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**THE EFFECTS OF MINDFULNESS AND MEDITATION  
ON FAKE NEWS CREDIBILITY**

Porto Alegre

2019

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Dissertação de Mestrado apresentada ao Programa de Pós-Graduação em Administração da Universidade Federal do Rio Grande do Sul, como requisito parcial à obtenção do grau de Mestre em Administração.

Orientadora: Prof<sup>a</sup>. Dr<sup>a</sup>. Cristiane Pizzutti

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## RESUMO

O fenômeno das *fake news* tem afetado a política, as figuras públicas e os negócios, e a incapacidade dos consumidores de diferenciar informações falsas de verdadeiras tem um papel na disseminação desse tipo de notícias. Na presente pesquisa, propomos que a meditação de atenção plena pode ser uma ferramenta para que os consumidores treinem sua atenção com o objetivo de melhor detectar se as notícias são falsas. Para testar nossas hipóteses, conduzimos dois estudos, um correlacionar e um experimental - além de um pré-teste. No primeiro estudo, demonstramos que aqueles que praticam meditação regularmente tendem a estar menos suscetíveis a notícias falsas, e também encontramos uma correlação entre *mindfulness* - atenção plena - enquanto característica pessoal e ceticismo. Em nosso segundo estudo mostramos, através de medidas de *eye tracking*, que uma indução a meditação de 6 minutos pode afetar a atenção e o esforço dos consumidores enquanto leem *fake news*.

**Palavras-chave:** Meditação, atenção plena, notícias falsas.

## **ABSTRACT**

The fake news phenomenon has been affecting politics, public figures and businesses, and consumers' inability to differentiate true and false information plays a role in spreading this type of news. In the present research, we propose that mindfulness and meditation could be a tool for consumers to train their attention in order to better detect if news are fake. In an attempt to test our hypothesis, we conducted a preliminary test and two studies, one correlational and one experimental. On the first study we demonstrate that those who practice meditation on a regular basis tend to be less susceptible to believe fake news. We also found a correlation between dispositional mindfulness and skepticism. Our second study shows, through eye tracking tools, that a six-minute meditation induction can affect consumers' attention and effort while reading fake news.

**Keywords:** Fake news, meditation, mindfulness



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## 1 INTRODUCTION

The fake news phenomenon is not recent: the ‘Great Moon Hoax’ spread fake information about the discovery of life on the Moon in 1835 (ALLCOTT; GENTZKOW, 2017). In the past, fake news has mainly involved insignificant jokes about brands, but the widespread use of the Internet can now provoke a remarkable impact. A keystone in this phenomenon of brands relate to fake Internet news scandals happened during the U.S. presidential elections in 2016, known as pizzagate. In that occasion, WikiLeaks disclosed e-mails revealing supposed child abuse at Comet Ping Pong pizzeria, whose owner and patrons had strong ties to the Democratic Party (MIHAILIDIS; VIOTTY, 2017). Rapidly, the hashtag #pizzagate spread throughout mainstream social networks (AISCH; HUANG; KANG, 2016).

The pizzagate event demonstrates that aspects of the contemporary context may favor the propagation of fake news. The barriers to publish and disseminate news are becoming smaller and it is nowadays relatively uncomplicated to set up a website and produce stories (PENNYCOOK; RAND, 2018). The growing use of social media to get information and the lack of specialized gatekeepers in channels such as Facebook and Twitter also promote the spreading of such news (BERTHON; PITT, 2018). In fact, a study recently published on Science magazine found that “fake news and false rumors reach more people, penetrate deeper into the social network, and spread much faster than accurate stories” (MEYER, 2018).

The threat of fake news to businesses has been reported by The Washington Post (FERRARO; CHIPMAN, 2019). Groups with ideological goals may want to inflict damage in certain corporations with no intentions of financial gain, as was the case of campaigns against Starbucks, Coca-Cola, Xbox, and Costco. Profiteers, on the other hand, release fake news in order to boost stock prices and earn profits. In both cases, companies are targets of fake information that impacts their businesses (BERTHON; PITT, 2018).

For consumers, it may be difficult to recognize which websites publish true news, as fake news websites emulate the layout or even copy the names of the true versions (LAZER et al., 2018). Furthermore, in a fast-paced world, consumers have little time to attend properly to the information surrounding them (BERTHON; PITT, 2018). Hence, actions that increase consumers’ attention to the content and source

of the news, for example, whether the information comes from a trustworthy source, could help them identify fake news more accurately.

One way of training and increasing attention is meditation, a practice which has its roots in ancient Buddhist teachings and has gained popularity over the last few decades as a way to promote physical and psychological well-being. Meditators practice in order to develop a less effortful and more easily sustained attentional state (LUTZ et al., 2008). The effects on sustained attention are backed by research showing that people who practice both concentrative and mindfulness meditation have superior performance on the Wilkin's Counting Test than controls (VALENTINE; SWEET, 1999), and brain-imaging research has shown that Focused Attention (FA) meditation activates brain regions implicated in monitoring, engaging attention, and attention orienting (LUTZ et al., 2008). Importantly, Lutz et al. (2008, p. 163) consider that several subcomponents of attention can be trained as skills with meditation, which is conceptualized by the authors as a "family of complex emotional and attentional regulatory training regimes".

Despite these findings on meditation and attention, research on fake news has focused on deception detection and the proposal of models that can detect fake news automatically (WANG, 2017; SHU et al., 2017; CONROY, RUBIN, CHEN, 2017), neglecting what consumers could do to be less susceptible to fake news. To the best of our knowledge, no research has addressed meditation as a tool to help consumers spot this type of news, protecting themselves from its malefic influence. In order to fill this gap and in line with Transformative Consumer Research, the present study is a seminal effort to understand how mental training, namely meditation, can help consumers detect fake news.

As the practice of meditation has an effect on attention and aims to help one reaching a state of effortless attention, we propose that people who meditate may be more efficient in responding to cues that characterize news as fake. Because of that, meditators should more easily realize that the news is not true. To test our rationale, we conducted two studies. The first study was correlational and measured the relationship between mindfulness (which is related to the meditation experience) and fake news credibility. The second study was experimental and measured the effects of a mindfulness meditation induction on consumers' attention to fake news.

**The main goal of this research is therefore to measure the effects of mindfulness meditation on attention and credibility perception of fake news.**

Specific goals are:

1. Comparing fake news credibility between long-term meditators and consumers who do not meditate;
2. Comparing fake news credibility between consumers after a six-minute meditation induction and six-minute control induction;
3. Measuring attention - fixations, fixation time, pupil dilation, visits - during the reading of fake news after a six-minute mindfulness induction and a six-minute control induction;

The results for our first study show a weak correlation between mindfulness as a trait and skepticism, and that long-term meditators perceive fake news as less credible than non-meditators. On our second study, there was no difference in levels of credibility between groups. However, results show that those who meditated were less aroused and had less activation of attentional systems - less pupil dilation - while reading fake news. Total fixations were not affected by the manipulation, indicating that both meditators and controls processed information similarly.

## 2 FAKE NEWS

Fake news imitates the appearance of real news for legitimacy and thus gains credibility by projecting fake stories, fake photos, fake reviews and fake searches (ALLCOTT, GENTZKOW, 2017; BERTHON, PITT, 2018). As much as fake news brings misleading information, it also tends to attract the attention of individuals because it fits into people's prejudices (BERTHON; PITT, 2018). This can be justified because attention is generated by visual stimuli presented in simple, daily tasks, such as reading a website, scene perception, visual searching and other cognitive processing tasks (KUNDE, KIESEL, HOFFMANN, 2003; RAYNER, 2009). In addition, recent findings demonstrate that the cognitive processing is higher for fake news than for real news (LADEIRA; DALMORO; SANTINI, 2019).

Allcott and Gentzkow (2017, p. 213) define fake news as "news articles that are intentionally and verifiably false, and could mislead readers", and differentiate it from unintentional reporting mistakes, rumors that do not originate from news articles, conspiracy theories, satires, false statements by politicians, and slanted reports that are not outright false. Among factors related to the fake news phenomenon is the declining trust in mainstream media, which "could be both a cause and a consequence of fake news gaining more traction" (ALLCOTT; GENTZKOW, 2017, p. 6). Historically, misinformation has served political and military goals and is strategically organized and orchestrated (MELE et al., 2017), and specifically in the case of political news, the increased political polarization is also a factor that contributes to this phenomenon.

Fake news pieces have been spreading and influencing opinion and collective decision-making in countries all over the world. It has been said that, were it not for false news, Donald Trump would not have been elected as President of the United States in 2016 (PARKINSON, 2016), and the result of the Brexit would have been different. In the case of Trump's election, a survey by BuzzFeed and Ipsos found that American adults were fooled by fake news about 75% of the time (SILVERMAN, 2016). Countries such as Brazil (PHILLIPS, 2018) and Sudan (CHARMICHAEL; PINNELL, 2019) are also affected by the phenomenon.

One reason for the belief in such stories may be that fake news that confirm consumers' prior beliefs are psychologically rewarding to them, as "consumers

choose the firms from which they will consume news in order to maximize their own expected utility” (ALLCOTT; GENTZKOW, 2017, p. 8). As a result, attempts to correct misinformation are not effective. In fact, because of familiarity and fluency biases, the repetition of information - even in the attempt to show that it is not true - may increase the belief in it (MELE et al., 2017). Finally, another aspect that promotes the propagation of false stories is that they are affective and inflammatory, and Facebook favours that type of content, independent of its veracity (BAKIR; MCSTAY, 2018).



### 3 MEDITATION AND MINDFULNESS

#### 3.1 DEFINITIONS AND HISTORY

The term meditation has different meanings in eastern and western traditions. The former sees meditation as thinking about something. To the latter, on the other hand, meditation is about “placing the mind upon physical sensations, upon raw sights or sounds, or upon the tangible objects of smell and taste” (OLENDZKI, 2009, p. 38). This paper is in line with the western definition. The practice of Buddhist meditation is the repetition of the process of focusing the mind on an object, realizing the mind has distracted itself, and concentrating back on the object. The mindfulness practice is also aligned with the idea of trying to concentrate on an object and its maintenance over time, but “tends to open to a broader range of phenomena rather than restricting the focus to a singular object” (OLENDZKI, 2009, p. 42), and allows the mind to follow the flow of what emerges from experience.

In the literature, however, mindfulness and meditation may be used interchangeably, encompassing studies that consider mindfulness to be either a personal trait (WALSH et. al, 2009; BROWN, GOODMAN, INZLICHT, 2013), or a secular practice that can be both short-term, as in the case of 5 to 20-minute inductions, and long-term as in the case of mindfulness-based protocols such as Mindfulness-Based Stress Reduction - MBSR (KABAT-ZIN, 2003) - or Mindfulness-Based Cognitive Therapy - MBCT (SEGAL et al., 2013). There are also studies with life-long meditators, including traditional Buddhist monks, that have been practicing frequently for over decades of their lives (CARTER et al., 2005) as part of a broader philosophical or religious belief. Mindfulness is sometimes treated as one specific type of meditation (DAHL; LUTZ; DAVIDSON, 2015) or as broader scope than meditation (OLENDZKI, 2009).

Another aspect is the difference between mindfulness as a topic of study in a secular environment and as a practice in Buddhist traditions. As Wallace and Shapiro (2006) explain, the Buddhist approach to well-being is not only based on the mental training of attention. The authors draw a model bridging Buddhism and Western Psychology and arrive at four types of mental balance to cultivate well-being:

conative, attentional, cognitive, and affective. The first type of balance is a prerequisite for the other three to take place.

