green stuff and non-green stuff is a part and parcel of our lives that serves as enabling conditions for learning to participate in several of our language-games, solely within which assertions and questions that are made can actually make any sense.

> How do I know that the color that I am now seeing is called 'green'? Well, to confirm it I might ask other people but if they did not agree with me, I should become totally confused and should perhaps take them or myself for crazy. That is to say: I should either no longer trust myself to judge, or no longer react to what they say as to a judgment.
>
> If I am drowning and I shout 'Help!', how do I know what the word Help means? Well, that's how I react in this situation.—Now that is how I know what 'green' means as well and also know how to follow the rule in the particular case. (Wittgenstein, *Remarks On The Foundations of Mathematics*, VI-35)

Learning to correctly play "the game" of language (in the sense of the end of §7) is the ongoing achievement of becoming, so to say, a *linguistic* being; it implies the continuous effort to weave one's own way of *living* in a way that is sufficiently harmonious with the ways in which things happen, on the one hand, and how other people live their lives, on the other, in order to be able to make some of one's own actions *meaningful* moves in historically emergent and circumstantially constituted language-games. In order to say, to think, or to reason correctly (i.e., in order to say, to think, to reason, *simpliciter*), it is the "grammar" of the several behavioral and affective concerns involved in each language-game, not just the grammars of syntactically defined linguistic frameworks, that must be obeyed. The sphere of what *can* be thought, in which the correctness of reasoning will always be determined, is thus *delimited* by much of what is actually the case. Consequently, there is *not* an infinity of manners in which things might be meaningfully described.

2.2.3 Saul Kripke on Direct Reference, Essences, and A History of Progress

2.2.3.1 An intuition about reference

Yet another thinker who has realized that history is a non-negligible element of what "gives life to signs" (PU, §432) was Saul Kripke – this time, however, as he spoke for himself regarding the relation between symbolic rules (and our knowledge, or lack thereof, of them) and signs' meaningfulness. Explicitly at least, he did not echo Wittgenstein's thoughts on propositional sense and their roots on language-games. What he did, however, was to pay attention to a narrower, but crucial aspect of propositional sense: its topic, and, by doing so, he presented a historical view of *reference* that, in my view, is entirely compatible with both, Wittgenstein's incorporation of the circumstances of enactment of language-games into the essence of propositional sense, and Kuhn's instantiation of Wittgenstein's thought about language, in general, to scientific language, in particular, by his prioritizing of paradigmatic scientific practices over the linguistic frameworks supposedly deployed by scientific communities.

In the first chapter I attempted to show how reason had little to do with the rise of the representationalist intuition. By presenting Kripke's thoughts on reference in this section, I intend to close the present chapter's selected assemblage of what is, in my opinion, the most compelling set of reasons gathered along the twentieth century to abandon that intuition for good. I will start by arguing that, so much as Wittgenstein's late philosophy of logic, and the good part of Kuhn's philosophy of science, Kripke's philosophy of reference was blatantly at odds with the representationalist intuition.[83] As Panu Raatikainen (2023, p. 49) put it,

> Wittgenstein argued that the presence of a certain mental image in one's mind is neither necessary nor sufficient for being able to use a word correctly and thus understanding a word. Kripke for his part contended that the presence of a certain description in one's mind – associated with a word – is neither necessary nor sufficient for being able to successfully refer with the word.

More than this, however, Kripke's philosophy of reference implies a partial recovery of Aristotelian ontology, and by consequence a partial recovery of Aristotle's views on knowl-

83 Kripke himself did not delve into such a conflict. His thoughts on the "mind-body problem" were merely against the particular thesis that (kinds of) mental states are identical to (kinds of) physical states, a thesis that presupposes, as discussion in the philosophy of mind, more often than not, does, that mental states are representational states.

edge construction as applied to modern scientific knowledge construction. That ancient view of knowledge construction was alien to any view that is based on the representationalist intuition (like empiricism and transcendental philosophy, in all their forms). In particular, as I show in the end, it is alien to Kuhn's post-Darwinian Kantianism, and immune, therefore, to its peculiar predicaments.

As seen, along the last four centuries scientific knowledge construction was very often taken as constituted by theoretically grounded descriptions of the world that totally dispense with Aristotelian categories. All-encompassing taxonomic systems, in which kinds of events would be classified and defined in relation to each other, were taken as appropriate *substitutes*, not at all complements of any sort, to the once traditional discernment of specific natures of the world's furniture. The outcome was the modern predicament, a sentiment of perplexity over newly and recurrently emerging scientific knowledge, detached in its conceived image as it was, and is, from both, common sense and Aristotelian ontology. According to the since holding "ethics of concepts" (Coffa, 1991, p. 10) that arose concomitantly with the rise of the sciences, every material event should be seen through the lenses of scientific indifference to essential differences.

A two-fold assimilation followed straight. On the one hand, the assimilation of the epistemic clumsiness of our individual perspectives to the accuracy (or lack thereof) of our individual judgments, such that mental states were generally understood as representational states.[84] Colors, sounds, and tastes, that we experience along our ongoing relationships with worldly stuff, were construed as representational elements of each of our guessing minds' representational states. A *sui generis* kind of representations, mental representations, was taken as the foundation of psychology, the thing making up our minds, and the ultimate alleged *explanans* for both, the naive and the scientific worldviews of individuals.

On the other hand, a second assimilation was forcibly conceived, of *stuff's properties*, such as they are either perceived or thought of by us, to the supposedly extant counterparts of *concepts* deployed in our judgments. Concepts which, as is most notable in scientific theoretical frameworks, are introduced within webs of inter-defining conceptual relations, and are therefore deployed and replaced alongside clusters of other concepts throughout scientific development, generally, and across scientific revolutions, in particular.

84 The very talk of mental *states*, as we shall appreciate in the next chapter, fits the supposed need to assimilate the mind to a series of representational snapshots (Gibson, 2015). By contrast, when the mind is thought of as identical to agency, talk of mental states is only allowed, but becomes irrelevant compared to the discernment of dynamical patterns in the development of a form of life.

Previously to the rise of the modern predicament, arguably for Aristotle himself, properties of things around us that we attend to, and think about, could themselves be regarded as (secondary) substances, provided they be essential to substance individuals, or else they as accidentals. Either way (i.e., either as substances or as accidentals), properties would themselves be *named* (to use somewhat of a Quinean phraseology, we would accordingly make *reference* to spatio-temporally scattered entities named by terms like 'water', 'the species of tigers', 'being a philosopher', etc.). In other words, in ancient times properties were often taken as *concrete universals*, as Iris Murdoch (2012) put it.[85] They would themselves possess essential and accidental traits, they would themselves have *causes* in the Aristotelian sense, whose unveiling would be the ultimate purpose of the (greatly observation-based) work of "the student of nature". As for the relation between properties, or concrete universals, thus conceived, and the individuals they are properties of, it might be conceived as a part-whole relation (which, importantly, is distinct from the set-member relation, for in their case altering which individuals bear the property doesn't replace the property for another). This would explain why discovering essential properties of the universals implies discovering essential properties of the individuals of which they are essential properties. Finally, dependence of what *is*, either essentially or accidentally, any concrete universal, on the one hand, and anyone's intellect, on the other, would at most amount to the fact that the properties we actually identify and of which we actually devise any traits, are named, referred to, by *us*, and by means of *our* discernment and discursive capabilities.

Following the rise of the modern predicament and the widespread acceptance of the representationalist intuition, questioning "what the nature" of this or that "is" seemed to loose all sense. Accordingly, any property that is to be ascribed to anything (either in the "inside", or in the "outside", domain that is accordingly conceived), either justifiably through clarity and distinction, or not, is first of all seen as a posit. It is, first of all, something that is purportedly represented by a node in the taxonomic system being "used" (whereas the extent and the nature of the gap between the concepts that are literally *used* by persons, and the representational elements our minds "spontaneously" operate with, is a matter of ever ongoing dispute). With the representationalist intuition in place (and the alternating of scientific taxonomies in the background), the first-assigned properties of anything whatsoever came to be thought of in terms of the elements, representational in their nature, solely by means of which we think

85 I am aware, though regrettably not much informed, that in medieval times there ran a discussion, one much dictated by Aristotelian scholarship, between "realists" and "nominalists" regarding the status of universals. These are, roughly put, the things whose denoting signs can be put in the predicate position (if only in some neutral connotation of 'denoting', of course). The position I sketch in the text seems to me evidently closer to the former, "realist" one.

about the property-bearer entities in the world, and talk of "the property itself" came to be regarded as an obscure one. It seemed better suited to think of a property – a universal – as something in-between the set of mind-independent objects satisfying a concept (often regarded as "ultimately analyzable" into punctual "sense-data") and a mind-dependent way of presenting this set. In a word, properties things were taken as constituents of were assimilated to concepts through which things are described.

Arriving at the twentieth century, the representationalist intuition provided the context for Frege (and, independently of him, for G.E. Moore, B. Russell, and others) to argue in favor of anti-psychologism as a guiding principle for thinking about what we mean when what we mean is purportedly valuable as true. Accordingly, then, Frege argued (most famously in his *Grundlagen der Arithmetik*) that what is logically relevant in our meaning anything as purportedly true, either by using signs or by thinking to ourselves, is strictly independent from our *taking* propositions to be true, *Wahrsein* independent from *Fürwahrhalten*. Since psychology was peacefully taken as the science of our spirits' *taking* their representations as true (since so much is what a guessing mind essentially does), that meant that logic should be seen as strictly independent from psychology.

So much for the sense of a proposition, according to Frege: it is a markedly objective "mode of presentation" expressed by the propositional sign, which latter will refer to a truth value depending on which mode of presentation that is. As for the references of names and other denoting phrases appearing in propositional signs, Frege maintained that such references too would be determined by the signs' respective expression of objective modes of presentation of referents, which in turn would be common parts of a set of modes of presentation expressed by whole sentences. (This is consequent to Frege's Principle of Context, also put forward, in consonance with his anti-psychologistic principle, in the *Grundlagen der Arithmetik*) When you take the set of conjoined true sentences about Socrates, for instance, and subtract mention to Socrates from each one of them, what you obtain is a concept that is uniquely satisfied by Socrates. The objective mode of presentation expressed by the name 'Socrates' is this concept; it is such a concept that determines what the *referent* of 'Socrates' is, namely, Socrates. More simply put, therefore, for Frege "the sense of a term is a concept, whereas the denotation or the referent of a term is whoever or whatever uniquely fits the concept" (Salmon, 1981, p. 09). Thus, according to Frege's theory of reference, to think of Socrates *just is* to think of whatever uniquely satisfies a given set of descriptions.

With this theory of reference of singular terms by conceptual determination, Frege – in *Über Sinn und Bedeutung*, 1892 – was able to derive some straightforward answers to otherwise potentially vexing questions, such as questions 1-3 below.

Question 1: Why is "*a* = *b*" *informative* about *a*, while "*a* = *a*" is not?

Answer: Because despite referring to the same object, '*a*' does it by expressing a different sense than '*b*'. Hence, what in general an expression of the form "*x* = *y*" would say is that the modes of presentation expressed by the term '*x*' determine the same reference as the modes of presentation expressed by the term '*y*' when these terms are used in propositions. This is informative if the modes of presentation of an object respectively expressed by '*x*' and '*y*' are different, and trivial otherwise.

Question 2: Given that 'Mount Everest' and 'Gaurisanker' refer to the same object, how is it possible for one to consistently believe that Mount Everest is the highest mountain in the world, while (perhaps precisely because of that) denying that Gaurisanker is the highest mountain in the world?

Answer: The different names of that one mountain express different modes of presentation of that one mountain. One may grasp one set of modes of presentation without grasping the other, and form one's beliefs accordingly without contradicting herself.

Question 3: How can negative existential statements, such as "there is no phlogiston", and statements involving non-denoting singular terms, such as "Pachamama was adored by several native American peoples" be true, or even meaningful, when what they purportedly talk about doesn't exist?

Answer: A term – and the sentences it belongs to – is meaningful by expressing a sense, not by denoting. Negative existential statements assert, precisely, that a compositional mode of presentation, e.g., that expressed by 'phlogiston' in "there is no phlogiston", is of a concept with no instances. There can also be modes of presentation of objects, such as that of 'Pachamama' in "Pachamama was adored by several native American peoples", or indeed as 'phlogiston' in "Loss of phlogiston was believed to be the cause objects' combustion", which, though expressible, determine no referent for the term.

The philosophical debt assumed by Frege for providing these answers was, of course, the postulation of a Third Realm of mind-independent modes of presentation for both, sentences and singular terms. Not only Wittgenstein, as we saw, but also Russell have quickly parted ways with the German logician in this respect. In fact, Russell ought to be remembered

as having most incisively parted ways with Frege by taking the *referents* of what he regarded as "logically proper names" as the *only* semantic contribution of these signs to the determination of the sense of a proposition.[86] That notwithstanding, whatever Russell would come to admit as a "logically proper name" was in the first place a theoretical posit expected to appear at the end of logical analysis: he did not admit of any vernacular name (be it 'Paulo', 'water', or 'tiger') as a "logically proper" one. The latter would take as referents only logical atoms: punctual sense-data, or else atomic propositional functions (Elkind, 2018). By contrast, vernacular names would be taken as abbreviating the logical analysis of definite descriptions, which accordingly amounted to an existentially quantified statement with a uniqueness clause, thus, e.g., "The present King of France is bald" into "There is one and only one x such that x is the King of France and x is bald". Analysis should continue until a level wherein only named sense-data and atomic propositional functions would appear as denoted and somehow judged to be related to one another in a fact.

Wittgenstein, who initially praised Russell's analysis of definite descriptions, had his own technical construal of "logically proper" names, accordingly fulfilling their sole function in the expression of propositional sense by *denoting*, and thereby having no "mode of presentation" by themselves. More similarly to Frege's view, however, all there would be for a (logically proper) name according to the *Tractatus*, as we saw, is the set of combinatory possibilities of it with other names in propositions, so much as for the objects they denote there would be only the logical space of possible worldly situations ("objects are colorless"). But, again, he maintained that the stuff we usually (take ourselves to) make reference to would not be referents of any logically proper name. Paulo, the water in the universe, and the species of tigers, would all be *facts*, not objects (they would be described, not denoted), in a logically proper sense.

With their respectively proposed analyses, Russell and Wittgenstein secured the power of Frege's theory of reference regarding Questions 1-3. By treating vernacular names as abbreviated descriptions (hence, as describing states of affairs rather than as denoting something) they were able to explain (1) the informativeness of non-trivial identity statements; (2) the non-substitutivity of synonyms in propositional-attitude contexts, and (3) the truth-value of statements involving non-denoting singular terms. All this without betraying the indepen-

86 More precisely, Russell purported to eliminate the notion of "propositional sense" altogether by construing propositions as complex relations comprehending denoted objects and (also denoted) propositional functions (the latter being stratified in types and orders, accordingly as they would admit certain types and orders of objects or propositional functions as their arguments, and be themselves admitted as arguments of further propositional functions), whereas true propositions would *be* the facts, and false ones would be non-obtaining such relations between extant *relata*.

dence of logic relative to psychology, and yet without adhering to the credo in the Third Realm.

That is to say, whereas a centuries-old tradition had already been made of taking worldly objects and properties we refer to as but counterparts to compositional elements of mental representations, Frege had insisted that, if there is any prospect of advancing a science of propositional sense (of logic) at all, things we refer to should generally be taken as counterparts of already objective, further non-mental entities. Only through the latter would our mental states indirectly relate to the world and be possibly right or wrong about it. Russell, and to a certain extent also the author of the *Tractatus*, on their turn, did open space for *direct* reference (i.e., reference unmediated by any mode of presentation of the referent) in their respective construals of logic, but this was reserved for what they took for logical atoms alone. For different reasons they came to the similar conclusion that logical analysis would have an end in the discernment of directly referring expressions, or else the sense of propositions could not be determinate. Only to such an extent they diverted from the Fregean thesis, which is traceable to Descartes, that it is only by means of the ways worldly stuff – like persons, water, and tigers – are *represented* (whether "objectively" or not) that we, guessing minds, make reference to any of them.

2.2.3.2 Names, descriptions, and essences

As I have been arguing in this chapter, the assumption that rules can determine the meaningfulness of any kind of sign, independently from their enactment contexts, leads to the paradoxes Kripke (1982) read in the work of Wittgenstein. We also saw how the latter's philosophical development was greatly determined by the confrontation with the consequences of that assumption. While insisting that the rules defining what each sign is as a sign, by contrast to what all other signs are as other signs, are of a self-standing, autonomous nature, relative to all the concrete contextual particularities of our language-games, we are left with no factual grounds at all to ascribe any particular sense to any particular proposition. Led by the representationalist intuition, we forget about the necessary contextual embeddedness within full agents' collective (and often non-linguistic) customs and institutions that is proper to actual representations, instead postulating an alternative, miraculous explanation for their meaning.

And the result is unaccountability of the greater reasonableness of expecting emeralds to be found in the future to be green rather than blue.

Analogously, as argued by Saul Kripke in *Naming and Necessity* (hitherto, *N&N*), we are led into paradoxes once we take reference to be determined by ways our referents be uniquely "represented", whether such a reference-determining representation be operated by hidden mechanisms of mental, transcendental, worldly, or otherworldly, a nature.[87] Now, the paradoxes specifically regarding *reference* – as conceived by philosophers that either ignored or despised the delusions of taking rule-following as a potentially insulated kind of event – were devised by Kripke, as indicated by the title of his most famous work, in terms of the relation between *naming* (or otherwise making direct reference to something) and *necessity*. Particularly, and by appropriating previous outcomes of both, technical and philosophical discussions on the prospects of developing a modal extension to predicate calculus (i.e., classic predicate calculus but with necessity and possibility operators, first given syntactical treatment by Ruth Barcan in 1948), he showed that a distinction very intuitive, though rigorously formalizable, *between necessary and contingent properties of things we make direct reference to*, is completely distorted by theories of reference that, as the ones mentioned above, take reference as determined by believed-in (or else, mentally entertained, tacitly assumed, dispositionally upheld, cognitively generated…) representations of referents.

(Direct reference is often taken to be the object of Kripke's "theory", even though Kripke denies he is advancing any *theory* of reference, direct or indirect. I agree with Kripke, he is not. Before considering any theory, we can intuitively recognize two ways of making reference to something, directly or indirectly. *Directly* we refer to things by using their names – like 'Kripke', 'Brazil', and 'Milky Way' – or indexicals – like 'this', 'that', 'here', 'now', etc. – and, *indirectly*, we refer to things by means of descriptions, e.g., the secretary general of the UN, this year's most awarded film in Cannes, the author of *Naming and Necessity*. The *theories* of reference attacked by Kripke were the ones to blur this intuitive distinction in the first place, between referring to some one thing in particular and referring to whatever gets represented in a certain way.)

Kripke's proposal is that both, the names we use to denote particulars, such as Socrates and Calias, and the names we use to denote kinds of stuff, such as water, gold, and living beings and their species, be given a formal treatment in modal predicate calculus as *rigid designators*. Modal predicate calculus could accordingly be used to reason about *counterfactual*

87 His arguments do not focus in any specific kind of representation, but only on the function that is theoretically ascribed to some representations, of determining the semantic value of a name that is used by someone.

ascriptions of properties to things we actually refer to directly, such as, say, ascription to Aristotle – that philosopher we have sometimes been referring to – of the property of having gone to medical school in Stagira, never to become a philosopher. For the name 'Aristotle' to be treated as a rigid designator is for its referent, Aristotle, to be taken as fixed, the same, across a variety of counterfactual situations imaginable that we describe of him using his name, such as this one of his having gone into medicine, but also the innumerable others we may conceive. Counterfactual situations regarding our actual referents are generally treated, in turn, as *possible worlds*. These, in the extended (still classic) predicate calculus in question, are varied assignments of truth-values to propositions involving our referents that are intuitively not necessary truths, but rather merely possible ones, alongside with invariable truth-value assignments (such as to contradictions, tautologies, etc.). That a given term – like a name – is regarded as a rigid designator means, then, that by the use of it that is being formalized, we designate the same (kind of) thing in every possible world in which the (kind of) thing be taken to exist (whereas, if the referent of the term is taken to exist in all possible worlds, it is called a *strongly rigid* designator). Thus, the referent of a rigid designator will be truly described in such and such a way in some possible worlds, and will be falsely thus described in others, while there may be some descriptions of it that will be true in every possible world in which it exists. This is how Kripke formalizes the distinction between necessary and contingent properties of *things* (whether individuals or universals), by contrast to what is logically entailed by, or merely consistent with, the descriptions that are actually (i.e., in the actual possible world) true of them. For a property, say, F(x), to be represented as *necessary of* a thing *a*, which is rendered as '□F(*a*)', is for 'F(*a*)' to be taken as true in every possible world wherein "*a* exists" is true. By contrast, for the same property to be taken as *possible of* it, which is signaled as '◊F(*a*)', is for 'F(*a*)' to be taken as true in at least one possible world.

The paradoxes debunked by Kripke regarding Fregean-like description-theories of reference stem from these theories' generalized presumption that a specific representation (of any form, so long as it be individuating of the referent in the actual world) must be either consciously believed to be true or correct, or spontaneously operated with by our cognitive faculties, so that reference *can* be made to anything in any proposition, factual or counterfactual. Trouble lies essentially in that, contrary to what such theories say (or at least imply), the descriptions usually pointed out as playing such a reference-determining role are hardly indicative of *necessary* properties of singular terms' referents, or at least they are hardly so insofar as our pre-philosophical intuitions about necessary properties go. For instance,

> if we designate Nixon as [whatever is uniquely described as] 'the man who won the election in 1968', then it will be a necessary truth, of course, that the man who won the election in 1968, won the election in 1968. Similarly, whether an object has the same property in all possible worlds depends not just on the object itself, but on how it is described. So it's argued. (Kripke, 1972, p. 40)

Generally speaking – i.e., not only in the case of Nixon – description-theories of reference will forcibly conflate the actually true descriptions, whichever they are, that they deem determining of reference in the cases of each singular (vernacular) term, with descriptions that are true of such terms' referents in every possible world. For what they tell us is that to refer to any such thing, either by using its name or appropriate pronouns, is the same, so far as logic is concerned, as describing (representing, etc.) *something* as the bearer of such and such properties. This assumed equivalence between directly denoting expressions and certain generalized property-ascriptions would hold in any context, i.e., whether in saying how things actually are with this or that, or in speculating about how things might otherwise have been with it. The problem is that what possibly bears this or that property often *varies* across possible worlds: descriptions, as any other kind of property-ascription, are usually *not* rigid designators (with a few exceptions, such as "the number that added to itself gives four": that is the number two in any possible world). That is to say, there is a possible world – namely, the actual one – wherein Nixon satisfies the description "the person who won the 1968 election", and there is also a possible world wherein Humphrey does (i.e., as we say, Humphrey might have won that election; it was possible that Humphrey was elected). By contrast, there is no possible world wherein Nixon is not Nixon, or Humphrey not Humphrey (if only there are possible worlds wherein Nixon or Humphrey do not exist). Hence, while names are always rigid designators, descriptions are often *nonrigid* designators. In modal contexts, names are not interchangeable *salva veritate* with descriptions that are uniquely applicable to the names' referents in the actual world.

Following description-theories of reference and consequently ignoring the distinction between rigid and nonrigid designation leads to paradox, as I said. Take another, slightly altered example of Kripke's (1972, p. 57), proposition (A):

(A): Aristotle was (f) the greatest of Plato's disciples; (g) tutor of Alexander; (h) founder of the Lyceum.

Many of us have heard the name of Aristotle for the first time (and perhaps many times further) as the subject of at least one, if not all, of descriptions (f), (g), and (h), in (A). Not only are they all quite certainly true of Aristotle in the actual world, they are also true of no other human being in actual history, rendering this particular set of descriptions one (among a few others) that might be deemed apt to play the role of the "mode of presentation" determining the reference of the name 'Aristotle' as we have been using it. Believers in some kind of "taxonomic architecture" of "our cognitive systems" might even consider it plausible that some people's brains generate a representation that in relevant respects be equivalent to (A) whenever they think of Aristotle, and that this brainy representation is what ultimately gives meaning – the *intended* meaning – to their thoughts on Aristotle. Take, then, the propositional functions f(x), g(x), and h(x) (meaning, "x was the greatest of Plato's disciples", etc., respectively). Were it true that,

(B): for all x, not-f(x), not-g(x), and not-h(x),

i.e., if there had never been any single greatest disciple of Plato, nor anyone who taught Alexander, nor any founder of the Lyceum, then, according to description-theories of reference, and supposing the name 'Aristotle' to be synonymous to the definite description "the x such that f(x)&g(x)&h(x)", it would follow that Aristotle never existed – i.e., that the *concept* of "being Aristotle" had the empty set for an extension. But it is perfectly intelligible to think or to say that Aristotle *might* have very well undertaken other paths in his life besides those that have actually turned him into a satisfying argument-value for the three propositional functions above, and as we speculated about what those paths could have been we would still be thinking of Aristotle, the man who actually – but not by necessity – did those things. Even if some of the counterfactual ascriptions of properties to Aristotle be conjoined to our supposing proposition (B) to be true.

So this is one paradox we are led into by assuming description-theories of reference: some innocent pieces of counterfactual reasoning (such as of a possible world wherein Aristotle existed but (B) was true) are vetoed by those theories. There are others, though. Imagine that someone else, say, *b*, performed the exact courses of action by which Aristotle came to be known to ourselves, in such a way that (B) would turn out to be false in this possible world, whereas proposition (C),

(C): f(*b*), g(*b*), and h(*b*) (meaning, "*b* was the greatest of Plato's disciples, *b* was tutor of Alexander, and *b* was founder of the Lyceum")

would now be true. And imagine also that, meanwhile, in that same counterfactual situation where (C) is true, Aristotle himself went to medical school, never to leave Stagira in his lifetime, and was never again mentioned by anyone by two or three generations after his passing. Nothing in this case would righteously force us (and any theory of reference would be wrong if it forced us) to admit that in the course of our counterfactual setting it was Aristotle that we were referring to by using the name '*b*', while someone else, not Aristotle, was called "Aristotle" by us. On the contrary, all the time we would have been thinking of someone else (i.e., *b*) having done the deeds for which Aristotle came in reality to be so renowned, while Aristotle would have been thought of, counterfactually, as having done other things. But then again, the role of the commonly attributed properties of Aristotle, and of the descriptions of their obtainment, cannot be to determine, nor else to allow, reference to Aristotle.

Last but not least, description-theories of reference often amount to the assumption that the relevant, identifying descriptions through which a name is given its reference should (mostly, at least) be known to be true by any competent speaker who manages to make said reference. However, had a contemporary of Aristotle's learned the philosopher's name only because, say, he was charged with the task of delivering him a letter, then perhaps none of the descriptions whose knowledge such theories would nowadays regard as necessary for competently using the name would have been known by the messenger in question, even if those descriptions were already true by then. All the messenger in question might have known about Aristotle was his residence address, for example (if at the time in question Aristotle lived in the court of Philip II, then that would not even be a uniquely identifying description). Does this imply that the messenger did not intend to meet *Aristotle*, the same to whom we refer today, to give *him* the letter? Of course not. Therefore, the (not so) relevant descriptions f(x), g(x), and h(x) (as well as the few other selections we might choose), were only *a posteriori* found to apply to Aristotle, and were never required for using his name with appropriate competence.

It is in place of description-theories of reference that Kripke proposes to think of names and indexicals as rigid designators: terms that designate the same entity in all possible worlds – i.e., all counterfactual scenarios – wherein it makes sense to include that entity as an existing one. Now, interestingly, description-theories of reference are right in implying that it is *not* always intelligible – it does *not always* make sense – to conceive of something as lack-

ing some of the properties it does actually possess. So, for instance, Aristotle had genes. More than two thousand years after his death we discovered that any human being has genes, and I think no one would say of anything that lacks (or lacked) genes that it is (or was) a human being. Neither would we say that Aristotle might have failed to be a human being, being instead, say, another kind of animal, or a warship. (This is not to ask whether an animal of another species, or a warship, might have been *called* by the name 'Aristotle', it is to ask whether *the man we actually refer to* might have been one of such kinds of things) Hence, we may say, Aristotle necessarily – essentially – did have genes. He has (had) genes in all possible worlds. It just so happens that properties like this one of Aristotle's – essential ones – are not ones the knowledge of which is anyhow required for reference to their bearers to be made. More often than not, necessary or essential properties of things are discovered by observation, long after reference to whatever have them to be first made. Aristotle might have failed to have been the greatest of Plato's disciples, tutor of Alexander the Great, or the founder of the Lyceum, and we can formalize these and other possibilities' expression in modal predicate calculus by as many possible worlds as required. But there is no possible world wherein Aristotle, the man we have been referring to, failed to have genes – which feature has three important characteristics: it is not unique to Aristotle, it was discovered *a posteriori*, and its knowledge was never in any sense required for anyone to think about that man.

It is important to stress, as a philosophical merit of his, that Kripke operated at an intuitive level in order to bring forth the important differences in modal contexts between names and indexicals, on the one side, and believed-in definite descriptions and otherwise upheld representations, on the other. It is in order to do so that he uses his possible worlds' semantics for modal predicate calculus, thus rendering the expression of his stated intuitions regarding necessary and accidental properties as precise as he can. While names and indexicals designate rigidly, definite descriptions *often* designate non-rigidly (thinking here again of mathematical exceptions). In having done so, Kripke (from the shoulders of Ruth Barcan Marcus) brought back from the ashes of modern intellectual cleansing one of its most vilified victims: essentialism. And that runs counter some derivatives of the main, comprehensively supplanting (or, better said, "reversing"), intuition of modern philosophy, the representationalist intuition.[88] Because of the latter, the phraseology of "essences" and "essential properties" has

88 Though the causes of our modernly "reversed intuitions" were not approached by Kripke, its effects were clear to him, particularly with respect to the intuition that things have necessary and contingent properties. "If someone thinks that the notion of a necessary or contingent property (forget whether there *are* any nontrivial necessary properties and consider just the *meaningfulness* of the notion) is a philosopher's notion with no intuitive content, he is wrong. Of course, some philosophers think that something's having intuitive content is very inconclusive evidence in favor of it. I think it is very heavy evidence in favor of anything,

taken such a turn in philosophical usage in the late centuries that it has long seemed practically disposable, principally after Kant's work. It was often disposed, in effect, in favor of talk of "conceptual analysis", and either "construction" or "grasp" of new *concepts*, so that all talk of discovering essential properties of something was taken to have been explained away in favor of conceptual analyses of modes of representing things.[89]

The difference between rigid and nonrigid designators is perhaps most clearly shown in identity statements: only those in which the identity sign is flanked on both sides by rigid designators, such as

The Morning Star = Venus,
or
Socrates = Calias

will, if true, be also *necessarily* true – for if, by supposition, any rigid designator denotes the same thing across all possible worlds in which that thing exists, then if 'A=B' is true in some (say, the actual) possible world, then both names 'A' and 'B' denote the same entity in all possible worlds. Alternatively, if in some possible world 'A=B' was false, then it would be necessarily false, for there being some possible world in which it was true would render it necessarily true.

By contrast, an identity statement between a rigid and a nonrigid designator, e.g.,

There is one and only one x such that x was the greatest disciple of Plato, & x = Aristotle,

would be true only in the possible worlds wherein both, the bound variable above and 'Aristotle' designate the same thing, and, an identity statement involving two non-rigid designators, such as

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myself. I really don't know, in a way, what more conclusive evidence one can have about anything, ultimately speaking. But, in any event, people who think the notion of accidental property unintuitive have intuition reversed, I think." (Kripke, 1972, p. 42)

89 But the substitute explains nothing away. Concepts are one thing, properties are another. Concepts are multiply instantiable aspects of propositions, properties are things – they are concrete universals. Whether they are individuals or properties and, in the latter case, whether they are essential or accidental to something, things, in general can often be discovered by mere observation. Concepts, by contrast, are a skill. Even though observation is oftentimes required for acquiring them, they can only be acquired (discovered, if you will) when their use is learned. I could go further in finding out differences between concepts and properties but, since my point is simply that they are different stuff, these shall suffice.

There is one and only one x such that x was the greatest disciple of Plato & There is one and only one y such that y was the founder of the Lyceum & x = y,

would be true only in the possible worlds where both bound variables x and y above designate the same thing, and false otherwise. Neither the cases of rigid-nonrigid, nor of nonrigid-nonrigid identity statements, will in general be necessarily true if true. For, while rigid designators denote the same thing in all possible worlds, nonrigid designators may denote different things in different possible worlds. Again, no one besides Aristotle could – in some possible world – be Aristotle, but someone else besides Aristotle could – in some possible world – satisfy some of the descriptions which in the actual world happen to be true of Aristotle.[90]

2.2.3.3 Expected objections, science, and history

Kripke touches upon two interrelated points of resistance against talk of essential and accidental properties of things. First, the since early-modern times prevailing conflation, between everything that is knowable *a priori* about concepts, and all necessary truths. Second, the assumed requirement of providing qualitative identity criteria for referents across possible worlds before purportedly referring to them in any piece of counterfactual reasoning. The two are related and, as I try to show below, they are evoked by Thomas Kuhn in order to invalidate

90 To be sure, Kripke himself asserts that a thing "should *not* be identified with the set, or 'bundle', of its properties, *nor with the subset of its essential properties*" (p. 52, emphasis added). Now, the reason why we should deny that a thing is identical to the set of its properties has, I think, been made clear enough: some of a thing's properties are accidental to it, they do not hold of it in all possible worlds it exists in, so there is a difference between the thing and the set of its properties. I think, however, that by Kripke's own lights anything is identical with the set, or "bundle", of all its *essential* properties. For, under those lights, as we saw, a thing has all its essential properties across every possible world where it exists; this is what it means, by Kripke's own lights, for a property to be something's essential property, whether we know which ones are these or not. If the occurrence of the exhaustive set of essential properties of something – say, A – in an object pertaining to some possible worlds does not imply A's existence (i.e., that this will be *A's* exhaustive set of essential properties) in all these possible worlds, then if two things, A and B, share all their essential properties, they can still be different from each other; i.e., they can still be two different things, even though they share all their essential properties. (It is indifferent whether A or B is a particular, a natural kind, a phenomenon, a process, etc.). Now, supposing A and B exist and have the same essential properties, the fact that A differs from B is either an essential property of A (or B), or it is an accidental one. On the one hand, if it is essential for A to differ from B, but all essential properties of A are essential properties of B, then it will be an essential property of B that it differs from B. But this is absurd. On the other hand, if it is accidental for A to differ from B, then there is at least one possible world in which A *does not* differ from B. However, if such be the case, then A and B would be the same in all possible worlds, and would not differ at all. Therefore, Q.E.D., anything is identical with the set of all of its essential properties.

the purported meaningfulness of speaking of essential and accidental properties of things as holding independently from the ways things are described by us.

