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Lucas de Britto Dorneles

# THE EFFECTS OF FOREIGN LANGUAGE ON SOCIAL MEDIA NEWS CONSUMPTION: HOW FOREIGN LANGUAGE INCREASES CONSUMER VULNERABILITY TO FAKE NEWS

Porto Alegre
2026

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Tese apresentada ao Programa de Pós-Graduação em Administração da Universidade Federal do Rio Grande do Sul como requisito para a obtenção do título de doutor em administração.

Orientadora: Profa. Dra. Cristiane Pizzutti dos Santos

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*Es ist nicht genug zu wissen, man muß auch anwenden; es ist nicht genug zu wollen, man muß auch tun*

*Johann Wolfgang von Goethe*

**RESUMO**

A ascensão das redes sociais transformou drasticamente o consumo de informação, tornando-as o principal canal de notícias para grande parte da população. Neste ambiente, caracterizado pela rapidez e, muitas vezes, pela superficialidade no processamento da informação, emergiu o problema social da desinformação, notadamente sob a forma de *fake news*. Simultaneamente, a globalização permitiu que consumidores interajam rotineiramente com conteúdo em língua estrangeira. Embora a teoria predominante do Efeito da Língua Estrangeira (*Foreign Language Effect* - FLE) sugira que o processamento de informações em um segundo idioma promova uma deliberação analítica favorável à detecção de notícias falsas, esta tese investiga a hipótese oposta. Alinhada a evidências recentes que questionam essa redução do viés, a pesquisa analisa se o consumo de notícias em língua estrangeira, na verdade, aumenta a vulnerabilidade do consumidor à desinformação. Para testar essa proposição, foram conduzidos cinco estudos experimentais e um estudo piloto (N = 1.369) com diferentes nacionalidades e pares linguísticos. Utilizando a Teoria de Detecção de Sinal (*Signal Detection Theory* - SDT) para separar a capacidade de discernimento do viés de resposta, os experimentos demonstraram consistentemente que os consumidores percebem *fake news* como mais credíveis quando apresentadas em língua estrangeira. Além disso, observou-se maior intenção de compartilhar desinformação no segundo idioma. Os achados revelam que o efeito da língua estrangeira não melhora o discernimento; pelo contrário, em diversos estudos, o discernimento foi prejudicado ou o viés de resposta tornou-se mais "liberal" (menos cético). Foram identificados dois mecanismos mediadores desse fenômeno. Primeiro, a dificuldade de leitura em língua estrangeira impõe uma carga cognitiva que esgota os recursos necessários à verificação da veracidade, o que leva à maior credibilidade e ao compartilhamento de notícias falsas. Porém, este efeito é mitigado pela proficiência do consumidor em língua estrangeira. Segundo, notícias falsas em língua estrangeira são percebidas como mais atraentes, o que aumenta sua credibilidade. Estes resultados oferecem implicações práticas urgentes para plataformas de mídia social e formuladores de políticas públicas, destacando a necessidade de intervenções de alfabetização midiática voltadas especificamente a consumidores bilíngues e a populações vulneráveis.