If one does not develop conative balance—a reality-based range of desires and aspirations oriented toward one's own and others' happiness—then there will be little or no incentive to try to balance one's attentional, cognitive, and affective faculties (WALLACE; SHAPIRO, 2006, p. 694)

Mindfulness and meditation, in its different forms, are used to achieve attentional, cognitive and affective balance. But if the intention of generating happiness for oneself and others is not present, this model falls apart. Mindfulness is, therefore, part of a broader system that aims to promote well-being.

In studies in which mindfulness inductions are used, and in which participants are subjected to only a few minutes of practice, this model does not apply, and the effects captured may be different from those in studies with life-long Buddhist meditators. This is part of the confusion inhabiting the realm this type of research, because all of those different approaches will be found under the same umbrella term, namely mindfulness research. To tackle this lack of conceptual clarity, Van Dam et. al (2017) suggest that articles around the theme should be clear about what is actually being studied.

In the present research, we study mindfulness in different forms. In our first study, which is correlational, we survey both life-long meditators and non-meditators. In this case, meditators were either part of philosophical or religious group that use meditation as part of a spiritual pursuit (Ananda Marga, Tibetan Buddhism, Yoga practitioners, and The Self-Realization Fellowship), or part of therapeutic groups practicing mindfulness meditation. Although participants are involved in different types of meditation, and with different goals, what unites them is that they have developed higher mindfulness as a trait, probably as a result of meditating (see results). In our experimental study, participants on the treatment group practice a six-minute mindfulness meditation induction, based on MBSR practices, and all participants have little or no meditation experience. We chose to study mindfulness in these two forms because it is a complementary way of understanding its effects: the first deals with dispositional mindfulness and long-term practices, indicating what will happen if different types of meditation became a part of a consumers' daily lives; and the second shows the potentialities of short-term practices that are commonly found in apps, indicating what happens to those who are starting to practice.

### 3.2 EFFECTS OF MINDFULNESS

There are basically two streams of research concerning mindfulness. One is based on Ellen Langer's work and the other is based on Kabat-Zin's practice and research (HART; IVTZAN; HART, 2013). The field of marketing has used both these streams of research as a reference, and there are researchers following Ellen Langer (USLAY; ERDOGAN, 2014) and Kabat-Zin (FISCHER et al., 2017).

Hart, Ivztan and Hart (2013) differentiate Ellen Langer's and Kabat-Zin's schools of thought. The "creative mindfulness strand" is led by Langer since the 1970's and characterizes mindfulness as a mode of conscious awareness opposed to the automatic and habitual mode of mindlessness. According to Hart, Ivztan and Hart (2013, p. 454), in the process of being less automatic - self-regulating one's attention - one would direct awareness to external stimuli and engage "with it cognitively in a creative way". Hence the name of the Langer's research tradition.

Kabat-Zin's line of research on mindfulness is concerned with therapeutic effects, using interventions to alleviate symptoms of physical and psychological conditions. Hart, Ivztan and Hart (2013, p. 455) call this tradition "meditative mindfulness" and suggest that it "involves metacognitive awareness practices with the aim of improving one's cognitive regulatory processes".

On an operational level, what differentiates these two perspectives is that Kabat-Zin's perspective proposes the practice of meditation, which promotes mindfulness, while Langer's perspective has no connection with meditation per se. Kabat-Zin and his followers use Mindfulness-Based Stress Reduction (MBSR) and adaptations. The latter is an eight-week program that includes meditation, yoga and group discussions, on a daily basis.

What both lines of thought have in common is the self-regulation of attention and focus on the present moment (HART; IVTZAN; HART, 2013). In the state of mindlessness or autopilot, when one is not attentive to present moment stimuli, the mind "becomes an unreliable instrument for examining internal or external processes" (HART; IVTZAN; HART, 2013, p. 455).

In the present research, we will apply Kabat-Zin's approach because it is the one related to meditation and allows for the testing of practices. We will therefore be

able to experimentally test how people can develop and attain an optimized level of attention. Following this perspective, there is established literature in clinical psychology, but only scant literature testing the effects of mindfulness in a consumption context. Most existing studies are around mindful eating, a topic that is found in psychology (JORDAN et al., 2014), nutrition (MEIER; NOLL; OLOKWU, 2017) and consumer research journals (VAN DER VEER; VAN HERPEN; VAN TRIJP, 2011). There is also preliminary evidence that mindfulness is negatively related to material values and exploratory experimental data reporting the effects of mindfulness on impulse buyers (ARMSTRONG, 2012).

Under a therapeutic perspective, various mindfulness-based protocols have been tested for the treatment of mental conditions (KABAT-ZINN, LIPWORTH, BURNEY, 1985; TEASDALE et al., 2000). Positive outcomes have been found, such as the reduction of chronic pain after a ten-week mindfulness program (KABAT-ZINN; LIPWORTH; BURNEY, 1985), the reduction of anxiety, depression and panic levels in patients with anxiety disorders (ZABAT-ZIN et al., 1992), and the efficacy in the relapse of depression after treatment with MBCT – Mindfulness-Based Cognitive Therapy - (TEASDALE et al., 2000). Positive effects on physical health have also been reported, such as the reduction of blood pressure in High School students after a three-month daily 20-minute meditation routine (BARNES et al., 2008).

Effects of mindfulness meditation have also been reported after brief inductions. In these studies, participants who are new to meditation are induced into a mindful state through audio recordings while controls listen to other types of inductions. These types of treatments have been found to affect motivation (HAFENBRACK; VOHS, 2018), reduce biases (STELL, FARSIDES, 2015; KIKEN, SHOOK, 2011; HAFENBRACK, KINIAS, BARSADÉ, 2014), promote emotional regulation (ARCH; CRASKE, 2006) and reduce food consumption (VAN DER VEER; VAN HERPEN; VAN TRIJP, 2011). Table 1 summarizes these findings.

Table 1 - Effects of short mindfulness induction.

<b>Psychological Effects</b>	<b>Reference</b>	<b>Inductions</b>	<b>Results</b>
Reduced motivation	Hafenbrack and Vohs (2018)	15-min focused breathing mindfulness meditation or mind-wandering comparison induction (studies 1 - 3); 8 - min focused breathing mindfulness meditation or mind-wandering comparison induction (study 4).	Mindfulness inductions reduce motivation to perform a task (studies 1 and 4), but do not affect task performance (studies 2 and 3).
Reduction of racial bias and automatic processing	Stell and Farsides (2015)	4-min Loving Kindness Meditation (LKM) and 4 minutes of imagining neutral people and situations.	Heightened levels of positive affect directed towards the focal target group (blacks) in the LKM participants.  LKM increased controlled and decreased automatic processing.
Sunk-cost bias	Hafenbrack, Kinias, Barsade (2014)	15-min mindful breathing induction vs. mind wandering.	Decreased sunk-cost bias.
Responsiveness to physiological cues in food consumption	Van der Veer, Van Herpen, Van Trijp (2011)	4-min recorded mindfulness instruction focused on the body or 4 minute mindfulness focused on the environment.	Attention to the body improves responsiveness to internal cues in food consumption.
Negativity bias	Kiken and Shook (2011)	15-min mindful breathing induction vs. mind wandering.	Reduced negativity bias and increased positive affect.
Emotion regulation	Arch and Craske (2006)	15-min mindful breathing induction, 15-min mind wandering (think of whatever comes to mind) and 15-min worry induction (Social Relations, Achievement, Money/ Economics, Environment, Health, and Safety).	Mindful participants maintained responses to images before and after induction, whereas the other groups responded more negatively after treatment.  Mindful participants had more adaptive responses to negative stimuli.

### 3.3 ATTENTION: THE LINK BETWEEN DIFFERENT LINES OF RESEARCH

As stated above, attentional regulation is the link between Ellen Langer's and Kabat-Zin's streams of research. Yet, other researchers have also found interesting results on the effects of mindfulness and meditation on attention. Neuroscience has been investigating the brain mechanisms involved in different types of meditation for more than 40 years (GOLEMAN; DAVIDSON, 2017). Research has been done with Buddhist monks and long-term western meditators. Although this strand of research cannot always be called experimental, it has contributed with vital insights to the field.

Dahl, Lutz and Davidson (2015) have proposed three categories of styles of meditation: attentional, constructive and deconstructive families. Mindfulness meditation is part of the attentional family, which trains the capacity to "intentionally initiate, direct, and/or sustain these attentional processes while strengthening the capacity to be aware of the processes of thinking, feeling and perceiving" (DAHL; LUTZ; DAVIDSON, 2015, p. 516). In these types of meditation, one will, for example, attend to the process of breathing in and out, without being attached to thoughts and feelings that may come and go. Once the mind realizes it got distracted by a thought or a feeling, it should redirect attention to the breath.

By analyzing the three different types of studies outlined above - Ellen Langer's, Kabat-Zin's and neuroscientific work -, we can conclude that attention is one of the key mechanisms in mindfulness. In contribution to Williams and Poehlman's (2017) research, Plassmann and Mormann (2017, p. 260) state that "attention plays a key role in moving mental processes along the consciousness continuum", taking them from the preconscious to the conscious level. One example given by the authors is that of someone who wants to eat healthy foods.

For example, a consumer may see a piece of chocolate cake and be aware of their goal to eat healthily, but their lack of attention to that goal - and thus the lack of communication with higher cognitive processes linked to self-control - keeps the healthy goal in the preconscious domain (PLASSMANN; MORMANN, 2017, p. 259).

Dehaene and Naccache (2001) suggest the existence of a consciousness continuum - not a dichotomy -, that goes from subliminal to preconscious and finally to the conscious level. Attention would therefore be like a transportation system from

the preconscious to the conscious domains. Toates (2006) goes a step further in drawing the relationship between attention, consciousness behavior and other processes. Based on his proposed system he states that “attention can be interpreted as a process of modulating the candidacy of particular stimuli and thoughts in their ability to capture the control of behavior and consciousness” (TOATES, 2006, p. 88) and is controlled both by top-down and bottom-up processes.

Scientific and Buddhist texts describe how meditation training - particularly Focused Attention meditation - affects attention. Lutz et al. (2008) review studies that suggest that trained meditators present a form of effortless concentration with a higher ability to sustain attention.

In expert meditators, one might therefore expect reduced activation in neural systems implicated in regulating attention, which might be associated with optimized performance in sustained and selective attention tasks. (LUTZ et al., 2008, p. 164).

Wallace and Shapiro (2006) describe how attentional balance is attained through mindfulness. According to the authors, both attentional deficits and hyperactivity are attentional imbalances that can be remedied by practice. Contrary to western psychology, in which lower arousal correlates with lower attentional levels, in Buddhist attentional practice:

One first emphasizes the cultivation of mental and physical relaxation; on that basis, attentional stability is highlighted, and finally one focuses on the development of attentional vividness. The result of such training is an anomalous state of attentional balance in which a high level of attentional arousal is maintained while remaining deeply relaxed and composed. (WALLACE; SHAPIRO, 2006, p. 696).

One can conclude that meditators' attentional patterns are different from the non-meditators. Less effort is necessary for meditators to process the same information and attentional levels are more stable.