I have been stressing the first point *ad nauseam* since section 1.1.2: the tendency, accompanying the representationalist intuition since the time of Galileo, to purport to analyze concepts by analyzing experience, hence by analyzing what is given to "the faculty of understanding" to be grasped (whereas some would admit of concepts being *given* also "by construction"), without need of any further empirical inquiry. It generates typical misleading intuitions with respect to modality, such as that "by running through all the possible worlds in our heads, we ought to be able with enough effort to see, if a statement is necessary, that it is necessary, and thus know it *a priori*", and also that "if something is known *a priori* it must be necessary, because it was known without looking at … some contingent feature of the actual world (Kripke, 1972, p. 38). By severing concepts from mental representations, anti-psychologism was already a partial remedy against this particular tendency. But it was clearly insufficient to provide a peaceful construal of the nature of concepts in its stead. And the traditionally assumed role of concepts in determining what philosophers thought of making *reference* to, thinking *about*, something, and things like that, was untouched by anti-psychologism (excepting the idiosyncrasies of logical atomism, particularly its idiosyncratic construal of logically proper names). It still seemed right – to Frege, Russell, Wittgenstein, and virtually all other great philosophers coming after them – to say that the reference of a (vernacular) singular term is determined by concepts uniquely describing *some* referent in the actual world, and concepts, objective or not, were still regarded as analyzable *a priori*. Hence, it might (and did) seem, we ought to know *a priori* what are the concepts deployed in each act of making reference to anything we refer to, either in stating how things actually are with it, or in stating how things might have been instead, in another possible world.

Kripke argued against the conflation between necessary truths and truths that are knowable *a priori* by providing counterexamples to it, i.e., examples of both, necessary truths – i.e., intuitively necessary truths – that are known *a posteriori*, and contingent truths that are known *a priori*, some of which were already seen. Belonging to the first class are statements like that Aristotle had genes[91]; that water is H_2O; that whales, tigers, etc., are mammals. Accordingly, there are no counterfactual scenarios we can meaningfully describe that involve reference to *water*, but not to a substance whose molecular structure is H_2O, and similarly with respect to counterfactuals wherein whales (the ones of our oceans) be fish, or tigers (the ones of our jungles) be reptiles. We discovered, *a posteriori*, some necessary truths.

91 This one was mine.

> We might find animals in some part of the world which, though they look just like a tiger, on examination were discovered not to be mammals. Let's say they were in fact very peculiar looking reptiles. Do we then conclude on the basis of this description that some tigers are reptiles? We don't. We would rather conclude that these animals, though they have the external marks by which we originally identified tigers, are not in fact tigers, because they are not of the same species as the species which we called 'the species of tigers'. Now this, I think, is not because, as some people would say, the old concept of tiger has been replaced by a new scientific definition. I think this is true of the concept of tiger *before* the internal structure of tigers has been investigated. (*N&N*, p. 120)[92]

Related to this is a question that Thomas Kuhn poses (and answers) in a quite different spirit.

> What should one have said when confronted by an egg-laying creature that suckles its young? Is it a mammal or is it not? These are the circumstances in which, as Austin put it, "we don't know what to say. Words literally fail us." Such circumstances, if they endure for long, call forth a locally different lexicon, one that permits an answer but to a slightly altered question: "Yes, the creature is a mammal" (but to be a mammal is not what it was before). The new lexicon opens new possibilities, ones that could not have been stipulated by the use of the old. (Kuhn, 2000b, p. 72)

Following Kripke, it is at least far from obvious that the discovery of platypuses changed what being a mammal is. At least we should say, I think, that nothing we can do can change what being a mammal is (except incidentally, as in altering the living conditions of mammals, or killing a lot of them, etc.). As for the *word* 'mammal', we can of course decide to drop the current use we make of it to refer to mammals (as we did, say, with the word 'planet' centuries ago), instead inventing a new use for it through which it shall designate some other kind of animal, or what else. But this is not what seems to have happened. What appears to have happened is that biologists discovered that there are mammals that lay eggs. Similarly, we can imagine a scenario wherein the remains of Austin's goldfinch are examined, and the cause of the animal's having exploded is traced to a rare bird's disease that unleashed due to Amazon rainforest deforestation. In both cases (that of the platypuses and that of Austin's goldfinch) we would plausibly be speechless for a while (as the first platypus' discoverers perhaps were), but despite this initial surprise the employment of already used common names for the respective anomalous cases in question is not obviously jeopardized.

92 Or again, take Austin's famous example of a goldfinch which out of the blue 'explodes, quotes Ms. Woolf, or what not' (Austin, *Other Minds*): is that an *animal*? If it isn't, it isn't a goldfinch either.

These, then, are some examples of Kripke's of how scientific breakthroughs are often better seen as discoveries of thereto unknown properties (whether necessary or contingent) of things already referred to, rather than as implicating a conceptual change. As for exemplars of the class of contingent truths that are known *a priori*, there are statements, such as the Cartesian *cogito*, expressing contingent truths known without observation. That I exist, that I am thinking, etc., is something I know ("whenever I think", etc.) unaided by, and independently from, any particular observation, but it is not necessary, it is contingent, that I exist or that I think. And there are also descriptions of contingent facts that are used to *fix* (to socially establish) the reference of a singular term. Two famous examples of Kripke's is the archaic ostensive definition of "one meter" as denoting the length of a metallic bar in Paris measured at a certain time in the nineteenth century (today the reference of 'one meter' is defined as a specific distance traveled by light in empty space). You may have never seen the bar in Paris, but you would have known just how long it was when the length of one meter got defined, no observations required. Because the bar might nevertheless have had another length at that exact time (say, because someone heated it until it measured 1,02m), the fact that it was actually one meter long at the specified instant is a contingent fact, and one that was known *a priori*. Another example of this kind is the discovery of Neptune, "the planet that causes the observed perturbations in the orbit of Uranus": that Neptune was such a planet, i.e., that this description applied to it, was known, not by observing Neptune causing the observed perturbations, but by stipulating that the name 'Neptune' should be used as the name of the planet that was then thought to have been causing them (as it had).

> If Leverrier indeed gave the name 'Neptune' to the planet before it was ever seen, then he fixed the reference of 'Neptune' by means of the description just mentioned [as the planet which caused such and such discrepancies in the orbits of certain other planets]. At that time he was unable to see the planet even through a telescope. At this stage, an *a priori* material equivalence held between the statements 'Neptune exists' and 'some one planet perturbing the orbit of such and such other planets exists in such and such a position', and also such statements as 'if such and such perturbations are caused by a planet, they are caused by Neptune' had the status of *a priori* truths. Nevertheless, they were not *necessary* truths, since 'Neptune' was introduced as a name rigidly designating a certain planet. Leverrier could well have believed that if Neptune had been knocked off its course one million years earlier, it would have caused no such perturbations and even that some other objects might have caused the perturbations in its place. (Kripke, 1972, p. 79)

The general point being made is this: when a description of a contingent fact (some actual fact, but so that it be meaningful to imagine it as having failed to occur), such as the length of a bar at a certain time, or the orbit of planet, is used to specify exactly what a given term will designate (e.g., one meter, or Neptune), if the description is a true and epistemically valuable one, it follows that we get a bit of knowledge *a priori* about the thing that is being now (re-)baptized, but it does *not* follow that such a piece of knowledge is of a necessary truth. The bar in Paris had exactly one meter when it was ceremonially measured to the end of defining the metric system, but it might have been heated and at that exact moment have had another length than the one that has passed into some of actual history as of one meter long. The length of the bar at that time was known *a priori* to have been of one meter long, but that it was one meter long was a contingent fact. The examples could multiply indefinitely. Gold, for instance, might have been first baptized[93] using a description to fix the reference of the name, as in "'Gold is the substance instantiated by the items over there, or at any rate, by most of them'" (*N&N*, p. 135). The description is of an obviously contingent fact, since it might have happened that no piece of gold was "over there", but if indeed there were pieces of gold over there, then the accidental location of pieces of gold at that time would have been known *a priori* by the baptizers on the spot.

There are other reasons for estrangement with the idea of discovering necessary properties by observation, and knowing *a priori* things that might have failed to occur. Another derivative intuition of modern philosophy of psychology that Kripke's reflections on metaphysical modalities seem to contradict, is the requirement that in speculating about counterfactual possibilities we manage to provide identity criteria for finding – "there", so to say, *in* the counterfactual scenarios – our referents. Such a requirement is clearly connected to the first one (that all necessary truths be known *a priori*, and vice versa). For, if in thinking about factual, not counterfactual, scenarios, we assume that identification of the stuff we think about is mediated by the web of concepts or other kinds of representational elements we either operate with, or grasp (either intentionally, or "spontaneously" so), then why think otherwise with respect to counterfactual thinking? The latter seems possible only by applying the same web of representational elements we have at our disposal (the only one we've got) to counterfactual imagination, so that the elements at play in the determination of our referents *here* (either in consciously thinking about, or in otherwise "cognizing" actual facts) will also be the ones at play to make reference *there*.

93 Which would have occurred several times, if "for the first time" be relativized to the several cultures first encountering gold, with their respective names for gold.

> If someone identifies necessity with a prioricity, and thinks that objects are named by means of uniquely identifying properties, he may think that it is the properties used to identify the objects which, being known about it *a priori*, must be used to identify it in all possible worlds. (Kripke, 1972, p. 49)

And so it is that, from such a "confusion of the epistemological and the metaphysical" (*Ibid*), one gets at an equivalence that, if only in letter, Kripke himself endorses, between "the question of essential properties" and "the question of 'identity across possible worlds'" (Kripke, 1972, p. 42). Now, for Kripke the two questions may indeed be deemed equivalent, because, to question what the essential (and accidental) properties of an object are, *is* to question which of its known properties ought to be ascribed to it in any possible world, by contrast to those it make sense to imagine the object as deprived of in some possible worlds. The difference is that for Kripke there is barely any *question* of identity across possible worlds; possible worlds "are *stipulated*, not *discovered* by powerful telescopes" (*N&N*, p. 44); they are stipulated, that is, for thinking counterfactually about referents that are *given*. But there is another way of conceiving of an equivalence between "the question of essential properties" and "the question of identity across possible worlds" wherein the latter is a rather pressing one. They may be deemed equivalent by someone who, for some reason, requires that we define by what criteria – i.e., through which characteristics known *a priori* – do we identify some one specific thing in the actual world, so that in another possible world we may try and pick up something that satisfies the same, or at least approximately the same, descriptions. This is "to think of a possible world as if it were a foreign country one looks upon as an observer" (Kripke, 1972, p. 43), as if we were in the *search* for the object we are thinking counterfactually about, so that qualitative identity criteria must be provided if we are to put ourselves in a position to decide whether or not something in particular (say, Nixon) exists in some such foreign, non-actual, possible worlds.

> Why need we make this demand? This is not the way we ordinarily think of counterfactual situations. We just say 'suppose this man [Nixon] had lost'. It is *given* that the possible world contains *this* man, and that in that world, he had lost. There may be a problem about what intuitions about possibility come to. But, if we have such an intuition about the possibility of *that* (*this* man's electoral loss), then it is about the possibility of *that*. It need not be identified with the possibility of a man looking like such and such, or holding such and such political views, or otherwise qualitatively described, having lost. We can point to the *man*, ask what might have happened to *him*, had events been different. (Kripke, 1972, p. 46)

That is to say, according to Kripke we first of all make reference to (some) stuff that is *actually* part of our lives in this world, and only afterwards, if at all, we think counterfactually about things we make reference to, asking, e.g., "what would have happened if, instead of winning that election, Nixon had lost it", or "what would have happened if, instead of enrolling in the Academy, Aristotle had remained in Stagira"? It *can* happen, of course, that in some cases the first time an object is referred to is by thinking counterfactually about it. Imagine a meteorite falling in a field about 200m distant from a household. This would plausibly immediately entice the counterfactual imagination of witnesses on the spot. But even in such a case it would have been about *that* meteorite that people thought, "what if *that* fell upon that house?", and the description these people might use, or otherwise "have in mind", to uniquely pick up that meteorite in the actual world, "the meteorite that fell over there, at about 200m from that house", is *false* of the meteorite in the possible world of their spontaneous speculations. It is not *through* knowledge of the fact thus described about the meteorite that we make reference to it.

However sound all of this be, it is not yet to answer how it was that reference came to be made in the first place, and has been continuously made, to either Nixon or Aristotle. Whether one likes (or even refutes) them or not, more than one richly articulated answer to this question has been elaborated by description-theories of reference (and is ready at hand for upholders of the representationalist intuition at large): there is a set of descriptions, of representations, one (or one's brain) takes to apply to something, and to nothing else, in the actual world, and it is this set of descriptions or representations that determines what the object denoted by an appropriately associated singular term is. Taken – as suggested by Kripke – as a rigid designator, however, a singular term is not assimilable to a representation, as we saw, but rather to a mere label, or tag, whose use has historically been established to talk about a specific being. The arguments drawn by Kripke show that the semantic contribution of a name, an indexical, etc., to the sense of a proposition, seems to be no further representational mode of presenting whatever uniquely fits a description, it is seemingly just presenting some one thing in particular. Such terms serve as indexes of what the proposition is about. As to the previously assumed representational determination of a singular term's reference, what Kripke proposes as a substitute for it in determining, for instance, that 'Nixon' refers to Nixon, that 'Aristotle' refers to Aristotle, etc., is simply the continuous history that has elapsed unbroken between the referent's (Nixon, Aristotle) having first been referred to, and the present intentions to participate in this history, preserving the same reference that was once first made with one of these names.

> Someone, let's say, a baby, is born; his parents call him by a certain name. They talk about him to his friends. Other people meet him. Through various sorts of talk the name is spread from link to link as if by a chain. A speaker who is on the far end of this chain, who has heard about, say, Richard Feynman, in the market place or elsewhere, may be referring to Richard Feynman even though he can't remember from whom he first heard of Feynman or from whom he ever heard of Feynman. He knows that Feynman is a famous physicist. A certain passage of communication reaching ultimately to the man himself does reach the speaker. He then is referring to Feynman even though he can't identify him uniquely. He doesn't know what a Feynman diagram is, he doesn't know what the Feynman theory of pair production and annihilation is. Not only that: he'd have trouble distinguishing between Gell-Mann and Feynman. So he doesn't have to know these things, but, instead, a chain of communication going back to Feynman himself has been established, by virtue of membership in a community which passed the name from link to link. (*N&N*, p. 91)

The story that is told by Kripke about the use of a name getting "spread from link to link as if by a chain" is his standard one, not only to account for the establishment and continuity of the denoting character of the proper names of individual people like Feynman; it is the same story to be told in the cases of countable nouns, mass terms, units of measurement symbols, numerals, and terms for denoting any kind of phenomena. Logical priority is given to reference; only later, if at all, we go on sorting out what we think is a necessary property of what we refer to, what an accidental one.

This becomes especially interesting, when we attend to the fact that necessary properties also belong to stuff like water, and the species of tigers, and human beings and planets, seen as concrete universals. Things whose designators are usually called "mass terms", "natural-kind terms", and "common names", that are the potential subject-matters of scientific investigations. Among the most interesting consequences of such things' also possessing necessary properties, is the fact that we *uncover*, *through empirical investigation*, necessary properties of things investigated by the sciences. I have already given the example of genes, as possessing them was found to be necessary, essential, to humans. Kripke mentions the property of being a mammal as essential to tigers and whales, and we just saw the case of platypuses. He also mentions water, heat, and light. Take, e.g., the possibility that we analyze the substance contained in a pond apparently full of water, and we find out that there is not a single molecule of H_2O within any of our samples. We would plausibly call it anything *but* water. Either we would use the name of a substance we already know and have recognized in the samples, or we would use some novel term in order to baptize some newly discovered substance[94].

94 I am *not* using 'substance' here in the Aristotelian, technical sense; for, as I said in the other note, Kripke does not go that far. As to the sense in which Kripke speaks of essences, though certain that I might find all kinds of resistance, I see no difference between his and Aristotle's such talk.

Facts like every bit of water in the universe's being essentially a bit of H_2O, and tigers' essentially being mammals, are facts we have some day discovered about, respectively, water and tigers. Water and tigers may have some day been regarded as some god's tears, and some other kind of god, respectively (anyway, there was a time when we didn't know what we know today about water and tigers, but people, scientists or natural philosophers or not, did make reference to what we call 'water' and to what we call 'tigers'). Nowadays we certainly know better what they are – and this means, what some of their essential properties are. For Kripke, who was well aware of the motivations behind Carnap's Principle of Tolerance, and Kuhn's late considerations with respect to taxonomic incompatibilities between successive scientific theories, science advances *continuously* as the best means we have ever encountered of discovering what is necessarily true of stuff around us to which we make reference. He did not shy away from characterizing science in a way it had not been for a long time.

> In general, science attempts, by investigating basic structural traits, to find the nature, and thus the essence (in the philosophical sense) of the kind. (…) Note that on the present view, scientific discoveries of species essence do not constitute a "change of meaning"; the possibility of such discoveries was part of the original enterprise. We need not even assume that the biologist's denial that whales are fish shows his "concept of fishood" to be different from that of the layman; he simply corrects the layman, discovering that "whales are mammals, not fish" is a necessary truth. (Kripke, 1972, p. 138)

This is not to deny that there are ever any cases of words changing their meaning. The Copernican revolution is a clear example. What Ptolemaic astronomers referred to when the used the word 'planet' (or equivalents) was a spatially scattered concrete universal encompassing the Sun and the Moon, but not the Earth. That clearly changed. We use the same word, now, to refer to the large masses (large enough to be nearly round) directly orbiting a star (and not, as satellites do, indirectly orbiting a star by directly orbiting a planet), and accordingly we regard the Sun as a star, the Moon as a satellite of the Earth, and the Earth as a planet. We *lost interest* in referring to the concrete universal Ptolemaics did, as they had no interest in referring to the one we do. Still, can't we say that we have discovered necessary properties of that kind of thing Ptolemaics called 'planets'? I think we can. We have discovered, for instance, that nothing they called a planet could be formed in less than a thousand years (furthermore, we have discovered that it did take some time for these massive objects to arise in the first place: they are not eternal objects). And, of course, we have devised essential

properties belonging to just a subset of the objects Ptolemaics called “planets” (say, housing a chain-reaction of nuclear fusion in its center, as this is a necessary property of every yellow star, such as the Sun, but not of Mars or Jupiter).

Other cases of conceptual change can be both, recovered from history, and imagined for the future of scientific development. Conceptual change *per se*, even if it occurs, does not hinder the thesis that science advances by discovering essential properties of kinds of stuff scientists care to forage. But often too will essential properties be discovered of things we refer to both before and after revolutionizing science. Water, tigers, humans, gold, light, etc., would be instances of this second type of development.

As I said, however, Kripke’s resulting view of the history of science as a history of steady progress towards discovering essential properties has been often mistaken by a (perhaps more palatable) mere appeal to “intersubjectivity” as a positive characterization of the negatively described fact that the determination of reference happens greatly outside of our heads. Most notable, perhaps, is Putnam’s so-called “causal theory of reference”, which has indeed been confounded with Kripke’s view by some authors. In particular, such an interpretive err was made by those who thought that Kripke’s view involved what Putnam called a “division of linguistic labor” (Putnam, 1975). This has been the case of Thomas Kuhn (2000b) when the latter directly addressed Kripke’s *and* Putnam’s views as if they were one and the same. Putnam’s main point was “that the psychological state of the speaker does *not* determine the extension of the word” (Putnam, 1975, p. 226), paradigmatically – in his text – when the word in question is a countable noun, like ‘human’, or a mass term, like ‘water’ (whose referents, by contrast to the referents of proper names, like ‘Aristotle’, are directly studied by the sciences).

So put (and supposing that ‘determine’ is meant as ‘completely determine’), Putnam’s claim is also implied by Kripke’s view of reference: it is the history of the linguistic community to which a speaker belongs – a history that holds largely independently of his or her psychological states – that determines what the references of one’s uses of singular terms will be. Therefore, also for Kripke, when it makes sense to ascribe an extension to a term, it is not the psychological state of the speaker (whatever that means) that determines such a term’s extension.

However, when it comes to telling a positive story about how is the reference or the extension of a term determined, Kripke and Putnam part ways significantly. Putnam’s talk of a “division of linguistic labor” is spelled out in analogy to the extant division of labor found in our social relations with things, which are various and demand of each person to play a differ-

ent part, so that the whole of our various relations with things may function as expected in a market society. With something like gold, for instance, some people are fond of wearing gold wedding rings, some others do the job of selling the latter, some of producing them, and there are also those who follow the fluctuations in the price of gold in the global market. Likewise, and as a part of the total division of labor in a society, Putnam claims, there would be work to be done with respect to the determination of a term's extension, or reference.

> The foregoing facts are just examples of mundane division of labor (in a wide sense). But they engender a division of linguistic labor: everyone for whom gold is important for any reason has to *acquire* the word 'gold'; but he does not have to acquire the *method of recognizing* if something is or is not gold. The features that are generally thought to be present in connection with a general name – necessary and sufficient conditions for membership in the extension, ways of recognizing if something is in the extension ('criteria'), etc. – are all present in the linguistic community *considered as a collective body*; but that collective body divides the 'labor' of knowing and employing these various parts of the 'meaning' of 'gold'. (Putnam, 1975, pp. 227-28; emphases in the original)

Thus, when it comes to Putnam's view, some emphasis should be put in that it is not necessarily the psychological states *of the speaker* that determine which objects belong to the extensions, or are the referents, of her uses of words. However, according to Putnam, it would nevertheless be *some* psychological states that do this job, namely, when they exist, the psychological states of the "experts" of the society the speaker belongs to, in recognizing the circumstances of correct application of words.

> And some words do not exhibit any division of linguistic labor: 'chair', for example. But with the increase of division of labor in the society and with the rise of science, more and more words begin to exhibit this kind of division of labor. 'Water', for example, did not exhibit it at all prior to the rise of chemistry [around 1750]. Today it is obviously necessary for every speaker to be able to recognize water (reliably under normal conditions), and probably every adult speaker even knows the necessary and sufficient condition 'water is H_2O', but only a few adult speakers could distinguish water from liquids which superficially resembled water. In case of doubt, other speakers would rely on the judgment of these "expert" speakers. Thus the way of recognizing possessed by these "expert" speakers is also, through them, possessed by the collective linguistic body, even though it is not possessed by each individual member of the body, and in this way the most recherché fact about water may become part of the *social* meaning of the word while being unknown to almost all speakers who acquire the word. (Putnam, 1975, p. 228)

Clearly, as Kripke (1986) notes, Putnam's causal theory of meaning (of reference, of extension) is similar to description-theories of reference in that it takes *some* believed-in or otherwise entertained modes of presentation of their referents as determining the reference, or extension, of terms. Insofar as Kripke's objections to such an epistemological grounding of reference go, Putnam's view is a target so much as Frege's is. It is, in Kripke's words, simply a "socialized" version of it.[95] Kripke rejects it, accordingly, in favor of a (once again) markedly historical view of reference.

> Is the existence of contemporary experts and encyclopedias important for the contemporary reference of the given common name? Take the name Peano. Imagine all the experts assembled in a hall which is then bombed. A few experts may survive; those are people who, though historians of mathematics, have somehow not studied a lot about Peano and have picked up the common misconception [that Peano, not Dedekind, was the first mathematician to have devised a way of axiomatizing the arithmetical series of natural numbers]. The others are gone. They are dead. The existing speech community then consists entirely of people who have the misconception. On the theory in question, taken as it is, the reference suffers a dramatic shift. Before the bombing it was Peano, after the bombing it was Dedekind. But this I think is not the case. And why isn't the case? It's because of what I have emphasized before: that normally we think of the relevant semantic features as preserved. *This is the essence of the historical theory. A speaker at any given time over time, and even if he has forgotten most of the descriptions he associates with the name of the being, or even he may be an amnesiac, still counts normally as preserving the same reference that he had before. And this is even the case here and it is the case when the name is transmitted*. (Kripke, 1986, pp. 6-7, emphasis added)

At this juncture, there is a question that we all, as familiarized (and, I would say, as victimized) as we are with the representationalist intuition, can barely avoid asking, which is the following. How do get in touch with the history the connection with which is a necessary condition for successfully making reference to the same stuff other people make reference to? How do we guarantee that when we talk about something, be it Aristotle, Nixon, tigers, gold, or whatever, we do not talk past each other? This is another point at which Kripke emphasizes in *N&N* that what he is offering is not another *theory* of reference, but simply "a better picture" of how reference works relative to our intuitions regarding necessity and possibility.

95 Strangely enough, as Kripke (1986) also notes, Putnam reasons that if we admit that the identity of water and H_2O was discovered by chemistry (as he seemingly does), then this identity held true also before its discovery was made. The problem, of course, is that there were no "experts" to secure "the social meaning of the word" as no one knew anymore than anyone else what water was in essence. So it is unclear what the role of "experts" would be according to Putnam in the determination of reference. What we can do, nevertheless, is to recognize what the false suggestion contained in the idea of a division of linguistic labor is. The suggestion is to socialize description-theories of reference. These are wrong, however, not because of having not been socialized before, but rather in that they subject reference to a mode of presentation of the referent.

> A rough statement of a theory might be the following: An initial "baptism" takes place. Here the object may be named by ostension, or the reference of the name may be fixed by a description. When the name is "passed from link to link", the receiver of the name must, I think, intend when he learns it to use it with the same reference as the man from whom he heard it. If I hear the name 'Napoleon' and decide it would be a nice name for my pet aardvark, I do not satisfy this condition. Notice that [this] outline hardly *eliminates* the notion of reference; on the contrary, it takes the notion of intending to use the same reference as a given. … To repeat, I may not have presented a theory, but I do think that I have presented a better picture than that given by description theorists. (*N&N*, pp. 96-97)

According to this picture – this view of reference, as I have been calling it – the intention to partake in the history of the use of a name as a denoting sign is the sole primitive ground of reference we are able to devise and "comply" with. Such a view is not spelling out what reference is, in such a way as to trade the notion of 'reference' by others more primitive and more precise than it, because the notion keeps being presupposed. Neither does it design any *method* for referring to this or that (for "guiding" our intention), because it takes it for granted that our intention to participate in a history of use of a name usually works. As for intention itself, Kripke does not pretend to add any clarity about it. But if there is anything near an epistemological grounding of our success in referring to the stuff we want to, it lies precisely in the intention to partake in the history of the use of a name as a denoting sign. To ameliorate this picture, the only foreseeable route would be to provide a theory of intentional actions and showing, from the tenets of such a theory, a bit more precisely how is it that our intentions connect us with the histories of the uses of signs, generally speaking. A sketch of how such a theory might develop was rehearsed by Wittgenstein's late work (mostly, perhaps, as he argued for "new concepts of experience" providing a direct link between our historically embedded intentions and the perceptual discernment of aspects, and in *On Certainty* by insisting that, *in order to* and *before* representing anything to anyone, we ought to first commune in forms of living and caring for things around us in sufficiently similar ways). And, as I have been announcing, we will soon see, in the next chapter, how intentional actions are currently being seen theoretically by emerging sciences of the mind. Meanwhile, all that Kripke could do was to avoid misunderstandings as to his talk of our intention to participate in histories of symbolic enactment.

Besides from Putnam's theory of social deference to experts' special powers of discernment, Kripke excluded another route for epistemically grounding one's partaking in the history of the use of a name. It may be supposed – and the supposition was indeed attributed

to Peter Strawson – that, though reference to the bearer of a name does not imply knowing any particular mode of presenting this referent, it does require being able to remember – to know – from whom one has learned the name, as in a chain of mental deference-attitudes that leads to the baptismal encounter. Kripke (*N&N*, p. 92) objects: "I may well not remember from whom I heard of Gödel, and I may think I remember from which people I heard the name, but wrongly", and yet, the referent of one's uses of the name of Gödel does not shift because these sorts of accidents in one's and others' memories may occur.

> The point is that Strawson, trying to fit the chain of communication view into the description theory [of reference], relies on what the speaker *thinks* was the source of his reference. If the speaker has forgotten his source, the description Strawson uses is unavailable to him; if he misremembers it, Strawson's paradigm may give the wrong results. On our view, it is not how the speaker thinks he got the reference, but the actual chain of communication, which is relevant. (*N&N*, p. 93)

For reasons we are rather familiarized with, however, the question of how our minds (our mental states) *must* be configured in order for us to make some specific reference, to think some specific thought, have preoccupied many philosophers to this day. Most notably (for our purposes), it did preoccupy Thomas Kuhn ever since he got into philosophy. With his Kantian turn, his thoughts may have become a bit more picturesque, so to say, but some of them kept deserving our attention. When he directly confronted "causal theories of reference" (those would indifferently include, as I said, both Kripke's and Putnam's views), he brought considerations forth that can be appreciated even by those of us who are already convinced that the representationalist intuition went awry. There (Kuhn, 2000b, p. 58) he talked, again, about the histories of the sciences, which he so often characterized as only nominally continuous, but fundamentally disruptive across their revolutions.

> [T]o understand some body of past scientific belief, the historian must acquire a lexicon that here and there differs systematically from the one current in his own day. Only by using that older lexicon can he or she accurately render certain of the statements that are basic to the science under scrutiny.

This can easily be seen as a simplified rendering of the historiographical predicament that had reportedly motivated Kuhn to go into philosophy in the first place (section 2.1.2).

Theories along a science's history make different predictions, elaborate different explanations, and in doing so often deploy orthographically identical terms, and sometimes even provide them with syntactical definitions differently. Because of this, attention must be paid to the game one is playing when one is researching some body of past scientific belief, not presupposing that the game is the same as the one current in one's day, under pain of inescapable confusion.

All we have seen of Kripke's reminders about direct reference present no objection to the difficulties Kuhn identifies in the work of the historian of any science. There are several ways of describing what we see and do, and some ways of describing what we see and do demand a whole repertoire involving the ability to describe further situations and objects besides the ones described at present. As Michela Massimi (2022) (a post-Darwinian Kantian herself, who is convinced that one must avoid metaphysical discussion about scientific progress) insists, all knowledge claims are made from a particular point of view. As time passes and large portions of communitary repertoires get substituted by others, and people go on caring for, noticing, and acting in relation to, different aspects of their common surroundings (inasmuch as these are in fact common), important differences emerge as to which possibilities can be *envisaged*, *described*, and *speculated* upon, by people. In Kuhn's words,

> To possess a lexicon, a structured vocabulary, is to have access to the varied set of [possible] worlds which that lexicon can be used to describe. Different lexicons – those of different cultures or different historical periods, for example – give access to different sets of possible worlds, largely but never entirely overlapping. (Kuhn, 2000b, p. 61)

As Kuhn himself notes, the historian's predicament is solved by getting in touch with, learning, other language-games, thus expanding one's repertoire so that the uses of words that were made in the past can be comprehended at last. Against the late empiricist philosopher Willard van Orman Quine, for whom translation between incommensurable lexicons would be in principle feasible – if only both were translated into purely behaviorist-dispositional and physical vocabulary – Kuhn argues that what "has made the assumption of universal translatability so nearly inescapable is … its deceptive similarity to a quite different one, in this case an assumption that I share: anything which can be said in one language can, with imagination and effort, be *understood* by a speaker of another. What is prerequisite to such understanding, however, is not translation but language learning" (Kuhn, 2000b, p. 61). And it will then be in

terms of such a repertoire expansion that Kuhn will characterize the part he sees that can be played by possible worlds' semantics in philosophical reflection about science.

Were it all, what Kuhn would be saying is that our total range of feasible speculation as to what might have been the case with whatever we may refer to is limited, and of course it is, by our actual abilities to describe things. I literally *can* only give examples of things *I can* think of that might have happened to Aristotle, my imaginative repertoire is not unlimited. The same holds, of course, of my speculative powers with respect to water, tigers, and light, and scientists' (experts') speculative powers are not unlimited either. Ptolemaic astronomers, as we saw, obviously lacked the capacity to speculate over the formation periods of what we call "stars" and "planets", and similar limitations are to be expected of today's physicists. None of this is to say that our singular terms' referents are determined by any way of describing them.

The reason why Kuhn remained unconvinced that this would be a difficulty that is limited to the work of a historian or a translator, and insisted that "Each of the lexicons combined for the historian's purposes embodies knowledge of nature, and the two sorts of knowledge are incompatible, cannot coherently describe the same world" (Kuhn, 2000b, p. 74), was his inexorable conviction that there is no epistemic access to the actual world itself that be unmediated by ways of representing it. *Any* sort of access to things or facts is representationally mediated.

> Throughout this paper I shall continue to speak of the lexicon, of terms, and of statements. My concern, however, is actually with conceptual or intensional categories more generally, e.g., with those which may be reasonably attributed to animals or to the perceptual system. (Kuhn, 2000b, p. 60, Note 2)[96]

This assumption alone is the cause of Kuhn's headaches with lexical incommensurabilities, which are otherwise a trifling hazard of the occupation of translating a text from one language to another (increased as such a hazard is, of course, in the proportion of existing cultural differences between translating and translated speakers). But if our views of the world (i.e., our perceptual, intellectual, speculative, and imaginative, views of the world) are entirely mediated by representational systems – lexicons – that are incommensurable with each other,

96 Virtually the same note is also put by Kuhn in the opening lines of another, much related article of his, *Dubbing and Redubbing*

then our views *of the actual world* are themselves (and in all these senses) potentially incommensurable, incommunicable, with each other. One may legitimately pass from the premise that "Each of the resulting lexicons gives access to its own set of possible worlds, and the two sets are disjoint", to the conclusion, "Each of the lexicons combined for the historian's purposes embodies knowledge of nature, and the two sorts of knowledge are incompatible, cannot coherently describe the same world" (Kuhn, 2000b, p. 74). Seeing *x*, imagining *x*, and thinking of *x*, just *is* bearing such and such a representation of *x* in one's mind, and any representation of an object (a property, a phenomenon) is accordingly enabled by the mind's lexical-taxonomical structure. If the perceptual, intellectual, and imaginative events of two people are entirely determined by incommensurable lexicons, then these two cannot refer to the same things at all, and in this sense they "live in different worlds".

Kripke argued, in spite of the representationalist intuition, that direct reference (through names and indexicals) is independent of any mode of presentation of referents. But, according to Kuhn, we embody today a lexicon that allows us to refer to things people with other lexicons are (were) not able to. This lexical cliff is insurmountable, according to Kuhn (by learning a new lexicon, we can *choose* which one to apply, we cannot accommodate them together). We can only jump, by means yet to be fully comprehended, from a worldview – and that means, from *a set of referents* – to the next. By insisting that there are "conceptual or intensional categories more generally", "which may be reasonably attributed to animals or to the perceptual system", it follows that reference (to *this* or *that*) is a function of a cognitive system's taxonomic structure, and cannot have a continuous history across thorough substitutions of these reference-determining taxonomic structures. Reference becomes inevitably lost in time, as well as across contemporaneous cultures.

Thus Kuhn arrives at what could aptly be taken as post-Darwinian considerations on the Kantian conception of sense, reference, and scientific knowledge construction.

> I discuss the acquisition of a lexicon because it is a source of clues to what the individual's possession of a lexicon entails. Nothing about the end product depends, however, upon the lexicon's being acquired by generation-to-generation transmission. *The consequences would be the same if, for example, the lexicon were a genetic endowment or had been implanted by a skilled neurosurgeon*. I shall, for example, shortly emphasize that transmitting a lexicon requires repeated recourse to concrete examples. Implanting the lexicon surgically would, I am suggesting, have involved implanting the memory traces left by exposure to such examples. (Kuhn, 2000b, p. 66, Note 11, emphasis added)

If the conception of our cognitive faculties upheld by Kuhn above is right, then actual exposure to examples – to the circumstances of symbolic enactment – is a disposable routine in the process of "acquiring a lexicon". This is, effectively, the abandonment of anything once resembling a "historical view of science" on Kuhn's part (ironically proving it to be a mere tag for Kuhn's late views), for historicity is now clearly portrayed as a mere historical accident concerning scientific thought, reference, and knowledge. Essentials lie all in the machinery in the head.