**Palavras-chave:** *fake news*, língua estrangeira, consumo de notícias, desinformação, redes sociais

**ODS: 12** - Consumo e Produção Responsáveis; **13 -** Ação Contra a Mudança Global do Clima

**ABSTRACT**

The rise of social media has drastically transformed how people consume information, making these platforms the primary news channels for a large portion of the population. In this environment, characterized by speed and often by superficial information processing, the social problem of misinformation has emerged, notably in the form of fake news. Simultaneously, globalization has enabled consumers to routinely interact with content in foreign languages. While the prevailing theory of the Foreign Language Effect (FLE) suggests that information processing in a second language fosters analytical deliberation that aids in detecting falsehoods, this thesis investigates the contrary hypothesis. Drawing on recent empirical evidence, the study explores whether consuming news in a foreign language actually increases a consumer's vulnerability to misinformation. To test this proposition, five experimental studies and one pilot study were conducted (N = 1,369), involving participants from different nationalities and language pairs. Utilizing Signal Detection Theory (SDT) to separate discernment capacity from response bias, the experiments consistently demonstrated that consumers perceive fake news as more credible when presented in a foreign language. Furthermore, a higher intention to share misinformation was observed in the second language. The findings reveal that the foreign language effect does not improve discernment; on the contrary, across several studies, discernment was impaired, or the response bias became more "liberal" (less skeptical). Two mediating mechanisms for this phenomenon were identified. First, reading difficulty in a foreign language imposes cognitive load that depletes the resources needed to verify truth, leading to greater susceptibility to fake news and its spread. However, this effect is mitigated by the consumer's proficiency in the foreign language. Second, fake news in a foreign language is perceived as more attractive, which increases its credibility. These results offer urgent practical implications for social media platforms and policymakers, highlighting the need for media literacy interventions specifically targeted at bilingual consumers and vulnerable populations.

**Keywords:** fake news, foreign language, news consumption, misinformation, social media

**SDGs: 12 -** Responsible Consumption and Production; **13** - Climate Action

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# 1. INTRODUCTION

The internet has rapidly and drastically changed purchasing behavior. For example, electronic commerce retail sales grew from 0.6% of total sales in 1999 to 15.1% in 2023 (Federal Reserve Economic Data, 2023). Amazon, a mainly online retailer, is the third most valuable brand in the world (Interbrand, 2025). The internet also drastically changed the communications and information industry, even though this sector often receives less attention than retail. For decades, news media in democratic societies remained a stable industry providing essential information, while consumers passively received news primarily through television. In 2019, the internet surpassed television as the world's primary medium. More than that, social media has become the primary channel for news consumption, with 30% of people saying it is their main way to get news online, followed by direct access to news websites/apps (22%) (Newman et al., 2023).

In addition, the internet, and especially social media, has changed how people consume information in many ways. First, information circulates faster and more broadly than ever before (Castillo et al., 2011; Hattab, 2017). Second, some behaviors that were once seen as transgressions (such as sharing only parts of newspaper articles) are now even incentivized by mainstream media on social media (Weeks & Holbert, 2013). Moreover, third, information on social media is fast, far-reaching, and often shallow (Vosoughi et al., 2018).

On social media, individuals are entertained by consuming information posted by others and are rewarded with "likes" and "comments" for the information they share. This incentive for sharing and engagement can make social media sites a favorable environment for the spread of misinformation (Aïmeur et al., 2023; Shu et al., 2017). With increased information consumption through the internet and social media, and the incentive to share, a societal problem emerged: misinformation in the form of *fake news*.

Nearly a decade after Collins Dictionary selected “fake news” as the word of the year (“What is 2017’s word of the year?”, 2017), the concept remains a critical societal concern. This choice reflected a time of transformation in information habits, when social media dominance was rising and the United States, the world's largest democracy, was facing the 2016 presidential election, complicated by misinformation (Allcott & Gentzkow, 2017). Since then, this phenomenon has become a focal point for interdisciplinary research.

Marketing researchers have also begun to address this phenomenon. Although the body of literature is still smaller than that found in the political or journalistic spheres, there is a

growing emphasis on investigating the dissemination of fake news and its consequences for brands and consumer behavior (Domenico et al., 2021).

Speaking more than one language is another thing that has changed in recent years with globalization. Although it is difficult to define precisely, estimates suggest that nearly half of the world's population is bilingual, with younger generations increasingly fluent in more than one language (Grosjean, 2021). The global accessibility of digital content, coupled with the algorithmic curation of social media feeds, means that billions of individuals now routinely encounter news in their native language and in foreign languages, often without actively seeking it (Levy, 2021). This intersection of bilingualism and globalized information flow creates a vast yet under-researched landscape of potential vulnerability to misinformation, posing a challenge for consumers, platforms, and policymakers alike.