### **3.3.1 On measuring attention**

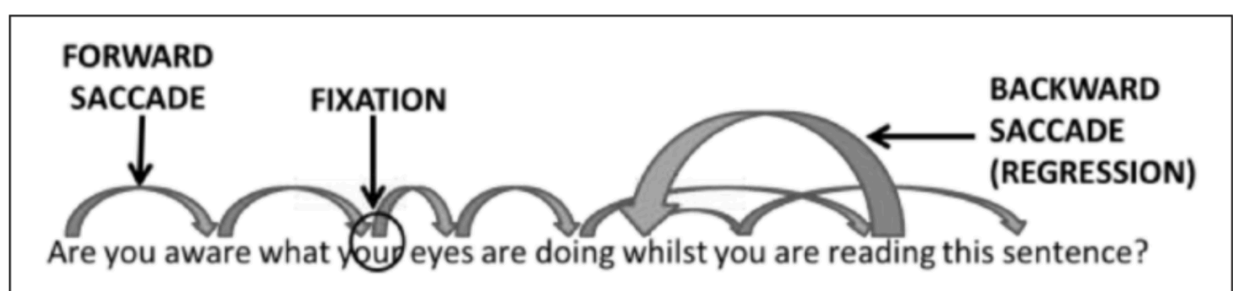
To measure attention, on the second study we used an eye tracking device, which has been used to the same purpose in different studies in psychology

(STRICK et al., 2009; ARMSTRONG, OLATUNJI, 2012) and marketing (HUDDLESTON et al., 2015, WEDEL; PIETERS, 2015). It is known that gaze behavior is related to the acquisition and processing of consumer information (WEDEL; PIETERS, 2015).

There are two basic types of eye movements: saccades and fixations. Saccades are fast movements of about 8 to 9 letter spaces, in which no information is processed due to the speed with which the eyes move (Rayner, 1993). Those movements are separated by fixations, when the eyes are relatively still. Fixations last about 250 milliseconds, and that is when readers retrieve information from the text. Regressions are backward saccades, when the eyes go back through the line of text (Figure 1). That happens from around 10 to 15% of the time in order to check information. Rayner (2009, p. 1458) shows that “attention precedes a saccade to a given saccade target location”. According to the author, “as text difficulty increases, fixation duration increases, saccade length decreases, and regression frequency increases” (RAYNER, 1993, p. 81).

On eye tracking studies, Areas of Interest (AOIs) are defined in the studied image, and every time the eye enters that AOI a visit is count. The higher number of visits indicates that a specific AOI drew more attention from participants, needed more processing or was more difficult to read (RAYNER; POLLATSEK, 1989).

Figure 1 – Eye movements while reading.



Font: McGray and Brunfaut (2016).

Eye movements are the fastest movement of the human body and fixations are known to direct attention to objects, after which mental processing is increased (HUDDLESTON et al., 2015). Attention can be influenced both by personal characteristics of individuals - top-down factors - and characteristics of the stimulus -



bottom-up factors (WEDEL; PIETERS, 2015). Huddleston et al. (2015) have found that eye movements not only serve as proxies for attention, but also can also be related to behavior: in their eye tracking field study of display signage in gardens, visual attention to price has been shown to have a positive relationship to likelihood to buy (HUDDLESTON et al., 2015).

Another way of measuring attention levels, cognitive effort and unconscious processes with the use of an eye tracking is the observation of pupil diameter (LAENG; SIROIS; GREDEBÄCK, 2012). According to Laeng, Sirois and Gredebäck (2012), Hess and Polt (1960) were the first to establish a method for pupillometry. These authors filmed the participants' eyes with 16mm cameras while being exposed to a series of images, and then measured pupil dilation on a projected image of the films. On this first study, Hess and Polt (1960) found that pupil dilation was larger on women when they looked at pictures of semi-nude men - while compared to men looking at the same picture - and larger for men when looking at pictures of semi-nude women - while compared to women looking at the same image. The authors have therefore established that the pupil dilates as a response to interest value of visual stimuli.

In his book *Attention and Effort*, Kahneman (1973) classifies pupil dilation as a manifestation of arousal, together with increased skin conductance and fast pulse. The author also reviews a number of studies in which pupillary dilation indicates mental effort and cognitive load. More recently, neuroscientific research has found a link between pupillary response and the activation of the LC-NE (locus coeruleus–norepinephrine) system in the brain, which are thought to play a key role in attentional modulation and task engagement (LAENG, SIROIS, GREDEBÄCK, 2012; UNSWORTH, ROBINSON, 2014). According to Gilzenrat et al. (2010) the LC-NE plays an important role in the regulation of what the authors call the *exploit/explore trade-off*.

Balancing this trade-off involves regulating the extent to which the control state of the system favors task engagement (exploitation) versus disengagement from the current task and the sampling of other inputs and/or behaviors (exploration) (GILZENRAT et al., 2010, p. 252).

The authors illustrate this trade-off with the case of an academic that has to decide between spending more time revising a manuscript on a topic that they

already have a lot of knowledge on (exploitation) or going to a seminar on a new topic that is potentially relevant (exploration). In the LC (locus coeruleus) this trade-off happens in two modes: phasic and tonic. The phasic mode relates to task-relevant events (exploitation) whereas the tonic mode relates to exploration (GILZENRAT et al., 2010). Usher et al. (1999) studied monkeys performing a visual discrimination task and found that poor performance is associated with higher tonic LC activity than good performance. Previous studies suggest is that “baseline pupil diameter corresponds to LC tonic firing rate, and task-evoked dilations correspond to LC phasic activity.” (GILZENRAT et al., 2010, p. 253).

The present research will measure both fixations and pupil dilation. Because the underlying mechanisms of the relationship between LC activity and pupil dilation are not fully known, we will assume that pupil dilation is a measure of attention and effort, and that a larger pupil diameter is an indicator of higher effort and activation of attentional systems. One of the advantages of using pupil diameter as a variable is that it is an implicit measure and indicates processes even if they are happening below the conscious level (LAENG, SIROIS, GREDEBÄCK, 2012). As for fixations, we will assume that fixations are related to attention and cognitive processing, which is in line with extant literature (HUDDLESTON et al., 2015).

## 4 HYPOTHESES

As reviewed in the previous sections, mindfulness-based stress reduction is part of the Attentional family in a typology of meditation proposed by Dahl, Lutz and Davidson (2015), and meditation is seen as an attentional training both in Buddhist tradition and scientific literature (LUTZ et al., 2008). With the practice of meditation, emotional reactivity is reduced and it becomes easier for meditators to concentrate (LUTZ et al., 2008). Wallace (2006, p. 12) describes *Shamata*, a type of meditation originated in Tibetan Buddhism, as “a path of attentional development that culminates in an attention that can be sustained effortlessly for hours on end”. In another publication, Wallace and Shapiro (2006) state that the attentional state of those who meditate is ‘anomalous’, because these practitioners reach high levels of attention in a relaxed manner. Meditators would therefore present higher levels of attention and concentration with less effort than those unexperienced in meditation. Considering the eye tracking metrics that we are using, we propose that: H1: Meditators will read fake news with less effort and less activation of attentional systems, showing a smaller pupil diameter, than controls. We expect that this reasoning holds for other attentional measures as well, so we propose that: H2: Meditators will read fake news with a lower count of fixations and lower fixation time than controls.

As stated above, meditators should find it easier to concentrate, even while employing less effort. This means that meditators will have an optimized performance when attending to the fake news. We expect, therefore, that meditators will find it easier to comprehend the text, and since visit count can be an indicative of comprehension difficulty (RAYNER; POLLATSEK, 1989) we propose that: H3: Meditators will read fake news with less visits than controls.

Related to meditation’s effects on attention is the finding that meditation involves a deautomatization of mental processes (LUTZ et al., 2008), having the potential to reduce automatism (SUN et al., 2015). Following this logic, we expect that those who meditate will have a slower, less automatic reading behavior, and that cues that characterise news as fake will more easily be attended to by them. Because attention is an important mechanism in helping stimuli become more conscious (i.e. less automatic) in individuals’ minds, and can even have an influence in behavior (PLASSMANN, MORMANN, 2017; TOATES, 2006), we propose that fake

news cues - e.g.: type of content, writing style, graphic characteristics - will more easily become conscious to consumers who meditate. As a result of that, it is less likely that this group find the fake news credible. We therefore propose that: H4: Meditators will have less credibility in fake news.

## 5 EMPIRICAL STUDIES

In an attempt to test the hypotheses, we conducted the two following studies.

### 5.1 PRE-TEST

In both of our studies respondents had to read a fake news and evaluate its credibility. For our first study, we designed the fake news ourselves. One advantage of doing so is that this would be a totally new fake news to participants would be less biased when evaluating credibility. We designed the news with the goal of making them somewhat believable to participants, so we wouldn't have a floor or ceiling effect. To do that and imitating a practice done by fake news outlets, we emulated the layout of Folha de São Paulo, a well-known media outlet in Brazil.

Also while designing the fake news, we included three elements that were meant to cue participants of the lack of veracity of the piece. To define which parts of an online piece are typical of fake news, we adapted our three cues from Facebook's 10 Tips on How to Spot Fake News<sup>1</sup>: the link, which carries a different text and date than the title of the news; the image in the news, which was followed by a disclaimer stating that it was an illustrative image; and the name of the media outlet, also created by the authors and meant to emulate an obscure source. In addition to the cues, the text of our piece also emulated those of news that have little credibility by not citing sources for alleged scientific data.

As for the content of our fake news, we tested two different ideas on a pre-test. The first was about slaughter houses injecting toxic paint in the meat to make it look better to consumers, the second was about a new exercise method that enhances life expectancy and can be practiced at a new fitness franchise that came into town. Both fake news are available on the appendix A.

For the pre test 137 participants (89 women,  $\mu_{age} = 38.5$ ) were recruited through posts on the author's social media profiles, presented with a scenario where either with the meat fake news (84 respondents, 57 women,  $\mu_{age} = 37.8$ ) or the gym fake news (53 respondents, 32 women,  $\mu_{age} = 39.57$ ) were posted by Facebook friends, and asked about its credibility. Credibility on the fake news was measured on

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<sup>1</sup> Retrieved from: <https://www.facebook.com/help/188118808357379> on 27th of June, 2019.

a 7-point Likert scale (adapted from CHEUNG; SIA; KUAN, 2012) with the affirmations: *I think this news is trustworthy, I think this news is real, I think this news is precise, and I think this news is credible*. 1 was equal to ‘totally disagree’ and 7 was equal to ‘totally agree’.

For the meat fake news (Figure 2), mean credibility was 3.44 (SD = 1.65), and for the gym fake news (Figure 3) mean credibility was 2.97 (SD = 1.68), with no significant difference [ $F(1, 136) = 2.553, p = 0.112$ ]. There are no significant differences in age [ $F(1, 135) = 0.491, p = 0.485$ ] and gender [ $\chi(1) = 0.799, p = 0.371$ ] between participants that read the meat or the gym fake news. We chose to work with the gym fake news because its histogram is slightly better distributed - there are responses on the higher numbers on the Likert scale as well as on the lower. We also reasoned that a fake news involving meat could be specially appealing to those who are involved in meditation practices, since many those groups stimulate vegetarianism. That would create an extra confounding variable, so we chose the gym fake news.