As a consequence, Kuhn's primary concern is not for what *is*, or might have *been*, the case – he ends up disentitling himself, and all of us along with him, to the privilege of reflecting on the nature of worldly things themselves, just as Kant did centuries before.[97] His primary concern is rather for *what is possibly told* by someone to be the case, as well as about what this person is able to speculate about what might have been. Talk of truth-values itself is seen as a talk about mere indices of epistemic status.

> Only when a new lexicon has been mastered can [its statements] be understood, and that understanding does not provide them with [other lexicon's] equivalents. Individually, they are neither compatible nor incompatible with statements embodying the beliefs of a later age, and they are therefore immune to an evaluation conducted with its conceptual categories. The immunity of such statements is, of course, only to being judged one at a time, labeled individually with truth values or some other index of epistemic status. (Kuhn, 2000b, p. 76)

Kripke did speak about a confusion potentially lurking the reception of his lectures in *N&N*, between the metaphysical possibilities he did primarily wish to speak about, and the epistemic possibilities he did not so quite wanted to approach (except to make the distinction). For example, Goldbach's conjecture says that any even number greater than 2 is equal to the sum of two prime numbers. So long we have had no proof of this, and so we say, *it might turn out* either way. But this way of speaking is only expressive of an epistemic possibility. Whether or not Goldbach's conjecture is true is no metaphysical accident, however; it is either *necessarily* true or *necessarily* false. Another example, whose empirical nature renders it more relevant for Kuhn's concerns, is that of cats.

97 And, again, as Massimi (2022) does.

> Cats are in fact animals! Then is this truth a necessary truth or a contingent one? It seems to me that it is necessary. Consider the counterfactual situation in which in place of these creatures – these animals – we have in fact little demons which when they approached us brought bad luck indeed. Should we describe this as a situation in which cats were demons? It seems to me that these demons would not be cats. They would be demons in a cat-like form. We could have discovered that the actual cats that we have are demons. Once we have discovered, however, that they are not, it is part of their very nature that, when we describe a counterfactual world in which there were such demons around, we must say that the demons would not be cats. It would be a world containing demons masquerading as cats. Although we could say cats might turn out to be demons, of a certain species, given that cats are in fact animals, any cat-like being which is not an animal, in the actual world or in a counterfactual one, is not a cat. (N&N, p. 126)

But Kuhn is making no such confusion, between the epistemic possibilities we can have access to, and the metaphysical possibilities the world in fact has. From epistemological premises about our knowledge *a posteriori* of the actual world, he drew an epistemological conclusion to the effect that *all we can work with* is epistemic possibilities.

> Those who maintain the independence of reference and meaning also maintain that metaphysics is independent of epistemology. No view like mine (in the respects presently at issue there are a number) is compatible with that separation. The separation of metaphysics from epistemology can come only after a position that involves both has been elaborated. (Kuhn, 2000b, p. 77, Note 25)

Kuhn has every right to speak about epistemic possibilities – i.e., about "the worlds accessible with a given lexicon" – and be primarily concerned about *them*, if he has any right to speak about a "lexicon" operative as a precondition for any act of reference. But the risk of disfranchisement is big as to the latter, if not so much as to the former. If accordingly we give attention to the epistemic possibilities that present to ourselves, while acknowledging that metaphysical possibilities are indifferent to our epistemic outlooks, then Kuhnian worries about lexical incommensurabilities become much less menacing to common sense than they have hitherto appeared. The assumption of the representationalist intuition is Kuhn's sole basis for devising a "threat to realism" in our understanding of scientific development.

> The threat to realism is the foremost of the problems I have in mind, and it can here stand for the entire set. [Note 24: Contrary to a widespread impression, the sort of position here sketched does not raise problems of relativism, at least not if 'relativism' is used in any standard sense. There are shared and justifiable, though not

> necessarily permanent, standards that scientific communities use when choosing between theories.] A lexicon acquired by techniques like those discussed … gives members of the community that employs it conceptual access to an infinite set of stipulatable worlds, worlds describable with the community's lexicon. Of these worlds, only a small fraction are compatible with what they know of their own, the actual world: the others are barred by requirements of internal consistency or of conformity with experiment and observation. As time passes, continuing research excludes more and more possible worlds from the subset that could be actual. If all scientific development proceeded in this way, the progress of science would consist in ever closer specification of a single world, the actual or real one, [but] a lexicon which gives access to one set of possible worlds also bars access to others. … And scientific development turns out to depend not only on weeding out candidates for reality from the current set of possible worlds, but also upon occasional transitions to another set, one made accessible by a lexicon with different structure. (Kuhn, 2000b, p. 76)

Such a picture of scientific development, elaborated by Kuhn more than twenty years after his having written *The Structure*, holds a broad resemblance to that earlier one. According to it, scientific knowledge is continuously deepened while entrenched presuppositions and methods of research stay the same, which is now characterized as a progressive exclusion of imaginable possible worlds from the set that is compatible with both, theory and experimentation. The progressive capillarity of disciplinary matrices' paradigmatic practices, modeling analogies, and symbolic generalizations into previously unstudied phenomena goes from a relatively open space of theoretical possibilities scientists legitimately speculate upon, to a relatively shrunk set of established results which specifies "a single world, the actual or real one" to the detriment of others. But then, disruptions force themselves upon the community. Thereto sedimented commitments prove unfit to provide model explanations, and are eventually replaced by a new set of commitments. Now, this is characterized as the access to a novel cluster of possible worlds, interrupting previous progress in favor of the advancement into a different road for the abstractly similar process of discernment and exclusion of theoretical possibilities.

There is no space, in this picture, for a phenomenon much more intuitively linked to scientific progress, which is the continuous widening of human imagination by virtue of scientific discoveries (not to mention, of course, the discovery of essential properties of kinds of stuff). If – to trade a bit with Putnam's idea – there is a specialized *linguistic* job for scientific communities it is *to fix the reference of new terms* (or, as sometimes occurs, to old terms for which a new reference gets ascribed), and thus, quite contrariwise to what Kuhn suggests, to expand the range of imaginable possibilities. We didn't have epistemic access to a possible world wherein energy would be generated by fusing atoms of hydrogen into atoms of helium

before the early twentieth century, nor to a possible world wherein the working class would seize and control the means of production from capitalists before Marx. But of course, this sort of work is not exclusive to scientists. Scientists participate in it alongside the rest of humankind and its evolving history of transforming encounters (which include, but are not exhausted by, language learning). Restricting common *reference*, however, to groups of people that share a conjectured-upon mental map in their heads, Kuhn risks something much more dangerous than "relativism in any standard sense", which is sectarianism. He does so by inviting blindness to the fact that, apart from speaking the same languages (or anyhow "structurally similar" ones), we first of all care for, and act in relation to, much the same kinds of stuff – like water, gold, tigers, persons, rivers, forests, and the starry sky. Admitting that our customs, including languages, are environmentally constituted, and not at all independent from their contexts – in other words, that describer and described are *united*, rather than separate – is nearly all we need in order to make sense of communication across incommensurable taxonomic systems. But environments and our actions will inexorably keep being thought of as separate while the representationalist intuition prevail.

The earlier version of Kuhn's philosophy of science, I argued (in section 2.1.2), was at least partly compatible with (indeed, inspired by) Wittgenstein's late realization that symbols' enactment circumstances are constitutive of their meaning, and the latter is fully compatible with Kripke's view on direct reference. "To repeat – naming is something like attaching a name tag to a thing", Wittgenstein says (PI, §26). The same way Wittgenstein professed that the circumstances of propositions' enactment give propositions their sense, Kripke professed that the circumstances of names' enactment give names their reference. The circumstances involved in both cases are *our* circumstances, the circumstances of *our* forms of life. They emerge historically, and involve much more that we care for than what our logical syntactical dispositions show.

Hence, there is no parallel between Kuhnian worries about incommensurability and Wittgenstein's numerous remarks about the limits of the language-game of providing reasons. On the contrary, the latter are intended at showing that any symbolic rule – with which to *reason* anyhow – rests on a basis that is outside logic: not on faith, but on the "animal certainty" we move around with, within communed environments. We all *see* the stars, the planets, the Moon, the rivers, the forests, and the working class, however we describe, and reason about, all these things differently, and however there are also many things that are *seen* only by some groups of people, and not by others.

In the face of the arguments we have seen in this chapter against presupposing the representationalist intuition for thinking on the nature of sense, reference, and scientific knowledge construction, what Kuhn's late philosophy of science brings forth is a dilemma. His "sole basis", as I called it, for turning the occupational hazards of translation into a philosophical problem was nothing short of the most established basis for thinking about phenomena like perception, reason, imagination, and language itself: the intuition that our minds are lifelong series of representational states. This intuition will not be abandoned while retaining this status, and so long as this situation remains, the reasons some of the most important philosophers of the past century (including Kuhn himself) might have raised for rethinking the role that is played by concrete, environmentally situated human customs in the constitution of sense, reference, and scientific knowledge construction, will remain being regarded as but an amusing collection of cumbersome paradoxes without any clear implication. As Thomas Kuhn knew very well, "Once a first paradigm through which to view nature has been found, there is no such thing as research in the absence of any paradigm. To reject one paradigm without simultaneously substituting another is to reject science itself" (Kuhn 1970, p. 79). Another paradigm for understanding our minds, our environments, and history, is the theme of our final chapter.

3 CHAPTER III: FROM A THEORY OF LIFE AND ACTION TO SENSE AND REFERENCE IN LIVING HISTORY

Twentieth century philosophies of propositional sense, reference, and knowledge construction have left us with an apparent stalemate. On the one hand, while remaining skeptical to what either philosophy or psychology have (more usually than not) agreed upon over the last four centuries about the representational nature of mental states, and attending, instead, only to the logical difference between directly and indirectly referring expressions of language in modal contexts, we arrive to the conclusion that we must surely be able to think about the same things, regardless of the different abilities we have to describe them. Were it not for such a cross-lexical capacity of ours to make direct reference to the same things, there would be no sense – as though we have seen there is – in saying that we have discovered, e.g., that a certain molecular structure is an *essential* property of what peoples all over the world, in all times, have had to drink in order to quench their thirst (among other similar such discoveries). But human history presents an enormous variety of abilities different peoples have developed to describe things, water included. Henceforth, we are not limited, in our intentions to *refer* to things, to such abilities to make indirect, descriptions-mediated, references. Otherwise, we could not have discovered any necessary property of stuff people referred to while mastering abilities to describe situations that we do not master ourselves.

Such a "first-horn" line of reasoning is supported, also, by considering that our descriptions' meaningfulness is itself enabled by their embeddedness within circumstances of symbolic enactment. Rules, in general, are only meaningfully followed or established thanks to people's active engagement with aspects of their surroundings – otherwise, we can hardly tell what a rule is, what turns an act into the following of one particular rule, etc.. Such an active – and experienced – engagement with situations must therefore happen as independently from any rule-grounded product of our making, such as descriptions or representations, as direct reference happens. Following this line of reasoning, we conclude, with Wittgenstein (OC, §402), that *in the beginning was the deed* – and that our *deeds* are historically emergent, environmentally embedded events.

On the other hand, by abiding for the doubtlessly still hegemonic belief that each of our own connections with the world requires mediation by a systematic process of production of representational states by our cognitive systems, we "see ourselves forced to conclude" that there exist some differences in the properties of our respective representation-producing inter-

nal mechanisms that make it impossible for some couples of us to even think about the same things, let alone to advance knowledge about the same things, at all. To be clear, there would be subjects x and y whose thoughts on kinds of stuff that populate the world would forcibly be about members of totally disjunct sets, *because of* features of their respective cognitive systems. These subjects x and y would accordingly lack the means, not only to understand each other's propositions, but also to anyhow relate to same kinds of things in the world – unless their cognitive systems acquired (either by natural or by artificial means) each other's systematic ways of generating representations on top of those previously operated with by each. Thomas Kuhn's "challenge", as put by Fried (2020), can be summarized as the following: "*If the meanings of key terms change between theories on either side of a paradigm shift, how can we still say that these theories are about the same thing?*" (emphasis added). And, as Kuhn has often emphasized, the "terms" whose meaning-changes he finds philosophically puzzling are the terms in which our cognitive systems supposedly convey their representations.

I have been building up my answer to Kuhn's challenge in three steps. First, I have recounted the history of ideas leading up to the establishment of the representationalist intuition in the modern era. There, in the first chapter, I also attempted to set forth a boundary between the well- and the ill-advised proposals by philosophers as they reacted to the rise of scientific communities between Galileo and Newton. While their praise for the epistemic value of systematically investigating *matter* (*sensu* Aristotle) was as well motivated as our own praise for hitherto obtained scientific progress (because investigating matter always was a way of obtaining understanding about kinds of stuff), their realization of the value of such an approach to natural phenomena fails to motivate the hallmark of modern philosophical inquiry, which has been the abandonment of Aristotelian ontology altogether, and an accompanying despise for common-sense thinking about agency. Consequential for this rejection of all "causes" but the material one was the establishment of the representationalist intuition to think about experience and the mind, which in turn laid the bases for the rise of experimental psychology in the nineteenth century, and the cognitive sciences in the twentieth.

As a second step, along the last chapter I have endorsed Wittgenstein's and Kripke's reasoning that rule-following comportment, generally, and representation-making, in particular, cannot obtain in isolation from the contexts of rules' enactment. But the representationalist intuition presupposes just such a context-independent formation of representations. Therefore, I concluded, it is the basis of Kuhn's puzzlement, the representationalist intuition about minds, that goes awry, and not the line of reasoning the goes from skepticism about that intu-

ition to reestablishing the notion of essential properties to think about both, reference and scientific knowledge construction.

My third step is to rethink the implications of changes of meaning by rethinking what our minds are. As already advanced, the latter task was incipiently outlined by Wittgenstein (PP). By realizing that the meaningfulness of propositions is due to their embeddedness in language-games, he attended to the ways in which the pre-logical grounds of propositional sense lie in our (experienced) forms of living and acting, and therewith caring for different, perspectivally salient aspects of the ongoing relationships we develop with our surroundings. By having presented Wittgenstein's incipient considerations on the relationship between acting and experiencing, and by sporadically rehearsing them in what follows (not to mention the modest presentation of Aristotle's view on purpose and "final cause" in the beginning of this work), I hope to have been laying the grounds to render the picture of language and meaning that will emerge by the end of this chapter less surprising than it might otherwise seem. This picture will serve to rid us of the second horn of the seeming dilemma we were left with, insofar as it will allow us to precise an anti-representationalist theory of the mind that poses no philosophical threat of endemic cross-talking.

As also advanced, the foregoing, anti-representationalist theory of the mind, is inherently a theory of action, too; it is by working on the question of what an action is, that it states, finally, what a mind is. And it does so without appealing to either mental or cognitive representations – and this is the sense in which it is *anti*-representationalist: it is alien to the representationalist intuition, not to the fact that *we make* representations. In such a theory's manner of picturing agency, the historicity of all *human* actions, in particular, comes to be more clearly described than authors like Wittgenstein, Murdoch, Anscombe, Kuhn, or Kripke – who have all cared about it – might have ever dreamed of rendering their own hunches. This theory helps, therefore, to understand what historical views of sense, reference, and knowledge construction mean. Along the exposition I will make of such a theory of mind and action, I will also defend that aid in clarification comes in either direction: in particular, it will be good to take heed of what Wittgenstein and Kripke said about sense and direct reference in order to avoid some pitfalls that suggest themselves while thus redirecting or views on minds and actions. Some of their "realistic spirit" will be well advised.

3.1 FROM AGENCY TO MIND: A HISTORIC PREAMBLE

What I shall be calling (interchangeably) “Enactive Ecology” or “enactive-ecological account of” or “approach to the mind” is the ongoing convergence between two late-twentieth century approaches to mind studies that together present a full theory of what agency is, both as an experienced and as an observed event, and how it emerges in nature and develops as it does. By “an experienced event” I allude to what phenomenology aims to describe of agency, particularly as phenomenologists attend to the bodily and environmental aspects of acting and experiencing while devising phenomenological types, or “structures”, as recurring patterns in what is reportedly experienced by human agents. This goes from devising the experienced differences between using a hammer, for instance, and examining it, merely holding it, etc., to devising the nuances that a Proust might describe in the intercorporeal distance that be exaggeratedly felt by someone with such and such a background, that at a moment is living hesitant and ephemeral feelings of romantic love for someone else. By agency as “an observed event”, on the other hand, I mean empirically observed action, including human, but not only human, action, as it unfolds in both, synchronous and diachronic relations with our environments.

The two approaches to both, the phenomenological and the empirical characteristics of agency, that I see as converging into Enactive Ecology nowadays, are Enaction Theory, also known as Enactivism, and Ecological Psychology. While not everyone would agree that Enaction Theory and Ecological Psychology do, or even should, converge (Heft, 2020; Read & Szokolszky, 2020), several others have, on diverse grounds, either defended, or attested to, such a convergence (Stapleton, 2016; Rietveld et al., 2018; Heras-Escribano, 2019; Popova and Rączaszek-Leonardi, 2020; Dings, 2020). I will hereby almost tacitly tread the latter path. Though questions of whether or not Enaction Theory and Ecological Psychology can, should, are, or did always, work together, by no means constitute the center of my concerns in this chapter, I will defend my position regarding it with something similar to a proof of concept: first, by making brief and broad introductions to what either theory says (and have said) about mind and action, and then by putting them to work together, as I believe they can, should, do, and in some important respects did already, work. Enactive Ecology works, I argue, in particular, to show how exactly do propositional sense, direct reference, and knowledge construction embed themselves in human history, and bear no dependency on *sui generis* representations in the head.

3.1.1 The Ecology of Perception

The first of them to come around, thanks to the foundational work of experimental and theoretical psychologists, James and Eleanor Gibson, from the 1950s to the late 1970s, was Ecological Psychology. The focus of Ecological Psychology is narrower than that of a general theory of the mind: it is a theory of perception (which, while basal to the understanding of any mental phenomenon, is peacefully only one among many), and it has from early on been conducted with the explicit aim of debunking the needlessness of the representationalist intuition for studying perception. The representationalist intuition, as we saw in the first chapter, translated into the cognitive sciences in the guise of three general principles for guiding research on the supposed material bases of mental states, i.e., the representational states of (either parts or wholes of) a cognitive system, including perceptual ones. The principles in question, we recall, were the following.

Principle of Individuality (PI): to forage and describe individuals, be they persons, animals, or machines, regarding said individuals as exhaustively constitutive nuclei of particular cognitive or mental phenomena, thus seeking to identify and characterize the structures within the bodies of these individuals that provide them with the ability to relate cognitively to the world.

Principle of Representationality (PR): to take a state of the specialized structures of an individual as constituting either a cognitive or a mental state, if and only if it be one that identifies, or naturally correlates with, the representation of a state of affairs distinct from itself.

Principle of Functionality (PF): to categorize a kind of state of the specialized structures of an individual as a kind of cognitive or mental state only when the existence of such a kind be accountable in terms of the favorable probability-variation its implementation begets to typical individuals of the species under scrutiny, for them to succeed in the generation of another individual of the same species.

Rather than postulating a cognitive system located inside an individual's body (PI), producing and processing instantaneous representations of its host's surroundings (PR) whose serial production be evolutionarily functional for the species of said individual (PF), the Gibson couple and their followers have consistently chosen to zoom out over perceptual phenomena, both in temporal and in spatial terms, and thus to put an end to the seeming need to resort

to *sui generis* representations to explain perception. They proposed to (and actually did, by means of their own, dissident disciplinary matrix for conducting experiments) look after an understanding of perceptual phenomena's *dynamics*, by contrast to devising instantaneous perceptual states of any sort. And, instead of focusing on individuals (as spatially delimited by their skins, membranes, etc.), they set their attention toward the lived transformations of whole organism-environment systems as that dynamics unfolded. Some typical concerns of cognitive scientists were thus excluded from the normal set of routines and explanations to be legitimized by ecological psychologists. For instance, they do not care to look after what instantaneous aspects of an individual's surroundings have at time *t* been "represented" by some discrete configuration assumed by any of its neurophysiological structures (nor about anything regarding any series of thus implemented "representational states" respective to times t_0 to t_n). They argued – and demonstrated – that it is possible to gain understanding about perceptual phenomena by describing the latter as the ongoing, *active exploration of environments* by living agents.

> According to the ecological approach, perceivers are not passive observers. They learn to perceive and need to actively explore their environment to pick up information necessary for perception. Because of that, perception cannot be studied in isolation from the perceiver's environment. The minimal unit of analysis is the organism-environment system. Perception is also direct in the sense that it is not mediated by representations or inferences. Perceivers do not infer how the world is based on a supposedly meager sensory input. (Carvalho, 2022, pp. 29-30)

In order to approach perceptual phenomena in this way, an indispensable move by ecological psychologists consists in re-describing *environments*. They talk about *the* environment, the worldly set of matter- and energy-flows that simply surround any portion of the biosphere in subordinate and superordinate forms, but also about *environments*, the subsets of the former that are defined in terms of the forms of life of living creatures, as the sets of aspects of the world these creatures gradually grow sensitive to as they act – and learn – to fulfill their multiple and changing needs.

Part of the importance of considering *both* these senses of 'environment' – the "universal" and the "agent-relative" one, as it were – lied, for Gibson (2015), in that the former alone had been given relevance to the study of perception, while much of the representationalist outlook of the resulting theories of perception might be accounted for precisely by extracting the consequences of neglecting the latter. Representationalist theories of perception were accord-

ingly built upon the presupposition of a gap between *the* environment, i.e., something that would be most accurately described in terms of quarks, gluons, bosoms, photons, and electromagnetic fields, on the one hand, and experienced objects of perception, such as the wind, flowers, persons, pebbles, and the sunrise, on the other. The traditionally conceived task of cognitive scientists was accordingly to explain how cognitive systems *add up* to the actual richness of information showing itself in lived experience (and being typified by phenomenologists), when all our cognitive systems are provided with from *the* environment is the much poorer input-set of information given by microscopic stimuli to their nerve endings. In other words, as we saw earlier (section 1.1.3), one of the reasons why PR always held as a principle for studying perception is the very reason why Descartes came up with the conclusion that there must be "ideas in the mind": to allow perceptual recognition of a piece of wax while all the senses provide is such meager information about it.[98]

Ecological Psychology was built on the assumption that the potential informational richness of *the* environment is actually much greater than needed for explaining perception (in all forms the latter occurs in nature). Put the environment – as well as the organism – in motion instead of freezing it into configurations of different types of atoms, and what appears is optic, sound, and chemical arrays whose dynamic distribution in a localized space is causally linked to the material structure and shape of surfaces to be potentially perceived, counting – if they are in fact perceived – as available perceptual information.

> For ecological psychology, perceptual information is contingent on the existence of spatial-temporally extended and structured patterns in the topology of the ambient energy array. Imagine a room illuminated by a ceiling light. As the light interacts with the surface of the objects that furnish the room, it generates a specific pattern – an ambient optic array. This pattern is not random or stochastic. Rather, it is lawfully generated given the conditions of the light and the objects – their situation, orientation towards the source of light, but also the materials they are made of. … To say that the ambient optic array is specific to the surfaces of the room is to say that there is a one-to-one covariation between the former and the latter. Because a particular surface α in the room lawfully generates a specific pattern β in the ambient optic array, the occurrence of β guarantees the presence of α. (Segundo-Ortin and Heras-Escribano, 2021)

98 It is worth remembering here that twentieth century behaviorist theories of perception were also given justification by philosophers (e.g., Quine, 1960) through the supposition that the sensory input would be too meager, demanding a lifelong history of complexification of behavioral dispositions through socialization to provoke adult speech-behavior in response.

Perception is to be seen as the potentially growing capacity of living agents to detect some of the available information around them by spontaneously rendering meaningful to their lives the material dynamic patterns to which their ways of living and acting relate. It is, accordingly, the meaningfulness some such dynamical patterns acquire relative to an agent that renders them (actually) perceptually *informative* of what its current environment affords to its action capabilities. Ecological information is thus no sort of information *about* such and such properties of an agent's surroundings. Filling the space with energy arrays whose shape, character, and dynamics is caused by, and thus specifying of, concrete structures and processes surrounding an agent, an agent's environment affords the exercise of its abilities. It is filled with information *for* an agent *qua* agent (not, say, *qua* disembodied contemplative observer who acts contingently on what is already known from a disinvested stance) (Carvalho and Rolla, 2020).

The contrast is clear, between the way the Gibsons proposed to analyze the surroundings of perceivers in order to study perception and the way such surroundings have traditionally been conceived to the same end. The latter has consisted in taking the environment as the counterpart of a representation, a picture; hence, as a static "state of affairs" that is more or less well depicted by the cognitive system – physics serving as the parameter for how well will the latter represent the environment – as to the objects and properties it presents at a given instant.[99] This is what Gibson (2015) repeatedly calls "the snapshot" view of perception. (I would also call it the "original sin" view of perception) Gibson's, by contrast, is a proposed view of perception wherein several time-scales of *change* are indispensable variables for the study of perception; for it is a description of an environmental dynamics that is to be incorporated into the description of any perceiver's intentional behavior. And, when we talk about the environment considered as relative to an agent, a perceptual environment, we will generally attend to several spatial and temporal scales of *change* to which the agent relates – not the millionths of second in which changes in elementary particles take place, nor the millions of years that would be necessary to observe galaxies' formation, but several scales nonetheless.

99 As Shaw, Turvey and Mace (1982, p. 195) observe, "There is a strong propensity to believe that the description of things at the atomic and molecular scale is metaphysically more real and scientifically more natural than their description at a level of ordinary perceptual experience. This bias holds sway in spite of the obvious fact that the furniture we sit upon, the ground we walk upon, the food we eat, the people we embrace, and the tools we handle provide a greater feeling of substance, solidity, and support than can be adequately reflected in the popularized physicist's image of them as probabilistic clouds of swirling particles".

> There are events within events, as there are forms within forms, up to the yearly shift of the path of the sun across the sky and down to the breaking of a twig. And hence there are no elementary units of temporal structure. You can describe the events of the environment at various levels. The acts of animals themselves, like the events of the environment they perceive, can be described at various levels, as subordinate and superordinate acts. And the duration of animal acts is comparable to the duration of environmental events. There are no elementary atomic responses. (Gibson, 2015, p. 12)

At any point in time, matter and energy around us to which we are sensitive – light, sound, texture, particles in the air and on the tongue, etc. – are there not just as collections of fields, waves, and particles, but most noticeably as myriad patterns, configurations – *Gestalten* (forms), if you like. And, *across* time these patterns change in regular ways by themselves, both in ways we have either observed or theorized about, and in ways we have no clue of. But the regularities in nature – including the regularities obtaining as a result of agents' exercise of their abilities – that we do perceive would generally obtain just as they do if there was no one there to perceive them. What does enable us (living beings, etc.) to detect some of these regularities is our ability to move ourselves intentionally: to displace ourselves; to change posture; to move our limbs, fingers, eyes; to eat, to walk, to swim, and to grasp objects. Through bodily action in a surrounding context, with the purposes they know without observing, agents of any species can know – by acquaintance – patterns of variation in ambient arrays relative to their own, purposefully moving bodies: variations in optic arrays, as well as in the arrays of sound, texture, and particles, that reach their bodies in dynamic patterns whose detection be relevant for them to succeed in doing what they are able to do. Agents detect some such patterns insofar as they *care* for how some of them unfold; not because they "represent" such patterns.

It is *irrelevant* for walking that we perceive the rotation of the Earth, but not that we see that the road is too steep to afford walking instead of climbing; hence, the ability to walk (as *we* do, with *our* bodies) affords recognition of a path's slant, but not of the Earth's rotation. Perception is *for* action, of aspects that present an *Aufforderungscharakter* (an affording, though not necessarily soliciting, character), which are accordingly termed as "affordances". Such aspects themselves form a subset of the total multitude of events that unfold in the processes of *the* environment at any time period; and such a subset is what constitutes *a* perceptual environment *for an* agent. For an agent, affordances will count as the "ecological information" available to it for the unfolding of its comportment in any time period.

What the (spatial and temporal) zooming-out that ecological psychologists thus propose for studying perception implies new models, (or, in Kuhnian terminology) novel symbolic generalizations, whose deployment aims *not* at modeling any sort of algorithm or linear function according to which representations are produced and manipulated inside a cognitive system through its discrete representational states. Rather, what is to be modeled is the dynamics that unfolds involving both, an environmentally informed bodily comportment, and an agent-relative perceptual environment that is specified as a selection of dynamic patterns in relation to the agent's abilities and concerns. In the end, the manner in which ecological psychologists model perception implies that their most basic unit of analysis is no single neuron, neural system, or even an agent's living body, but rather a whole organism-environment system. There is a mutual dependency between the terms in which perceiver (agent) and percepts (affordances) are to be described.

Some of the experiments that gave inspiration and first leverage to Ecological Psychology were not very different from – and, in fact, some of them were the same as – those that impressed Kuhn regarding the phenomenological transformations of changes of habit.[100] Gibson (2015, Preface) acknowledges his intellectual debt to *Gestalt* psychologists, especially to Kurt Koffka. But those experiments were interpreted quite differently by ecological psychologists: not as evidence of mere changes in the hidden neural mechanisms that generate visual *Gestalten*, but rather as proof that acting and perceiving are two sides of the same coin. Among the most famous such experiments is the inversion glasses experiment (Kohler, 1951), also cited by Kuhn in *The Structure*. What ecological psychologists emphasize in this case is that only if the subject consistently tries to move around and perform some familiar tasks that it is possible for her to regain normal sight. Another experiment that pointed in this direction was the one conducted by Held and Hein (1963), which consisted of comparing two groups of kittens: those in the first group spent the hours they were awake walking, but attached to a rotating rod on whose fixed axis lied a basket with a kitten in it, passively watching the spinning scene. After a few days and a few rounds of the experiment, the kittens of the basket-group, when released, moved exactly like blind kittens would, without balance, bumping into objects, disoriented. The ones on the first group moved normally. Lastly, and perhaps most im-

100 But Kuhn, as we saw, interpreted said experiments differently. He was a Harvard Fellow at the time and was heavily influenced by experimental psychologists that upheld the New Look theory of perception. The latter trend, opposing then dominant behaviorist ones, "(a) emphasized the contribution of internal mental states (partly determined by social factors) of the perceiver to what is perceived and (b) denied that the external stimulus is *the* determining factor in perception" (Graham, 1998, p. 20). What this ensued in Kuhn's philosophy of perception and science (and, to some of extent, of logic) was his Post-Darwinian Kantianism (section 2.1.2).

pressively, Bach-y-Rita's (1972) tactile-visual substitution device, which consisted of a camera fixed at eye level or on top of the head of a blind person, and stimulus transmitters from the camera to the tongue causing arrangements of haptic stimuli in covariation with the luminous patterns captured by the camera. After using such a device for some time, as long as they moved themselves and tried to do things, the experimental subjects no longer felt haptic stimulation and began to report increased structuring of visual experience, including awareness of depth, occlusion of surfaces and ambient light (VERGARA, 2019, p. 138).

Instead of explaining the changes in visual *Gestalten* that follow changes in behavior by positing some kind of "reprogramming" of the representational lexicons of cognitive systems, as Kuhn submitted, ecological psychologists submit that perception is a *direct*, unmediated process of detection by an agent of ecological information available in the dynamical patterns present in the environment. The *Gestalten* that give the contours of, e.g., visual perception are the ones objectively taking place in the concrete luminous arrays around an agent that afford it to act according to its bodily abilities. In fact, for this reason, Ecological Psychology has been often defended as a markedly "realist" theory of perception.

While 'realism' is a rather polysemic term in philosophy, some authors have risked stating what they mean by "a realist theory of perception" by describing it as "a theory that identifies the objects of perception with objects that can be said to be present when no perception is taking place", by contrast to "the promotion of two kinds of objects – that which perception is with reference to, the physical distal object; and that which perception is an experience of, a mental object representing the distal object" (SHAW, TURVEY AND MACE, 1982, p. 160). The objects the ecological approach takes perception to "be an experience of" are enabling conditions for their abilities to be successfully exercised, they are affordances. The patterns of energy and matter distribution that are detected by an agent are physically caused by the material traits of the environment that afford successful comportment to the agent – i.e., that the agent perceives. These patterns thus specify the perceptual environment of an organism without the mediation of a second kind of object, "that which perception is an experience of": energy arrays are causal enablers, not epistemic intermediaries of the perception of affordances.

Admittedly, lived experience involves events that cannot be taken as the detection of anything present in the surroundings of the organism living it ("perceptual illusions", as many would call them), but these are simply not taken as cases of perception by ecological psychologists. They are taken as action's unfolding under shortage of ecological information.

Gibson's (2015) concept of "ecological information", which implies a mutuality between the definitions of an organism's intentional movements and variations of environmental dynamical patterns to which the organism is sensitive, implies a *direct perception* of the distal causes of these arrangements, in the sense that no representational mediation is required (Gibson, 2015; Turvey et al., 1981; Shaw, Turvey and Mace, 1982).

> The term *information* cannot have its familiar dictionary meaning of *knowledge communicated to a receiver*. This is unfortunate, and I would use another term if I could. The only recourse is to ask the reader to remember that picking up information is not to be thought of as a case of communicating. The world does not speak to the observer … . Words and pictures convey information, carry it, or transmit it, but the information in the sea of energy around each of us, luminous or mechanical or chemical energy, is not conveyed. It is simply there. (Gibson, 2015, p. 231, emphases in the original)

Ecological information in this sense is better understood in terms of a decrease of uncertainty relative to comportment's success in a given environmental setting, rather than as any sort of representational "content" that could be attached to such a talk of "information" (Carvalho and Rolla, 2020). Ecological information – decrease of uncertainty – specifies *affordances*, or "opportunities for action" around the organism that detects it. While the *Aufforderungscharakter* of a given material or energetic array is of course dependent on the existence of an agent to which it afford some kind of action, the material patterns that eventually acquire this character are there when no one is detecting it, with all natural relations with its surroundings obtaining normally. Perception is therefore the perception of "objects that can be said to be present when no perception is taking place", although when it does take place it does only in relation to the affording character of each object or set of objects – and the respectively caused, detectable informational arrays – in relation to the perceiver in question.[101]

> Thus, a basic principle of ecological psychology is the suggestion that we give up the microstructuralism of these [cognitive] sciences (recognizing as we do, however, that they can provide reasonably valid analyses of the causal foundation of psychological processes) in favor of a more pragmatic macrofunctionalism that preserves the integrity of the animal-environment synergy (SHAW, TURVEY AND MACE, 1982, p. 195).

101 This was Gibson's (2015) interpretation of affordances (and also Turvey et al., 1981; Shaw, Turvey and Mace, 1982), although the literature of ecological psychology contains defenses of anti-realist readings of this notion (Heras-Escribano, 2019, p. 63) and also of the abstention of any use of it other than the merely methodological (Chemero, 2009).