This dissertation analyzes the role of a foreign language in news consumption, specifically how a non-native language can affect consumers' responses to misinformation, such as fake news. To address the effects of news consumption and misinformation in a foreign language, there are two possible lines of research. The dominant theory about foreign language, known as the Foreign Language Effect (FLE), posits that processing information in a non-native tongue is more cognitively demanding and less emotionally resonant (Keysar et al., 2012). This should, in theory, reduce reliance on intuitive, heuristic-based (System 1) thinking and promote more deliberative, analytical (System 2) evaluation (Costa, Foucart, Arnon, et al., 2014). Consequently, the standard prediction is that the FLE should improve an individual's ability to distinguish fake news from true news, as heightened deliberation is consistently linked to better fake-news detection (Pennycook & Rand, 2019).

However, a recent study, published in the Journal of Experimental Psychology: Applied, challenges this conventional wisdom. Muda, Pennycook, Hamerski, and Białek (2023) found the opposite: proficient Polish-English bilinguals were significantly worse at discerning the veracity of news headlines when presented in English (their foreign language) than in Polish (their native language). Although they provided initial evidence for this interesting effect, Muda and colleagues (2023) studied only one language pair and used graduate students as their sample. They did not explain why a foreign language leads to greater perceived credibility of fake news. The present dissertation takes the Muda and colleagues' road, as it is the most recent and the only one focused on the effect of language *on responses to misinformation*.

It is worth noting that, besides the findings from Muda and colleagues (2023), the few papers (e.g., Bryanov et al., 2023; Ivancu et al., 2023) that analyzed fake news and foreign

language took a different perspective, not really focused specifically on the effects of a foreign language on fake news credibility.

In this dissertation, we seek to understand when and why a foreign language leads to greater perceived credibility and sharing intentions of fake news. In order to understand the "why", we propose and test two mechanisms as mediators: (1) the reading difficulty (Graf et al., 2018; Miller et al., 2024), in which we argue the is more difficult to read news on a foreign language and that this difficulty hinders individual's information processing, leading them to be less skeptic, and not focusing on the central argument of the news, also increasing their sharing intentions (Duffy et al., 2019; Langdon et al., 2024); and (2) perceived attractiveness (Ohanian, 1990), as foreign-language news can be perceived as more appealing, interesting, and "exotic." This perceived attractiveness acts as a powerful peripheral cue (Petty & Cacioppo, 1986), creating a halo effect that inflates the message's credibility and, in turn, increases share intentions due to the correlation between the two variables.

To address the "when" component of our research question, we propose two moderating mechanisms: reading difficulty and news cultural incongruence. First, we follow previous research that calls for investigating the role of foreign language proficiency in the effects of using a second language (Corey et al., 2017; Maschio et al., 2022). We propose that highly proficient individuals will not find reading the news in a foreign language difficult. Second, we draw on underexplored findings from Muda et al. (2023) and argue that the cultural incongruence of the stimuli may moderate the foreign-language disadvantage in fake news detection. The findings from Muda et al. (2023) suggest this to be the case. In experiment 1, American news was presented to Polish individuals in Polish versus English (cultural incongruence between news and native language), and the effect size for the difference in fake news credibility between native and foreign language was r = -0.257 (95% CI [-0.360; -0.148]). However, in experiment 2, in which Polish news was presented to Polish individuals in Polish versus English (cultural congruency between the news and the native language), the effect size for the same difference was about half (r = -0.137; 95% CI [-0.257; -0.017]). However, the authors did not discuss this in their work.