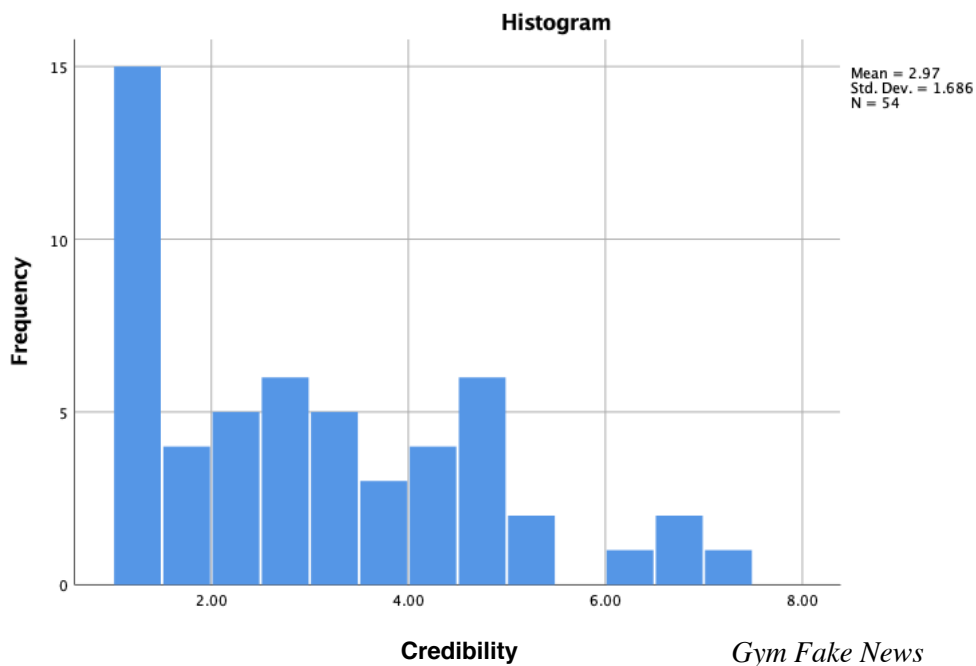


Figure 2 – Credibility for gym fake news.

Font: Author (2019).

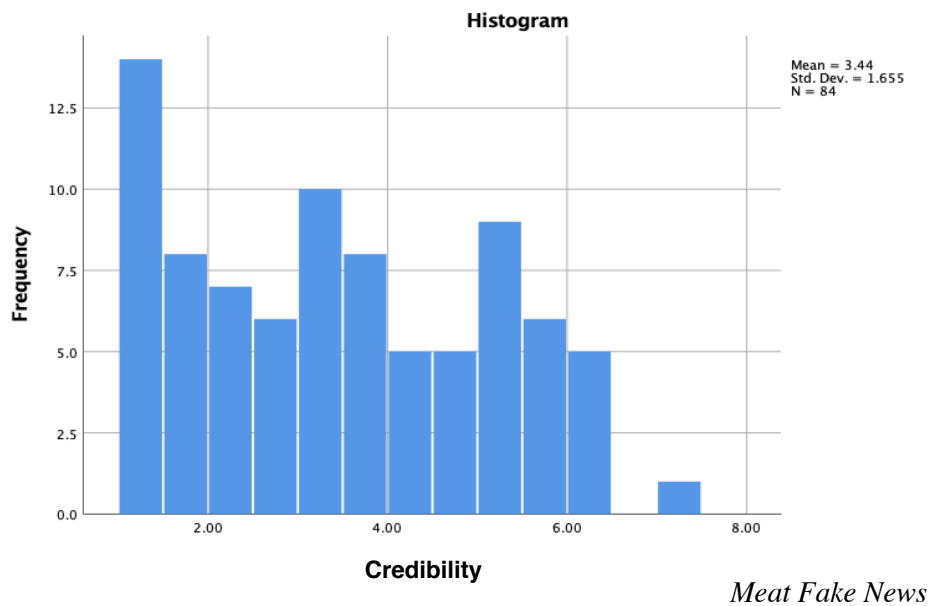


Figure 3 – Credibility for meat fake news.

Font: Author (2019).

## 5.2 STUDY 1

We recruited 98 participants (56 meditators, 59 women,  $\mu$ age = 39.43) both online and on meditation centres across Porto Alegre, Brazil, between December 2018 and May 2019. We contacted the leaders at different religious and secular institutions where meditation and mindfulness are practiced (e.g. The Self-Realization Fellowship, the Chagdud Gonpa Yeshe Ling, CEBC, and mindfulness instructors) and asked them to share our online questionnaire with the members of their communities. Both respondents and leaders at the different institutions were blind to our hypotheses. Meditators had varying experience, ranging from 6 months of regular meditation practice to 10 or more years of experience. The non-meditating group had no meditation experience and was recruited on social media. We matched the samples for demographic variables. We ran a Pearson Chi-Square Test and there was no significant difference in gender [ $\chi(1) = 0.014, p = 0.905$ ] and income [ $\chi(1) = 2.745, p = 0.601$ ] between groups. We also ran an ANOVA and there was no significant difference in age [ $F(1, 96) = 0.148, p = 0.701$ ] between groups.

### 5.2.1 Scenario

Participants responded to an online questionnaire that started with the presentation of a fake news created by the authors. This piece reported a new type of exercise method that promised to have a positive effect on life expectancy and was available at a new gym franchise called BodyOne.

### 5.2.2 Measures

Credibility of the fake news was measured on the same scale used in the pre-test, and Cronbach's Alpha for this measure was 0.931. The Five Facet Mindfulness Questionnaire (BAER et al., 2006) was used to assess participants' level of mindfulness as a personal trait, and the Professional Skepticism Scale (HURTT, 2010) was adapted to a more general context - not only professional - in order to assess participants' trait skepticism. The FFMQ asks questions such as *When I'm walking, I deliberately notice the sensations of my body moving, I can easily put my beliefs, opinions, and expectations into words, I don't pay attention to what I'm doing because I'm daydreaming, worrying, or otherwise distracted*, and has a 0.910 Cronbach's Alpha in this study. The Skepticism Scale asks questions such as *I believe learning is exciting, I like to determine if what I read or heard is true, I tend to immediately accept what other people say*, and has a 0.808 Cronbach's Alpha in this study. Participants were also asked to indicate how many hours they meditate every week, approximately how many hours they have meditated in life, and for how many years they have had a regular practice of meditation.

### 5.2.3 Results

In the meditation group, 12.2% of participants practiced meditation or mindfulness for less than 1 year; 13.3% between 1 and 4 years; 15.3% between 4 and 10 years; and 16.3% for more than 10 years. Participants responded to the Five Facet Mindfulness Questionnaire (FFMQ) ( $M = 4.75$ ,  $SD = 0.83$ ) and the Skepticism scale ( $M = 5.25$ ,  $SD = 0.73$ ). FFMQ scores had a significantly positive correlation with



participants' self-reported weekly meditation practice hours ( $r = 0.428$ ,  $p < 0.000$ ), and years of regular meditation practice ( $r = 0.503$ ,  $p < 0.000$ ). This suggests that all participants, even those who practice other types of meditation than mindfulness, are promoting mindfulness as a trait. Also, FFMQ for meditators ( $M = 5.07$ ,  $SD = 0.72$ ) was significantly higher than for those who do not practice meditation [ $M = 4.31$ ,  $SD = 0.75$ ,  $F(1, 96) = 25.692$ ,  $p < 0.001$ ], and skepticism for meditators ( $M = 5.22$ ,  $SD = 0.57$ ) is not significantly different from those who do not meditate [ $M = 5.27$ ,  $SD = 0.89$ ,  $F(1, 96) = 0.126$ ,  $p = 0.723$ ]. Mindfulness and trait skepticism were correlated ( $r = 0.284$ ,  $p = 0.005$ ) - this correlation can be considered weak according to Evans (1996) - and there was no difference in skepticism between meditators ( $M = 5.22$ ,  $SD = 0.57$ ) and non-meditators ( $M = 5.27$ ,  $SD = 0.89$ ).

We ran an ANOVA and news credibility perception was lower for meditators ( $M = 2.39$ ,  $SD = 1.42$ ) than non-meditators [ $M = 3.26$ ,  $SD = 1.76$ ,  $F(1, 96)$ ,  $p = 0.009$ ]. We controlled for trait skepticism and age and news credibility was still lower for meditators than non-meditators [ $F(3, 94) = 3.121$ ,  $p = 0.030$ ]. News credibility was not significantly correlated with trait skepticism ( $r = -.133$ ,  $p = 0.193$ ) and age ( $r = 0.004$ ,  $p = 0.971$ ), which indicates that participants' skepticism as a trait and their age are not influencing the results. There was no significant difference in news credibility between genders [ $F(1, 96) = 0.108$ ,  $p = 0.743$ ]. These results suggest that those who practice mindfulness tend to be less susceptible to fake news, and that skepticism, although correlated to mindfulness, does not play a role in this relationship.

#### **5.2.4 Discussion and limitations**

Our correlational study reached two news findings in the literature. The results show that dispositional or trait mindfulness is associated with less credibility in fake news, even when controlling for trait skepticism, and that there is a correlation between mindfulness and skepticism.

The limitations of this study are that we did not control for other confound variables, such as materialism or the interest in exercise. Since our fake news attempted to promote a fitness business, those variables could have an impact on the effect. Future studies should control for those and other confounds. Also, because this is a correlational study, no causal relationship can be drawn.

In the next session, we describe our attempt to establish a negative causal relationship between mindfulness and fake news credibility. We also attempt to confirm H1, H2 and H3, which state that attention to fake news cues is the underlying mechanism of this relationship.

### 5.3 STUDY 2

One hundred and two (48 women,  $\mu$ age = 25.04) undergraduate and graduate students were recruited at the university campus during the month of April 2019, and randomly assigned to two groups. Participants would blindly draw a number between 1 and 120, and those with odd numbers would be assigned to the mindfulness meditation condition whereas those with even numbers would be assigned to the placebo condition. The treatment group ( $n = 52$ ; mindfulness meditation induction) would listen to a six-minute audio recording instructing participants to close their eyes, focus on their breath, and let thoughts and feelings come and go, without getting attached to them. The placebo group ( $n = 50$ ) would listen to a six-minute audio recording instructing them to follow any thoughts that came to mind. Both audios were adapted from Hafenbrack, Kinias and Barsade (2014), and translated into Portuguese and narrated by a trained meditation instructor at the UFRGS' radio studio. The meditation instructor was careful to speak with the same tone of voice and speed in both recordings. See attachments for induction transcripts.

The experiment was conducted in a laboratory setting, keeping lighting and temperature constant, with the aim of allowing greater control of factors that may distract consumers' attention (CHANDON et al., 2009; MENON et al., 2016). Gaze data were collected with a Tobii Pro X3-120 screen-based eye tracker, which samples gaze data at a rate of 120 Hz. This type of equipment is used in studies with environmental conditions that cap visual attention and perception in web sites or social media.

After listening to the inductions, participants were seated in front of a computer with a Tobii Eye Tracking device attached to it. Calibration was done by an experienced researcher and participants read a fake news piece which was translated and adapted from a known fake news website<sup>2</sup>. After reading the news,

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<sup>2</sup> Retrieved from: <https://beforeitsnews.com/v3/alternative/2019/3673800.html> on 27th of June, 2019.

participants responded to a questionnaire on another computer. Different from Study 1, in the second study we chose to adapt a fake news that had been published online with the goal of enhancing realism. Find the original fake news and its version as seen by participants in the appendix B.

### 5.3.1 Measures

The measures for news credibility were the same as Study 1. As manipulation checks we adapted measures from Hafenbrack, Kinias and Barsade (2014) and asked participants, on a seven-point Likert scale, *How focused on your breath were you during the audio exercise?*, *How focused on your physical sensations were you during the audio exercise?*, and *How connected to your body were you during the audio exercise?*, where 1 equals 'very little or not at all' and 7 equals 'extremely'. Cronbach's Alpha for the manipulation check was 0.859, and the three questions were united into an index for analysis. On the eye tracker, we measured pupil dilation as a proxy for attention and effort, and total fixations, fixation time and visit count as a proxies for attention and information processing. We controlled for previous belief in the content of the fake news by asking participants how much they agreed with the sentence *Before reading this news I already believed that cell tower radiation can cause cancer*, to which participants responded on a 7 post Likert scale. As in study 1, we also controlled for skepticism, but for this study we chose a smaller scale in order to reduce the time participants would have to spend in the lab. To do that, we adapted the Dispositional Trust subconstruct from Zhang et al. (2016)'s Skepticism Scale, and asked participants how much they agreed with affirmations such as *I generally trust other people* and *I generally have faith in humanity* in a 7 point Likert scale. Cronbach's Alpha for that construct was 0.833.