Talk of "causal foundations" being provided by the "microstructuralism" of elementary particles constituting everything that can be called "an organism" or "an environment" (or an accordingly integrated system) is *not opposite* to the unfolding of purposeful, perceptually guided action, and agency-guided ecological perception, that in turn are to be analyzed through the "macrostruturalism" of organism-environment models. The latter serve to model agent-level phenomena, such as perception. That perception should involve explanations in irreducible terms of actions' unfolding within organism-environment systems, is no obstacle to devising the material characteristics a system must assemble in order to enable the emergence of an organism-environment system. Aristotle made sense of this idea (i.e., of the coexistence of both, "material" and "final" explanatory factors of different aspects of the same things, especially when it came to agents), and so do ecological psychologists.[102]

Although it subordinates its explanation of perceptual experience to the capacity to act, and not to the mere physical mobility of a living body, the ecological approach does not contain its own explanations, either of what it means for a living body to be capable of *acting* in the first place, or of what it means for a body to be a *living* body. There is recognition in the specialized literature that these are important and pressing questions, especially as a "theory of agency and action is required to specify precisely which affordances are perceived and which one is acted upon" (Carvalho, 2022). Since Ecological Psychology is a theory of perception and perceptual learning, there is also the need to account for the effects on these by other events besides exploration of actually obtaining environmental affordances, such as imagination and dreaming (and the roles these play in skillful activities, such as artistic performance, ratiocination, play, etc.). In other words, there is a need to account for the mind in general to fully account for perception. These (and other) questions have led ecological psychologists to search for explanations of agency, generally put, outside the Gibsonian framework, with the aim of weighing them up and identifying which of them would be most compatible with the ecological approach to perception (Rietveld et al., 2018; Heras-Escribano, 2019; Dings, 2020). Next we see how Enaction Theory, though initially conceived as an alternative to the ecological approach (especially when it came to the latter's "realist" view of perception), evolved into a full-blown theory of mind and action that both supports and is well served by the ecological approach to perception.

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102 This approximation between Ecological Psychology and Aristotle is also suggested by Fuchs (2017) and Lombardo (2018), not to mention Sheets-Johnston's (2011) urge that the ecological approach be *more* Aristotelian. As anticipated in the first chapter, nothing of this is to rehearse the Aristotelian claim that the universe moves with a purpose, but rather to acknowledge with the Stagirite that agents do, and that explaining their agency is the irreducible key to explaining their perceptual experience.

3.1.2 The Emergence of the Life-Mind Continuity Thesis

3.1.2.1 Life as Autonomous Self-Prodution

Enaction Theory (Varela, Thompson, and Rosch, 1991; Di Paolo, 2005; Thompson, 2004; 2007; Di Paolo, Buhrman and Barandiaran, 2017; Di Paolo, Cuffari and De Jeagher, 2018) was born as a theory of the whole mind, not only of perception. As if modeling itself after Ecological Psychology, though, it attained insight into mental phenomena not by further detailing descriptions of material structures inside individuals previously presumed to be minded, but rather by broadening toward beyond epithelial boundaries what it thought to constitute the matter of *agency*. And, again, what it ends up telling us about agency is that the experienced, intentional, actions that unfold in some environment, and the environment within which they unfold, must be understood in terms of each other, in the strong sense that there is no unit of analysis more basic or elementary to characterize an action than an organism-environment system. In this sense, what we experience is our actions, and our actions are events encompassing an organism-environment system.

The development of Enaction Theory, or Enactivism, began – without yet being named either way – with a problem for Biology: to define the difference between living and nonliving material systems. Daily and in practice, there may be no confusion between machines and living beings: we are usually perfectly able to tell apart the specimens of one and the other type of thing without generating major discussions. However, an organism used to be (and still is, oftentimes) defined in relation to its species; its species, in relation to the components that are typically found in its particular instances (e.g., things like biochemical substances, organelles, tissues, organs, limbs); finally, the evolution of species is studied in terms of the adaptability of the combinations of components that are typical of each, in relation to the given conditions of their surroundings, with the specific ways each type of organism reproduces being defined, as part of what these material assemblages can "do" (whereas putting the scare quotes around any agency-related term is always an advisable routine). In short, an organism is often regarded as nothing more than an instance of types of arrangement of components, "a machine that happens to be made of meat rather than silicon" (Rosch, 2016).

The conceptual distinction between machines and living beings is not a question removed from central concerns in philosophical debates about the mind and knowledge, even across well distanced stances (Ryle, 1949; Greco, 1993; O'Regan and Noë, 2001), neither is it always well articulated (if this is not an understatement). As we saw in the first two chapters, under the triad of PI, PR and PF the cognitive sciences – and the philosophies of mind that feedback into them – actually take for granted that much of what any living being *is* is a machine-like assemblage of parts, the brain being nothing but a peculiarly sophisticated one and with quite special powers. When there is anything philosophers claim to lie beyond such a machine-like dynamics in the lives of some privileged kinds of animals, most typically ourselves and because of our mesmerizing, rational minds, and yet refuse to follow some neo-Kantian *a priori* delimitation of all possible knowledge from which the mind be excluded, they will hardly not be accused of espousing some mystical view on the mind, and even more hardly will this be an unfair accusation. Hence, the prospects of delimiting precisely what is alive from what is not lie in opening up a new domain of discussion, a domain which has been barred by the – all in all Cartesian – assumption that living beings are just special sorts of machines.

For Chilean biologist and neuroscientist Humberto Maturana (1928-2021), who began to think more seriously about this conceptual demarcation problem around the 1960s, there was an actual urge to offer a defining characterization of what is alive, by contrast to what is not. He saw the study of living things simply dispensing with any set of objectively measurable, necessary and sufficient conditions, according to which a material system could be rigorously identified as alive. With the collaboration Francisco Varela (1946-2001), Maturana coined and developed the concept of "autopoiesis" for dealing with this issue. The point of Maturana and Varela (1994) was to find a definition of the dynamic relations between processes inherent to anything identifiable as an organism, individually and independently of the types of components that would concretize these dynamic relations, by contrast to whatever material process that surrounds it but is no constituent of it.

> Our hypothesis is that there is an organization common to all living systems, whatever the nature of their components. Since our theme is this organization, and not the various forms in which it can be made effective, we will not make distinctions between types of living systems (Maturana and Varela, 1994, p. 66)

According to the theory of autopoiesis (Maturana and Varela, 1994, p. 69), regardless of its species, every living thing (i.e., from unicellular organisms to human beings) is a system that is spatially and functionally delimited by virtue of the very physico-chemical processes that constitute it, with each constituent process being an enabler (i.e., its persistence being a necessary condition) of at least one other constituent process and being also enabled (in the same sense) by at least one other constituent process. As self-delimited processual units, autopoietic systems "transform matter into themselves, in such a way that their product is their own organization" (Maturana and Varela, 1994, p. 73). The mutually enabling relationship between processes of an autopoietic system is its *operational closure*; no process constitutes an autopoietic system if it does not constitute, together with others, this type of dynamic organization.

Autopoiesis is a feature of how a set of processes modify themselves over time, and not of the topological structure these processes constitute at any given instant. It embodies a feature of the living that Maturana and Varela found essential to life: the *autonomous* character of the movements of living beings in relation to their respective surroundings, which is functional to maintain its dynamic organization despite material and energetic exchange with the environment. A contrast can be made between autonomous – autopoietic – systems and systems that are similar but not quite autonomous: autocatalytic reactions, whose products facilitate the same chemical reactions that produce them. By contrast to such chemical reactions, whose functional topology must be externally arranged and controlled, the processual organization of autonomous systems originates, given their own constitutive processes, the continuous reproduction of the topological conditions that enable the system as a whole to remain a closed network of mutual enablement. The paradigm-case of such an autonomous organization is that of a living cell. Its internal processes are enabled by the sustained regeneration of its cytoplasmic membrane, while the latter's persistence enables the continuity of the former. Thus considered, Maturana and Varela (1994, p. 73) claimed that "the notion of autopoiesis is necessary and sufficient to characterize the organization of the living systems".

As expected, with the definition of autopoiesis one may tell apart, in principle, constituent processes of a living system from processes that do not constitute it. For example, sunlight and a fertile soil enable the autopoiesis of a plant, but neither sunlight nor soil are enabled by the plant's photosynthesis, thus sunlight and soil do not constitute the plant, even though they enable it.

Discernibility of what belongs from what does not belong to the constitution of an autopoietic system does not imply that the organism subsists independently from processes that

are not part of the defining (constitutive) network of mutual enablement. On the contrary: the organism is an operationally closed system, but in order to keep such an organization over time it must be materially and thermodynamically *open* towards the environment in specific manners that keep its autopoietic form viable. The system is thus necessarily subject to disturbances from the environment, just as the environment is necessarily subject to disturbances by the organism's self-individuating activity. To the extent that such an engagement with the environment is required of any organism to keep being an organism, autopoietic systems – living systems – are therefore aptly understood as "units of interactions", and their interactions with the environment cannot be taken "independently of that part of the environment with which it interacts: the niche; nor can the niche be defined independently of the living system that specifies it" (Maturana, 1970, p. 02). Energetic and material exchanges occur between organism and environment whose character will be determined as a function of both, the particular autopoietic organization of the organism at a time and the conditions of its environment. This organism-environment engagement sustains a process of continuous, though always malleable, organic self-individuation, for as long as the autopoietic organization remains viable as a whole.

Because autopoietic systems are metastable nuclei of processual relations, convoluted in, and constituted by, events of multiple temporal scales (such as spatial displacement, limbs' movements, changes in temperature, luminosity, food availability, circadian cycle, etc.), the models of the theory were elaborated based on dynamical systems theory, which provides a mathematical toolkit apt to convey the relevant dynamic relations highlighted by the theory of autopoiesis (although the usefulness of this toolkit extends over various fields of application beyond biology, i.e., for what is generally called "complex systems").

Two aspects of the biological interpretation of dynamical systems proposed by Maturana and Varela suffice, here, for us to understand what it means to say that living systems constitute coupled dynamical systems with their environments. First, variables in equations describing the state of an autopoietic system assume values that indicate rates of directional change: they are vectors, not discrete-value variables. The overall change directions of the system are the system's attractors. Second, the differential equations describing the states of each process of an autopoietic system are coupled to differential equations describing the states of other such processes *and* to some processes outside the system. Such a multiple "dynamic coupling" amounts to each constitutive process of an autopoietic system having as parameters (temporarily defining features) vectors that will be partly determined by descriptive equations of other constitutive processes, as well as of processes external to the autopoietic

system (that is, the parameters of the former will be represented as variables in the latter equations, and some parameters of the latter will also be represented as variables in the former). The reason why processes that constitute the autopoietic organization get described as thus dynamically coupled to each other, is that compensatory changes in each constitutive process of an autopoietic system are required to sustain the autopoietic organization of the system across direct disturbances in other processes of the system, whether such disturbances are endogenous or exogenous ones. This generalized spreading of local disturbances into the whole net of operationally closed organic processes is what amounts to the characterization of an autopoietic systems as an "excitable medium" (a feature that is also present in autocatalytic reactions). The coupling to external processes, on its turn, is due to the fact that mutual disturbances continuously occur between organism and environment, as a consequence of the latter's material and thermodynamic openness.

I may be helpful to point out that dynamical systems theory is not usually deployed, nor is it in this case, to model the dynamic coupling of just two processes. In other words, it should not be assumed, because of the now (and hitherto) repeated expression "organism-environment system", that there are only two processes, that of the organism's autonomous movements and that of the environment, whose dynamic coupling will be interesting to analyze. The scheme of such model is useful to gain insight into the intertwining of a much larger number of processes occurring on multiple time scales, with a view to both a global understanding of the relationship between a living being and its often multifarious environment, and specific events in this myriad coupling. For instance: the heartbeat, the waves of neural oscillation, the movement of the eyes, the wind, and the flight of a bird that an experimental subject observes in a country-side field on a sunny day. In, say, a 30-s interval, how did these different processes change and to what extent did their changes influence and were influenced by each other's unfolding? It is to solve this kind of problem that modeling these events as coupled dynamic systems is useful.

The theory of autopoiesis was expected to provide an explanation of the fact that the movements of living beings are in general oriented – albeit imperfectly – to the desideratum of maintaining themselves viable as operationally closed systems (such an orientation towards sustained self-individuation would have to be taken into account while describing the behavior of the bird-stalker in the aforementioned example). The autonomy of the ways a living body changes while still maintaining itself in metastable, autopoietic conditions, could seemingly serve already as a model of how a living body *acts*, and agency, as a natural phenomenon, could accordingly be defined as an emergent property of operationally closed, environ-

mentally coupled systems, whose dynamics adaptively warrants its own viability under precarious conditions. With this, instead of the *teleonomic* vocabulary that is usual to the biological sciences, where accordingly living beings are described *as if* they had intentions, *as if* they cared about such and such aspects of their environments, etc., we would then admit speaking literally of a lived and discriminatory appreciation of valences, of the *intentional actions* of living beings. In short, we would have a full-blown naturalized teleology (Varela, 1996). Maturana and Varela have thus effectively paved the way for a direct connection between the theory of autopoiesis and phenomenology, and Varela would effectively tread it towards spearheading the establishment of Enaction Theory.

3.1.2.2 From Bodily Autonomy to Minded Action

The "domain of conduct" of autopoietic systems (which, in turn, were deemed as "units of interactions") would come to be explicitly treated by enactivists (Varela, Thompson, and Rosch, 1991) as a domain of intentional actions, conscious and experienced actions, dispensing with any underlying unconscious informational processing process. "The domain of all interactions [with the environment] in which an autopoietic system can participate without losing its identity, that is, the domain of all the changes it can undergo while compensating for perturbations, *is* its cognitive domain" (Maturana and Varela, 1994, p. 114, emphasis added). Now, similarly to what happens in the ecological approach to perception, where the set of dynamic surrounding aspects counting as the perceptual environment of an agent is specified at each time period by the abilities of the agent, the domain of conduct that is identified to the cognitive domain by Maturana and Varela gets specified by the particular dynamic organization of the autopoietic system. Consequentially, "if the way in which the autopoiesis of an organism is realized changes throughout its ontogeny, its cognitive domain also changes and its repertoire of conduct (knowledge) follows a history of changes determined by it" (*Ibid*).

That is to say, assuming that an autopoietic system is defined by the operational closure of three processes, P1, P2 and P3, and that disturbances in, say, P2 are caused by process E1 outside the operational closure relationship, it is not necessary for disturbances to E1 to come symmetrically from P2. Even so, if disturbances to E1 come from, for example, P3, the operational closure of the autopoietic system implies that parameters of the equation describing E1 will be variables of the equations describing all operationally closed processes P1, P2,

and P3. Finally (what is being stressed above), it is important to keep in mind that E1 is not only subject to physical disturbances by the organism's reorganization, as it can also come to no longer belong to the organism's newly determined domain of conduct (agent-relative environment).

There would still be room for doubt, however, about what kind of "cognitive domain" this is, "equivalent to the domain of conduct" of an autopoietic system. It was on this theme that Francisco Varela, beginning to work increasingly independently of Maturana, focused until he came to lay the foundations of Enaction Theory, counting for this on collaboration from Evan Thompson and Eleanor Rosch, in *The Embodied Mind: The Continuity between Life and Mind* (1991). The domain of conduct emerging from a dynamic coupling between living body and environment would be implied by the defining organization of every living body. Clarification would seemingly still be required, however, as to the manners in which such and such alterations of this domain of conduct over time would in general be *experienced*, and, furthermore, about the terms in which "experience" should generally be spelled out. Somehow Varela needed to fix new concepts of experience, to add to his discernment of "which dynamic processes produce the special kind of identity of living organisms" the manner in which "these same processes underlie demarcating properties of the mind, such as inwardness and a concernful perspective on the world." (Di Paolo 2005, p. 01). As Evan Thompson (2004, p. 382) would also explain,

> The problem could be put this way. It's one thing to have a scientific representation of the mind as "enactive" – as embodied, emergent, dynamic, and relational; as not homuncular and skull-bound; and thus in a certain sense insubstantial. But it's another thing to have a corresponding direct experience of this nature of the mind in one's own first-person case. In more phenomenological terms, it's one thing to have a scientific representation of the mind as participating in the "constitution" of its intentional objects; it's another thing to see such constitution at work in one's own lived experience. Francisco [Varela] believed, like phenomenologists and also Buddhists, that this kind of direct experience is possible.

Phenomenology was advanced, both in the European tradition and in the Eastern tradition mentioned by Thompson, as an investigation that aims to identify, discern, and describe patterns of the unfolding of experience, without necessarily seeking to explain which material factors cause or enable its emergence in nature. As Varela (1996) clarifies, phenomenological investigation is not limited to mere introspective report, as it is conducted according to a method whose central element is what Husserl called "phenomenological reduction". Phe-

nomenological reduction requires that one temporarily attempts at ceasing to take experience as a means to obtain knowledge about any object, in order to take experience itself, as much as possible, as an object of examination (Varela, 1996, p. 336). In this way it is intended that general features of experience can be discerned and typified. The training of the appropriate attitude (for both writing and reading about experience), as well as attempts to discern and describe patterns deriving from it "is the ambition of making reflection emulate the unreflected life of consciousness" (Merleau-Ponty, 1962, pp. xi-xvi). Enaction Theory, as conceived by Varela, can thus be seen as the project of discerning the types of materially, objectively observable conditions that enable the emergence of the previously discerned phenomenological structures, so much as of tentatively projecting phenomenological types into the modeled observation of non-human agency.

The immediate suggestion to start working on such a theory was to incorporate into autopoietic analyses of organisms the phenomenological analyses of Merleau-Ponty, mainly because these are particularly attentive, within Western phenomenological studies, to the ways in which bodily properties (strength, tallness, health conditions, tiredness, etc.) modulate experienced action. On the other hand, Buddhist traditions of describing the way the dynamics and structuring of experience unfold also exerted a great influence on the first generation of Enactivism. One of the claimed achievements of Buddhist meditative practice is the realization that experience – in meditation as in daily life – is in a relation of mutual determination with the cycle of impulses and emotional attachments of the experiencing subject to phenomenal aspects of their own experience. The latter aspects get altered – get *lost* – precisely by consequence of the subject's submitting to their craving to act as they desire to, in relation to such aspects – which ensues an ongoing relationship of mutual determination over time, between the structuring of lived experience and the subject's cravings relative to it. Such a relationship would define the intrinsically unsatisfying condition of life, *samsara*, whose realization forms the basis for the Buddhist soteriological teachings (Loy, 1988).

Buddhist phenomenology seemed to them to be the most congruent way of describing the experience that they claimed to be grounded in autopoietic systems, as of the emergence of sensorimotor contingencies deriving from the particular autopoietic organization that is circumstantially embodied. Autopoietic systems seek to conserve their own processes of self-individuation. They behave, as a consequence, in an interested manner in relation to certain aspects of what happens to themselves and their surroundings. But their search is an ever flawed one (they are ever insensitive to much that nevertheless affects them and everything they care for), and result in a continuous redefinition of their identity – as well as in a redefinition of

their courses of action and structuring of experience. Since the domain of conduct of an autopoietic system is identified with its cognitive domain; and since this is identified with the phenomenal experience emerging from its dynamics, the models of the theory of autopoiesis then seemed to serve, at once, to understand both life and mind.

Varela argued that, in one way or another, experience is "a basic fact to be incorporated in the future of the discipline [of the cognitive sciences]", such an incorporation being feasible only after admitting that at "the heart of the matter" is "the nature of the circulation between a first person and an external account of human experience" (Varela, 1996, p. 333). The intuition was that the domain of conduct of an autopoietic system would be the material basis to the phenomenological domain: it is the mind being thought of as emerging from the exercise of an organism's agency. What emerges along the way – that is to say, along the transformation of the particular autopoietic organization that anyhow thrives in securing *an* autopoietic form, though never the same – is *sensorimotor contingencies*, action and perception but being framed as one irreducible phenomenon: actions as perceptually guided, and perceptions as determined, on the one side, by the organism's current autopoietic form and conduct, and, on the other, by its currently related environment. Again, similarly to the way ecological psychologists had thought of affordances, sensorimotor contingencies are thought of by Varela as properties neither of an organism alone, nor of an uninhabited environment. He conceived sensorimotor contingencies as properties of a dynamical system that involves both, an organism and an environment. Action's being thus perceptually guided is what enactivists rebaptize as 'enaction' (Varela, Thompson, and Rosch, 1991, p. 173).

Because it is the organism's actions in relation to the environment that make emerge and continuously redefine the agent-relative *meaningfulness* that events acquire in a domain of conduct, the term "sense-making" was eventually adopted – much as a synonym of 'enaction' – to refer to the unfolding of meaningful phenomenological aspects coming forth from the lived actions of an organism (Varela, 1991; Weber and Varela, 2002). The concept attempts to capture the fact that it is the instantaneous appreciation of the *importance* (not the being-represented-as) of certain events that will determine both, the concrete dynamics of a form of life, and the ways in which that form of life experiences its actions (or, accordingly, "makes sense" of them). Living is giving rise to meaningfulness relative to the continuity of the autopoietic processes of self-individuation. At the same time, the way a form of life acts for the sake of the continuity of its own self-individuation engenders perturbations in the constituent processes of the autopoietic system that introduce new parameters, thereby altering the very form of the self-individuation being sought, and so on. Sensitivity and motility are

framed as two sides of the same coin making up the particular phenomenal character of a subjective perspective on the world. It is in this sensorimotor dynamics that enaction, or sense-making (Weber and Varela, 2002, p. 116), consists.

For reasons to be appreciated below, the purported direct articulation between autopoietic theory and a full-blown theory of mind and action proved itself ultimately unfeasible. For one, actively lived experience is in most of its forms too rich for the single craving to sustain an autopoietic organization to account for it, and it is no accident, I submit, that the early generation of enactivists ended up relying too much on metaphysical interpretations – mostly coming from the Mahayana school – of the Buddha's teachings in order to spell out the nature of sensorimotor contingencies. Alas, the agent-relative notion of "environment" that that early enactivist approach put on scene was to some extent seen as a *substitute* for what was usually thought of as the representational targets of a cognitive system, i.e., the subject-irrespective facts in the world. Such a conceived substitution amounted to a construal of the experience (in particular, the perceptual experience) that would emerge from an autopoietic system as the experience of an environment, but *not*, thereby, of aspects of the world (*an sich*, so to say). Rather, the whole organism-environment system would accordingly give rise to something *more* than itself; a "*surplus of signification*" (Varela, 1991, p. 86, emphasis in original) to be experienced, whereas the potentially insignificant world would remain unacquainted. For this reason, what was conceived as sense-making would be the activity of "bringing forth a world of significance" in a sense intended as literal, defined by contrast to the idea that different forms of life would only have different perspectives on the same world (Varela, Thompson, and Rosch, 1991, p. 202).[103] In other words, for them it was not the case that the organizational form of matter cause properties *of* material systems to emerge that would not be predictable from the study of their isolated components, as rather realities would come forth where none of their kind existed before.[104]

To counter such an incredibly revisionist, phenomenalist-like metaphysics, may be to counter some ideas that were dearest to Francisco Varela but not, I think, his most fruitful ones. Among the latter is the idea that "a world without organisms would be a world without meaning" (Weber and Varela, 2002, p. 119). Besides, if I interpret correctly the most recent developments of Enaction Theory, the seeds of a robust theory of mind and action were effec-

103 For contemporary defenses of Enaction Theory in its earliest shape (particularly with respect to this "non-duality" metaphysics), see De Jesus (2018) and Rolla & Figueiredo (2023).

104 According to Evan Thompson (Live webinar with Evan Thompson "What is Enaction–A New Relationship Between Our Mind and the World? - YouTube) the very title of the seminal work of Enaction Theory was not "Worlds without Grounds" for editorial reasons alone (it is, nevertheless, the title of one of the chapters of *The Embodied Mind*).

tively planted. A theory of mind with no basis on the idea of a representational mediation between subjects and the world, that is rather based on the lived condition of differentially *caring for* a variety of aspects of oneself and one's surroundings – in a word, of aspects of one's own actions – that is intrinsic to life. These central tenets beget a fully embodied and world-involving view of the mind in nature, and allows further insight into how the world is made sense of.

3.2 AN ENACTIVE ECOLOGY

3.2.1 Adaptive Engagement with The World

> From the fact … that there is a mutuality between animal and environment – or in our terms that the two are structurally coupled – it simply does not follow that the act of perceiving is direct in the Gibsonian sense of "responding" or "resonating" to optical invariants. Of course, this latter Gibsonian claim is a substantive empirical hypothesis and so does not stand or fall on the basis of logical considerations. Nevertheless, our point is that this claim represents only one way of explicating the relation between perceptually guided action and animal-environment mutuality. We disalign ourselves with this explication because we believe it leads to a research strategy in which one attempts to build an ecological theory of perception entirely from the side of the environment. (Varela, Thompson, and Rosch, 1991, p. 204)

The incorporation of a research strategy that paid greater attention not only to the agent-relative environment, but also to the most diverse characteristics that may go unnoticed in the agent-irrespective surroundings of a living body, would prove crucial to the maturing of the enactive approach. Such a maturing process began – I submit – with the discovery that basing mental phenomena on the dynamics of autopoiesis is "a promising starting point but has a series of shortcomings that can be identified through scientific and phenomenological routes" (Di Paolo, 2005, p. 01). Realizing this, and bridging the conceptual gap between autonomous systems and full-blown agents, allowed an ongoing reconciliation between Enac-

tion Theory and Ecological Psychology (Stapleton, 2016; Di Paolo, Buhrmann, and Barandiaran, 2017, p. 136; Rietveld et al., 2018; Di Paolo, Cuffari, and De Jeagher, 2018, pp. 55; 129; 234; 245; Heras-Escribano, 2019; Dings, 2020).[105]

Autopoiesis – a relationship of operational closure among certain processes delimiting a living body as well as a domain of conduct – was taken as the basis from which the "scientific representation of the mind" could be elaborated "as embodied, emergent, dynamic and relational" (Thompson, 2004, p. 382). Enaction, or sense-making, was intended to be the most general expression of what it means to experience as a result of an ongoing history of interested engagement with changing surroundings, a genuine theoretical framework for beginning to understand the mind as a natural phenomenon through an understanding of life.

If life-experience is thus inherently concernful, however, the parameter defining what an agent will be concerned for cannot be such that its objectives have already been reached, otherwise it will not be concerned with anything at all. The experience that is to be attributed to any form of life, sense-making, can only be framed based on some aspect of the nature of the living that can be improved or menaced in variable degrees across the lifespan of an organism: not on some all-or-nothing aspect, such as the mere obtainment *of* an autopoietic organization.

Autopoiesis either occurs or ceases to occur. The sustained viability of its operational closure is no sufficient condition to the discernment of ontogenetic alterations aiming at *improving* the conditions of its dynamic coupling to the environment, nor does it offer, because of this, criteria for distinguishing matters of greater and lesser importance to a form of life. If, as previously thought, autopoiesis' self-sustained viability conditions were the sole parameter for distinguishing better from worse happenings in a life-course, then anything resulting in the living system's remaining under its viability thresholds would be made sense of as equally good for it, while events causing these limits to be trespassed are *a fortiori* the very end of any process of sense-making.

> According to [this] perspective, balancing at the edge of a cliff is a perfectly viable behaviour, so is falling over, both are interactions that conserve autopoiesis, it is only crashing against the ground that is bad for the organism. Such all-or-nothing normativity is clearly stated in the definition and use of the concept of *structural coupling*, i.e., encounters with the environment resulting in perturbations to the autopoietic dynamics without loss of organization … This important concept is the ba-

105 This is all the better for Enactivism because Ecological Psychology has been less involved in conceptual revisions than in thriving – and now assimilable – empirical work (Chemero, 2009; Rietveld and Kiverstein, 2014).

> sis of all that autopoietic theory has to say about cognition and a key element in the enactive approach (Varela, Thompson, & Rosch, 1991). And yet, if any value judgment could be formally derived from structural coupling it would be the rather useless *a posteriori* realization by the external observer that the organism should have avoided that very last encounter that killed it – it would be, unsurprisingly, no sense-making at all (Di Paolo, 2005, p. 07)

This is in no way a reason to reject the concept of "autopoiesis". It is simply that the characteristic notes of self-sustained operational closure cannot be the whole story about lived agency, even at its simplest. Sense-making must be based on the attempts that the organism makes (in life) to *improve* the conditions of its own autopoiesis, and not on the established fact that such an organization obtains. Within an environment that is by itself changing, this implies *adapting*, rather than just being alive. What the introduction of the concept of "adaptivity" (Di Paolo, 2005) intends to cover, then, is what happens between the establishment of an autonomous system and its disappearance that accounts for its concernful and appraising stance before changes in the organism-environment system – for it is *such* a stance that will move it into action. "Regulative adaptation is a precondition for agents to have a subjective outlook on the world. Without it, the only meaningful events an agent would encounter would be those that would lead him or her to unfeasibility" (Di Paolo, Buhrmann, and Barandiaran, 2017, p. 124).

The fist thing to note about the dynamic organization of the living devised by Maturana and Varela is that it always obtains under *precarious* conditions. The mutual enablement relationship obtaining among constituent processes of such an organization means that no thereby constituting process possesses long-term stability after the system's collapse. Each and every one of those processes persists only insofar as its relationships within the system do. *Adaptivity* is then characterized as the capacity to purposefully regulate some attractors of the organism-environment coupling, countering respective tendencies to approach the viability thresholds of organic operational closure by readjusting the way in which this same operational closure particularly organizes itself.

Adaptivity can be devised conceptually, partly by the simple unpacking the concept of 'autopoiesis' into the natural tendencies that threaten the dissolution of any autopoietic system. In fact, two opposite but complementary tendencies can be discerned. The first is the tendency for the system to open up to material and energetic exchanges with the environment (to absorb food, to release excrement, etc.). Without its particular kinds of openness any autopoietic system would no longer be viable as such, it needs constant *self-production*.

The second characteristic tendency of autonomous systems, contrary to the first one, is the tendency to self-differentiate from, and remain unhindered by, external disturbances. Without *self-differentiation* (without, for example, the continuous restoration of a cell's semi-permeable membrane), the once operationally closed system would dissolve into independent processes and disintegrate as such.

In the ideal conditions respective to each of these tendencies, self-production and self-differentiation, they would prevent each other from being realized and consequently provoke death. And yet, actively turning these tendencies into actions is required for the continuous maintenance of precarious self-individuation that is enabled from the moment an autonomous system is constituted (Di Paolo, Cuffari, and De Jeagher, 2018, pp. 39-40). Any life-form, by virtue of its autonomous organization, is therefore partly defined by an enduring and lived-by tension between self-production and self-differentiation, and the process that unfolds while these are effectively equilibrated, so that an autonomous system endures, is self-individuation.

Sense-making requires *agency*, however, so that to talk about it there must be more than mere tendencies inherent to self-individuation (as I put it, they need to be turned into *actions*). Autonomous operational closure, which implies said tendencies, is but the first requirement to speak of actions (understood here in the minimal sense, which Enaction Theory attributes to any form of life). By itself, autonomy implies a symmetric organism-environment relationship of dynamic coupling between organism and environment. Devising such a relationship as involving any set of processes serves to predict trajectories of complex, multilayered systems (such as those comprising weather conditions) but, by itself, this is to make no distinction between processes acting upon others and processes being acted upon by the first.

> By themselves, the dynamical and the autopoietic notions of coupling are insufficient to capture the idea of a system acting or behaving. … [A]cts have the property of being asymmetrical in terms of the relation between agent and environment. Because the idea of coupling is symmetrical, one way to introduce an asymmetry in it is to go one level up and propose that an agent is sometimes able to modulate its coupling with the environment (i.e., to modify the way its own processes and those of the environments relate). This condition of *interactional asymmetry* is the second requirement for agency. (Di Paolo, Buhrmann, and Barandiaran, 2017, p. 117)

The empirical model of an action developed by Di Paolo, Buhrmann and Barandiaran (2017) is that of an asymmetrical regulation of the organism-environment dynamic coupling, by means of which the attractors of said coupling be reoriented toward more favorable trajec-

tories regarding the continuation of the autonomous system. It is these asymmetrical regulations by means of which "the agent is, at least on occasions and with some regularity, the *source* of certain activity" (Di Paolo, Buhrmann, and Brandiaran, 2017, p. 116, emphasis added) that can be identified empirically as *actions* (and, the autonomous systems that sporadically present it, as agents), so long as it proves itself a sustained capacity of a system.

Empirically identifying the asymmetrical regulation of an organism-environment coupling on the part of the organism admits more than one criterion (constraints to energy flows demanding physical work on organic structures, and changes internal to the organism in anticipation of environmental changes, being among them). In general, however, *acts* will consist in alterations of a subset of parameters and constraints of an organism-environment coupling that occur as a function of vector-changes internal to the operationally closed system during a certain time interval. An example of an act is that of an e-coli individual's reshaping itself and coordinately moving its cilia for advancing in directions presenting increasing gradients of nutrients. Another is that of a hawk's sustaining and finely adjusting the position of its wings in order to glide and concentrate on the movement of its prey. Though unequivocally environmentally constituted, these actions – these modulations of an organism-environment coupling – take place through a reorganization of the constituent process of the respective autonomous systems. Acts need not occur all the time for the autonomous systems in question to be regarded as agents, but their at least sporadic occurrence is the mark of agency.

> Of course, agents are not necessarily able to modulate all conditions of their coupling all the time. Nor are agents the unique source of asymmetrical changes in their relation with the environment, which may also contain other agents or other processes that occasionally induce a modulation of the coupling. The concept of asymmetry only requires that a system be capable of engaging in some modulations of its coupling and that it does so at least in certain cases. (Di Paolo, Buhrmann, and Barandiaran, 2017, p. 120)

Finally, the third and last requirement for us to be able to talk about actions, hence of sense-making, is that these sporadic asymmetrical regulations of the organism-environment coupling, on the part of an autonomous system, occur through an evaluative discernment of potential disturbances – better and worse – to the dynamics of self-individuation (coming from both inside and outside the system), in order to optimize the conditions of self-maintenance of the system, however these are set at a moment. The positing of this condition aims to capture the fact that asymmetrical regulations occur as a result of an agent's normative *appre-*

ciation of better and worse courses of action. This is for autonomous systems to modify their coupling with their environments "so as to improve their prospects of remaining viable" (Di Paolo, Buhrmann, and Barandiaran, 2017, p. 122). They act according to an inherent normativity whose parameter is not just *an* autopoietic organization, but *theirs* as it is configured at each time.

This third requirement for agency (besides autonomous organization and sporadic asymmetric regulation of dynamic coupling) serves not only to do justice to the affective terms in which enactivists (and many, if not most ecological psychologists) describe experience. It serves also to restrain the range of asymmetric regulations to be identifiable as actions, to less than all alterations of subsets of parameters and constraints identifiably occurring as a function of vectors internal to the operationally closed system. Spasms and reflexes are not actions, however they are modulations of an organism-environment coupling deriving from a change in the autonomous system. The difference is that these kinds of modulations are not *aimed at* distancing current attractors from the viability thresholds of any foreseeable autonomous process. (Ascribing things like spasms and reflexes an evolutionary function is another thing entirely, and it remains a completely legitimate theoretical step: evolution is not driven by actions alone.)

Thus, only after we identify autonomous, asymmetrical and normative regulation of self-individuation can we speak of a body that acts, and that thereby "makes sense" of its own world-involving actions, affectively discerning both its internal and surrounding dynamic tendencies in gradable, self-concerned, appraisals to guide comportment (Colombetti, 2014). Only then – when we have *life* which is when we have *actions* – can we speak of an invested subjective perspective which cares for certain aspects of what happens and thereby *perceives* them.