### 5.3.2 Results

Of the total participants in our sample, 42.2% have already experienced a meditation practice in their lives, but 87.3% are not practicing meditation regularly in the present time. We ran analysis excluding those who had some experience in meditation and there was no difference in our DV, so we chose to keep all participants in all

analyses. Also, there was no significant difference in previous meditation experience between those who meditated ( $M = 1.35$ ,  $SD = 1.13$ ) in the experiment and those in the control group [ $M = 1.4$ ,  $SD = 1.03$ ,  $F(1, 100) = 0.063$ ,  $p = 0.803$ ]. Scores for the manipulation check were significantly higher on the treatment group ( $M = 4.6$ ,  $SD = 1.26$ ) than on the placebo [ $M = 3.14$ ,  $SD = 1.65$ ;  $F(1, 100) = 25.242$ ,  $p < 0.000$ ], indicating that the treatment group actually practiced mindfulness meditation. There was no significant difference in news credibility between the treatment group ( $M = 3.72$ ,  $SD = 1.48$ ) and the placebo group [ $M = 3.74$ ,  $SD = 1.41$ ;  $F(1, 100) = 0.005$ ,  $p = 0.942$ ], which indicates that a short mindfulness induction does not seem to be enough to change participants' belief on fake news on a conscious level. There was no significant difference in the scores for dispositional trust between the treatment ( $M = 4.55$ ,  $SD = 1.31$ ) and the placebo [ $M = 4.85$ ,  $SD = 1.32$ ,  $F(1, 100) = 1.245$ ,  $p = 0.267$ ] groups, and no significant difference in the previous belief that cell tower radiation can cause cancer between the treatment ( $M = 2.98$ ,  $SD = 1.66$ ) and placebo [ $M = 3.1$ ,  $SD = 1.86$ ,  $F(1, 100) = 0.131$ ,  $p = 0.718$ ] groups. Because of these results, we kept our choice to keep all participants in the subsequent analyses, except for one that was not accurately recorded by the eye tracker.

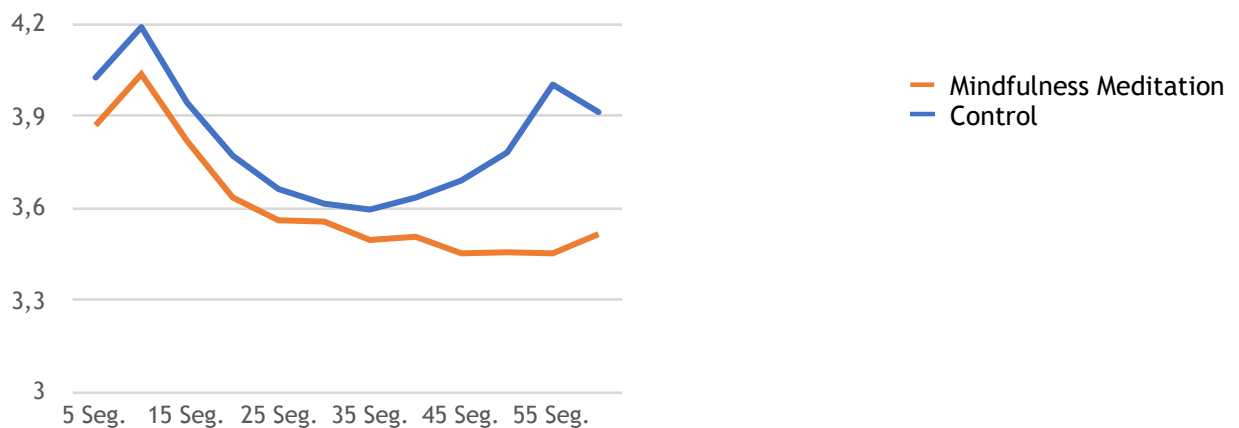
We, hence, turn to the findings from the eye tracking. We selected the fake news text as our area of interest - see attachments for image of AOI - and in order to analyse pupil dilation and total fixation count, we divided the total time participants were attending to the fake news in intervals of 5 seconds. We then ran ANOVAS comparing the meditation and placebo groups. Confirming H1, meditators presented less dilated pupils than controls in all intervals (Table 2 and Figure 4), indicating that they employed less effort activated less attentional systems than participants who did not meditate.

Table 2 - ANOVA test for Pupillometry.

Time	Group 00 - Control	Group 01 - Mindfulness Meditation	ANOVA (p <)
5 - 10 seconds	4.025	3.869	0.000
10 - 15 seconds	4.190	4.036	0.000
15 - 20 seconds	3.943	3.835	0.000
20 - 25 seconds	3.770	3.634	0.000
25 - 30 seconds	3.662	3.560	0.000
30 - 35 seconds	3.614	3.556	0.000
35 - 40 seconds	3.595	3.496	0.000
40 - 45 seconds	3.634	3.506	0.000
45 - 50 seconds	3.689	3.452	0.000
50 - 55 seconds	3.781	3.456	0.000
55 - 60 seconds	4.000	3.452	0.000
60 - 65 seconds	3.913	3.515	0.000

Font: Author (2019).

Figure 4 – Pupillometry.



Font: Author (2019).

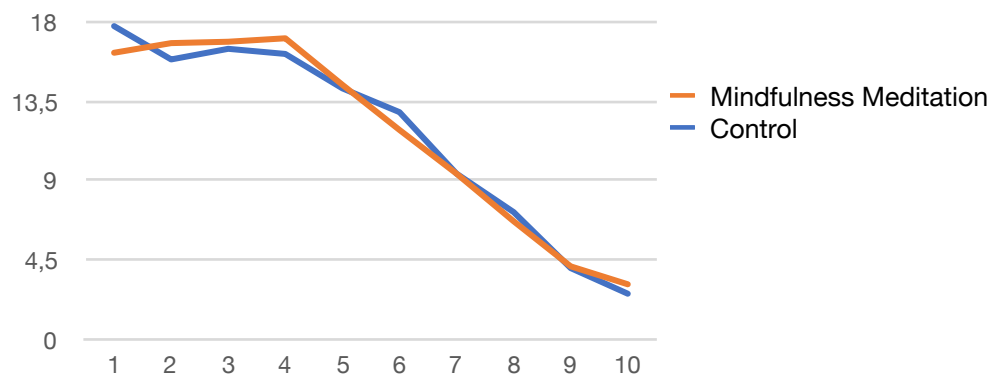
For fixation count there was no significant difference between groups (Table 3 and Figure 5). However, it is interesting to note that for the first 5 seconds the treatment group made less fixations than the control group, at the 0.10 level, which may mean that in a longer mindfulness meditation treatment fixation count could be lower for those who meditate.

Table 3 - ANOVA test for Fixation Count.

Time	Group 00 - Control	Group 01 - Mindfulness Meditation	ANOVA (p =)
5 - 10 seconds	17.770	16.000	0.092
10 - 15 seconds	15.875	16.458	0.599
15 - 20 seconds	16.479	16.770	0.732
20 - 25 seconds	16.187	16.916	0.427
25 - 30 seconds	14.229	14.458	0.869
30 - 35 seconds	12.875	12.166	0.659
35 - 40 seconds	9.375	9.500	0.942
40 - 45 seconds	7.187	6.708	0.768
45 - 50 seconds	4.000	3.979	0.988
50 - 55 seconds	2.541	2.895	0.764
55 - 60 seconds	2.453	2.447	0.896
60 - 65 seconds	1.989	1.878	0.685

Font: Author (2019).

Figure 5 – Fixation count.



Font: Author (2019).

We then measured the average fixation duration - in milliseconds - and visit count in our AOI during the total time spent attending to the fake news. Due to time limitations, we did not separate these analyses in 5 second intervals, and were not able to analyze the number of regressions (backwards saccades). Average fixation duration for the treatment group (M = 0.23, SD = 0.43) was not significantly different

from the control group [ $M = 0.23$ ,  $SD = 0.5$ ,  $F(1, 99) = 0.115$ ,  $p = 0.735$ ]. Visit count, however, was at the threshold for significant difference between groups: the treatment group ( $M = 4.41$ ,  $SD = 1.99$ ) made less visits than the control group [ $M = 5.48$ ,  $SD = 3.36$ ,  $F(1, 99) = 3.789$ ,  $p = 0.054$ ] in the text AOI.

We will further discuss these findings on the following session.

### **5.3.3 Discussion, limitations and future studies**

The results of study 2 are in line with previously mentioned literature that suggests that some types of meditation cause a more relaxed attentional state (Lutz et al., 2008, Wallace and Shapiro, 2006). Even though meditators employed less effort (pupil dilation) in the reading of the fake news, they achieved the same cognitive results (news credibility). This suggests that meditators need less cognitive resources to achieve the same conclusion as non-meditators, optimizing attention. Fixation count and duration, which are also measures of cognitive processing were not different between groups, but visit count, which can indicate difficulty of the text, was lower for those who meditated. That suggests that processing was the same between groups, but those who meditated may have found it easier to read the fake news. It can also indicate that those who practiced meditation were more concentrated in the text, because they left the AOI less frequently than controls (measured by visit count). And particularly in the first 5 seconds of reading, those who meditated had less fixations on the text, suggesting less information processing.

These results confirm H1 and H3, but do not confirm H2. This may have happened because this 'anomalous' attentional state reached when meditating affects only some attentional variables or because our treatment was too short to have an effect on all variables. Future studies should aim to resolve this question by testing longer mindfulness inductions. Also, the finding that fake news draw more attention than real news (LADEIRA; DALMORO; SANTINI, 2019), may be an explanation why fixations count and fixation time did not differ between groups: all participants may have employed a high level of attention to process the fake news. To the best of our knowledge, however, this is the first study to find evidence of changes in attentional processing with a short mindfulness induction.

A less conclusive analysis can also be done from observing the pupillometry curves of both groups (Figure 1). Whereas meditators have an initial peak at 10 seconds and then keep pupil diameter stable for the rest of the time, controls have the same peak at 10 seconds and another peak at 55 seconds. It was not a goal of this research to investigate sustained attention but these results may be an indicative that the meditation group had less variations in effort, arousal and attention, which is also in line with results present in the literature.

The fact that fake news credibility was lower for long-term meditators (Study 1) but not after a short induction (Study 2) is also an interesting point to be discussed. It appears that a six-minute mindfulness meditation induction is too little to cause a conscious effect in the evaluation of fake news. As we mentioned in the previous sessions, our correlational study is not conclusive. The causes for less fake news credibility could be the influence of mindfulness groups or Buddhist philosophical and religious traditions or other confounding variables.

Another limitation of this study is that each person reads a fake news in a different manner, which does not allow us to determine an equal fixation on which to measure the baseline pupil diameter. According to Franklin et al. (2013, p. 4) a state of task-engagement is associated with “lower baseline pupil diameter and higher event-related pupil diameter”. In their studies of task engagement with the use of pupillometry, Gilzenrat et al. (2010) used the first second prior to an auditory stimulus as pupil diameter baseline and the peak pupil diameter as event-related. This was not possible in our study because we have little control of what is being attended to by participants on the first second of fixations.

Future studies should test longer manipulations of mindfulness, such as eight-week MBSR programs or weekend retreats, in an attempt to test if meditation in fact causes less fake news credibility. Another approach for future studies could be to replicate our eye-tracking studies with experienced meditators versus those new to this type of practice. That would allow researchers to understand if changes in attention and effort are mechanisms behind the difference in fake news credibility, but confounding variables would have to be controlled for. Future research should also be concerned with creating scenarios where baseline pupil diameter can be assessed, in order to better understand the effects of mindfulness meditation on attention and task engagement.



Finally, other implicit measures can be used in an attempt to understand the mechanisms behind the effects of mindfulness meditation on how consumers read fake news. Emotional response could be assessed by the measurement of Galvanic Skin Response, and brain waves could be measured via EEG during and after meditation.

## 6 CONCLUSION

The present research aims to test meditation as a tool for consumers to train their attention to and become more critical of fake news. The phenomenon of fake news has been causing harm to society on many levels, from politics to business. We live in a time when it's hard to know what to believe in, and a crisis in trust affects the very fabric on which economic exchanges are made (ASHRAF; CAMERER; LOWENSTEIN, 2005). As stated earlier, the theoretical background of fake news is mainly linked with the communication context (e.g., TANDOC, LIM, LING, 2018; BALMAS, 2014) and lacks empirical evidence (e.g., BERTHON, PITT, 2018; KANG, 2016). Consequently, research with empirical findings that can be applied to marketing and specific consumer behavior is scarce.

With the ever growing speed with which information spreads, consumers may find it difficult to attend to every news piece they get in contact with. Meditation is considered by scholars as a form of attentional training (LUTZ et al., 2008) and a way of dealing with attentional imbalances (WALLACE; SHAPIRO, 2006), and mindfulness, which is both a type of meditation and a personal trait, affects emotional and attentional regulation (HART; IVTZAN; HART, 2013).

More is yet to be understood about how meditation affects attention, but both Buddhist and scientific literature describe it as a less effortful attentional state (Wallace and Shapiro, 2006; Wallace, 2006; Lutz et al., 2008). We therefore proposed that: meditators would read fake news with less effort - smaller pupil diameter - than controls (H1); meditators would read fake news with lower fixation count and fixation time (H2); meditators would use less visits to read the fake news (H3); and meditators would have less credibility in fake news (H4). H1 and H3 were confirmed but H2 was not confirmed in Study 2, where we found that fixation count and fixation durations were not significantly different for the treatment group (6 minute mindfulness meditation induction) and the control group (6 minute placebo induction), but that visit count was lower for those who meditated. H4 was confirmed in Study 1, which was a correlational survey, but not in Study 2, which was experimental. In Study 1 we also found a weak but significant correlation between mindfulness and skepticism as traits. Skepticism was however controlled for in Study

1, so it can be said that this trait is not behind the mechanism that reduces fake news credibility for long term meditators.

Aligned with the Transformative Consumer Research Movement (DAVIS; OZANNE, 2016), these findings are informative to consumers, policy makers and marketing professionals. Consumers may find in this research an incentive to start practicing mindfulness and meditation, with the goal of reaching less effortful levels of attention and becoming more critical in the way they consume news. It is interesting to know that there is something consumers may do by themselves to act against fake news. Ultimately, this may lead to higher levels of personal well-being, as consumers would deal with attentional imbalances, and societal well-being as consumers would be better able to discern between true and fake information.

These results may also inform policy makers that can start promoting this sort of mental practice in the population at large. This is already being done in countries like England (MAGRA, 2019), where mindfulness has become a part of children's school curriculum. And for marketing professionals, it may be interesting to know that consumers who practice mindfulness and meditation are less susceptible to fake information about products or brands.

Finally for those interested in mindfulness and meditation theory, this research sheds light on the effects of mindfulness on attention, arousal, effort and its relation to fake news credibility. This is, to the best of our knowledge, the first research effort to use an eye tracking device to observe participants performing a task after a short mindfulness induction. With that technique, we were able to find evidence of a less effortful attentional state caused by mindfulness meditation, since the participants that meditated had smaller pupil dilation than controls but no difference in fixation count. This finding may be a small evidence, but may contribute to Wallace and Shapiro's (2006, p. 696) empirical question: "Is focused attention opposed to relaxation or is relaxation a fundamental prerequisite to states of focused attention that can be maintained for long periods without exhaustion?". Also to the best of our knowledge, this is the first study to report that mindfulness and skepticism are related variables - even if weakly so - and to report that mindfulness is negatively correlated with fake news credibility.

Many limitations are yet to be overcome by future studies. We only tested two fake news, one created by the authors, and one adapted from a fake news website.

Different fake news could be tested in order to determine if this is an effect that depends on the topics of the news we chose. Both of our fake news had below the medium scores for credibility, which may indicate a floor effect, so it could be interesting to test for our effect with more credible fake news. Also, longer mindfulness meditation treatments must be tested in order to assess if less credibility in fake news is an effect of mindfulness or of another confound variable that we have not controlled for in our correlational study. And a longitudinal study could be done to measure changes in attentional patterns during mindfulness protocols such as the 8 week long Mindfulness-Based Stress Reduction. Study two could be replicated with experienced meditators in the treatment group to observe attentional patterns - via eye tracker - in those who have the habit of meditating, and to determine if changes in attention are the mechanism behind the inverse relation between mindfulness and fake news credibility. Finally, an analysis of the regressions during fake news reading could be an extra measure of task difficulty, and other implicit measures (such as Galvanic Skin Response and brain waves via EEG) could be used to understand the mechanisms behind our effects.

This research is only a starting point in the understanding of both the potential of the study of mindfulness in the consumer arena and of ways that one can prevent consumers from believing in fake news. We expect to continue this research in the future and also that others may join us in trying to understand these phenomena.

## REFERENCES

AISCH, Gregor; HUANG, Jon; KANG, Cecilia. Dissecting the# PizzaGate conspiracy theories. **The New York Times**, v. 10, 2016.

ALLCOTT, Hunt, GENTZKOW, Matthew. Social media and fake news in the 2016 election. **Journal of Economic Perspectives**, v. 31, n. 2, p. 211–236, 2017.

ARCH, Joanna J.; CRASKE, Michelle G. Mechanisms of mindfulness: Emotion regulation following a focused breathing induction. **Behaviour Research and Therapy**, v. 44, p. 1849–1858, 2006.

ARMSTRONG, Alisson. **Mindfulness and consumerism: a social psychological investigation**. University of Surrey. 2012. Retrieved from: <https://ethos.bl.uk/OrderDetails.do?uin=uk.bl.ethos.576094>. Access: 20 jun. 2019.

ARMSTRONG, Thomas; OLATUNJI, Bunmi O. Eye tracking of attention in the affective disorders: A meta-analytic review and synthesis. **Clinical Psychology Review**, v. 32, p. 704–723, 2012.

ASHRAF, Nava; CAMERER, Colin F.; LOEWENSTEIN, George. Adam Smith, Behavioral Economist. **Journal of Economic Perspectives**, v. 19, n. 3, p. 131–145, 2005.

BAER, R. A. et al. Using self-report assessment methods to explore facets of mindfulness. *Assessment*, v. 13, n. 1, p. 27–45, March 2016. Retrieved from: 10.1177/1073191105283504. Access: 20 jun. 2019.

BAKIR, V.; MCSTAY, A. Fake news and the economy of emotions: problems, causes, solutions. **Digital Journalism**, v. 6, n. 2, p. 154–175, 2018.

BALMAS, Meital. When fake news becomes real: Combined exposure to multiple news sources and political attitudes of inefficacy, alienation, and cynicism. **Communication Research**, v. 41, n. 3, p. 430-454, 2014.

BARNES, V. A. et al. Impact of breathing awareness meditation on ambulatory blood pressure and sodium handling in prehypertensive african american adolescents. **Ethnicity & Disease**, v. 18, p 1-5, 2008.

BERTHON, Pierre R.; PITT, Leyland F. Brands, truthiness and post-fact: Managing brands in a post-rational world. **Journal of Macromarketing**, v. 38, n. 2, p. 218-227, 2018.

BROWN, Kirk Warren, GOODMAN, Robert J., INZLICHT, Michael. Dispositional mindfulness and the attenuation of neural responses to emotional stimuli. **Social Cognitive and Affective Neuroscience**, v. 8, Issue 1, p. 93–99, 2013.

CARTER, Olivia Louise et al. Meditation alters perceptual rivalry in Tibetan Buddhist monks, **Current Biology**, v. 15, Issue 11, p. 412–413, 2005.

CHANDON, Pierre et al. Does in-store marketing work? Effects of the number and position of shelf facings on brand attention and evaluation at the point of purchase. **Journal of Marketing**, v. 73, n. 6, p. 1-17, 2009.

CHARMICHAEL, Flora; PINNELL, Owen. How fake news from Sudan's regime backfired. **BBC**, 2019. Retrieved from: <https://www.bbc.com/news/blogs-trending-47899076>. Access: 20 jun. 2019.

CHEUNG, Cindy Man-Tee, SIA, Choon-Ling, KUAN, Kevin K. Y. Is this review believable? a study of factors affecting the credibility of online consumer reviews from an ELM perspective. **Journal of the Association for Information Systems**, v. 13, Issue 8, p. 618–635, Aug. 2012.

CONROY, Niall J., RUBIN, Victoria L., CHEN, Yimin. Automatic deception detection: Methods for finding fake news. **Computer Science**, v. 52, Issue 1, p. 1–4, 2016.

DEHAENE, Stanislas, NACCACHE, Lionel. Towards a cognitive neuroscience of consciousness: basic evidence and a workspace framework. **Cognition**, v. 79, n. 1-2, p. 1–37, 2001.

DAHL, Cortland J., LUTZ, Antoine, DAVIDSON, Richard J. Reconstructing and deconstructing the self: cognitive mechanisms in meditation practice. **Trends in Cognitive Science**, v. 19, n. 9, p. 515–523, 2015.

DAVIS, Brennan, OZANNE, Julie L. The transformative consumer research movement. **Journal of Public Policy and Marketing**, v. 35, n. 2, p. 159–169, 2016.

EVANS, James D. **Straightforward statistics for the behavioral sciences**. Pacific Grove: Brooks/Cole Publishing, 1996.

FERRARO, Matthew F., CHIPMAN, Jason C. Fake news threatens our businesses, not just our politics. **Washington Post**, 2019. Retrieved from: [https://www.washingtonpost.com/outlook/fake-news-threatens-our-businesses-not-just-our-politics/2019/02/08/f669b62c-2b1f-11e9-984d-9b8fba003e81\\_story.html?noredirect=on&utm\\_term=.f818860cbf1a](https://www.washingtonpost.com/outlook/fake-news-threatens-our-businesses-not-just-our-politics/2019/02/08/f669b62c-2b1f-11e9-984d-9b8fba003e81_story.html?noredirect=on&utm_term=.f818860cbf1a). Access: 20 jun. 2019.

FISCHER, D. et al. Mindfulness and sustainable consumption: a systematic literature review of research approaches and findings, **Journal of Cleaner Production**, 2017. Retrieved from: 10.1016/j.jclepro.2017.06.007. Access: 20 jun. 2019.

FRANKLIN, Michael S. et al. Window to the wandering mind: pupillometry of spontaneous thought while reading. **Quarterly Journal of Experimental Psychology**, v. 66, n. 12, p. 1–15, 2013.

GILZENRAT, Mark S. Pupil diameter tracks changes in control state predicted by the adaptive gain theory of locus coeruleus function. **Cognitive, Affective, & Behavioral Neuroscience**, v. 10, n. 2, p. 252-269, 2010.

GOLEMAN, Daniel, DAVIDSON, Richard J. **A ciência da meditação: como transformar o cérebro, a mente e o corpo**. Rio de Janeiro: Objetiva, 2017.

HAFENBRACK, Andrew C.; VOHS, Kathleen D. Mindfulness meditation impairs task motivation but not performance. **Organizational Behavior and Human Decision Processes**, v. 147, p. 1–15, 2018.