> This is, for enactivists, the hallmark that distinguishes all forms of mindful activity, no matter how complex, from non-mindful activity. Bacteria swimming up chemical gradients and scientists trying to understand them are both cases of sense-making, albeit very different ones. (Di Paolo, Buhrmann, and Barandiaran, 2017, p. 123)[106]

106 The aforementioned example is of E.coli bacteria, which are known for displaying chemotactic behavior: they move towards regions where there is a higher concentration of nutrients, oxygen, or where there are better temperatures, and in the opposite direction to where they find conditions that are more harmful or less favorable. This behavior is observed, however, even when the conditions of the environment where the bacteria are found are sufficient for their survival (when, in order to survive, they could stand still or move in circles). "It is also known that "sensitivity to attractors increases after periods of deprivation [of nutrients]" (Di Paolo, Buhrmann, and Barandiaran, 2017, pp. 130-31).

This elucidates the extent to which a minimal form of life, just by virtue of being alive, is sensitive to the world: it is able to affectively discriminate events in its own body and events external to it alike, as what it discerns is the ongoing relationship between aspects of these events, to the exact extent that it is able to regulate the tendencies of the situation to favor its own self-maintenance. Sense-making is a monitoring of tendencies, some of whose vectors (those, and only those, to which the organism can react) constitute an intrinsically value-laden phenomenal landscape consisting in organism-environment sensorimotor contingencies (Di Paolo, Buhrmann, and Barandiaran, 2017, p. 136). Any agent is "an autonomous system capable of adaptively regulating its coupling with the environment according to the norms established by its own viability conditions" (Di Paolo, Buhrmann, and Barandiaran, 2017, p. 127).

What happens or fails to happen in the world is often independent of the aspects of these same events constituting relevant sensorimotor contingencies. On the other hand, what happens to materially constitute sensorimotor contingencies *always* depend, as to its nature and outlook, on much that goes generally unperceived by the agent because of the latter's inability to react intentionally to all aspects of events. This much having been admitted, the earlier notion of sense-making as *literally* "bringing forth a world" is rejected (if only, that is, as more than a metaphor) in favor of a view according to which life-processes merely render meaningful some portions of the good old, single world, that happen to partake in the salient challenges of somebody's life. Sense-making ceases to be taken as the bringing forth of a "surplus of signification" that be – apart from anything else – the stuff that constitutes experience, to be taken as the ongoing *endowment* of meaning (importance, value) to an otherwise (say, if no life existed) meaningless but extant subtraction of happenings actually constituting an organism-environment system. Certain happenings that occur independently of any life-process – as well as events that occur only because of life-processes – *become* meaningful, and are thus *themselves* appraised as such, "made sense of", from a given embodied perspective.[107] With this, the Gibsonian notion of direct perception via detection of environmental energy-arrays (turned meaningful) that specify surrounding material patterns is made assimilable to Enaction Theory.

107 Appraisal does not entail correct appraisal. The agent-relative value of viable courses of action obtains independently of how such courses of action will be appraised from an agent's perspective. For instance, while all extant sensorimotor contingencies may induce an organism to move towards an increasing nutrient-gradient to the near direction *d*, a more favorable concentration of nutrients than this one may lie in the underappreciated direction *d*'.

> Meaning and related concepts (value, significance, etc.) apply only to the whole situated organism in relation to its associated milieu, which itself coemerges with the individuation and activities of organisms. … Moreover, sense-making does not "add" anything to the rich coupling with the environment, it "subtracts" from it by monitoring and responding to only a small and relevant subset of all the influences that impinge on the organism, a subset out of which the organism constitutes itself as a sense-maker. Some environmental influences may have crucial consequences for the organism and still lie beyond its sense-making capabilities (e.g., the presence of ionizing radiation, for which there is no organic compensatory regulation, or the too subtle clues left by a well-camouflaged predator). (Di Paolo, Cuffari, and De Jeagher, 2018, p. 36)

Varela, Thompson and Rosch (1991, p. 204) rejected Gibson's theory of a direct detection of ecological information on the grounds that it was "a substantive empirical hypothesis" that "does not stand or fall on the basis of logical considerations". It was their own construal of sense-making that fell, however, on the basis of a conceptual gap between autopoiesis and basic expectations we have for an adequate concept of "agency". Substantive or not, Gibson's hypothesis is no longer seen as untenable by enactivists, but simply as not the whole story about minds (as it never purported to be). For, in fact, the situations most kinds of organisms find themselves in are much richer than just the subtraction that constitutes an organism's perceptual environment; agents do much more than to explore available affordances. As will become clear in the following sections, what happens both concomitantly and as a consequence of the acts developed in an organism-environment system is crucial for the enactive approach – or, shall we put it already, for Enactive Ecology – to explain motor and perceptual learning, but also to account for *minds* as the variegated kind of phenomenon it is. Consequentially, the environment, whether perceived or not, will also be part of the analysis of the forms of sense-making that are characteristic of social interactions, the analysis of which enables understanding of more complex mental phenomena, such as engaging in language-games.

3.2.2 *Uno, Nessuno, Centomilla* (Or: Animal Certainties)

> According to enactivism, the body counts as a cognitive system because it is possible to deduce from processes of precarious, material self-individuation, the concept of sense-making (i.e., a perspective of meaning on the world invested with interest for the agent itself). With the individuation of an autonomous identity there arises (in

> history, but also at each moment) an intrinsic norm aimed at securing the systemic identity, a basic dimension of care, and thus a subjective viewpoint from which interactions with the world are evaluated and thus become meaningful … For enactivism, once we clarify the concept of sense-making, minds cannot be conceived without bodies. (Di Paolo, Buhrmann, and Barandiaran, 2017, p. 22).

The life-mind continuity thesis was never conceived as a thesis about life and mind in its simplest manifestations.[108] Albeit accepting that Enaction Theory provides a good explanation for the emergence of vital norms, which undoubtedly accounts for a portion of our own, human concerns and actions, we humans act as a function of encounters with other people, desires, thoughts, opinions, faith, and, in general, habits that are sometimes conflicting, sometimes harmonious with each other, there even being habits that lead us against the importance (whatever that be in each case) that we give to self-maintenance as living beings. The ability to autonomously moving oneself is not, for much of what the natural phenomenon of life is, just about keeping oneself alive. We develop styles, mannerisms, fine shades of behavior, regarding things like reaching for a glass, holding a pen, speaking casually, telling stories, drawing pictures, cooking, and what not. All of our manners, our ways, have a history, and also contexts that synchronously exert their influence upon – that in fact constitute – the enactment of our ongoing concerns. For instance, modulations induced by the presence or absence of another person, or of *that* person, on the way someone sits, walks, holds a glass, prepares food. That of illumination conditions on the distance we position a book from our eyes. Or that of the temperature, the pavement, the surrounding sounds, upon one's jogging style. In short, the natural phenomenon of sense-making does not reduce to the regulating the primordial tension of organic self-individuation between self-production and self-differentiation.

Still, what happens on top of this primordial condition of being alive is not, in important senses, categorically different from it. The general characterization of the various forms of life and sense-making emerging throughout evolutionary history are approached by enactivists (i.e., by Enactive Ecology) by characterizing and identifying new processes that, first, could not exist without the basic, organic form of sense-making we saw in the previous section, and, second, have to be analyzed as, once again, dynamically coupled to the processes that make their emergence possible. On the one hand, the reason for this is the markedly naturalistic commitment of the enactive approach (Di Paolo, Buhrmann, and Barandiaran, 2017, p.

108 I do wish to imply that *one* variously reformulated thesis is at stake. Such a thesis states the identity between life and mind and agency. As will become clearer in the following sections, however, this thesis does not imply that the study of mind and agency be reducible to what we know as Biology. On the contrary, it arguably demands an expansion of the interdisciplinary range to include virtually all the sciences to study human mind and agency.

43), which commitment is hardly a feature of any representationalist theory of cognition (Hutto and Myin, 2013; Noguez, 2021). On the other hand, it is the unified theoretical treatment of material processes basic to the emergence of agency (in history, but also at each moment), with their evolutionarily posterior manifestations, such as the emergence of habits, prototypically in the animal kingdom, and the varied forms of social agency that lead to the emergence of language and the human mind as a natural phenomenon, that allow Enactivism to resort to a single set of theoretical assumptions in order to address phenomena whose complexity is already challenging enough.

> In the fewest possible words: mental phenomena constitutively demand explanations of individuality, agency, and subjectivity, and the principles and conceptual categories for these explanations are the same as those required to explain the phenomenon of life. (Di Paolo, Buhrmann, and Barandiaran, 2017, p. 251)

For this reason, it is noteworthy that Enactive Ecology – or Enactivism as it embraces the ecological approach to perception, and is embraced by the latter as a theory of agency – be *also* a thesis about such an exotic kind of lives and minds as that of bacteria. Theorizing about them is not, after all, to postulate any enigmatic, *sui generis* kind of entity, or event. Enactive Ecology is a theory about lives and about the intrinsic capacity of any form of life to discriminate better from worse trajectories for itself. Every form of life *cares*. There is no magic involved in how Enactive Ecology explains this. Furthermore, as we see below, the models elaborated by enactivists for gaining insight into the most basic kinds of direct affective involvement with the world became paradigms for reaching models of increasingly complex forms of life.

What we see in this section is the enactive-ecological explanation of the emergence of habits and the type of agency that constitutes them, sensorimotor agency. This is a form of sense-making that is enabled by organic agency – the one that applies to any form of life – and is constituted by it, but involves further complexities (Di Paolo, Buhrmann, and Barandiaran, 2017, p. 142; Di Paolo, Cuffari, and De Jeagher, 2018, p. 48). Sensorimotor agency is what is required of us, for instance, to open a door.

> You open the door that leads into a familiar room where you must look for something you have forgotten. You are in a hurry. Yet, if we were to slow down time and focus on the fractions of second it takes you to reach for the door handle, turn it down, and push the door open, what would we find? Clearly, your attention is elsewhere, and still you perform a small series of coordinated eye, arm, and hand movements quite flawlessly in the act of opening the door. You probably do not need to search for the door handle. Some broad peripheral awareness confirms that it is to be found where it has always been. In fact, your body knows already how to proceed. You slow down your walking or even stand still in front of the door. Your shoulder and elbow joints adopt adequate angles so that a slow approach brings your open hand right up to the handle. Upon contact, your fingers close around the handle, the smooth metal surface feeling slightly cold. The strength of your grip increases until it reaches a comfortable point, a safe sensation. You feel most of the handle in contact with your palm and fingers. It is not too thin or too thick. Then keeping a firm grip, you initiate an angular movement of your forearm and wrist, bringing the handle down. The resistance it offers is just right. It is neither too slack nor unmovable. You feel that the resistance is not uniform as you push the handle down. You sense a click as the latch bolt retracts. After that, you stop pushing down but keep the handle in that position where you still feel it pushing upward. You pull the door open. (Di Paolo, Buhrmann, and Barandiaran, 2017, p. 41)

What we have above is exemplary of the fine-grained way in which we are constantly attuned to the world while acting successfully within our environments. Expressly, the attention of the agent in the phenomenological description above "is elsewhere"; however, any disruption in the fluid and unreflective actions underway – a slippery carpet in the entrance, a stuck doorknob, a noise inside the room – would plausibly be immediately noticed by him. Any perceptually guided action, such as this one, of opening "the door that leads into a familiar room where you must look for something you have forgotten" (and any other of the countless possible alternative exemplars) *consists in perceiving* dynamic relations between our bodies and parts of the world, such as the aspects of the doorknob that have thereby been noticed. So much as bacteria perceive variations in food gradients along their pathways while acting according to the vital norms of keeping their organizational forms, what is there to disclose about ourselves is the further kinds of norms that *we* follow while acting, and perceiving the sensorimotor contingencies involved, in order to turn a doorknob. Perception is enaction: "perceptually guided action" emerging "from the recurrent sensorimotor patterns that enable action to be perceptually guided" (Varela, Thompson, and Rosch, 1991, p. 173).

Now, this is a point where enactivists of both, old and recent days, may slip into seemingly very strange conclusions – a risk to which, by the way, adepts to the ecological approach to perception are equally subject. Perception being framed as of sensorimotor contingencies that relate to the course of action taking place at each moment, what is perceived by each agent is not the same as what is perceived by another.

> Importantly, taking sensorimotor contingencies as a basic notion compels us to always understand the environment from the perspective of the agent and not as a set of objective properties available to the external observer. Sensorimotor contingencies are always the result of a "dialog" between agent and environment and are therefore neither "subjective" nor "objective" in the traditional senses of these terms. (Di Paolo, Buhrmann, and Barandiaran, 2017, p. 32)

And, in a similar vein, Gibson writes:

> An important fact about the affordances of the environment is that they are in a sense objective, real, and physical, unlike values and meanings, which are often supposed to be subjective, phenomenal, and mental. But, actually, an affordance is neither an objective property nor a subjective property; or it is both if you like. An affordance cuts across the dichotomy of subjective-objective and helps us to understand its inadequacy. It is equally a fact of the environment and a fact of behavior. It is both physical and psychical, yet neither. An affordance points both ways, to the environment and to the observer. (Gibson, 2015, p. 129)

But how then is perception of any named object possible, e.g., of a door handle? How is it possible for us to share and understand descriptions that apply to one and the same object, descriptions representing that they have this or that property, such as the material or the temperature of the handle? Neither the doorknob, nor its material, nor its temperature, nor anything else that concerns only the doorknob in abstraction of the perceiving agent, is equivalent to a "recurrent sensorimotor pattern", to "sensorimotor contingencies", or to "ecological information", nor are any of these the kinds of things that we daily claim to perceive.

Assume that So-and-so is going to the market with his wife, but realizes, while still close to home, that he has forgotten his wallet in the living room of their apartment. So-and-so immediately goes back to get it while his wife awaits on the sidewalk, and, from then on, *mutatis mutandis*, the aforementioned phenomenological description applies. After that, So-and-so goes back to find his wife, who in the meantime has remembered that the door handle outside had fallen off on the floor the last time she had left the house and slammed the door. It could have fallen off now too. She asked So-and-so if the doorknob was in place. "Yes, of course, it was there, everything's normal". But she insists: "But did you *see* the handle?". It would be absurd if So-and-so (say, a champion of the enactive-ecological approach himself) went on to say that he didn't see *the doorknob*, out of scruples like: "No, what I saw was the

flow of sensorimotor contingencies determined by the asymmetrical regulations of the norms that govern my agency, coupled as the latter is with my idiosyncratic environment."

Usually, questions like "What do you see?" or "What did you see?", etc., are not asked with a view to finding out how the person being addressed is, or was feeling, or what they were doing; we do not ask for a phenomenological reduction of her visual experience when we make this sort of question. On the contrary, not infrequently what we want when asking questions like these is precisely to find out, *apart* from whatever someone was doing, or however she felt, what was in front of her she could safely tell was in front of her. Is it something I can see too? Can we see it together? Is there a study on this? What kind of thing is it that that you saw? It is obvious that the interest in each of these questions is important; and more than that: clearly, properties of the handle, and also the handle itself, constitute any perceptual phenomenon that be truly describable as "I saw the handle". The perceptual phenomenon in question would necessarily be different if the handle were made of wood, and also if So-and-so were 10cm shorter than he is.

Even so, none of the interests we might take in these questions is the point of departure for the enactive-ecological approach to perception. Our concerns as we play the language-games of asking and answering what we see are not the only ones involved while we see (and, widening up our scope to the sight of non-humans, they are not at all a concern), there are more basic ones that serve those as conditions of possibility: it is based on *these* that perception occurs. As Wittgenstein noticed, language-games are goal-oriented practices, but (as he also noticed, especially in *On Certainty*) there are many more goal-oriented practices that are more basic, more "animal" ones, grounding any possible word-exchange.

The relationship between the emergence of sensorimotor contingencies and our talk about perceived objects is the topic of more advanced discussion. Still, for the moment one may already guess some ways in which our previous discussion on paradigm-priority and direct reference show up as useful for adherents to the enactive-ecological approach. Since there is no basis – sensory or transcendental – for homogeneity across experiences of different subjects, the enactment of propositional sense and direct reference in our lives, independently of agreed upon criteria, is part and parcel of our social technologies for interacting and coordinating the ways we make sense of what happens in each of our lives. These technologies do not grant us cognitive homogeneity, they serve us to participatorily deal with our differences effectively, despite our inevitably different ways of living and seeing the world. More on this will be said soon.

3.2.2.1 Tight brains, messy habits

First, sensorimotor agency. It deserves its name, not because life *becomes* sensorimotor in some stage of evolutionary history; agency always necessarily involves an interdependence between bodily movement and sensitivity, there being as little sense in speaking about action and perception as the outcomes of two separate systems as there is in speaking about organisms and environments in isolation from each other. Enaction is perceptually guided action, but then it is also, very often, affordance-guided perception.

But organic agency does not imply any autonomous self-organization of the manners in which organisms engage with their environments producing sensorimotor contingencies. The label 'sensorimotor agency' and related talk of *sensorimotor bodies* denote the kinds of life wherein precisely such an autonomous self-organization of *habits* takes place.

This is where a distinguished role for the nervous system can be devised within the enactive-ecological approach to life and mind, even if the development of an enactive-ecological theory of the brain is still underway (Gallagher, 2013; Fuchs, 2016; 2017; Di Paolo, Buhrmann, and Barandiaran, 2017). It is beyond reasonable doubt, however, that the ensuing construal of the emergence of the nervous system in evolutionary history by the enactive-ecological approach "privileges the idea that early nervous systems evolved to coordinate bodily mobility rather than to process external sensory inputs" (Di Paolo, Cuffari, and De Jeagher, 2018, p. 45). Indeed, this is compatible with studies on the evolution of the nervous system attesting that

> it has become clear that there is a deep continuity at the molecular, genetic and physiological level between organisms with and without nervous systems. Key molecular components – such as ion channels, neurotransmitters and synaptic protein families – appear to have been present in precursor organisms without nervous systems, and even in single-celled ones (Keijzer et al., 2015, p. 07)

The authors cited above (which, by the way, do not declare themselves as either enactivists or ecological psychologists) articulate an understanding of early, unicellular and multicellular, invertebrate organisms, whose outermost membranes – myoepithelia, as they call them – work as excitable media, swiftingly propagating the effects of local disturbances across boundary tissues, and claim that "that can be modeled and understood in terms of self-

organizing pattern formation" (Keijzer et al., 2015 p. 13). Accordingly this would provide evolutionary advantage of easing motility and changes of shape, as well as internal physiological adaptations. Sensorimotor activity is facilitated for such small creatures thanks just to their myoepithelia's functionally producing rapid enough global adjustments across their whole extensions, in a dynamic sensorimotor coupling with processes both in and outside the organism.

Later in evolutionary history, nervous systems present patterns between afferent (peripheral-central direction) and efferent (central-peripheral direction) activities that make it possible to satisfactorily coordinate, via differential stimulation or inhibition of whole sets of neurophysiological structures, the mobile and plastic structures of an organic agent (e.g., the musculoskeletal system) for optimally fulfilling its ongoing attempts at escaping its autonomous organization's viability thresholds.[109] Accordingly, "early nerve nets evolved when some conducting cells – either within or connected to the myoepithelium – evolved elongated processes and synaptic connections in a way that modified and enhanced the patterning capabilities of a pre-existing myoepithelium" (Keijzer et al., 2015 p. 14).

The differential role played by thus specialized neural activity in sensorimotor agency is not one of "control", it rather enables and promotes a continuous mutual adjustment and coordination between the nervous system and the rest of the – relatively enlarged and functionally differentiated – body.[110] As much as its myoepithelial ancestor the brain is an excitable medium, and its global states coordinate and mediate coordination among all parts of the body in functionally short timescales. The propagation of sensorimotor dynamics across the total surface of an organism's motor tissues is better served in the bodies of animals by excitable channels that literally shortcut the body toward all surface points. In the end, nevertheless, all

109 "A characteristic of animal bodies is that they are capable of self-directed mobility through regulated tissue contraction and relaxation. This regulation is performed thanks to the activity of nerve cells that directly or indirectly sense and modulate the contraction and relaxation of muscles, connecting tissue, tendons, etc., that integrate with bones to form flexible yet dynamically robust networked structures combining tension and compression at multiple scales, from the cellular packing of epithelial tissue to the whole musculoskeletal system. … A simple movement like raising an arm is, in normal circumstances, never produced in isolation of the rest of the body. It relies on a series of preparatory synergies (e.g., compensatory balancing on the opposite side of the body if one is standing) and causes the whole body to reaccommodate through the mechanical propagation of tensions feeding back sensory signals to the nervous system through spindles that follow the stress lines in connective and muscular tissues and other proprioceptive and external sensory activities that the movement provokes. Everyday actions … are the result of many processes in the body interacting over a multiplicity of interdependent scales involving loops of proprioception, acoustic, haptic, and optic flows, and contextual regulation of breathing and balance." (Di Paolo, Cuffari, and De Jeagher, 2018, p. 45)

110 In this respect the enactive-ecological approach resonates with much more conservative approaches of the cognitive sciences, such as connectionism (Mcclelland, 2010) and predictive-processing theory (Friston, 2009; 2013), as what has previously seemed as evidence in favor of a functional compartmentalization of the brain goes through increasing revision and reevaluation even in these trends of the cognitive sciences (Fuchs, 2017).

functionally specialized processes of the body – neurophysiological ones included – form an operationally closed system whose form at each moment dictates the adjustments to be made distributively for avoiding the autonomous form's viability thresholds. Aside from such theoretical tenets, brain-control is anyway belied by reported evidence.

> For instance, Kelso et al. (1984) asked participants to pronounce one of two phonemes, /baeb/ or /baez/. Toward the closing of the vocalization, a force was externally applied to the jaw provoking a displacement. This was compensated within 5 to 10 milliseconds, which is faster than the the brain could have calculated a new sensorimotor configuration. In this short time, the lower lip moves to a new configuration that preserves the intended vocalization. Rather than processing incoming information in order to articulate an adaptive response (there is no time for that), brain and body are poised in a critical state appropriate to the current context and whose stable outcomes are sensorimotor synergies that correspond to the relevant behavioral options. … The brain helps set up this critical configuration but does not need to control its ensuing flow. (Di Paolo, Cuffrai, and De Jeagher, 2018, pp. 57-58)

Rapid compensations of activation or inhibition of movements of the whole body are required to, for example, stop writing, looking out of the window and think (suppose this movement starts and ends within some 10 seconds): the fingers are suspended over the keyboard, the position of the spine may be tense due to the cold (and chills); the eyes are no longer optimally configured for focusing on any object; the legs remain still, or, if they don't, they move only to the extent that it doesn't disturb the visual influx. Eventually, then, the torso moves slightly backwards, the eyebrows arch; the mouth opens a little, as if denouncing the intention to speak; one goes back to writing. Considering only the evolutionary function of aiding coordinated movement and allowing functional complexification of organisms, the nervous system serves this kind of integration between parts of the body, to the same extent that it itself is affected by what happens in the rest of the body and in the environment. Such is the regular – but now neurally aided – dynamics according to which "motor and sensory activities in the self-moving body are codetermined as each motor change provokes an alteration in the configuration of the body within its environment, thus leading to changes in the activity of sensors" (Di Paolo, Cuffari, and de Jeagher, 2018, p. 46), which is observable in any form of life.

Besides making it possible to better coordinate bodily mobility for satisfying organic vital norms, however, the presence of a nervous system is directly involved in the emergence of further norms guiding animals' ways of living. More precisely, the nervous system's pecu-

liar dynamics and integration to bodily movement is strongly involved in the dynamic metastability, in diverse time scales, of various modes in which an animal's affect-laden engagements with the environment obtain along its life's history. That occurs because the nervous system is an excitable medium, and presents by itself an operationally closed organization and its own – if obviously bodily intertwined – sensorimotor loops. This is where the enactive-ecological approach to brain-function begets a theory of habits.

Maturana (1970) had already envisaged the possibility of characterizing neurophysiological processes themselves as engendering an operationally closed system of precarious processes, thereby implying a "domain of conduct" of neural activity *per se*, coupled to bodily and environmental processes. This is, to repeat, in no way conflicting with considering the nervous system one more process constituting global organic autonomy; it is – enactivists submit – an operationally closed system inside another.[111]

> The self-induction of neural patterns manifests itself most clearly in broad correlations, as well as in multiple couplings and coordinations between neural oscillations over different time scales, which change in subtle ways during the microgenesis of cognitive activity (say, visual recognition). Thus, neural activity never reaches a state of equilibrium, but instead transits between metastable states that are sometimes durable enough to be considered quasi-stationary, and sometimes too chaotic, fleeting, unfinished. The closure of the nervous system is also evidenced in the self-structuring of the intrinsic activity of neural populations, even in the absence of specific stimulation or the performance of a cognitive task, the so-called default mode that manifests itself in brain imaging studies during those moments when we are not doing anything in particular (Di Paolo, Cuffrai, and De Jeagher, 2018, p. 47)

Hence, in addition to sensorimotor loops of the first type – i.e., of the organism as a whole, including the nervous system – the sensorimotor life of an animal is constituted by the semi-autonomous dynamics formed by emerging patterns of activity of the nervous system,

111 Maturana (1970) highlighted the importance of the formation of neuropils within the nervous system. A neuropil is "a dense network of fine glial processes, neuronal processes such as axons and dendrites, and fibrils in the gray matter of the CNS, forming a homogeneous matrix that surrounds neurons and other cells and is sufficiently dense that individual cellular processes cannot be distinguished under the microscope" (Neuropil - an overview | ScienceDirect Topics, accessed in 19/10/2025). Maturana stressed that these are formations whereby the activities of individual constituent neurons are greatly unaccountable by their intercellular synaptic connections alone, while the neuropil formations themselves seem congruent with cerebral activity when the latter is analyzed as the reaching of global, nonequilibrium states along time. Neuropil-formation and its explanatory power over neuronal activity reinforces Maturana's hypothesis that the central nervous systems constitutes an operationally closed system among the members of an organism's autonomous system as a whole. In the face of the great variety of both orthodox and unorthodox approaches to the functioning of the brain that take the latter as giving rise to global emergent states not decomposable into the activities of individual neurons or brain-areas (McLelland, 2010), this is not a particularly bold hypothesis. It is the hypothesis on which the authors I have been presenting as defendants of the enactive-ecological approach to the mind currently work.

linked as these are to the coordinated motion of the whole body, and dynamic environmental recurrences. As a result, the very manners in which the organism engages with its environment constitute the processes intertwined in relationships of mutual enablement that form an operationally closed system, actively and functionally sustaining itself under precarious conditions, exactly like the organic body does for itself. Because (i) the fact that the agent's body consists of a nervous system means that the organic agent's engagements with the environment constitute sensorimotor loops enabled and constituted by neural activity, and because (ii) the dynamic compensations of global neural activity tend to conserve dynamic patterns of neural organization obtaining relative to environmental variables as themselves of a kind of self-sustained system-environment dynamics, we get to the foreseen result. The history of the agent's engagements over time adds (changing) determinations to the courses of action of the agent as a whole, which determinations arise from patterns of activity sedimented in a neurophysiological and environmental operational closure, aside from the ones that exist in any case solely on account of organic normativity.

However, if that were the whole story, then human and non-human animals would be subject to tyrannical mandates by their brains. Affective engagement of life-forms with the world cannot be due solely to the norms of organic self-individuation. Actual bodily movements, we just saw, are partially determined by the quasi-autonomous self-organization of modes of acting themselves, at the very least in the lives of animals. If it is not the case that we only see photos of people crying when jumping out of a plane and dogs growling when fetching a ball, then it must be possible to identify not only self-individuation, but also asymmetrical regulation, and self-referring norms – in a word, *agency* – at the level of the modes of acting displayed by animals, in such a way that affective engagement complexifies beyond basic survival concerns, into self-individuating habits that are co-anchored in an organic body and "live" with it.

Such is the enactive-ecological view on habits. Whereas previously acts were taken as the joint adaptive coordination of processes of an autonomous system, now they are each taken by themselves as the processes defining the norms of further modes of appraising better and worse trajectories of the whole sensorimotor agent. "It is acts – the acts of an agent – that constitute and reassert a new kind of agency, one that is enabled and constrained, but ultimately underdetermined, by biology. It is literally a case of explaining who you are by referring to what you do, and explaining what you do by referring to who you are" (Di Paolo, Buhrmann, and Barandiaran, 2017, p. 142). What a sensorimotor agent is – who we are, if you

like – is a whirlwind of "micro-identities" (Varela, 1999) affectively invested in self-production and self-differentiation.

> When we think or talk about a person we know, we do not picture an organic body the way it looks while lying on an operation table, but a body-in-the-world, a way of moving, gesturing, making sounds, a style of doing things, of being annoyed by things, and of making things happen. This activity is carried around with the person's organic body, but it is also very much present in what surrounds this body and could not happen or make sense if we were to sufficiently alter those surroundings. (Di Paolo, Cuffari, and De Jeagher, 2018, p. 60)

Each way of acting in the world enacted by a sensorimotor agent consists in a process of self-individuation that is materially based on structures and processes internal and external to the organism which is constitutive of it. Both organelles and nutrients are constitutive of a cell's organism-environment dynamics. In the case of habits it is things like emerging neurophysiological patterns, differential muscular tensegrity, and hormonal regulations, on the one hand, and the organization of surrounding contexts, such as kitchen utensils, workshop tools, wardrobe clothing, or computer file organization (etc., etc.), on the other, which feedback into each other, recurrently completing sensorimotor cycles of agency. By consequence, the normativities of sensorimotor agency are not something that is placed on top of, or that substitute, the norm of organic self-individuation. They "are enabled and constrained, but ultimately underdetermined", by biological normativity – if only for the simple reason that organic self-individuation both enables, and is enabled by, the self-individuating habits of the sensorimotor agent. To speak of a sensorimotor agent, therefore, is to speak of a myriad normativity (including organic normativity) that can be more or less in concert, more or less in conflict, within a singularly fragmented form of sensorimotor life, the organic body serving as both, the anchor and a constituent to an emerging, interdependent variety of micro-identities.

> These activity clusters are formed historically and to an important extent idiosyncratically, subject to the particular life experiences of each developing sensorimotor body under the direct influence of local environments that have also been produced as a result of previous activity by sensorimotor agents. Thus, plastic sensorimotor bodies are always historically coupled to places, situations, and changing landscapes, and so they are shaped accordingly, neither universally nor uniformly, but not randomly either. (Di Paolo, Cuffari, and De Jeagher, 2018, p. 59)

To more precisely understand how a sensorimotor agent – such a "cloud" or "whirlwind" of enactments (Di Paolo, Cuffari, and De Jeagher, 2018, p. 60) – relates to sensorimotor contingencies emerging from a thus multifaceted and markedly ontogenetic type of engagement with the world, descriptions of different levels of generality are well advised. From coarser to finer sensorimotor contingencies across the realm of sensorimotor life, enactivists devise (1) sensorimotor environments, (2) sensorimotor habitats, (3) sensorimotor coordination patterns, and (4) sensorimotor schemes.

(1) **Sensorimotor environments**: the most general way to describe the organism-environment dynamics of sensorimotor lives is to identify what kinds of dynamic patterns can emerge between, on the one hand, surrounding distribution of potential sources of sensory stimulation (i.e., light energy, sound, surfaces, etc.) and, on the other hand, the types of bodily movements (of the head, limbs, trunk, etc.) that are feasible based on a specified bodily size, morphology, and plasticity. The distribution of sound- and light-flow vectors in any context, for example, reaches any spatial volume moving and/or deforming in such and such manners in specific ways. Deterministic interactions between energy flows and the surfaces of the surroundings of an organism specify for the latter a domain of potential affordances according to the organism's potential abilities to move and explore available ecological information. At this yet unspecified level of analysis regarding the actual abilities of an organism we speak of a sensorimotor environment.

(2) **Sensorimotor habitats**: at this level, analysis attends to previous processes sensorimotor learning, i.e., ways in which a sensorimotor agent has already given rise to recurrent organism-environment patterns of sensorimotor engagement. Examples may include acquired readiness to act and perceive in given environmental circumstances arising only after sports or intellectual training. For instance, the way a football player runs and – on the run – adjusts his feet to receive the ball that was launched to him from a long distance, or the immediate recognition of geological past events by a trained scientist spending her vacations on the beach. One cannot deduce the properties of a sensorimotor habitat from the specification of a sensorimotor environment, even if the former's emergence is enabled by the characteristics of the latter.

(3) **Sensorimotor coordination patterns**: These are patterns (ways, methods, styles) of performing perceptually guided actions related to specific "tasks" or "goals" (the scare quotes mark the fact that oftentimes, especially when experimenting on non-human animals, only experimenters will attend to an explicitly predefined objective), such as assessing the consistency of a sponge, lighting a cigarette, or chopping an onion. For example, some people will assess the consistency of the sponge with their index finger, middle finger, and thumb; others will also use their ring finger; still others will wrap all their fingers around it and press it against their palm. These are three distinct sensorimotor coordination patterns related to the same task, i.e., assessing the consistency of a sponge. Their sharing by two or more sensorimotor agents implies the sharing of the same sensorimotor habitat, though the converse implication does not hold.

(4) **Sensorimotor schemes**: These constitute every singular perceptually guided action and do not recur across different sensorimotor bodies. Sensorimotor schemes result from the dynamic integration (synchronic and diachronic) of various sensorimotor coordination patterns anchored in a sensorimotor agent at a particular time. A particular action by a sensorimotor agent is a joint (synchronous and diachronic) operation of networks of sensorimotor schemes, each organizing themselves asymmetrically towards an environment according to the norms of their own precarious self-individuation. However, a particular action (definable in any arbitrary time lapse) is also constituted by a virtual field of non-actualized directions, which are enacted as hesitations, preparations, reorientations, arising from breaks in the course of the preceding dynamics. This "virtual field" is not any ghostly entity, but rather a set of concrete regulations of attractors of the dynamic system constituting the sensorimotor agent at every moment. These virtual tendencies are grounded in sensorimotor schemes that participate in the total balance of a sensorimotor body's coordination, and their dynamic regulation is experienced from moment to moment and constitutes the unique character of the subjective experience of each sensorimotor agent.[112]

112 The four levels of analysis were initially proposed by Buhrmann, Di Paolo, and Barandiaran (2013). Di Paolo, Buhrmann, and Barandiaran (2017) devote two chapters (3 and 4) to the formalization, operationalization, and phenomenological contextualization of each of these concepts. Inevitably, the informal exposition we have chosen does not present the criteria that the authors offer to frame borderline cases between (2) and (3), although it is sufficient to isolate the more general and more specific categories of sensorimotor regularities from the others.