HAFENBRACK, Andrew C., KINIAS, Zoe, BARSADÉ, Sigal G. Debiasing the Mind Through Meditation: Mindfulness and the Sunk-Cost Bias. **Psychological Science**, v. 25, n. 2, p. 369–376, 2014.

HART, Rona, IVTZAN, Itai, HART, Dan. Mind the gap in mindfulness research: a comparative account of the leading schools of thought. **Review of General Psychology**, v. 17, n. 4, p. 453–466, 2013.

HESS, Eckhard H., POLT, James M. Pupil size as related to interest value of visual stimuli. **Science**, v. 132, p. 349-350, 1960.

HUDDLESTON, Patricia et al. Seeking attention: an eye tracking study of in-store merchandise displays. **International Journal of Retail & Distribution Management**, v. 43, Issue 6, p. 561–574, 2015.

HURTT, Kathy R. Development of a Scale to Measure Professional Skepticism. **Auditing: A Journal of Practice & Theory American Accounting Association**, v. 29, n. 1, p. 149–171, May 2010.

JORDAN, Christian H. et al Mindful eating: Trait and state mindfulness predict healthier eating behavior. **Personality and Individual Differences**, v. 68, p. 107–111, 2014.

KABAT-ZIN, Jon. Mindfulness-Based Stress Reduction. **Constructivism in the Human Sciences**, v. 8, Issue 2, p. 73–83, 2003.

KABAT-ZINN, Jon et al. Effectiveness of a meditation-based stress reduction program in the treatment of anxiety disorders. **American Journal of Psychiatry**, v. 149, p. 936–943, 1992.

KABAT-ZINN, Jon, LIPWORTH, L, BURNEY, R. The clinical use of mindfulness meditation for the self-regulation of chronic pain. **Journal of Behavioral Medicine**, v. 8, n. 2, p. 163-190, 1985.

KAHNEMAN, Daniel. **Attention and effort**. New Jersey: Prentice-Hall Inc., 1973.

KANG, Cecilia. Fake news onslaught targets pizzeria as nest of child-trafficking. **The New York Times**, 2016.

KIKEN, Laura G.; SHOOK, Natalie J. Mindfulness increases positive judgments and reduces negativity bias. **Social Psychological and Personality Science**, v. 2, n. 4, p. 425-431, 2011.

KUNDE, Wilfried; KIESEL, Andrea; HOFFMANN, Joachim. Conscious control over the content of unconscious cognition. **Cognition**, v. 88, n. 2, p. 223-242, 2003.

LADEIRA, Wagner; DALMORO, Marlon; SANTINI, Fernando. Visual cognition of fake news: the effects of consumer brand engagement. **Journal of Product & Brand Management**. Working Paper, 2019.

LAENG, Bruno, SIROIS, Sylvian, GREDEBÄCK, Gustaf. Pupillometry: a window to the preconscious? **Perspectives on Psychological Science**, v. 7, n. 1, p. 18–27, 2012.



LAZER, David M. J. et al. The science of fake news. **Science**, v. 359, n. 6380, p. 1094-1096, 2018.

LUTZ, Antoine et al. Attention regulation and monitoring in meditation. **Cognitive-emotional interactions**, v. 12, Issue 4, p. 163–169, 2008.

MAGRA, Iliana. Schools in England introduce a new subject: mindfulness. **The New York Times**, 2019. Retrieved from: <https://www.nytimes.com/2019/02/04/world/europe/uk-mindfulness-children-school.html>. Access: 20 jun. 2019.

MCGRAY, Gareth, BRUNFAUT, Tineke. Investigating the construct measured by banked gap-fill items: Evidence from eye-tracking. **Language Testing**, v.1, n. 26, pp 1–23, 2016.

MEIER, B. P., NOLL, S. W., OLOKWU, O. J. The sweet life: the effect of mindful chocolate consumption on mood. **Appetite**, v. 108, p. 21–27, 2017.

MELE, N. et al. **Combating fake news: an agenda for research and action**, 2017, Retrieved from: <https://shorensteincenter.org/wp-content/uploads/2017/05/Combating-FakeNewsAgenda-for-Research-1.pdf>. Access: 20 jun. 2019.

MENON, R.G. Vishnu et al. Consumer attention to price in social commerce: Eye tracking patterns in retail clothing. **Journal of Business Research**, v. 69, n. 11, p. 5008–5013, 2016.

MEYER, Robinson. The grim conclusions of the largest-ever study of fake news. **The Atlantic**, 2018. Retrieved from: <https://www.theatlantic.com/technology/archive/2018/03/largest-study-ever-fake-news-mit-twitter/555104/>. Access: 20 jun. 2019.

MIHAILIDIS, Paul; VIOTTY, Samantha. Spreadable spectacle in digital culture: Civic expression, fake news, and the role of media literacies in “post-fact” society. **American Behavioral Scientist**, v. 61, n. 4, p. 441-454, 2017.

OLENDZKI, Andrew. Mindfulness and meditation. **Clinical Handbook of Mindfulness**, p. 37–44, 2009.

PARKINSON, Hannah J. Click and elect: how fake news helped Donald Trump win a real election. **The Guardian**, 2016. Retrieved from: <https://www.theguardian.com/commentisfree/2016/nov/14/fake-news-donald-trump-election-alt-right-social-media-tech-companies>. Access: 20 jun. 2019.

PENNYCOOK, Gordon; RAND, David G. Lazy, not biased: susceptibility to partisan fake news is better explained by lack of reasoning than by motivated reasoning. **Cognition**, v. 188, p. 39–50, 2018.

PHILLIPS, Tom. Bolsonaro business backers accused of illegal Whatsapp fake news campaign. **The Guardian**, 2018. Retrieved from: <https://www.theguardian.com/world/2018/oct/18/brazil-jair-bolsonaro-whatsapp-fake-news-campaign>. Access: 20 jun. 2019.

PLASSMANN, Hilke, MORMANN, Milica. An interdisciplinary lens on consciousness: the consciousness continuum and how to (not) study it in the brains and the gut, a commentary on Williams and Poehlman. **Journal of Consumer Research**, v. 44, Issue 2, p. 258–265, 2017.

RAYNER, Keith; POLLATSEK, Alexander. **The psychology of reading**. Englewood Cliffs: Prentice Hall, 1989.

RAYNER, Keith. Eye movements and attention in reading, scene perception, and visual search. **The Quarterly Journal of Experimental Psychology**, v. 62, n. 8, 1457–1506, 2009.

RAYNER, Keith. Eye Movements in Reading: Recent Developments. **Current Directions in Psychological Science**, v. 2, n. 3, p. 81– 85, 1993.

SEGAL, Zindel V. et al. *Mindfulness-based cognitive therapy for depression*. 2<sup>nd</sup> ed. New York: Guilford Press, 2013.

SHU, Kai et al. Fake news detection on social media: a data mining perspective. **Explorations Newsletter**, v. 19, Issue 1, p. 22– 36, 2017.

SILVERMAN, Craig. Here are 50 of the biggest fake news hits on facebook from 2016. **Buzz Feed**, 2016. Retrieved from: <https://www.buzzfeednews.com/article/craigsilverman/top-fake-news-of-2016>. Access:20 jun. 2019.

STELL, Alexander J., FARSIDES, Tom. Brief loving-kindness meditation reduces racial bias, mediated by positive other-regarding emotions. **Motivation and Emotion**, p. 1–8, 2015.

TANDOC, Edson C.; LIM, Zheng Wei; LING, Richard. Defining “fake news” A typology of scholarly definitions. **Digital Journalism**, v. 6, n. 2, p. 137–153, 2018.

STRICK, Madelijn et al. Humor in the eye tracker: attention capture and distraction from context cues. **The Journal of General Psychology**, v. 137, n. 1, p. 37–48, 2009.

SUN, Sai et al. Calm and smart? a selective review of meditation effects on decision making. **Frontiers in Psychology**, v. 6, n. 1059, p. 1–11, 2015.

TEASDALE, John D. et al. Prevention of relapse/recurrence in major depression by mindfulness- based cognitive therapy. **Journal of Consulting and Clinical Psychology**, v. 68, p. 615–623, 2000.

TOATES, Frederick. A model of the hierarchy of behaviour, cognition and consciousness. **Consciousness and Cognition**, v. 15, p. 75–118, 2006.

UNSWORTH, Nash; ROBINSON, Matthew K. Individual differences in the allocation of attention to items in working memory: Evidence from pupillometry. **Psychonomic Bulletin & Review**, v. 22, p. 757–765, 2015.

USHER, Marius et al. The Role of Locus Coeruleus in the Regulation of Cognitive Performance. **Science**, v. 283, p. 549–554, 1999.

USLAY, Can, ERDOGAN, Emine. The mediating role of mindful entrepreneurial marketing (MEM) between production and consumption. **Journal of Research in Marketing and Entrepreneurship**, v. 16, Issue 1, p. 47–62, 2014.

VALENTINE, Elizabeth R., SWEET, Philip L. G. Meditation and attention: A comparison of the effects of concentrative and mindfulness meditation on sustained attention. **Mental Health, Religion and Culture**, v. 2, Issue 1, p. 59–70, 1999.

VAN DAM, Nicholas T. et al. Mind the hype: a critical evaluation and prescriptive agenda for research on mindfulness and meditation. **Perspectives on Psychological Science**, v. 13, n. 1, p. 36–61, 2018.

VAN DER VEER, Evelien, VAN HERPEN, Erica, VAN TRIJP, Hans. Body and mind: how mindfulness enhances consumers' responsiveness to physiological cues in food consumption. **Advances in Consumer Research**, v. 39, p. 603-60, 2011.

WALLACE, Allan B. Attention revolution. unlocking the power of the focused mind. 1<sup>st</sup> ed. Boston: Wisdom Publications, 2006.

WALLACE, Allan B.; SHAPIRO, Shauna S. Mental balance and well-being: Building bridges between Buddhism and Western psychology. **American Psychologist**, v. 61, n. 7, 690–701, 2006.

WALSH, James J. et al. Predicting individual differences in mindfulness: The role of trait anxiety, attachment anxiety and attentional control. **Personality and Individual Differences**, v. 46, Issue 2, p. 94–99, 2009.

WANG, William Yang. Liar, liar pants on fire: a new benchmark dataset for fake news detection. **Cornell Univertisty**, 2017.

WEDEL, Michael, PIETERS, Rik. A review of eye-tracking research in marketing. **Review of Marketing Research**, v. 4, p. 123–147, 2015.

WILLIAMS, Lawrence E., POEHLMAN, Andrew T. Conceptualizing consciousness in consumer research. **Journal of Consumer Research**, v. 44, Issue 2, p. 231–251, 2017.

## ATTACHMENTS

### 1. Fake news used in the pre-test:

The screenshot shows a web browser displaying a page from MundoFitness.com. The URL is www.mundofitness.com/2015/07/três-rotinas-para-perder-peso.html. The page features a navigation menu with categories like 'esporte', 'alimentação', 'shakes', 'ranking academias', and 'saúde'. A prominent blue banner at the top reads 'Monetize your WordPress blog!' with a 'WordAds' logo and a 'LEARN MORE' link. The main article is titled 'Método BodyOne aumenta qualidade de vida' and is dated '25 ago. 2018 às 15h31' by 'Talita Fernandes'. The text describes the BodyOne fitness method, claiming it improves quality of life and is based on recent research from the United States. It mentions that the method involves daily 30-minute workouts combining weightlifting, cardiovascular exercises, and relaxation. An image shows a person performing a plank exercise with dumbbells. A quote from Mariana Gonçalves, director of BodyOne in Brazil, states: '“Nossas academias estão prontas para receber alunos de todos os perfis, e garantimos a melhora na expectativa de vida de quem treinar conosco”'. To the right, there is a 'relacionadas' section with three related articles: 'Como se motivar para o projeto verão', 'Melhore sua disposição com 5 exercícios simples', and '3 receitas irresistíveis com abacate'. At the bottom right, there is a red promotional banner for 'RED DAY' with 'EU QUERO ATÉ 69% OFF' and 'PUBLICIDADE'.