> The concept of sensorimotor schemes is analogous to the notion of schemes introduced by Jean Piaget in this theory of equilibration. For Piaget, a scheme corresponds to a string or cycle of coordination patterns. Thus for instance, a baby drinking from a milk bottle engages her environment through a cyclic scheme with roughly three coordination patterns: suckling the bottle, swallowing milk, and breathing air. All of these coordination patterns involve a coming together of elements of the body and elements of the environment, and all take the form of a sensorimotor correlation or synergy between these elements. In addition, it is important that these coordination patterns cohere as a whole for the overall scheme to be repeated; thus, they must be well timed with respect to each other (drinking too much milk can delay breathing and provoke choking). In other words, as we have defined them, what makes a sensorimotor scheme is a normative, mutual fit between coordination patterns. (Di Paolo, Cuffari, and De Jeagher, 2018, p. 50)

Just as models were adopted describing organic and environmental processes as dynamically coupled (since autopoietic theory, section 3.1.2.1), organic and environmental variables and parameters of descriptions of sensorimotor schemes' support structures are modeled as coupled constituents of a dynamical system. Thus, e.g., breathing rhythm and depth adapt to thin air and level of muscular effort in places of higher altitude (and in the long run increase the number of pulmonary alveoli and red blood cells); chewing movements adapt to the temperature and texture of food, and the hand's dexterity to the surface, angle, bodily posture, and illumination of writing situations. They also adapt to counter and avoid reenacting failures and barely successful acts within all those circumstances.[113]

Although it may have already become evident, it is important to stress that support structures for sensorimotor schemes are not univocally related to sensorimotor schemes. This is perhaps clearer in the case of support structures that reside in the nervous system or in the organic body as a whole. In the cited example above, the nervous and musculoskeletal systems of the infant, those of its mother, the bottle, the milk, are all support structures of the sensorimotor schemes partaking in the infant's suckling act.[114] Similarly, the development of a child's fine motor skills through the manipulation of modeling clay and drawing enables the subsequent emergence of sensorimotor schemes related to writing with pencil and paper, but also that of sensorimotor schemes to be enacted when the child is to turn a doorknob (like extending her hand and grabbing an object).

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113 Both organic and environmental support structures change along diverse time scales along the enaction of the sensorimotor schemes they constitute (as well as apart from such enactments), from climbing down a mountain to finishing mastication. The notion of sensorimotor contingencies – i.e., of sensorimotor environments, habitats, coordination patterns, and schemes – serves to encompass all actual spatiotemporal scales in which environmentally constituted intentional actions unfold and intertwine along a sensorimotor life.

114 We may also think of how many modes of operation in the world of a sensorimotor agent would be differentially affected by the amputation of an arm, or how variously can brain injuries affect an animal's otherwise usual behavior and sensitivity, etc..

> Not only can a scheme be a precondition for a subsequent scheme – a "good" or successful reach for the door handle is, among other things, one that allows me to subsequently turn the handle and open the door – but its successful or unsuccessful enactment also bears vertical consequences for its own support structures and those of other schemes. Every action we perform sends waves through a network of structural and functional relations. When these relations become operationally closed, every enacted scheme in the network can have positive or negative consequences for the viability of the whole. The set of structural and functional dependencies between schemes defines the viability conditions for the ongoing maintenance of the sensorimotor network, very much like molecular self-individuation defines how food concentration, pressure, or temperature affect the viability of cellular life. (Di Paolo, Buhrmann, and Barandiaran, 2017, p. 155)

In general, the empirically measurable manifestation of well sedimented abilities, such as using pencil and paper or turning doorknobs, can be modeled as cases of well-adjusted coordination of networks of sensorimotor schemes. Such a dynamic organization can be described as presenting "horizontal" linkages between schemes whose enactment is often concomitant or sequential (over several time-scales), as well as "vertical" linkages between schemes that serve each other as support structures or otherwise enabling conditions. What obtains from habits' intertwining with each other in these ways is the spreading of effects of their readaptation, dissolvement, and emergence over the whole sensorimotor body. The continuous and multiply tensed equilibration between sensorimotor contingencies on several normative stances is referred to as "sensorimotor mastery". It can be seen as the degree of harmony within a fragmented subjectivity.

The variety of purposes at play in a sensorimotor life – a life that is dictated by the normative myriad of sensorimotor schemes; our norms – by itself implies a rich perceptual landscape to be affectively discriminated and to guide action. There is a direct implication, from any form of life's differentially *caring* for certain happenings around it according to its own form of organic autonomy, to such a form of life's *cognizing* (by acquaintance) some portions of its surrounding circumstances. This is at play from the very start of the enactive-ecological story, with organic agency, "by noticing that it implies a discerning perspective on the part of the organism – one from which the organism discriminates or distinguishes what is good for itself from what is bad, in various degrees" (Colombetti, 2014, p. 18). Sensorimotor life implies the same but relative to every different norm that guides it, not only for what is better or worse according to organic survival's parameters. Every perceptually guided action of a sensorimotor agent is made sense of – is experienced – from several appraising stances on the opportunities to act that the situation (of which the agent is a part) presents.

Aside from such a manifold of normative parameters for guiding perception, and consequently enriching it, an immediate consequence of sensorimotor schemes' intermingling structure and dynamics is that the enactment of one is always actively monitored, experienced, and reacted upon according to the norms of self-individuation of many others.

This is "what allows us to know our actions as ours, our touch and our vision as unified in concrete experience through their mutual reversibilities (we see our hands touching and being touched, we touch what is also visible to us) and only exceptionally abstracted one from the other" (Di Paolo, Cuffari, and De Jeagher, 2018, p. 63). And it makes it evident that it is not through pictorial *Gestalten* that we recognize stuff around us, whether particular or universal. For what we recognize perceptually is the various things they afford us to do.

> I don't normally inspect a bottle with my fingers to perceive in it a Gestalt shape as opposed to disjointed sensations; I pour some beer out of it. I don't regard the red tomato and consider its unseen sides and its voluminous presence; I cut it and add it to the salad. (Di Paolo, Buhrmann, and Barandiaran, 2017, p. 237).

Thus, perhaps somewhat counterintuitively, it is thanks to the fragmentary – though co-anchored and continuously equilibrated – construal of subjectivity that is depicted by Enactive Ecology that the sensorimotor loops that all action and perception consist of can give rise, for sensorimotor agents, to a unified apperception. In fact, sensorimotor loops can both be recognized as "one's own" actions and perceptions, and allow a sensorimotor agent to recurrently recognize different aspects of one and the same thing that be perceived. Once chopped and mixed into the salad, *that* tomato no longer offers the pleasure of admiring its smooth, red skin, nor does it allow one to bite into it halfway while holding it in one's hand. As for perceiving sensorimotor loops as one's own, this is because a sensorimotor agent monitors – and adaptively responds to – its own actions from as many perspectives as there are networks of sensorimotor schemes whose structures be thereby affected in ways to which each can respond (whether or not it does respond).

Regarding the previously mentioned *desiderata* of ecological psychologists, that "a theory of agency and action is required to specify precisely which affordances are perceived and which one is acted upon" (Carvalho, 2022), what is suggested by the ecological take on Enactivism is that we perceive and act upon affordances according to all our appraisals of ongoing surroundings. These continuously made appraisals are based, both as to their number

and their significance, on the parameters provided by self-individuating processes of a sensorimotor body and on current attractors of said processes relative to respective viability thresholds. Aspects of our ongoing situations become more salient – in fact, more *soliciting* – according to how the self-individuating processes we embody need to intervene in their environmental couplings in order to move away from their viability thresholds.

Finally, then, it is in terms of sensorimotor agency, of the sharing of support structures by different sensorimotor schemes, and of the active monitoring and regulating dynamical couplings among the latter, that mental phenomena besides perception can be characterized continuously in enactive-ecological terms. It is in those terms that small hesitations, sudden remembrances, and utter distraction, are to be described alongside further types of experienced detachment from ongoing situations.

> The enactment of a scheme has virtual implications for the future propagation of the activity. These past, present, and future influences shape the enactment of the scheme here and now, and the enactment in turn modifies these virtual influences. I grasp the cup differently depending on whether I see tea in it and want to drink some or whether I will wash it in the kitchen sink or whether I will put it back in the cupboard. A skilled agent may be more sensitive to such influences, which may then involve activity further back or forward in time or space. I grab the cup differently whether, for example, (1) I aim to put it in the cupboard, close the cupboard door, turn around, and leave the kitchen or (2) I aim to empty the cold tea, rinse it, put the kettle on, choose a new tea bag, and wait till the water boils. The differences may be only slightly manifested in the actual movements and in postures that put me on course to the next events in my activity stream. In this way an agent regulates the relations between schemes within a cluster of activity. Eventually, these regulations may not take the form of an overt, enacted scheme that has been prepared by sensitivity and readiness to ever-longer series of projected actions. To act virtually is like any embodied skill, and practice may lead to progressive refinements. At some point the virtual act may simply be the act of regulating long-range sensitivity and readiness, even before acting, by a prolongation of the "onset" phase of an enactment. Most of the time, however, these regulations happen while we act. (Di Paolo, Buhrmann, and Barandiaran, 2017, p. 233)

The virtual actions consisting in the partial enactment of sensorimotor schemes can be characterized by contrast to cases where their complete enactment implies perception and hence the detection of available ecological information. The enactment of sensorimotor schemes in the absence of respectively relevant ecological information is the matter of practical errs, as sensorimotor schemes are active via their organic support structures sometimes irrespective to the current environmental context. Sensorimotor activity never comes to a halt, and neither does it consist in clear-cut choice procedures for the activation of some sensori-

motor schemes instead of others. But, as suggested above, to "act virtually is like any embodied skill, and practice may lead to progressive refinements", hence the enactment of sensorimotor schemes in the absence of respectively relevant ecological information can also be the matter of *intentional* micro-adjustments in ongoing comportment, such as in planning and imagination.

The identity between experience and enaction means – moving outside the enactive-ecological jargon for a bit – that every time *what we experience is identical to what we do*, and this is, for sensorimotor agents, for its sensorimotor schemes to adaptively regulate their environmental coupling. Oftentimes most aspects of what we do can be characterized as involving the detection of ecological information (i.e., perception): at these times, we are bound to say, ecological information is an environmental support structure – a constituent, together with the affordances it specifies – of those same aspects of our actions, and therefore of our overall experience. But, insofar as we err, plan, imagine, dream, and hallucinate (even if we also in the meantime *perceive*, to some extent), we are still acting and are therefore experiencing. We are acting, that is to say: our organic bodies and therewith supported networks of sensorimotor schemes are actively regulating their respective organism-environment couplings.

It is a very significant fact about our lives that it is possible for us to entertain much of what there is to be entertained in Beethoven's 9th while sitting in an armchair in a silent room. What we must not forget, when reflecting about *this* sort of experience, is that music, poetry, and any other form of artwork is something *done* by us which demands high degrees of perceptual discernment (playing an instrument, choosing words, etc.). This is why we admire the artist, not only the artwork. *We* admire her because we grow sympathy for what she does, and we ourselves attempt to do what she does, with our limited resources (i.e., under shortage of well supported sensorimotor schemes), when we whistle, sing in the shower, play the piano, or even just make rhythmic movements with our eyes-closed heads. When such "attempts" are made, we may – maybe if we close our eyes – experience what we do almost as if the situation presented all particularly needed environmental support structures that it nevertheless lacks. And doing so is effective when, beyond aesthetic fruition, what we seek is also learning how to perform tasks, whether artistic or not. Imagination – perhaps dreaming – is an indelible ingredient of *perceptual* learning. Not because our brains are playing with the "representations" they magically produce, deciding which ones they will start to believe in. Rather, because imagining is *acting*.

The enactment of sensorimotor schemes in the absence of respectively relevant ecological information is part and parcel of habits' self-maintenance, and it obtains in situations

that vary from walking as if the footstep were some 10cm higher than it in fact was, yielding loss of balance or maybe a stumble, to intentionally reenacting "in one's head" Beethoven's 9th while sitting in an armchair in a silent room, possibly yielding infinitely many things (only fruition and learning having been mentioned above), or perhaps nothing quite noticeable. The former is a failure to make bodily abilities resonate to current environmental circumstances, the latter is an intentional such detachment. Both are actions, nevertheless. For this reason they are – under these aspects – cases of experience but not of perception.

3.2.2.1.1 Unclearly bounded, concrete stuff

All this being said, one last aspect of sensorimotor schemes to be examined (before we may move on in adding the interactional complexities of social beings) is the fact that, despite presenting agency, sensorimotor schemes are often not so readily identifiable in space as organic bodies are, even when we face them unfolding in front of us.

> We may ask where exactly this network of schemes resides. Can we identify a physical boundary that confines it, like the membrane in the case of the cell? Is it located in the brain or perhaps in the biological body? The short answer must be negative. While we may be inclined to point to an organism's body as the locus of sensorimotor agency, it is important to stress that sensorimotor schemes, and networks of these, constitutively involve both the organic body and its environment. Of course, a lot of the support structures, potential for plasticity, and a capacity for selective enactment and equilibration rest within the organism (and in particular within its nervous system). But a network of schemes equally depends on its environmental support. Scheme selection may in some cases rely on resonance of the network with specific aspects of the environmental situation, and equilibration may involve plastic changes in structures of the environment. Sensorimotor schemes are by definition modes in which structures in the agent and structures in the environment meet and mutually stabilize. As such, it makes no sense to try to identify their physical boundaries. (Di Paolo, Buhrmann, and Barandiaran, 2017, p. 152)

Indeed, there can be no sense in speaking of physical boundaries while none be made of something's being spatially located on the one or on the other side of said boundary. And, in fact, it makes no sense, e.g., to question whether the nitrogen particles that are floating between myself and my coffee mug at this moment are within or outside the "physical boundaries" of the sensorimotor schemes I enact every time I take a sip. How, then, can we talk of

self-differentiation in the case of sensorimotor schemes? (After all, every form of agency, that which is ascribed to self-individuating habits included, consists in adaptively regulating a tension between self-production and self-differentiation. Sec. 3.1.2.2)

First of all, one is to note that there are physical (chemical, biological, environmental) events that serve as support structures of sensorimotor schemes: my nerves, muscles, skin, eyes, fingers, and the mug and the coffee the latter is filled with (and all physical particles of said structures).[115] Second, it is based on the parameter provided by my particular way of drinking coffee while working that I would find it distressing (for a while at least) to have a slightly taller auxiliary table to place my mug upon instead of my own, or to have my mug replaced by another, with a sufficiently smaller handler, some different material, or another thus immediately noticeable difference in my sensorimotor schemes. (I ask the reader to find for herself further examples, but of minor distress caused by subtle alterations in environmental support structures of her own habits.) Some sensorimotor schemes that are now habitually enacted would dissolve into new ones – new habits, as to the sensorimotor habitat of drinking coffee while working – if these support structures were to be changed to a certain extent, for a certain amount of time, and the process of reaching out their viability thresholds would be felt (as discomfort, distress, or even pain) in direct proportion to the size of the ensuing slaughter of my habits.

As for the self-*production* of sensorimotor schemes, the need to open themselves to relationships with their surroundings takes place (not to mention their overall dependency on the sustained organic-environmental basic autonomy) in the formation of networks of sensorimotor schemes, as we saw. In order to fetch my coffee mug I must first (mostly as a child, I suppose) have acquired some dexterity in about holding recipients filled with liquids and moving them without spilling them off on the ground. And *as* I fetch my coffee mug right now I enact many other sensorimotor schemes that either modulate or in fact constitute a sedimented network of concomitantly and sequentially enacted sensorimotor schemes. In this case

115 Defenders of Enaction Theory and Ecological Psychology alike do not deny that Physics can study any kind of matter, including the matter that constitutes organism-environment systems, and organic and environmental support structures of sensorimotor schemes. What they deny is that Physics can deliver insights on how action and perception unfold based on the excessively large- or excessively small-scaled analyses of physical theories. There is no obvious conflict between the enactive-ecological approach to life, action, and mind, on the one hand, and Physics, on the other, although there may be a conflict between the former and the philosophical doctrine that every physical event can only have physical causes, depending on how such a doctrine is spelled out. Anyway, agency can be conceived as matter behaving in irreducibly systemic manners (as in organism-environment systems), not despite, but rather thanks to physical particles' isolably manifest properties. Thus conceived, living beings' agency would be adding determinations to the total course of events in the universe rather than substituting any of those that are studied by Physics. This is how my Aristotelian intuitions go on this subject. A nice and deepened discussion of it can be found in Paul Humphreys (2016).

this might include the ways I usually sit to work at home and how I adapt the shape of my lips while taking a sip of coffee depending on the temperature of the latter at the moment. Self-producing in this way is as necessary and as risky for sensorimotor schemes and the networks they yield as it is in the case of organic self-production and it is equally tensed with their self-differentiation.

All of this is to say, habits' having no physical *boundaries* makes them *no less concrete* dynamical processes than organic bodies, nor does it render their agency any more whimsical than organic agency. It is agency that, from an evolutionary point of view, becomes fragmented and intertwined into several coemerging, sometimes competing, sometimes mutually supporting, self-enacted concerns. Sensorimotor bodies do not have clear-cut boundaries but they are bodies nonetheless.

Last but not least, it should be noted that not even organic bodies have their physical boundaries as well demarcated as suggested by their skins and membranes.

> It is in principle possible to identify what processes belong or do not belong to the operationally closed network of the organism. … But this distinction does not translate into a straightforward topological relation as might be postulated by pointing to boundary processes such as membranes, cell walls, skin, etc. The network of operationally closed processes can extend beyond these boundaries and environmental processes can transverse them. (Di Paolo, Thompson, and Beer, 2022, p. 29)

As examples of these blurred and changing boundaries of organic bodies, consider the warm air that surrounds the skin or circulates within the fur of warm-blooded animals. The air counts as a process belonging to the operationally closed net by definition: it is enabled by some processes of the system as well as it enables processes of the system. Or then again the air-bubbles some insects and spiders produce and trap in the hair of the abdomen while floating on the surface of water – the bubbles afford them both floating above surface and breathing. These are cases in which "an organism … temporarily incorporates an external process into its own constitution" (Di Paolo, Cuffari, and De Jeagher, 2018, p. 28) – and walking sticks, eye-glasses and artificial eardrums are here to prove the case for sensorimotor bodies as well.

Developing a theory of the dynamically intertwined activity of sensorimotor schemes, constituting progressively complex, precarious networks of interdependence and mutual adjustments, has proven to be a remarkably fruitful achievement for the ambitions of the enac-

tive-ecological approach to life, action, and mind as one kind of natural phenomenon. In fact, it was only from understanding in these terms the emergence and dynamics of sensorimotor agency that the enactive approach has recently begun to seek to account more precisely, and again, continuously from a theoretical point of view, for the forms of life that not only act but also (in doing so) *interact* in environments filled with other agents mattering to them.

3.2.3 Participatory Sense-(and Reference-)Making

Enactive Ecology is compromised by an indelible task, that of accounting for *thinking*, if it aims at establishing "a coherent way of thinking about minds in all their manifestations from an all-encompassing embodied perspective" (Di Paolo, Cuffari, and De Jeagher, 2018, p. 04). Of course, as a task that I deem as remaining relative to what we have seen so far I am not referring *only* to the sort of thinking that can be identified in the adaptive regulation of networks of sensorimotor schemes through which an agent masters its multiple normative relationships with surrounding events. I have no qualms in calling *that* (that many kinds of animal can obviously do) "thinking". But it remains to be seen how living beings can develop concerns for symbols, including propositions and names and theories and calculi, and act accordingly, so as to reason by means of symbols; devising and telling each other which ones are true from which ones are false, which clear or clarifiable and which obscure or nonsensical, etc.. What is next to be seen is the enactive-ecological account of the kind of thinking that can only be performed by engaging in language-games.

This is where I hope to reconvene with Wittgenstein. He thought of Frege's subject-matter, the thought, propositional sense, as something whose ontological dependence on real-life *thinking* with symbols cannot be ignored – yet without turning it into an epistemological discussion about what (in general) can we *know* about what we mean by a string of words, or what have you, that is either true or false. No. Wittgenstein's quest was for clearing out the difference between *being* and *not being* a proposition. And *that*, he came to realize, can only be seen with clarity by understanding the nature – the natural phenomena – of language-games.

Well, this is one of the virtues I see in the enactive-ecological approach to life, mind, action. It does not purport to state necessary *and* sufficient conditions for there to be logically meaningful language – it trespasses any illusion that the investigation of the essence of lan-

guage, whether or not we speak of propositional language, can bypass an investigation of "the actions into which it is woven" (PU, §7) and "extremely general facts of nature" (PU, §142). Given such a contextual embeddedness and the particularism deriving from it, of the conditions rendering our uses of words meaningful in any way, what Enactive Ecology does is to devise some very general *necessary* conditions for there to be happenings in nature we are most inclined to characterize as linguistic. It submits very clearly that *languaging*, as it is, is essentially something that can only be done by living beings, by *bodies that become linguistic* in their forms of life, so as to play language-games.

Some of such very general necessary conditions for, accordingly, there being linguistic bodies, were seen in the last sections. Only living beings care for stuff around them and are thus capable of any affective discernment of aspects of their ongoing situations, their own actions. We can only sort out some things and name them, describe them anyhow, because we are alive, because we care differently for different things. Moreover, only quite complex living beings can relate to a unique object, phenomenon, or universal in the world, in nearly so many different ways as we come to linguistically portrait some objects, phenomena, and universals. Only sensorimotor agents can even recursively care about ways of caring (acting) themselves.

In short, we can only *say* or *think* (by languaging) at all – we can only *do* these things – because we are alive and we have a diversified interest in our ecosystems. Hence, what we should expect of the enactive-ecological approach (of any approach) to our condition of "rational animals" is some of what we have already seen: a theory of some, even if not all, conditions that must be in place in order for certain kinds of actions to be performed, certain kinds of languaging included.

Through the lens of Enactive Ecology, language appears not as an endowment of evolutionary history to creatures presenting such and such a bodily constitution. It is not a kind of individual ability whose overt manifestation is constrained by properties of other individuals and particularities of each ecosystem. Rather, language is to be approached directly from an ecological perspective. It is to be approached as involving individual agents of such and such a bodily constitution as well as particularities of each ecosystem but as *matter* for something whose *form* is irreducibly ecological. We are not *endowed with* language: we *partake in* it as we partake in the constitution of our own environments.

We needed an organism-environment system in order to have the simplest form of sense-making. We needed the manifold normativity of co-anchored networks of sensorimotor schemes in order to have forms of life developing unique affective relationships with the

world with respect to further concerns beyond that of organic viability. Now we need it all – we need organic and sensorimotor agency – in order to have linguistic agency but, in order to reach the latter stage, we need more: we need participation. The enactive-ecological account of language is fundamentally rooted in its account of *interactions* between sensorimotor agents. Individual perspectives – sense-making – acquire features which have hitherto been unpredictable, when the phenomenon of social interactions is taken into consideration; features of *participatory sense-making* (De Jeagher and Di Paolo, 2007). And the conceptual toolkit of dynamical systems, operational closure, and the active navigation of tensions between opposing concerns, is once again to be put in motion.

3.2.3.1 Decentering Concerns

> From birth our experience is fundamentally an experience of relating to other bodies. We inhabit a world of others. The bodies we encounter there are not given to us as objects of contemplation but as powers of interpellation that can look at us or ignore us, question us or support us, move us and respond to us, smile, cry, and just be alongside us in sharing a world of concerns and activities. … We see (touch and smell) them in their materiality and at the same time sense their own powers and sensitivities, and their vulnerabilities and blind spots. These powers and sensitivities are not merely objects of our perception, they also have a hold on us as we are drawn by them into a different portion of the world, one that can fascinate us … The bodies of others become displaced centers of vectors and fields for me, ambiguously present together with those of my own body. (Di Paolo, Cuffari, and De Jeagher, 2018, p. 62)

We saw in section 3.2.2.1 how the operational closure of the nervous system, together with the sensorimotor loops that are inherent to its embedding organic life, yields autonomous systems at the level of modes of acting themselves, neurological patterns of activity bringing the whole organic body to hold a myriad, continuously and fallibly equilibrated normativity, together with its vital norms. Habits – networks of sensorimotor schemes – anchored in sensorimotor bodies asymmetrically regulate their coupling to the environment following their own drive for self-individuation. Sensorimotor norms are continuously adjusted among themselves and the (also changing) norm of organic self-individuation. These are the affective, appraising

ingredients, of the phenomenal flow that is lived within a sensorimotor life in its surrounding circumstances as an agent lives.

The enactive approach to intersubjectivity consists, first and foremost, in clarifying what happens that is necessarily different when social interactions take place between sensorimotor agents. Attention shall be placed in the way this type of situation is enabled and constrained by a joint regulation of (at least) two independent agents but, despite such a regulation, itself exhibits some level of independent dynamics. It is for dealing with such a remain of unpredictability of social interactions, which is never to disappear (but rather to transform along a history of attempts to be dealt with) that a historically emergent repertoire of participatory engagement is required, ending up in a form of life that can be recognized by us as linguistic.

The first thing to be noticed is that not every encounter between sensorimotor agents yields a social interaction. A social interaction is not what occurs when, for example, a father places a toy in a certain place within the toddler's reach so that the toddler can find it, and then goes back to writing his dissertation; this could only be characterized as an influencing of the toddler's sensorimotor influx by the father. By contrast, an example of social interaction might be the case in which the father extends the hand holding the toy toward his son or daughter, and the latter accepts the invitation, takes the object, or else declines the invitation and pushes the toy away (Di Paolo, Cuffari, and De Jeagher, 2018, p. 146). What happens in the latter case that does not in the former is that both agents are then momentarily *coregulating* aspects of a situation in which both are actively and independently invested. The outcome of following the norms of their respective sensorimotor schemes in dealing with situations presenting features of this one but abstracted from the other agent (say, grabbing, holding, twisting, tossing, examining, playing alone with, an object that is similarly weighted and shaped as the toy in question) are no longer the only ones in place. Each agent is to deal with aspects of its surroundings she is familiar with, whose dynamics is now being modulated by factors that obtain solely because there is another agent acting concomitantly with respect to the same aspects of the situation in question.

A further aspect can be expected from an interaction between two or more sensorimotor bodies. Each agent perceives what it does, what it does being constitutively an organism-environment dynamics. But sense-making, when it amounts to perception, involves only a subtraction of the overall dynamics of a situation, not all that occurs in the latter is an aspect of the organism-environment coupling that some of the acting networks of sensorimotor schemes can monitor and react to. Hence, every *action* yields a *move* that, whether beneficial

or not, is unforeseen, undesired, and not under anyone's control. (One can once again remember Anscombe here: our intentional actions are known under some descriptions without observation, but then they are concrete events some of whose descriptions can only be known, if at all, *through* observation) While individually within sensorimotor agency this is part of what yields habits' plasticity and redesign within their overall, ongoing adaptivity, within social interactions it amounts to something more: the excess of interactants' moves relative to their intended and perceived acts of coregulation yields aspects of such events that are unforeseen, undesired, and escaping from anyone's control, which however only exist because of such coregulatory acts. In turn, part and parcel of what lends coregulatory acts their specific character is the need to cope with such aspects of interactions that can only occur within interactive contexts. Thus, an operationally closed, precarious organization of events can be devised in the dynamics of social interactions.

Coregulation of what happens during a social interaction is what causes the kind of "life of its own" of such events, insofar as participants, as coregulators of the interactive situation, continue to act and cause movements that exceed their own intentions, thus feeding into a chain of events that escapes absolute control. Even though social interactions can only emerge from intentional actions, they are never fully under the control of anyone's intentions; once emerging, social interactions can continue for some time even against the will of all the interactants involved.

> The autonomy of interactive patterns is vividly confirmed by experiences of interactions that frustrate the intentions of all the participants involved, who feel unable to steer the direction of social engagement. Interpersonal coordination can emerge even against a well-defined individual intention not to coordinate. Consider for example how telephone conversations with a friend or relative can prolong themselves even after we have started to say goodbye. A last-second comment, sending regards to somebody, can respark the conversation even if we didn't intend for this to happen (it's only polite for the other party to respond with a bit of news about the person we mentioned and for us to listen and make a comment, and so on). Or consider interactions that escalate agonistically without anybody's intent, especially in cases when the participants attempt to avoid repeating previous negative patterns and therefore tread carefully in ways that precisely summon the negative patterns. Escalations of this kind, such as a family quarrel, can occur through nobody's fault but that of the relation between attitudes, mismatched perceptions, acts, and timing. Another classic example is the short-lived "corridor dance" we sometimes experience when somebody is walking in the opposite direction to ours along a narrow corridor. Here we each engage in a lateral displacement, not in order to sustain an interactive encounter, but in order to break it. But when these moves are coordinated and we end up in front of each other again, the original situation of mutual obstruction reemerges, sustaining the relational pattern. Think also of a group of people moving together, say they are exiting a cinema and heading toward a known destination. The group may be engrossed in a lively conversation and unexpectedly they all stop

> walking, each participant responding to what she perceives the group to be doing. Without abandoning the conversation and equally unexpectedly the group may at some point reinitiate movement. (Di Paolo, Cuffari, and De Jeagher, 2018, p. 69)

The reason for technically attesting the autonomy of social interactions under enactive-ecological parameters is simple. What each agent is to deal with along an interactive situation is an operationally closed system constituted by (i) its own actions, whose character is modulated by the peculiarity of the interactive situation, (ii) the actions of another agent, which are equally peculiarly adapted but relative to its own sensorimotor constitution, and (iii) the unfolding relational patterns that are caused by co-regulation but not intentionally with respect to either interactant's motives. A moment's reflection allows one to see that none of these (i-iii) processes would obtain were it not for the others to occur: this is for them to enable each other under precarious conditions. "To speak of a social interaction is to speak about relational patterns and individual participants as equiprimordial" (Di Paolo, Cuffari, and De Jeagher, 2018, p. 71). The constitutive processes (i-iii) of any social interaction therefore constitute a far from equilibrium, precarious, operationally closed system, i.e., an autonomous system.[116]

> An interactive encounter can then be seen as an excitable medium. It is charged with potentialities and may undergo changes in its modes of stability as a consequence of the actions and moves of the participants, whether they intend these changes or not, but also as a result of the physical and social situation in which the interaction is taking place. (Di Paolo, Cuffari, and De Jeagher, 2018, p. 69)

When social interactions do obtain, the norms guiding simple sensorimotor life are no longer enough to guide an agent's overall comportment and sense-making. For the emerging autonomous process in which such an agent partakes can either unfold in synergy with its momentary individual norms, or in dissonance with them. The case of the "dance" in the narrow corridor is one where a dissonance will plausibly occur on both sides, as almost surely along family fights in the dining room. But neither, it should be noted, is simply doomed to be a bad interaction; interactions are open-ended dynamical systems that are susceptible to breaks and

116 Not an agent, of course. Autonomy does not imply agency, and agency implies autonomy, asymmetric regulations on the part of the organism, and norms of self-individuation. Social interactions' is therefore "a basic form of autonomy, similar perhaps to the autonomy of autocatalytic sets of chemical reactions", which is sufficient for stating that "interactions can thus be identified as distinct from other patterns of relating to the world that may be occurring simultaneously" (Di Paolo, Cuffari, and De Jeagher, 2018 pp. 66-67).

recoveries, both fortuitous and intended. The hallway-dance may become an exciting flirting situation, and a usual family fight can disclose with a creative move, perhaps a joke, or some unexpected turn caused by street noises or a broken glass. Synergies can also be illustrated by a dance (without scare quotes) or a conversation that turns out to be increasingly fluid and pleasant. Cases of synergistic interaction are those from which we get more than previously wanted from an interactive situation, that can make us feel that making ourselves vulnerable to others can be worthy (Di Paolo, Cuffari, and De Jeagher, 2018, p. 143). The peculiarity of interactive encounters in relation to non-interactive ones and their noticeable difference between synergistic and dissonant ones makes sensorimotor agents *care* specifically for this type of situation they constitute as sensorimotor agents (if only, of course, these are frequent enough).

Participatory sense-making, then, consists essentially in a sensitization to, and practical learning of, ways in which a social interaction tends towards patterns that are dissonant or synergistic in relation to one's own concerns, as much as in the capacity to actively avoid these dissonances and promote these synergies. It is, in short, a new sort of sense-making, as always consisting in the emergence of norms of agency (discernment between better and worse events among both, intended and unintended) but specifically related to participation in social interactions. These are the norms of coregulation, i.e., "the organization of individual sensorimotor coordination patterns into *jointly regulated* sensorimotor schemes" (Di Paolo, Cuffari, and De Jeagher, 2018, p. 145). Because norms of coregulation emerge solely within, and due to, interactive encounters – involving other agents and relational patterns into an autonomous system – the metaphor of "anchoring" that applied to networks of sensorimotor schemes does not hold for social norms. Adaptation, care, and purpose, are in this case decentered into the various kinds of social interactions – with different agents, in different places, with different duration, in different physical conditions, etc. – in which synergies are to be pursued and dissonances avoided.

Still, in the same manner as the norms of sensorimotor agency do not obliterate any vital norms, they themselves are not anyhow obliterated by such decentering concerns of interacting lives. On the contrary, participatory sense-making is continuously enabled and constrained, even if underdetermined by organic and sensorimotor forms of self-individuation. Because of this, an emerging concern for social interactions yields a novel kind of functional and affective tension to be dealt with besides all other, preextant (and enduring) ones.

> The autonomy of the social patterns would be enhanced if we eliminated the autonomy of the participants, and vice-versa. *Such is the primordial tension of participatory sense-making*. Acts are regulatory for the embodied autonomy of the participants and at the same time they are moves in the interactive game. The tension is inherent in the concept itself, made flesh in the materiality of acts, and something we actually live through in everyday interactive experiences. (Di Paolo, Cuffari, and De Jeagher, 2018, p. 145, emphasis in the original)

The reason why this tension is inherent to participatory sense-making is that agents, no matter how well socialized and caring for the salutary development of the social interactions in which they partake, never share the same history, nor are they ever placed in totally predictable or controllable contexts of interaction. The different histories of sensorimotor agents, as well as their ensuing singularity, are what we saw (not that it is the case, but that the enactive-ecological approach can explain why it is) when we analyzed the four levels of analysis through which we can speak of sensorimotor contingencies. We observed there that the sets of sensorimotor coordination patterns constituting each scheme stem from a particular history of agent-environment couplings. An individual's networks of sensorimotor schemes "are formed historically and to an important extent idiosyncratically, subject to the particular life experiences of each developing sensorimotor body under the direct influence of local environments" (Di Paolo, Cuffari, and De Jeagher, 2018, p. 59). Hence, every coregulatory engagement will necessarily be either in synergy or in dissonance (on many degrees and under several aspects) with the emerging autonomy of social interactions. To the extent that we are sensitive to this, our acts in social interactions are inherently strenuously guided, simultaneously, by norms aimed at the good development of interactions, on the one hand, and by the norms singularly embodied in ourselves as individual agents, on the other.

3.2.3.2 Trying to make it work: stages of coping with social tensions

> Our aim is to understand linguistic agency and linguistic bodies in the most general terms permitted within human practices and social patterns. This means not only attempting to use constraints that are widespread, as opposed to those that appear in a particular culture or social period, but also attempting to eschew prejudices about the ways linguistic agency occurs. The result should be a concept of linguistic bodies applicable, but not limited, to contemporaneous human beings. The concept will

> not be specific as to the form that languaging can take (e.g., speech, gestures, facial expressions). In this way, we attempt to look at the conditions that make social agency linguistic, the deeper roots all forms of human languaging share. These conditions may also apply to other cases apart from contemporary humans, provided the material constraints we have used in the model can be generalized to those cases. (Di Paolo, Cuffari, and De Jeagher, 2018, pp. 165-166)

Explicitly, the development of social abilities we can deem as linguistic is modeled in *Linguistic Bodies* (Di Paolo, Cuffari, and De Jeagher, 2018) not as a historical development, however it be sometimes hard to avoid making the projection of the stages that are thereby devised into history, either evolutionary or human (and however adequate such a projection may even be sometimes). Strictly speaking, however, what Enactive Ecology shew itself able to devise were subsequent conditions of possibility for the emergence of novel patterns of participatory sense-making, each stage being seen as emerging from the need to navigate more aptly through the social-individual tensions taking place at previous stages. No such stage disappears along with the emergence of subsequently enabled ones when these are actualized. The relations between the progressive stages of realization of participatory sense-making, each unfolding over the operationally closed patterns emerging in social interactions, are such that "the introduction of new forms of social agency alters the existing tensions and how they are managed, but does not fully overcome them" (Di Paolo, Cuffari, and De Jeagher, 2018, p. 161), the same holding for the back-propagating effects of social engagement on individual sensorimotor lives and organic norms of self-individuation.