*Gvm Fake*

Gazeta da Terra: Frigoríficos adi

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## Frigoríficos adicionam corante tóxico para humanos na carne

25 ago. 2018 às 15h31

A- A+

Talita Fernandes

Autoridades sanitárias denunciaram más práticas em frigoríficos brasileiros. Segundo investigações, funcionários das indústrias estariam habituados a cobrir os alimentos com uma mistura de corante, água e sal. O intuito da ação seria deixar a carne mais atraente e saborosa para o consumidor. Isso seria necessário devido à criação em massa dos animais, que resulta em carne pálida e sem sabor.

Foram coletadas amostras da mistura em questão, que estão sendo analisada em laboratórios. Segundo fontes, o corante usado em muitos frigoríficos tem resquícios de ferro, que pode ser tóxico ao consumo humano. Para ativistas pelos direitos dos animais, essa é mais uma história que aumenta a preocupação de quem ainda consome carne, reforçando as ondas contemporâneas de vegetarianismo e veganismo.



Imagem: Produção Ilustrativa

relacionadas

Aumenta o consumo de água no Brasil e há risco de racionamento

A nova onda da energia nuclear

Peixes infectados são pescados no litoral

(evino)

RED DAY

EU QUERO ATÉ 69% OFF

PUBLICIDADE

*Meat Fake*

## 2. Mindfulness induction and placebo transcripts:

### Mindfulness:

Agora, faremos um exercício de respiração focada. Talvez, você nunca tenha feito este tipo de respiração focada antes. E isso não é um problema para se fazer este exercício. Focar na sua respiração pode ser pouco familiar para você. E isso é completamente normal. Por favor, não se julgue. Se você começar a se distrair, tudo bem. Ao perceber que se distraiu, apenas volte a prestar atenção a sua respiração. Não há uma forma certa ou errada de se fazer isso. Sinta-se livre para relaxar e aproveitar esta experiência. Primeiramente, se acomode em uma posição sentado e que seja confortável para você. Sente-se com as costas eretas, tocando levemente o encosto da cadeira. Mas sem pressionar as costas no encosto. As pernas não devem ser cruzadas. Pés retos no chão. E as suas mãos relaxadas no seu colo ou sobre os joelhos. Agora, gentilmente, feche seus olhos, sem tensioná-los, sem pressionar as suas pálpebras uma na outra. Apenas um leve toque. E pergunte-se: qual a minha experiência neste momento? No que estou pensando? Que emoções estou sentindo? Quais sensações estão presentes no meu corpo? Apenas observe a sua experiência, seja ela qual for.

[Pausa de 25 segundos na locução]

Trazendo a sua consciência para o seu corpo, foque sua atenção nas sensações de toque ou pressão. Onde seu corpo está em contato com a cadeira. Use um ou dois momentos explorando essas sensações.

[Pausa de 20 segundos na locução]

Agora, traga a sua atenção para as sensações físicas na parte de baixo do seu abdomen. Enquanto a respiração se move para dentro e para fora do seu corpo. Para ajudar você a prestar atenção a sua respiração, coloque sua mão sobre a parte de baixo do abdomen, e torne-se consciente das sensações que se alternam onde sua mão está em contato com o seu abdomen.

[Pausa de 30 segundos na locução]

Mais cedo ou mais tarde, sua mente poderá vagar para longe do foco na respiração ou no baixo abdomen, indo em direção de pensamentos, sentimentos, sonhos acordados ou navegar para outros lugares. Isso é perfeitamente normal.

[Pausa de 15 segundos na locução]

Quando você notar que a sua consciência não está mais na respiração, perceba simplesmente e brevemente aonde a sua mente esteve. E então, gentilmente, traga a sua consciência de volta para as sensações físicas que se alternam no seu baixo abdomen, renovando a sua intenção de prestar atenção na sua respiração, no ar entrando e no ar saindo.

[Pausa de 15 segundos na locução]

Agora, quando você estiver pronto, lentamente e gentilmente, abra seus olhos.

### **Placebo:**

Agora, vamos fazer um exercício. Primeiramente, se acomode em uma posição sentado que seja confortável para você. Agora, simplesmente, pense o que vier à sua mente. Deixe sua mente vagar livremente, sem tentar se concentrar em nada particular. Deixe sua mente vagar, como ela faria normalmente.

[Pausa de 35 segundos na locução]

Agora, simplesmente continue deixando a sua mente vagar, e pense sobre qualquer coisa que quiser. Eu avisarei quando for a hora de fazer algo diferente.

[Pausa de 30 segundos na locução]

Permita que seus pensamentos vagem por onde eles forem.

[Pausa de 35 segundos na locução]

Agora, simplesmente continue deixando sua mente vagar, e pense sobre qualquer coisa que quiser. Você pode seguir quaisquer pensamentos que surjam na sua mente.

[Pausa de 50 segundos na locução]

Permita que seus pensamentos viagem, viagem para onde quiserem.

[Pausa de 50 segundos na locução]

Agora, simplesmente continue deixando sua mente vagar, e pense sobre qualquer coisa que quiser. Lembre-se que eu avisarei quando for a hora de fazer algo diferente.

[Pausa de 50 segundos na locução]

Agora, continuaremos para a próxima parte deste estudo.





### 3. Fake news used in Study 2:

Original: <https://beforeitsnews.com/v3/alternative/2019/3673800.html>

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## Cell Tower Radiation Cancer Link Confirmed By World's Largest Animal Study

Monday, April 1, 2019 17:30

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By: [Natural Blaze](#) |

Researchers with the renowned Ramazzini Institute (RI) in Italy announce that a large-scale lifetime study of lab animals exposed to environmental levels of cell tower radiation developed cancer. A \$25 million study of much higher levels of cell phone radiofrequency (RF) radiation, from the US National Toxicology Program (NTP), has also reported finding the same unusual cancer called Schwannoma of the heart in male rats treated at the highest dose. In addition, the RI study of cell tower radiation also found increases in malignant brain (glial) tumors in female rats and precancerous conditions including Schwann cells hyperplasia in both male and female rats.

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"Our findings of cancerous tumors in rats exposed to environmental levels of RF are consistent with and reinforce the results of the US NTP studies on cell phone radiation, as both reported increases in the same types of tumors of the brain and heart in Sprague-Dawley rats. Together, these studies provide sufficient evidence to call for the International Agency for Research on Cancer (IARC) to re-evaluate and re-classify their conclusions regarding the carcinogenic potential of RFR in humans," said Fiorella Belpoggi PhD, study author and RI Director of Research.

The Ramazzini study exposed 2448 Sprague-Dawley rats from prenatal life until their natural death to "environmental" cell tower radiation for 19 hours per day (1.8 GHz GSM radiofrequency radiation (RFR) of 5, 25 and 50 V/m). RI exposures mimicked base station emissions like those from cell tower antennas, and exposure levels were far less than those used in the NTP studies of cell phone radiation.

"All of the exposures used in the Ramazzini study were below the US FCC limits. These are permissible exposures according the FCC. In other words, a person can legally be exposed to this level of radiation. Yet cancers occurred in these animals at these legally permitted levels. The Ramazzini findings are consistent with the NTP study demonstrating these effects are a reproducible finding," explained Ronald Melnick PhD, formerly the Senior NIH toxicologist who led the design of the NTP study on cell phone radiation now a Senior Science Advisor to Environmental Health Trust (EHT). "Governments need to strengthen regulations to protect the public from these harmful non-thermal exposures."

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"Not by might, nor by power, but by my spirit, saith the Lord of hosts."  
Zechariah 4:6

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*Original Fake News Study*

#### 4. Adapted version of Study 2 fake news for the eye tracker:

The screenshot shows a web browser displaying a news article on the GazetaDaTerra.com website. The browser's address bar shows the URL: www.gazetadatterra.com/2015/07/radiacao\_cancer. The website's header includes the logo 'GazetaDaTerra.com' and navigation links for 'MENU ASSINE', 'ENTRAR', and 'BUSCAR'. Below the header, there are category links: 'saúde > energia florestas povos nativos crianças' and 'AGÊNCIA LUPA PIAUÍ'. The main headline of the article is 'Relação entre radiação de torre de celular e câncer confirmada'. Below the headline are social media sharing icons for Facebook, Twitter, and WhatsApp. The author is identified as 'Talita Fernandes'. The article text states that researchers from the Ramazzini Institute (IR) in Italy announced a study showing that animals exposed to ambient radiation from cell towers developed cancer. A specific detail mentioned is that 2448 Sprague-Dawley rats were exposed to cell tower radiation for 19 hours daily. A note indicates that the radiation levels used in the study were below regulatory limits. An illustrative image shows a radiation symbol, a cell tower, and a mouse. To the right of the article, there is a 'relacionadas' (related) section with three links: 'Aumenta o consumo de água no Brasil e há risco de racionamento', 'A nova onda da energia nuclear', and 'Peixes infectados são pescados no litoral'. On the left side of the article, there is a small advertisement for 'RED DAY' wine, featuring a bottle and the text 'EU QUERO ATE 69% OFF'.

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## Relação entre radiação de torre de celular e câncer confirmada

Talita Fernandes

Pesquisadores do renomado Instituto Ramazzini (IR), na Itália, anunciaram que um estudo em larga escala da vida de animais que foram expostos a níveis ambientais da radiação de torres de celular desenvolveram câncer.

O estudo expôs 2448 ratos Sprague-Dawly à radiação de torre celular por 19 horas diárias. "Todas as exposições usadas no estudo Ramazzini estavam abaixo dos limites dos órgãos reguladores. Em outras palavras, uma pessoa pode legalmente ser exposta a esse nível de radiação".

Imagem: Produção Ilustrativa

relacionadas

- Aumenta o consumo de água no Brasil e há risco de racionamento
- A nova onda da energia nuclear
- Peixes infectados são pescados no litoral

## 5. Area of Interest (AOI) analysed in Study 2:

The screenshot shows a news article on the website GazetaDaTerra.com. The article title is "Relação entre radiação de torre de celular e câncer confirmada". The author is Talita Fernandes. The article text states that researchers from the Ramazzini Institute in Italy announced a study where animals exposed to ambient radiation from cell towers developed cancer. The study involved 2448 rats exposed to cell tower radiation for 19 hours daily. The text concludes that the exposures used were below regulatory limits, meaning a person can legally be exposed to that level of radiation.

The red Area of Interest (AOI) box highlights the following content:

- Article title: **Relação entre radiação de torre de celular e câncer confirmada**
- Author: Talita Fernandes
- Text: "Pesquisadores do renomado Instituto Ramazzini (IR), na Itália, anunciaram que um estudo em larga escala da vida de animais que foram expostos a níveis ambientais da radiação de torres de celular desenvolveram câncer."
- Text: "O estudo expôs 2448 ratos Sprague-Dawly à radiação de torre celular por 19 horas diárias. "Todas as exposições usadas no estudo Ramazzini estavam abaixo dos limites dos órgãos reguladores. Em outras palavras, uma pessoa pode legalmente ser exposta a esse nível de radiação".

Other visible elements include the website logo, navigation menu (saúde, energia, florestas, povos nativos, crianças), search bar, and related articles on the right side.