The first such stage of participatory sense-making, which is characterized by the tension inherent in coregulatory acts as they are prompted by individual and social norms at the same time, is to be regarded as taking place in whatever sensorimotor form of life that involves recurrent interaction.[117]

Coregulatory acts are thus inherently social acts. As we saw, they are "the organization of individual sensorimotor coordination patterns into a *jointly regulated* sensorimotor scheme" (Di Paolo, Cuffari, and De Jeagher, 2018, p. 145). They are the kind of thing that

117 The enactive-ecological approach to intersubjectivity must operate the abstraction of what makes human intersubjectivity the way it currently is, in order to mark and characterize the types of participatory sense-making (a phenomenon that in itself characterizes the lives of ants and termites, for example; not only those of humans) which enable and constitute our own participatory lives. This is an effort of abstraction that we have been making since we spoke of the importance a human being gives to their own life and how a human being opens a door; norms of participation permeate our lives even in such events (consider the interaction of social and organic norms in a person's going on a diet, or the careful manner in which she opens the door to a room wherein she knows there is someone else studying). With a similar heuristics, now, we are to devise simpler forms of participatory sense-making by abstraction from our already more sophisticated ones, hopefully to end up attaining a better understanding of the latter.

happens when we learn to shake hands, to accept and reject object offers, to be beckoned with a hand wave (or a smile) and to respond with another. Social acts require the enaction of *partial* acts from each agent, so that the interactive situation can be coregulated, however fallibly, towards more synergistic dynamics relative to individual agency. A handshake does not happen if only one person makes the gesture, without the other complementing it. Nor can one successfully offer a toy to a child if the child neither accepts it nor rejects it. Sensitization to manners in which social interactions may unfold while seeking synergies with them, and avoiding dissonances, involves the joint enactment of sensorimotor coordination patterns *with* other agents, and these coordination patterns are significantly employable only through the complement – the participatory sense-making – of another party.

To give another example, most of us can only carry a heavy couch across a living room and down a staircase with the help of at least another person. While doing this, each person must attend not only to other pieces of furniture along the way, fragile objects on a layover, and the height of each step of the stair, but also to the changing movements, posture, fatigue, and attention of the other along the way, everything one does serving as a complement, a partial act, relative to what the other does in a jointly enacted social act. Social acts thus always inherently involve a partial bestowal of control over one's own lived and acted upon situation, in favor of norms that are participatorily established.

> Coregulation implies accepting a more direct participation by others in our sense-making without entirely giving up our agency. … In accepting the possibility of yielding, partly and temporarily, our individual agency, we exert some influence on something we *can* control ourselves: our willingness to accept the participation of the other in constructing a joint social act. … In a sense, a social act is the precise opposite of the attempt to establish synergy by orchestrating everyone's moves, which we saw is doomed to fail (or turns a genuine interaction into something else). Coregulation is not only acting together but giving the interactive situation itself influence on our acts. (Di Paolo, Cuffari, and De Jeagher, 2018, p. 149)

Therefore, according to the enactive-ecological approach it is from interactions that the learning of partial acts conforming a social act occurs; it is from reiterated interactive engagement that we learn to "do our part" in a handshake, as well as to expect others to do theirs; to recognize the appropriateness of our own, as well as others', partial acts in the context of an interaction. Even though each agent is responsible for the enaction of a partial act of coregulation in each occasion, their sensitivity extends to the coregulation as a whole, including typical relational patterns and sedimented ways of responding to them with others. Regu-

lar participants in social interactions grow sensitive to both, the complementary partial acts of their interactants and to the contexts wherein the social act as a whole obtains.

Herein the conditions of possibility for further developments of participatory sense-making take place. As we saw before, the ongoing equilibration of sensorimotor bodies tend to stabilize into networks of concomitantly and sequentially enacted sensorimotor schemes – partial, or "virtual" enactments included – forming "clusters of activity" (Di Paolo, Cuffari, and De Jeagher, 2018, p. 150) which are now aimed specifically at interactive contexts. After engaging in different social interactions, coregulatory patterns tend to sediment into new (networks of) sensorimotor schemes. They become sedimented *habits of interaction*. Sensorimotor bodies become socialized.[118]

Moreover, given an actual variety of interactive encounters, different coping strategies are to be developed for otherwise similar tasks – for example, small variations of greeting, offering, carrying objects together, as well as variations in subtasks related to recovering from different sorts of breaks in each these different kinds of interaction (say, readdressing a passer-by that doesn't listen to a first greeting in a louder tone of voice), etc.. Partial acts of every learned kind of social act add to a repertoire of equivalent and complementary classes of partial acts (say, an equivalent class of ways of beckoning at someone at a distance, and a complementary class of ways of responding to gestures of the first class). Despite such a sedimentation of habits of interaction, a situation is never one of social interaction if some supposed participants let themselves be completely driven by social norms (e.g., by taking their repertoire of equivalent and complementary partial acts as protocols to be followed) as if no conflict existed between these and individual norms.[119] The establishment of something like an accepted repertoire is useful for dealing with the primordial tension of social interactions, but that tension is an essential trait and never completely vanishes from social interactions – which does not mean that social interactions cannot become something else.

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118 Here it should be stressed that this means for forms of life not only to acquire a social dimension, but in fact to *become* social. Organic normativity starts being complied with *through* interactive engagements, such as hive-construction and pack-hunting. And networks of sensorimotor schemes increasingly find their support structures in aspects of coregulatory events. This process never entails the obliteration of organic and sensorimotor norms as such, by the simple (and already stated) reason that each individual form of life, as to both its organic and sensorimotor dimensions, have a unique history of coupling with its respective surroundings, the particular social patterns in which it partakes being one among other factors of said surroundings.

119 Properly speaking, there is no social interaction if there is no proper coregulation of the encounter (Di Paolo, Cuffari, and De Jeagher, 2018, p. 71). Contexts of unilateral control of an encounter between agents are, for one, like dealing with inanimate objects; for the other(s), it is like mimicking a machine (which is done intentionally, but both predictably and without giving any import to relational patterns). Examples of this kind of situation include some laboring services, like telemarketing and other sorts of shopping assistance, as well as many sorts of unfortunate human-non-human encounters.

In other words, the learned equivalence and complementary classes of partial acts that agents come to embody with their histories of participation always leave room for improvisation, and improvisation in this context serves the ever present tendency to comply with individual norms *against* social ones. At the same time, interactions that constantly invite improvisation can be distressing. Too unpredictable interactions are no good environment for sensorimotor schemes that emerged from recurrent interactive situations. Some welcome amount of comfort is to be found doing things as they are customarily done, which in this case means: to do (and, of course, be enabled to do) the things one trusts the most it will work while interacting. Therefore, there arises a lived tension "between *spontaneous social acts* and habitual codefined partial acts" (Di Paolo, Cuffari, and De Jeagher, 2018, p. 151).

From each novel tension that be occasioned by habits of interaction between sensorimotor agents (those we have seen and those we are about to see) it does not *follow* that new coping strategies will be developed so as to steer interactions into more favorable trajectories and consequently remodulate preextant tensions into new ones. Since the start, the enactive-ecological approach to agency purports to devise conditions of possibility for kinds of agency (sense-making), yet not to devise any *law* of agency. Accordingly, both for coping with the primordial tension of life – between self-production and self-differentiation – and for coping with every new tension arising from novel configurations of social patterns, there will always be both, bodily (philogenetic and ontogenetic) and environmental constraints at play, that can ultimately confine a generic form of life to *that* kind of lived-by normative conflict, whether organic, sensorimotor, or participatory.

As for the case of the tension between spontaneous social acts and habitual codefined classes of equivalent and complementary partial acts, it is plausible – though not within my jurisdiction to decide – that animals of several species live social lives that be characterized by just such a tension (and all others, of organic, sensorimotor, and social dimensions, that enable it and endure). However, since our goal here is to reach the stage of the model wherein forms of *languaging* can be fully recognized (and I do wish to imply that they are already being *partially* recognized: we are discriminating some of the actions into which language-games are interwoven), we can proceed by imagining how bodily and environmental conditions typical to ourselves – to our own natural history – enable further developments of social patterns and socialized agents.

At this stage, interactions of each agent with others lead to the sedimentation of repertoires of equivalent and complementary partial acts, and the environmental constraint to be considered is that "social interactions take place with biased distributions: some participants

are more likely to interact repeatedly than others" (Di Paolo, Cuffari, and De Jeagher, 2018, p. 150). Such local differences in social patterns are not always to make a big difference as to the manners in which different groups of agents carry on with their social tasks (as in the example of moving a big, heavy object together), but sometimes it does. For example, in a certain locality people may greet each other with handshakes whence each person uses only one of their hands. In another, the handshake can be further cherished by the hands that are not being shaken, which gently envelop the hand of the interactant that is shaking one's own. It may also be that the act of extending the hand to greet be offensive (i.e., not perceived as a greeting at all); that one should, instead, incline the torso or the head forward (and here the angle of this inclination, how quickly it is done, whether or not one looks into the other person's eyes while making the movement, etc., can also matter). Likewise for other social acts besides greeting, each repertoire that emerges within different groups of recurrently interacting agents can thus be constituted by locally sedimented classes of equivalence and complementarity of partial acts constituting social acts.

When these classes do present some significant discrepancy or divergent "biases" across different groups, agents that, by virtue of diversified interactions, come to attend to such divergences, may also learn certain manners of preventing them from ensuing dissonant breaks in interactions: metaregulatory partial acts. "A partial act can thus become a recursive regulator of other partial acts. The coregulation problem becomes, in part, a problem of coregulating ways to coregulate" (Di Paolo, Cuffari, and De Jeagher, 2018, p. 153, emphasis subtracted). Such metaregulatory partial acts – which, as always, are socially enacted, and not as merely individual skills – can assume the form of gentle delays in the completion of interactive moves, smiles, and other short-timed hints directed at the other so that the partial act be appropriately complemented without abruptly interrupting the flow of the interaction.

> All partial acts to some extent induce a certain projection and expectation about the responses that would fit them and complete the whole social act. An intensification of these projective aspects … can turn a partial act into a metaregulatory one. … The awkward moment when noncompatible partial acts are initiated is often resolved spontaneously, on the fly. But it is possible for one participant to intensify an aspect of a partial act and thus regulate the choice of complementary act in the other participant – for instance, gesturing ahead toward the partial act to be enacted, initiating it earlier or emphasizing it (e.g., opening both arms a bit quicker so as to move toward an embrace). (Di Paolo, Cuffari, and De Jeagher, 2018, p. 154)

The social affordances' being disclosed of enacting metaregulatory partial acts, such as "showing a palm to induce a pause in the partial acts others are initiating" (*Ibid*) not only facilitates the enlarging of classes of equivalence and complementarity of partial acts, but also induces an increased awareness with regards to non-actualized alternatives along the actually chosen enactment of each. What expectedly happens along the history of an agent's acquiring a repertoire of equivalent and complementary partial acts, which is reinforced by metaregulatory attention to such equivalence and complementarity classes, is the accommodation of interactively learned sensorimotor schemes. They accommodate into networks and relations of shared support structures ensuing the virtual enactment of some while *others* are being overtly enacted. A whole local *pragmatics of interactions* is thus strongly brought under attention, social acts themselves are perceived and acted upon. But not only social acts are evaluated (i.e., appraised, perceived, made sense of) for how appropriately their partial acts combine in an interaction, but also metaregulatory partial acts themselves get evaluated for how appropriately they resolve tensions between different equivalence and complementarity classes of partial acts. Hence, whereas previously a tension existed between individual sensorimotor norms and attempts to extract synergy from social interactions (a tension that was doubled by the emerging difference between repeating coregulation patterns and creative new ones), now a new, equally tensioned contrast to spontaneity, rises from sedimented but fallible metaregulatory partial acts.

Still, this is and remains a tension to be lived and experienced by participatory sensemakers in relation to relatively proximate fellows. The next stage of the model requires the supposition of actual movement and of encounters between agents which share little to almost nothing of their pragmatics of interactions. Having become conscious of the social meaningfulness – and effectiveness – of metaregulatory partial acts, and considering an interaction wherein both social acts and metaregulatory attempts seem to systematically fail to be adequately complemented, agents engaged with the objective of steering the interaction towards a relatively more favorable trajectory can use coarser metaregulatory acts they master but with a greater emphasis, for an *interlocking* (not merely suggestive) effect upon the ongoing coregulation. Consider, e.g., wide-opening the eyes and sternly facing someone in order to turn her silent or still; or even shouting, to the same effect. Or, again, not merely gesturing with open palms oriented toward someone else in order to prevent her from further approaching, but actually touching her body so as to stop her. Interlocking partial acts like these combine, thus, the exploration of an interactant's social history, which includes the enactment of metaregulatory partial acts (however they fail to share much of such a history), with more basic forms of

coregulation and sensorimotor mastery (sudden movements, physical barriers, loud noises, all afford halting and reorientation). They are *portable* in the sense that they are simple enough to serve to navigate contexts of interaction wherein two local pragmatics are deeply divergent. This is expected to occur with the ability of agents to move across different territories entering the picture, wherein sharper differences between local pragmatics are to be expected.

Though primarily required for dealing with interactions wherewith little to no shared participatory history obtains, however, interlocking partial acts make their way back home, as it were, both modifying and combining with partial acts of local participatory pragmatics. Nodding with the head to agree or disagree, and hand gestures indicating, for instance, the intention to eat, directions to follow, or ostensible elements of the shared surroundings, among others, are examples of simple, portable, and effectively interlocking partial acts that come to constitute both, local pragmatics and encounters where they are more markedly required. Being used within more familiar contexts, however, interlocking partial start to give rise – alongside the customs they become enmeshed with – to novel social patterns, such as distinctions "between local, private, familiar, more spontaneous interactions and distant, public, stranger, more ritualized ones" (Di Paolo, Cuffari, and De Jeagher, 2018, p. 166). Signatures of leadership, friendship, rivalry, and submission, can be established within communities by differential frequencies within encounters between specific subjects, of either conventional, docile social acts, or else strongly normative, interlocking social acts. Roughly speaking: no one bows to a friend.

An interesting, global effect of this process of "bringing back home" the employment of strongly normative, interlocking partial acts, and by doing this to change and transform local pragmatics, occurs. The pragmatics consisting in classes of equivalent and complementary partial acts, and also metaregulatory ones, were and will keep being, after all, where those *portable* partial acts came from in the first place. Now, local pragmatics is modified by the reintroduction of interlocking partial acts in frequent and familiar contexts. The effect is that a precarious, operationally closed system is formed at a cross-community-wide scale, whose constitutive processes are *social acts* (as always, with all their inherent relational patterns involved). Partaking in a social interaction in times like this, therefore, is to engage with an autonomous system, the interaction itself, which in turn is constitutive of a further autonomous system, formed by mutually enabling patterns of interactive engagement.

It is worthy to note that this kind of move involves an acute manifestation of its performers – and, by consequence, of its addressees – as loci of intentional actions with strongly determining power over the autonomous systems that arise from coregulation. We "should

note that a sensitivity for others and for the self is gradually built into the skills and capacities of the participants as we move through the stages of the model" (Di Paolo, Cuffari, and De Jeagher, 2018, p. 162). Full awareness of oneself as socially contrasted to others is assumed to be still on its way, however, as participants of social interactions "are first assumed to be sensitive to being engaged *in interactions*" (*Ibid*, emphasis added).

As should be expected by now, for each individual agent participatory sense-making is to be characterized by yet another tension to be lived through. The character of the tensions that are inherent to social patterns constituted by the widespread usage of interlocking partial acts is not difficult to predict either. As always, agents coregulating in social interactions attempt to steer the latter into synergistic formats relative to their own embodied normativity – something which increasingly means turning the relationship with the autonomous social interaction synergistic to *all* agents involved. The sustainment of social interactions is functional for the self-individuation of an increasing number of networks of sensorimotor schemes (and, indeed, for organic normativity itself), insofar as they *are* sensorimotor schemes *of social acts*. Even so, idiosyncrasy is never completely lost, and interlocking partial acts are a powerful ability for (as much as possible) controlling interactions.

Hence, the tension. The power of interlocking partial acts to reconfigure the interactive process according to the will of its performer is something seducing, and, as should be clear by now, no one can be the only one to sense its attractiveness. Abusing this power, however, can yield complete control over an encounter. But then the latter will no longer be one of social interaction, and the intention to steer *the interaction* will not be satisfied. On the other side of the rope, relying solely on established local pragmatics in its weakly normative metaregulatory acts can yield the opposite scenario, as the use of strongly normative partial acts from others can dictate the interaction toward synergistic trajectories relative to their interests, irrespectively to one's own concerns. Abuse of power on both parts, on its turn, can easily leave the sphere of the co-enactment of social acts and turn the encounter into a fight. The tension to be dealt with (or not) at this stage, therefore, is one between power and abnegation.

The fallible solution to this tension, in turn, in spite of lacking any magic, comes near to isolate humans in the enjoyment of its privilege.[120] As the aforementioned tension is itself

120 But notice how much we have already advanced up to this point, in disclosing the concrete enabling conditions for traits of our own lived experience that are doubtlessly (though, obviously, to different extents) shared with members of other species. Perception, hesitation, imagination, and dreaming, all find their roots in the nature of sensorimotor agency. Our sense of the autonomy of social interactions, of the inexorable difference there exists between the unfolding of social interactions and our own intentions; of the synergy of some encounters with our own wishes, and of dissonances thereby. Adding to these, our sense of comfort

perceptually disclosed along repeated interactive encounters, with the possibility of breakdowns of the interactive autonomy due to one part's overruling the encounter being anticipated, escaped from, or fallen into along diverse occasions, a gradual enactment of *asymmetric roles* in the co-production of social acts can be first brought forth on a regular basis. To be clear, such roles can only be part of social interactions so long as they be actively *accepted* by all parties involved, and hence actual *co*regulation, and the autonomy of the interactive encounter, keep obtaining.

> If one participant initiates a strongly normative partial act, then this participant is assuming a *regulator role*. If the interaction is sustained in such a case, then other participants can only assume *regulated roles*. This differentiation can persist because to assume a regulated role is not yet to have lost autonomy; it can be a role that is accepted by the regulated participants, a prolongation in time of the attitude of letting things be that enables social acts to be coregulated in the first place. (Di Paolo, Cuffari, and De Jeagher, 2018, p. 168)

It is along these lines that the enactive approach to our significant custom of *dialoguing* is gradually elaborated – whose developments may satisfy yearnings for distinctive features of human nature in relation to the rest of the animal kingdom (again, this is an empirical question I shall not answer), although they fall short of elevating human nature to any "other" realm. Rather, what is new to *dialogues* under the enactive-ecological model is the spontaneous and consented establishment, by all parties involved, of a temporary allocation of the regulator role to one participant within an interaction, in such a way that an agent be actively allowed to guide, according to her (limited) means and purposes, other interactants' sense-making. (The repeated use of dyads of agents to exemplify the modeled developmental stages of social interactions should not divert the attention from the fact that social interactions can involve any number of agents above one).

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with regular practices and excitement with creative interactive moves we produce; the felt abyss within interactions with little to no common ground of social acts, and our sometimes near to aggressive, sometimes childishly funny coping strategies to build the desired bridges. And, finally, our sense of the ritualized and intimate moods that interactions – sometimes one and the same – can take, and the risks involved in both dominating and letting others dominate interactive encounters, to the point that one or another's agency can no longer make itself effective to the encounter. All of these traits do not yet imply, nor involve, things like dialogues, reasoning, reflection, and symbols. They are, to different extents, recognizable features of a vast array of different forms of life besides those of ourselves, from bee-hives to wolf-packs to dolphins-pods to higher primates-societies. The extent to which other animals share with us the foregoing capabilities to be modeled continuously with the former, is a question for empirical research to answer that escapes the scope of this dissertation.

Hence, in place of the quick interactive asymmetries caused by alterations in tone of voice, abrupt gestures, and other simple, coarser forms of strongly normative intervention, the partial acts that constitute dialogues are *alternated time concessions* for one of the participants to exercise a regulator role in the coregulation of the interaction, and hence, to some extent, of what others see, hear, do, and even how they virtually act. Dialogues are thus characterized as interactions whence there are periods in which one of the participants enacts the role of asymmetrically bringing forth and orienting the sense-making – the perceptually guided actions, the monitoring of significant environmental events and structures – of other participants, who not only accept this but actively help sustaining this interactive configuration (Di Paolo, Cuffari, and De Jeagher, 2018, p. 172). That these are the only essential characteristics of dialogues implies that *utterances* – the partial acts produced by those exerting such a regulator role in a dialogue – are not necessarily discursive acts; i.e., dialogues do not necessarily contain verbal utterances, words being used. Utterances can be, for example, demonstrations of how to make a fire, ostensive gestures, and acting performances, as much as they can be verbalized orders, lessons, lectures, and sentences. But also the primitive – yet complete – language-game from §2 of the *Philosophical Investigations*, where one participant utters single terms like ‘slab’ and ‘pillar’ and the other brings him an item, counts as a dialogue. The duration of an utterance (so much as the particular outlook of the performance, e.g., whether verbal or not) is inessential, but the co-determining roles exercised by the one who produces an utterance and by the one who grants this, is an essential property of an utterance, of a dialogue. Their efficacy in bringing forth an actual regulation of the encounter is enabled by all previous stages of development of social interactions. Dialogues rely on a previous (and ongoing) history of habits of interaction, the establishment of classes of equivalent and complementary partial acts of coregulation, metaregulatory partial acts, and interlocking interventions. They are borne out of the acceptance that interactive asymmetries can be sustained in mutual accord, and that this may bring about benefits, both for the continuation of the social interaction, and for the joint steering of the latter toward synergistic trajectories.

It is only with this developmental stage of social interactions that one of the most overvalued traits of human minds for modern and contemporary philosophies of mind can be established – in our natural history – containing two inseparable facets: on the one, the full awareness that oneself is something that counts as an individual agent – with a particular physical constitution, and paricular sensitivities, styles, customs – that is capable of steering

an interaction with other agents and be guided by them in common accord.[121] On the other, the full awareness that one is dealing with something that counts as an equal under these aspects – i.e., with another vortex of intentions, affects, acts, styles, and a life history – among still others that so count. For the causes (and not only the effects) of interactive synergies and dissonances in relation to an interaction are now perceived and traced back by each participant, to the different and respective capacities to produce and make sense of utterances that agents embody in themselves. “In both cases, in considering others and in considering the self, the actions and moves of participants are seen as anchored to an identifiable center that can be related to the actions and moves inherent in the same body across time (eventually across recurring encounters)” (Di Paolo, Cuffari, and De Jeagher, 2018, p. 170). It is those bodies – those sensitivities, those styles, those customs – that will determine the feasibility and appropriateness of diverse manners of asymmetrically regulating and being regulated in an interaction, while either conducting or letting oneself be conducted along the latter.[122]

Now, such an actively endorsed role-asymmetry being established as a feature of a way of interacting that is functional for coping with familiar tensions (what I called the “power or abnegation” tension, in particular), and consequentially becoming incorporated into social patterns, a double aspect of utterances is brought forth. On the one hand, they are *pragmatically* useful. Utterance-producers do their job being aware that they are being allowed to

121 Equally to the case where I cursorily mentioned the rising of the “unity of apperception” in section 3.2.2.1, when we saw how a sensorimotor agent is capable of both tracking the same object as such along changes in the latter and recognize their actions as their own, one might complain that not every feature is yet being made evident here, with respect to what is traditionally referred to as “self-awareness”. In neither occasion is it my point to delve into any exegetical discussion (of which there are many, and have endured enough around the commonly presupposed representationalist intuition). Still, I use these terms as an attempted heuristics to show how a naturalistic rendering of all features of our lived experience is possible, including those that are still often talked about in grandiose tones of mystery and profoundness – precisely due to their lack of naturalistic groundings.

122 Needless to say, no matter how entrenched within social patterns do dialogues become, this does not transform thus socialized agents into mere producers and interpreters of utterances, not even if by abstracting from all situations in their lives that are of no interaction. Previous capabilities, previous tensions, are all in place; the dialogic, often turn-taking game that we are now describing, is neither always established whenever a social interaction occur, nor does it warrant that the now “mutually recognized” agents will thrive as to their goal of leading the interactive processes to good terms. Simpler coregulatory practices can be enough (we can still carry that couch without a word being said), and they will effectively be carried out along the course of a dialogue, with all their specific tensions and social resources being brought forth as the interactive situation unfolds. Besides, there are obvious social asymmetries that make a big difference in interactive dynamics – asymmetries related to size, strength, gender, resources – that are ever present elements feeding in the communitarily operationally closed system of social patterns, wherever such a societal organization obtains. The enactive-ecological approach addresses these frequently (Di Paolo, Cuffari, and De Jeagher, 2018; De Jeagher, 2019; Di Paolo, 2020; Di Paolo and Potapov, 2024; Gambarotto and von Es, 2025). However, the model under consideration is for understanding, under a minimal set of assumptions, how language can be borne out of interactions between environmentally embedded, enactive, agents. Under these minimalist constraints, we have seen up to now what are the enabling conditions for the emergence of interactions in a dialogical form, and are currently unveiling some of the character participatory sense-making assumes, from such a stage onwards.

do so: namely, to steer the interactive encounter toward synergistic dynamics, not only for themselves, but for all involved. On the other hand, as we saw above, such a role asymmetry brings forth the attention to individuals' manners of acting and reacting within dialogic contexts. For the pragmatics of a dialogue to work, the manners in which individual agents make sense of their surroundings must be attended so that the regulating acts, the utterances, can themselves be effective. All utterances have, therefore, an *expressive* aspect. They "can reflect the affect, attitudes, and intentions of the producer to all participants (the producer included)", and "also [have] direct effects on the affect, attitudes, and intentions of all participants that extend beyond the pragmatics of coregulation" (Di Paolo, Cuffari, and De Jeagher, 2018, p. 176). That is to say, expressing oneself through an utterance bears on one's relationship with others beyond the immediate coregulation of a dialogue. A master toolmaker interrupting his apprentice's attention in order to teach him (by demonstrating) the right movements counts as an utterance (Di Paolo, Cuffari, and De Jeagher, 2018, p. 173), and it can be pragmatically successful insofar as the apprentice actually learns to perform the right movements. But it can also, at the same time, fail as an expressive act, insofar as the apprentice fail to see that act as part of the master's melancholic, but hopeful intention to "pass the bucket" to the next generation. Utterances' expressiveness is therefore not reducible to immediate coregulatory pragmatics, so much as the latter is not to the former.

Because of such a double aspect of dialogues, the partial acts constituting them can aptly be called the *production* and the *interpretation* of utterances. To be clear, it is not that the production of utterances is pragmatic, and their interpretation expressive. It is rather (two things), first: that to asymmetrically and consensually regulate a social interaction and interactants' sense-making is to produce utterances, while to let oneself and the interaction be accordingly regulated is to interpret utterances; second: that *both*, the production and the interpretation of utterances comport, each by itself (and not respectively), a pragmatic and an expressive aspect.

It is important to realize that utterances are produced sensibly to the fact that they elicit modulations on the sense-making of interpreting agents, even if the specifically affective, cognitive, and behavioral responses of either party cannot be completely foreseen (as neither can the ensuing relational patterns of the interaction). Utterances, just as any social act that is learned, implies the sedimentation of new and newly accommodated networks of sensorimotor schemes. Consequently, as a complexified attention is demanded from agents with respect to each other, it also manifests in hesitations and self-adjustments that each interac-

tant, whether producer or interpreter, performs and experiences *while* exerting these roles, being aware that the others go through similar experiences.

> The recognition of other participants as embodied agents also involves an additional sensitivity, in all participants, to the circumstances that can make the sustained use of a regulator role go wrong and induce others to break off the interaction, and the skill to act adaptively to avoid this outcome. (Di Paolo, Cuffari, and De Jeagher, 2018, p. 170)

The gap between *acts* as they are intended and *moves* as they are concretized is again the source of a tension to be experienced by sense-makers, this time the tension that follows conceptually from the essential traits of dialogues. Utterances are concrete moves, but they are also instances of typical repertoires of shared practical knowledge on how to steer interactions into mutually synergistic trajectories. The tension between the concrete instantiation of utterances as *moves* (always exceeding intentions) before particular sensorimotor interactants, and the various ways in which the interpreters' sense-making may be modulated in response, is a tension between the codefined abilities to produce and to interpret utterances, to be manifest in the flow of particular dialogues.

It is no good, for example, to insist on concluding a complex line of reasoning when your interlocutor clearly wants to go to the toilet and therefore gets distracted. Or, in an environment that suddenly becomes noisy (cars passing by, honking and accelerating) it is just sensible to halt one's own sentence in the middle, express some discomfort (slowly closing the eyes, making a slightly grumpy face) in order to make the other perceive that that was an interruption, not the end of the sentence, and only thereafter – if the noises diminish – proceed.

The ensuing tension between the habits of producing and interpreting utterances is what makes agents gradually enhance currently socially sedimented repertories of utterances they use, as micro-adjustments turn into self-differentiated, more finely appropriate schemes envisaging the facilitation of both partial acts of dialogues, in both their pragmatic and expressive dimensions, and these adjustments reverberate into how communal, operationally closed patterns, unfold across communities of interactors. A myriad factors are important for appreciating the appropriateness of utterances, and a myriad factors of autonomous social patterns can be acted upon and modified by attentive subjects.

> Moreover, the utterance creates and projects a space of meaningful responses, reactions, and rejoinders for other participants to take up. … Acts within an utterance "live" in a network of situated relations with other acts, including the acts of the audience. These relations determine the effect of these acts on the interaction, in other words *their sense* within the dialogic context. (Di Paolo, Cuffari, and De Jeagher, 2018, p. 174, emphasis added)

Can we speak, though, of *propositional* sense already here? Perhaps we can, depending on the detailing of the situation we are prone to provide. The effective significance of a certain paradigmatic performance that counts as an utterance within a given community of interactors – the steering of sense-making that is regularly intended and provoked with it, with the important consideration that sense-making in any format is an objective, factual process regarding an organism-environment system – may be such that interpreters be regularly led by it to act in the expectation that in some specific location such and such a situation obtains (say, there is a bear by the riverbank). This is a lot of possible reactions, of course. But then, there are a lot of ways one may react to anything we most readily point out as an example of a proposition. Anyway, let us keep speaking of utterances for now, not propositions, as of the former we have a definition to work with, and some (never all) necessary features of propositions have already shown and will keep showing as the model unfolds.

Among necessary features of propositions, it seems fairly clear that language-games – those Wittgenstein would have called "primitive" ones, at least – are already in place. Utterances cannot be *randomly* performed, or inserted in a sequence of events, if they are to be useful – and recognizably so – in a social interaction. There are patterns of acting that are to be more or less effective along a synergy- and dissonance-promoting spectrum in given contexts, according to which paradigmatic forms of uttering are braided with one another sequentially, either by one or by alternating producers. This is what allows, for instance, both the reenactment of the same patterns and the joint enactment of utterances by different producers in a same context.

> For example, an utterance may count as incomplete (e.g., a demonstration where the final stage is lacking). Someone may step in and attempt to complete the demonstration. What makes the two parts (enacted by different people) belong to the same utterance is how these parts relate, forming a single unit within the set of relations to other utterances and contexts (in this case both constitute the demonstration that may have been requested by others, who after witnessing the

> two-part utterance may now respond to it by imitating the whole procedure or nodding in gratitude). (Di Paolo, Cuffari, and De Jeagher, 2018, chapter 8, Note 5)

In other words, dialoguing requires (and implies) insertion and participation in customs. Dialogues (similarly to *many* language-games) are collaborative, deeply enmeshed in all aspects of interactants' forms of life – which are, without exception, relevant for how they make and respond to utterances, hence to the very constitution of each utterance – and emerge in and from social interactions in variable, flexible, but not at all random ways.

The tension to navigate through, at this stage, occurs between, on the one hand, expressing oneself as completely and as efficaciously as possible, as if revealing one's soul to the other and commanding the interactive encounter with the minimum amount of effort, and, on the other, receiving a clear, detailed, and effortful picture of sentiments, moods, intentions, perceptions, and directives that are embodied in the moves of another agent. Herein devising respective ideal conditions for following such tensed trajectories (in this case, the ideal conditions for *producing* and *interpreting* utterances) is once again useful.

> From the production side, in terms of effort, time, and simplicity, the utterance would ideally be compact rather than redundant, holistic rather than partitioned, integrated rather than differentiated, open-ended rather than delimited, tacit rather than explicit, and contracted rather than expanded. For interpretative sense-making, the demands are exactly the opposite. In the ideal circumstances that maximally facilitate production, a producer would generate the pragmatic and expressive aspects of an utterance as one integrated whole. In the ideal circumstances that maximally facilitate interpretation, these aspects would be clearly distinguishable. A producer would throw herself into the turn activity without attempting to determine or signal its duration early in the act or its approaching ending. An interpreter would prefer a clear indication of the duration of the utterance as soon as possible and a warning when the turn is about to end. (Di Paolo, Cuffari, and De Jeagher, 2018, p. 177)

This is when functionally differentiated vocalizations, words, *can* emerge, either as parts or wholes of utterances, but it is still not necessary that utterances be verbalized – as gestures, acting performances, demonstrations, and other non-vocal behaviors can achieve the desired effects (for instance, in the example of a wordless demonstration of a master tool-maker to his student). The varied ways we use words serve, anyway, the tensed desiderata of sometimes expressing ourselves more shortly and holistically (as in poetry, proverbs, runes), and sometimes in piecemeal, rigorously structured fashion (as by means of a *Begriffsschrift*).

Context is key to navigate this tension. Growing skillful awareness to the whereabouts, the occasion, the rituals involved, the life-histories of interactants, their spatial disposition, the expected (the possible, the prohibited) duration of an encounter, the level of intimacy, the objectives of each person interacting… Attention to these and many other factors, with a view on the desiderata of production and interpretation of utterances seen above, gradually consolidate *participation genres* wherein dialogues are enacted and features of how utterances get built up and braided with one another sediment themselves as diverse social patterns.

> There is no context-free golden mean. Acceptable utterance duration, intelligibility, redundancy, and expressivity can vary radically whether in the context of a poetry reading, a political rally, a business lunch, or a conversation between family members. (Di Paolo, Cuffari, and De Jeagher, 2018, p. 178)

Sedimentation of participation genres, then, is the smooth accommodation, within social patterns as well as in socialized sensorimotor bodies, of a (fallible) sensitization to appropriateness within diverse dialogic contexts. They are "starting points" (*Ibid*) for participatory, dialogic sense-making, as they allow a certain decrease of uncertainty regarding an otherwise dizzying variety of options on how to conduct and be conducted along a dialogue. Participation genres are ever unfinished, ongoing social patterns that are continuously modified, however they present their levels of relative metastability and can be devised as such. They are markedly historically shaped, thus also territorially, even if (analogously to the diverse local pragmatics we saw previously) agents' mobility and communication yield mutual modulation by differently rooted participation genres along history.

In a way analogous to the specifying subdivisions of sensorimotor environments into habitats, coordination patterns, and sensorimotor schemes (section 3.2.2.1), participation genres can be devised in progressive levels of specificity, from normativities that are prototypically valid, e.g., for how to behave at a funeral, to normativities valid in restricted scopes, such as a conversation in the kitchen, which is the kitchen of your mother's house, which takes place with an older man, who is your brother, who is particularly upset about problems at work, and so on. As general paradigms for adequate participation (and also as an analytical category for the analysis of social interactions), however, participation genres are *general* conditions: they are emergent patterns at the social-environmental level and are, therefore, or-

ganizational processes that individuals have to deal with alongside the genre-transcending particularities of a situation.

As smoothly as they are introduced in the ecosystems of participation, participation genres ensue novel tensions that are now related to their being misidentified, differentially familiar to each interactant, and even switched along a single interactive encounter. Nothing guarantees that the partial acts (now typically dialogical) of interactants are situated in relation to the same participation genres, so that specifically genre-related dissonances can appear. The authors of *Linguistic Bodies* summon the example of a supermarket cashier who, immersed in what they are doing, helps a customer who drops their groceries, only to then discover that the customer is a long-time friend. What will they do? Adopt the posture familiar to a friend, starting a conversation about what they have been up to, when they will meet again; or rather express the timid recognition of someone who possibly finds themselves under the gaze of the manager? Factors such as the length of the checkout line or the temporal distance until the end of the shift can, among many other factors, modulate the overt enaction of one or another participation genre, while the hesitations of self-adjustment can also be made apparent. Another example is an unexpected encounter between ex-lovers: many well-sedimented practices in that local participation genre to which they were once accustomed will have to be readjusted, on the spot, by both, according to the specific environmental markers of the place and time of the unusual reunion.

This is where both, the enabling conditions, and the affective, sensorimotor, and social function, of something more clearly resounding *reflection* make their first appearance in the enactive-ecological approach to agency. More precisely, what is enabled as a tool to navigate genre tensions – i.e., in order to optimize the relationship between dissonances and synergies arising specifically from *these* aspects of interactions – is for agents to start assuming the role of producers *and* interpreters of their own utterances in genre-specific (and possibly alternating) varieties. This is what enactivists label as “social self-control”: control of oneself under both aspects of dialogical engagement, pragmatic and expressive, taking into account the repertoire of participation genres in which one knows – more or less – how to act. Both roles, that of producer and that of interpreter of utterances in these diverse contexts, are assumed by the same linguistic body, which emulates contextually embedded dialogues in order to improve their reactions and adaptivity capacities in such contexts.

> As an interpreter herself, the producer can therefore be guided by self-interpretation. In such a case, the dialogic know-how and skills are used not to engage directly with the utterances of others but instead with the producer's own utterances. As we have seen, interpretation and production are two sides of the same social act of participatory sense-making. This remains the case for self-interpretation. To actively interpret oneself in the situated dialogic context invites changes to one's own utterances, changes that are themselves regulated dialogically – that is, using other utterances addressed to one participant in particular: oneself. In other words, mutual interpretation leads to self-interpretation and to the self-regulation of utterance production. The latter in turn can be achieved through the resources of dialogic agency (i.e., through self-directed utterances). (Di Paolo, Cuffari, an De Jeagher, 2018 p. 183)

Social self-control can occur both in situations of social interaction, when breaks arising from genre dissonances are anticipated, and one may alter one's own utterance before it occurs *because one interprets herself*, as well as in soliloquy. It differs from the individual self-control of sensorimotor agency (such as self-regulating the relative distance from a painting in the wall) because it is a self-imposition of properly dialogical norms; norms necessarily arising from familiarity with performing roles of production and interpretation of utterances in certain participation genres. Even when it happens in soliloquy, this is not an occurrence "in the head" of someone: the enaction of social self-control occurs through gestures, vocalizations in a low tone of voice, nods, averting gaze or relative positioning of the eyes so that vision looses focus on immediate distractions, as when one is "staring into nothing". It is, as always, an environmentally embedded and *constituted* action, which in this case is moreover enabled (and therefore implies) a complex historical development of social interactions.

Social self-control contributes to the double task of producing and interpreting utterances, but it does not exclude the ever-present possibility of misunderstanding (not even in soliloquy, but especially in interactions where more agents are present). For example, in a difficult face-to-face dialogue, the transition from a ponderative, reinterpretive attitude, to one that confirms a certain interpretation of, a way of understanding, a sentence said by another, can constitute itself as a furrowing of the brow, a resting of the chin on the hand, a mutter, followed by a slow nodding of the head back and forth with a lightened facial expression. It is the sequential production, albeit on a short temporal scale, of material and contextualized utterances (like this sequence of movements), which can thus be misinterpreted as if it were, e.g., an expression of agreement (or rather as the passage from disagreement to agreement), and not merely of an understanding of what the other is saying. There is no participation

genre, nor self-control in previously emulated dialogues, that prevents this type of dissonance from happening.

Thus we arrive at the last stages of the enactive-ecological model for the rising of enabling conditions for forms of participatory sense-making – which last stage is itself to be characterized by further (therewith unresolved) tensioned tendencies. Once sedimented, the habits of recursive mutual interpretation during a social interaction and reflective self-control can be facilitated by the reenaction of utterances brought forth from other, paradigmatic dialogic contexts. This can be done in order to help establishing the mutual recognition of initial conditions, participation genres, stages of dialogic interaction, moods, and intentions once expressed, all for interpreting of one's ongoing expressive and coregulatory efforts. There is a myriad possible ways an utterance can be paradigmatic *for the interactants*: they can be culturally paradigmatic, as Shakespeare's "to be or not to be"; they can be communitarily paradigmatic, as a phrase a local politician used to say; they can be professionally paradigmatic, such as the description of the defining function of a carburetor; they can be interpersonally paradigmatic, as the phrase once used by one of the participants themselves in such and such an occasion, and so on. Instead of displaying social self-control on the fly, that is to say, it may be more helpful to break the current course of a dialogue and bring about paradigmatic forms of uttering known to both parties, such as a proverb, a slogan, a meme, a "as Paulo Freire said", or some utterance the interactants themselves, or a common acquaintance, have produced in the past. This is to work together from *reported utterances*. It is using the latter, as historically established and commonly known interaction patterns, as trustworthy means to bring an ongoing dialogue to synergistic trajectories and desired expressivity. Reported utterances are linguistic paradigms which have already been, in mutually familiar ways (whether successfully or not at the time of their production), interpreted in the past, so that to reenact them – although within a new particular context, hence certainly leaving a margin for reinterpretation and, alas, misinterpretation – *helps* placing the interactants on relatively more common grounds and shortcuts the efforts of social self-control with respect to one's current uttering attempts.

> Just as this reenactment is a summoning of a previous act of production and of the presence of its producer, so too does it entail a blending with the current producer's presence and acts. With inevitable distortions caused by this blending with the current producer's own sense-making, other participants are to an extent involved in the production of a reported utterance in that their own past utterances are part of it. The reported utterance uniquely highlights the interpretive processes of the current

> producer and how she stands in relation to other participants whose utterances are reported. (Di Paolo, Cuffari, and De Jeagher, 2018, p. 188)

The tension that is ensued by socially sedimenting the *habit* of reporting utterances is one between social authenticity and social self-alienation to others. “The model begins and ends with the same primordial tension between orders of normativity that fuels participatory sense-making: individual and interactional” (Di Paolo, Cuffari, and De Jeagher, 2018, p. 198) (except that this time we are speaking of already socialized individuals). Reported utterances – which, as any utterance, may often be exemplified by paradigms of word usage, but are not necessarily to be put in words – become our most sophisticated social asset for navigating any kind of tension we have previously seen to constitute one’s sense-making, even though they emerge as a habit specifically in response to the hazards of social self-control. Reported utterances (and, with them, other agents’ perspectives, styles, habits, preferences, and environments) can be summoned in the context of one’s deciding whether to go on a diet, thus (and in further imaginable ways) influencing organic normativity itself. More characteristically to this stage of the model, however, the braiding of utterances, both reported and newly produced, within the process of social self-control, turns reflection (from a process of merely playing the roles of producer and interpreter of one’s own utterances) into a full-blown dialogue, where a single agent plays alternating roles of producer and interpreter of different utterances. Whether reported or made anew, utterances constituting self-enacted dialogues are all singular enactments, singularly dependent on their enactment circumstances and relational patterns, while also responsive to socially established (often locally established) forms of normativity.

But the habit of producing utterances that is established in linguistic bodies becomes inherently tensioned between, once again, a form of self-production and a form of self-differentiation. However useful, the reenaction of paradigmatic social performances once displayed by others can either serve self-regulation and accommodation of one’s own set of social skills (with all their implications for all of one’s normative parameters), or it can remain as a foreign, largely unincorporated element that nevertheless diverts one’s attention, attitudes, actions – in a word, one’s sense-making. This is the difference between actually *incorporating* manners, styles, moods, and vagaries of habits that emerge historically, and merely *incarnating* others’ ways of doing things and feeling about them. Because reflection – reflection “as we know it” – becomes habitual and yet is thus strongly rooted in parameters of

better and worse trajectories (norms) emerging greatly apart from our partially idiosyncratic concerns, it is a habit that may promote self-regulation and authentic insertion and contribution into the social dynamics one finds herself enmeshed within, as much as it presents the danger of self-alienation, that is: of letting oneself be driven by norms that have not been well accommodated with the myriad, singularly adjusted normativity that arises in one's own particular form of life.[123]

We keep reflecting, nevertheless. And now it is time to give a closure to the long chain of braided utterances that I have been weaving in this dissertation. First, some final remarks are in order about this general, enactive-ecological picture of language, particularly as it bears on our understanding of the logic of language.

3.2.3.3 Sense and reference: enactive, ecological, historical

Our capacities to interpret utterances – considering utterances as expressive social patterns agents embody and modify with time – is what gives rise to the possibility and the desirability to linguistic bodies of enhancing utterances in this respect: to enhance, that is, the modes we have of expressing ourselves and of interpreting others' expressive attitudes. Such an enhancement involves a refinement of attention to potentially everything we affectively relate to in the organic, sensorimotor, and linguistic dimensions of our forms of life. It consists, fundamentally, in attending to differences.

Herein lies, perhaps, the principal importance I see in the enactive-ecological concept of "an utterance", as its essential traits are presented until the last stage of the model we saw. Being in each enactment the expression of a singularly situated agent, an utterance can aptly be described as the expression of "a world". But the metaphor contained in describing them thus implies "different worlds" *only to the extent it implies different ways of caring, living, and acting*. "Our worlds" (if you are fond of this metaphor, which I am not) cannot be described as "commensurable" or "incommensurable" with each other because no kind of metric mediates our relationships with the world, neither geometrical nor lexical. There is absolutely no remaining temptation to characterize our awareness of differences as the "projection" of any mental or cognitive representational set of symbols. We barely spoke of

123 This is, of course, only to name the benefits and dangers of reflection *per se*, i.e., not to mention any of multiple other social patterns that constitute the struggle for authenticity and the fall into self-alienation of linguistic bodies.

symbols, but there is seemingly just no place for them before advanced stages of social development seen in the last section – certainly no place for them outside of participatory sense-making. We *partake in* the enaction of symbols, representations, rules, and if we are to trade with metaphors, then there seems to be much more "absorption" involved (of others, of attitudes, of circumstances, of history) than "projection" on each of our parts.

History, traditions, and customs are *not* part of the enactive-ecological picture of utterances in that they characterize any kind of *mediation* or *access* to things of any kind. On the contrary: history, traditions, and customs enter this picture as dynamically coupled, *material systems* that partly constitute our own doings (just as, in general, our doings partly constitute these material systems). As a consequence, *my* history, culture, customs, *do not isolate* me or my "access" to the world; on the contrary, it is there where I find *community*, to many different extents, with other singular forms of life.

Not only finding community, but also building up and reinforcing community gets pictured by the enactive-ecological approach to life, mind, and agency as a central *norm* of participatory sense-makers (Fourlas and Cuffari, 2022). And thus we make our way back to differences, and to showing them: ameliorating our ability to interpret someone else' utterances (something which, as we saw, is adamant for improving self-expression and self-reflection) motivates an attitude of active *discernment of* the multifarious aspects of linguistic bodies' doings, which in turn are always organism-environment events. Such a proneness to discernment is what the authors of *Linguistic Bodies* deem an "objectifying attitude". It is the attitude we develop with respect to things, events, and aspects of these as we try and *utterly express* them as portions (details that make a difference) of our world-involving actions.

> The objectifying attitude, understood less as the search for propositional truths than as the practice of regulating other practices and experiences in a mutually constraining relation with sociomaterial conditions, appears progressively in our model in the shape of a *recursive pragmatics*: social practices for regulating other social practices. These go from the use of partial acts to regulate other partial acts … to the coupled flows of self-directed and reported utterances in dialogues. Each of these powers goes hand in hand with sensitivities that contribute to the objectifying attitude. (Di Paolo, Cuffari, and De Jeagher, 2018, pp. 203-204)

The outcomes of this attitude consist in refinements, global reorientations, sparkling novel interests and relationships to our environments, creative attempts toward older patterns, or simply a better, more precisely put, utterance. Among aspects of some utterances that can

be thus participatorily discerned is propositions. Our use of words can be differentiated enough (for several purposes) for us to make the distinction between anyone's trusting that things are as exactly as they are depicted by any means, and the way in which things are thus depicted. We may grow sensitized to the fact that someone's saying that there is a bear by the riverbank is one thing, that there being a bear by the riverbank is another. We may grow sensitized to the fact that there cannot be some bear by the riverbank and there be none at the same time. That there being five bears by the riverbank is different from there being one, and so on.

Similarly, we can distinguish the utterance-forms "I saw the doorknob" and "I saw the flow of sensorimotor contingencies determined by the ongoing asymmetrical regulations of the norms that govern my agency, coupled as the latter were with my sensorimotor environment". – It all depends on what we care to express and what we don't. (Are we interested in the perceptually attested, regardless by whom, fact, or are we interested in the perceiver's phenomenology and its enabling conditions?) But always, since we rely on autonomous and historically constituted social patterns, succeeding in expressing what we care to express is no isolated act of the will. It is, first of all, mastering the existing language-games our potential interpreters play; mastering, that is, the social norms of coregulation, participation genres, and the sound braiding of reported and creative utterances.

And so we manage to attend to and refine the *propositional aspect* of some of our utterance-production and utterance-interpretation capacities, which bears no conflict with the fact that any utterance, to any extent propositional or not, *because it is something linguistic bodies do*, "summons a world of physical expectations, constraints, actions, entities, social needs and niceties, abbreviated (or "play") temporality, choices and other burdens of agency, pretense, and emotional significance" (Di Paolo, Cuffari, and De Jeagher, 2018, p. 201). We simply develop the participatorily enacted habit of attending and directing attention to some, more than to other aspects of what we do, and so we note propositions.

Language-games, whose general characteristics we have been watching display since we started to speak of *agents*, and continued to see until we spoke about self-enacted dialogues, *could* be talked about, I submitted, from the point we could talk about dialogues (I cited the language-game of PU, §2, at that stage). Talk of rules to abide for, in order to participate in this or that language-game, may have their roots in dialogues too, as the acceptance of an asymmetric configuration of interactive encounters therewith becomes salient (significant) and can be taken into consideration by itself by our lately further developed objectifying attitudes. But language-games have their simpler, "animal" elements,

we saw earlier, and so does the objectifying attitude. “All sense-making is inherently world-relating and world-involving” (Di Paolo, Cuffari, and De Jeagher, 2018, p. 201). Agency in itself *is* actively and differentially caring for actual differences in ways of acting, and therefore in circumstances that constitute ways of acting. But now awareness of differences in ways of acting becomes part of both, the pragmatic and the expressive dimensions of utterances, and therefore of differences we care about together with others. The difference between 1 and 2; the difference between right and wrong; the difference between green and red; the difference between you and me; the difference between humankind and you; the difference between jadeite and nephrite, *and so on*.

There is certainly a difference between the use of a symbol and the circumstances of its enactment, but – according to the enactive ecological approach – this is a difference between something and some of its essential constituents, not between accidentally related objects. The autonomy of social interactions, which I emphasized in section 3.2.3.1 – and that in fact receives much emphasis from the authors of *Linguistic Bodies* themselves – implies that social acts of any kind, utterances included, are constituted by the circumstances of their enactment, particularly by the relational patterns that exceed the intentions of the agents involved in either its production or interpretation. The world-involvement of utterances – and thereby of propositions – is entailed by their being social acts, whether enacted in social interactions or in soliloquy. This is anyway obviously continuous with the enactive-ecological treatment of agency (of acts), in general, as an organism-environment phenomenon.

Part of several of our languaging practices, including the construction of propositions, is the *direct* symbolizing of different *things* to which we can jointly attend. Utterances can thus gradually develop into means of reifying – literally and simply, treating as things – potentially any element of our forms of life.

> Reified thematizations thus provide the objects that certain utterances and dialogues can *refer* to. These objects can be anything from patterns of social exchange, kinship obligations, and institutions, to material presences (things, events, spaces, patterns, flows, shapes, movements, bodily parts, sounds, smells, bits of the landscape, plants, animals tracks, etc.). These presences are brought forth as objects by socially enabled and regulated sensorimotor schemes. (Di Paolo, Cuffari, and De Jeagher, 2018, p. 205, emphasis in the original)

Using names and other symbols for making direct reference serves to mark differences between anything we care to refer to and anything else. Differentially and jointly caring for

portions of what we express through our utterances – the objectifying attitude – comes first, naming comes afterwards if at all. But we are also aware that things might have been otherwise – we *see* things happening contrariwise to what we expected – and we question what would have been of stuff we actually refer to (care for) had such and such things been different. We also *see* things *changing* in time, but refuse to call them – name them – differently. Hence these different differences among things, essential and accidental ones: they reflect our interests, our concerns, as much as they reflect traits of things themselves. What they barely reflect, however, is our opinions about things. Kripke claimed that, apart from initial baptisms with ceremonial references to the baptized stuff being made indirectly, descriptions that are regularly associated with the once baptized object are irrelevant, *the use that have been historically made of the name* being relevant, for determining which object (property, or what have you) is the referent of the name.[124] And, regarding the associated descriptions of weird baptisms (and not so weird ones, such as Neptune's), their relevance fades away as soon as they have been given such a peculiar role, and can equally be forgotten if the name keeps being used.

All this having been put, some may still be tempted to point out an elephant in the room. Isn't the historicity of sense and reference – of utterances, of linguistic bodies' agency in general – a problem?

> The simple attempt to induce a partner toward his half of the handshake, and not some other partial act, reveals an embodied understanding of norms that have been accumulated through a history of material constraints and therefore speak as much of the world as of the intentions, motivations, and preferences of social agents: the fact of the matter is that half of a handshake and half of a high five do not together realize a successful social act. Regulatory acts that attempt to avoid or correct this mismatch implicitly thematize this fact. Because only some facts of the matter, and not others, are revealed by the shared norms, the objectifying attitude is consequently always relative to a set of practices in a community. In other words, objectification cannot be absolute. If knowing-that is built on the recursive application of knowing-how, the objectifying attitude never ceases to be situated historically. (Di Paolo, Cuffari, and De Jeagher, 2018 p. 204)

How is it, after all, that we manage to build any kind of joint attention – any sort of objectifying attitude, especially regarding propositions and referents – if our perspectival out-

124 Remember how he describes "the essence" of his historical view of direct reference; "A speaker at any given time over time, and even if he has forgotten most of the descriptions he associates with the name of the being, or even he may be an amnesiac, still counts normally as preserving the same reference that he had before. And this is even the case here and it is the case when the name is transmitted." (Kripke, 1986, pp. 6-7)

look, our perception, our sense-making, is fundamentally a function of each our (not only communitary, but *individual*) life-histories, and, no matter how similar these are among each other, they are – and I repeatedly insisted they are – always unique? Mustn't there be some transcendental homogeneity of our capacities to relate to stuff in the world that guarantees we shall be stating one and the same proposition, describing and referring to one and the same object, however such a homogeneity be perhaps achievable only through some social-material preconditions, and not reside (simply and magically) in the "cognitive architecture" of our brains?

I honestly believe that the doubt itself is only a reminiscence of the representationalist intuition. In particular, it seems reminiscent of the idea that our relationship with anything that is not part of our own mental (representational) states must be mediated, if at all, by our mental states' success in establishing this relationship. But there is a way to give a rather more assertive answer to the aforementioned discomfort. Notice, with Gibson, that all aspects of all events surrounding an agent, whether perceived or not, are both spatially and temporally *nested* within some other, as a lightening is nested within a storm, you within humankind, and a written sign within the circumstances of its use. If two subjects, S and S', are positioned in front of the same object *o* within *indistinguishable* immediate circumstances (apart from the difference between S and S'), then we may rest assured by all we learn and trust from the enactive-ecological approach, that the ongoing experience of S along any timespan will be one, the experience of S' (under the same conditions) will be another. They will consist in different sensorimotor contingencies; in particular, different sensorimotor schemes. However, if, wanting to exercise our objectifying attitude to the case, we want to talk specifically of the environmental support structures *of both*, the networks of sensorimotor schemes of S and S' when they are in front of the same object (at the same distance from it, under the same lightening conditions, etc.), we can. And, however there will be differences between the total sets of environmental support structures relative to S and S', there will also, quite plausibly, be intersection between these sets. To test it empirically is very simple. Can they both do similar things with respect to *o*? E.g., can they both grab it? Will they both be tempted to smell it? Could they both stump on it? If the answer to these and related questions is yes, then there is certainly a shared sensorimotor habitat between S and S'. Coregulation of social interactions is built on the bases of superordinate patterns relative to the most singular and idiosyncratic aspects of interacting sensorimotor lives; superordinate patterns that encompass, nest, our singularities. Language is a *socially* obtaining set of patterns of which we participate, it is *not* a multiply realized property or disposition each of us is endowed with. And it is in language,

not in any multiply realizable property languaging agents happen to individually possess, that reference (direct or indirect) happens.

The moral of the story is that different levels of incomplete coordination of our perspectives upon our shared surroundings are sufficient for several of our purposes. Among these to refer to *water*, to *Paulo*, to *this dissertation*, as well as to many aspects of these things, without fearing that because our perspectival outlooks upon them are divergent to some degree we are to any degree condemned to talk past each other. To speak (the same things) about the same things is *not* to homogenize our perspectives, neither is it dependent on this philosophical chimera.

As I remarked earlier, the historicity of sense and reference yields problems for linguistics and anthropology, but is not a philosophical problem (it is arguably the *dissolution* of many). Differences of culture and tradition and ways of describing things can only take place on top of commonalities we share with virtually all fellow humans of all ages. Again, what we refer to and describe as the water in the rivers and the starry sky were things people quenched their thirst with, for their organic as aesthetic needs, no matter how differently they saw these things.

Utterances are social acts, all of whose differentiated aspects emerge historically, through concrete engagements of people in social interactions. We inherit the expressive differentiations that have been made along history, we reemploy them, and with our companions we help establishing further ones. It is certainly true, therefore, that sharing a historical background, to whatever extent, is proportional to the level of enabled coordination with others and feasible expressive refinement through produced utterances. But, because the world is one, as we make reference to stuff we make reference to stuff that is also significant, even if differently signified or not signified at all, by people belonging to utterly different traditions from our own.

For all I can see, then, there is nothing contradictory between the enactive-ecological approach to language, and Wittgenstein's and Kripke's views of propositional sense and direct reference. Not every approach to language shares this privilege. In turn, I believe that both the historicity and the intention of our uses of propositions and names, which Wittgenstein and Kripke pointed out as the determining factors of propositional sense and direct reference, get their places in our forms of life well explained by Enactive Ecology. Conversely, while I see Wittgenstein and Enactive Ecology as deeply aligned in showing how rules, symbols, language, and reason are constituted by their historically emergent enactment circumstances, I see Enactive Ecology being well served by Kripke's view on direct reference. For the latter

highlights both dependence of reference on history and its independence from any trait (epistemic, qualitative, emotional) of the experience of using a referring expression apart from the will to participate in its historical usage.

4 CONCLUDING REMARKS

To recognize where differences lie and where they do not *in* utterances (in the organism-environment circumstances they *are*); to bring about new differences, and not to inadvertently take the same thing for another; to distinguish utterances, their authors, their circumstances of enactment, and the elements of those circumstances, etc., is something whose relevance (and enabling conditions) for linguistic bodies have been clearly shown in the enactive-ecological model for participatory sense-making. This model shows, I believe, how we become sufficiently sensitive to the fact that we can enrich, as our ancestors did, the myriad subset of aspects of reality with which we can relate affectively, and *together*. We can unveil the significance of what was previously indifferent to ourselves or to others, including differences that were indifferent to all, as (as Anna Lowenhaupt Tsing says) we "contaminate" each other – as individuals, as groups, as cultures, etc. (Tsing, 2015). Therefore, even though the intentions that the producer of any utterance tries to express always retain idiosyncratic aspects of their circumstantial relationships with their environments, we value and seek to enhance an *objectifying attitude* that unveils aspects of circumstances that are, or become, participatorily relevant to us, participatory beings.

Indeed, a question that I see being left for further work by my reading of Enactive Ecology is the following. Why isn't the objectifying attitude taken by the authors of *Linguistic Bodies* to be a (ultimate) strategy for navigating the tension they characterize at the last stage of their model? As we saw, that tension was one between authenticity and self-alienation. More precisely, it was a tension between the *incorporation* of historically emergent utterances (and the "worlds" they bring with themselves), as means of putting forward our individual preferences and expression in social dynamics in which we partake, and the *incarnation* of norms that have not been well accommodated with the myriad, singularly adjusted normativity that arises in one's own particular form of life. The intuition behind my question is that the objectifying attitude seems to make distances shrink between expressive agents as such: historically, it gives us the powers to fine-grain individual expression and thus to provide each other the details of how communally signified aspects of our forms of life particularly combine in each. Literature is what occurs to me as the prime example of our showing of these powers. As all powers the model describes as being enabled by the previous

configuring of tensioned tendencies in participatory sense-making, the objectifying attitude could not be characterized as *eliminating* any tension, but only as an effective means to deal with one in particular and "distensioning" it a bit. Anyway, as I said, these are questions for further work.

As to the questions that I put forward and purported to answer as part of this dissertation, I believe that something of value was perhaps achieved. From the beginning, I intended to argue that propositional sense, direct reference, and scientific knowledge construction are all inherently historical phenomena, so that the New World Problem dissolves. The reason why it dissolves, that is, is that the whole *philosophical problem* stemming from Kuhn's characterization of scientific revolutions are due to his reliance on a fundamentally a-historical construal of signs' signifying powers, to the point that symbols are conceived as basic ingredients of any mental state: *mental* states are in general conceived, according to Kuhn's intuition, as *representational* states. By contrast, I argued, a properly historical construal of propositional sense, direct reference, and scientific knowledge construction can only be built upon a theory of agency: one that made sense of the historical emergence and social-environmental embeddedness of language-games, continuously, from a natural history of our forms of life. Only such a theory could give us an alternative mode of thinking about minds (hence, about perception, imagination, delusion, reason), that didn't rely on the representationalist intuition. I presented Enactive Ecology as such a theory. As I shew, Enactive Ecology entirely dismisses the representationalist intuition, featuring experience as *of our actions* and featuring our actions as *organism-environment, concrete events*. Moreover, Enactive Ecology provides what historical views of propositional sense, direct reference, and scientific knowledge construction needed the most: a theory that made sense of the historical emergence and social-environmental embeddedness of language-games, continuously, from a natural history of our forms of life.

This conclusion was reached by combining three distinct but convergent lines of inquiry, corresponding to the three chapters of this work. Chapter I, "The Modern Predicament, and the Representationalist Intuition", provided a genealogy of the problem. I argued that the representationalist intuition is not a self-evident truth but a historical contingency born from the modern predicament. The Scientific Revolution at the dawning of the modern era did not just offer new theories; it shattered the intuitive, Aristotelian worldview. Aristotelian natural philosophy was an "ordinary man's philosophy", whereas the investigation of stuff's nature was taken as a direct, intuitive engagement with observable things.

The success of the new, counterintuitive but highly revealing theories of emerging modern science created a profound philosophical crisis. It generated a perceived schism between the "intuitive world" of common sense and the "real world" described by science. This predicament yielded the intuition that the human mind is a *guessing mind*: a mind isolated from the "world out there", tasked with correctly picturing an external reality it could no longer directly access.

From Descartes onward, "representations" became the necessary philosophical bridge across this newly conceived chasm. The mind was conceived as a bearer and entertainer of "ideas", and philosophy's task became validating how these internal representations could correspond to the external world. This is the historical-psychological origin of the intuition that gave origin to the scientific program of the cognitive sciences, which assumed that cognition *is* representational information-processing. Chapter I established *why* the representationalist intuition is so deeply entrenched, setting the stage for presenting some philosophical arguments against it in the next.

Chapter II, "The Representationalist Intuition, and the Philosophies of Sense, Reference, and Science", showed some of the undesirable philosophical consequences of this intuition. I traced its deployment into twentieth century philosophies of logic and science, where it manifested as the logical-syntactical view of propositional sense championed for almost half a century by logical empiricists. The latter held that propositions' meaningfulness was a matter of a-historical, logical-syntactical rules and their verification (or confirmation) conditions against a neutral background of physical stimuli.

This entire project collapsed under the weight of its own assumptions. As I argued, the logical-syntactical view of propositional sense is untenable. Nelson Goodman's "new riddle of induction" demonstrated that the notion of "confirmation" is an ill-founded one by logical empiricists' own standards. The problem is not that we cannot confirm a hypothesis, nor that it makes no sense to think that we do. Rather, it is that we cannot understand what it means *to confirm a hypothesis* while upholding a logical-syntactical construal of propositional sense. More generally, Wittgenstein's rule-following paradox showed that no fact about an individual (mental, physical, or dispositional) at time *t* could ever determine whether a (or which) rule was followed by such an individual at time *t*. Wittgenstein's is a challenge to any view on propositional sense that resembles the logical-syntactical one enough to postulate *the independence between a subject's following a rule and a context's being appropriate for applying this rule*.

I then argued in this chapter that Thomas Kuhn, despite his groundbreaking "historical view" of science and his explicit use of Wittgenstein's notion of "language-games" for taking paradigms as prior to rules, ultimately remained a captive of the very intuition of reversed priorities he sought to escape. Kuhn's appeal to *Gestalt* psychology and his later "post-Darwinian Kantianism" entail a retreat to representationalism. His "lexicons" or "conceptual schemes" are merely a neuropsychological, post-Darwinian version of the same representational mediation of full-blown Kantianism. Because he still believed that our *access* to the world is filtered through a structured "taxonomy", he was *forced* to conclude that a change in this taxonomy (a revolution) means a change in the "world" being accessed. He failed to apply Wittgenstein's radical lesson: that the priority of paradigms (or language-games) is not just a psychological phenomenon but a logical one, grounding propositional sense in *historically embedded agency*, not in an internal mechanism.

Chapter III, "From a Theory of Life and Action to Sense and Reference in Living History", provided the alternative to the representationalist intuition. Having diagnosed the problem in Chapter I and challenged the representationalist framework in Chapter II, this chapter presented a new approach for understanding the mind.

I argued that Enactive Ecology successfully reelaborates the life-mind continuity thesis into a robust, naturalistic framework for thinking about minds. I began with Humberto Maturana's and Francisco Varela's concept of "autopoiesis" – life as autonomous self-production. I then argued, following Ezequiel Di Paolo, that biological autonomy is the parameter for a normativity that is inherent to life itself. Organic agency, or "sense-making", is not the processing of information, but the *adaptive regulation* of an organism-environment coupling according to self-defined norms for improving an agent's own viability conditions. Mind, therefore, is not a processor, but the *intentional activity of living* – an embodied, affective, and world-involving activity – that is manifest in various forms of living.

This account was then integrated with Ecological Psychology. I argued that perception is not the construction of an internal model, but the *direct detection of affordances* – opportunities for action that exist in the environment relative to an agent's sensorimotor schemes. The ensuing framework scales up from basic organic agency to complex sensorimotor agency (habits), and ultimately to social and linguistic agency.

I argued that language is not a system of symbols to be mapped onto representations, nor an ability that is multiply realized in different individuals, but a form of *participatory sense-making*. It is a set of historically sedimented, jointly regulated *social acts* that emerge from tensions between individual agency and the autonomy of social patterns. *Utterances* and

dialogues are seen as concrete, historical, and embodied practices for coregulating encounters, long before their propositional aspect emerges and gets targeted by an objectifying attitude. This provides the naturalistic, non-representational theory of mind, action, and language necessary to dissolve both, the modern predicament and the representationalist intuition. The enactive-ecological framework developed in Chapter III provides the positive grounding for the critiques leveled in Chapter II, and, in doing so, definitively dissolves the New World Problem.

The core thesis of this dissertation – that *propositional sense, direct reference, and scientific knowledge construction are all inherently historical phenomena* – is now fully articulated.

1. *Propositional sense is an inherently historical phenomenon*: The enactive-ecological account of the mind vindicates the Wittgenstein. Propositional sense emerges variously and is constituted by historically emergent circumstances of symbolic enactment.

2. *Direct reference is an inherently historical phenomenon*: The enactive-ecological account of the mind vindicates Kripke. Direct reference is not a function of a set of descriptions or representations that an agent grasps, believes in, or otherwise entertains. Direct reference is a *historically embedded act*. An agent successfully refers when using a name by *intending to participate* in the same historical, social practices (the same language-games) as the community from which they learned the name.

3. *Scientific knowledge construction is an inherently historical phenomenon*: Scientific knowledge construction is revealed to be a fundamentally historical and participatory endeavor. Scientific communities do not consist in a set of individuals that are guided by theories and methodologies they test empirically against homogeneous stimulation, nor yet in a set of individual minds processing stimuli through similarly structured lexicons. Rather, a scientific community is a community of agents, bound by collective, paradigmatic interests and practices, engaging in the skilled, embodied, and social *actions* of referring, measuring, describing, and intervening in natural phenomena.

The “New World Problem” dissolves because it was predicated on a false premise. Kuhn saw himself forced to conclude that scientists work in “different worlds” across

scientific revolutions only because he assumed that reference was determined by their internal representational lexicons. Once we reject this intuition, the problem vanishes.

Scientists *can*, and often *do* refer to the same things across revolutions. When they do, it is not because their "internal representations" are commensurable, but because they are participants in the *same continuous historical practice* of participatory sense-making. Ptolemaic astronomers and Copernican astronomers were both referring to the same entities – some among those respectively called "planets" – by participating in a historical chain of reference that extended back to the first humans who named the "wanderers" in the sky. Their theories (their descriptions and lexicons) about those entities are demonstrably radically "incommensurable" if given a formal treatment, but common reference is secured by participation in historically embedded practice, not by lexical structural coherence.

Kripke was right. Science progresses, partly by discovering essential properties of the kinds of stuff in the world. Kuhn was also right, in his *historical* observations, that the practice and *worldviews* of scientists sometimes change radically; that scientific paradigms are prior to scientific rules and methods; that community cohesion around paradigmatic practices and interests accounts for the dynamics of both, normal and revolutionary periods of science, as well as for the transitions between them. This dissertation has argued that these two views are not contradictory. By discarding the representationalist intuition in favor of an enactive-ecological account of our minds, we can finally see scientific progress for what it is: a continuous, historically rooted, collective engagement with the one and only world we all share.

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