Another advance of this dissertation is the use of Signal Detection Theory (SDT; Green & Swets, 1966) to examine what happens when people consume climate change news on social media in a foreign language. SDT allows us to disentangle the discernment and response criteria. In other words, we can look not only at how a foreign language affects the credibility of fake news, but also at whether it improves or worsens people's ability to discern true from

false, and at how skeptical or naïve they are in their responses. This addresses a call to understand better psychological factors and interventions that may affect discernment and response criteria in the fake news arena (Batailler et al., 2022; Modirrousta-Galian & Higham, 2023)[1].

With this, this dissertation proposes the following questions:

*RQ1: Do bilingual people believe more in fake news when it is written in a foreign language (compared to when it is written in their native language)?*

*RQ2: If so, do reading difficulty and news attractiveness explain these results?*

*RQ3: Do the news' cultural incongruence and the individual's language proficiency play a moderating role in the foreign language effect on news consumption?*

*RQ4: Does reading news in a foreign language worsen the ability of bilinguals to discern between true and false news and influence their skepticism towards social media news?*

The contributions of this dissertation are relevant to the field of marketing by offering insights into the mechanisms that increase consumers' vulnerability to misinformation. Consumers get information from social media every day, but these platforms fail to provide mechanisms to prevent misinformation, specifically about climate change (Friends of the Earth. More than that, by understanding how consumers process information on social, this dissertation applies to a series of "calling to action" from the area of advertising and marketing to counteract the rise of misinformation in the form of fake news (Domenico et al., 2021; Nyilasy, 2019; Talwar et al., 2019).

The theoretical contributions of this dissertation also encompass foreign language theories. We add to the field of studies that state that foreign language plays a central role in information processing and how individuals think differently in their second language (Białek et al., 2020; Costa, Foucart, Arnon, et al., 2014; Hayakawa et al., 2017; Keysar et al., 2012; Muda et al., 2023). By linking foreign language and fake news vulnerability, we contribute to an emerging field of research that focuses on understanding the effects of foreign language in different situations (Białek et al., 2020; Circi et al., 2021; Costa, Foucart, Arnon, et al., 2014; De Langhe et al., 2011; Hayakawa et al., 2017, 2017; Keysar et al., 2012; Muda et al., 2023).

As practical implications, this dissertation offers contributions to practitioners and companies, and public policymakers can use the findings from this research to improve consumers' well-being on social media, since misinformation is a widely spread issue (Islam et

[1] It is worth noting that this is also a new tendency on fake news research, since that, despite SDT is being used since the 60's on psychology (Green & Swets, 1966), it appears in this context only in 2022 (Batailler et al., 2022).

al., 2020). Furthermore, serious news organizations can benefit from understanding how to improve the circulation of accurate news at the expense of fake news, especially on social media, the medium that appears to be the primary channel for news consumption (Newman et al., 2023). This dissertation can inform public policy and platform governance by identifying specific consumer vulnerabilities that could be targeted with future interventions.

This dissertation is structured as follows. First, section 2 will provide a general theoretical background on fake news, how the marketing field addresses information, the variables studied, and the mechanisms that influence fake news vulnerability. We will also discuss how a foreign language affects information processing and certain behaviors. Next, in section 3, we will develop our first hypotheses based on the theoretical background. Following this, we will present 4 experiments to test our first hypotheses. After, we will discuss two additional hypotheses and develop one more experiment to test those. Section 5 will provide a general discussion of the findings from all the experiments.

# 2. THEORETICAL BACKGROUND

The purpose of this section is to provide an overall theoretical background to the dissertation. First, this section examines how the literature on consumer behavior, psychology, and marketing addresses information processing. It draws on prominent theories from consumer research and related fields to explain why people consume and share information. Then we will review fake news, its unique characteristics, and how it affects the credibility and sharing of information. Additionally, we will analyze prior research on how people respond to misinformation and fake news. We will also provide a general overview of the Foreign Language Effect (FLE) and its analysis in the psychological literature.

## 2.1. INFORMATION PROCESSING

The consumer behavior area has typically treated information and consumption as separate themes, with the study of information more focused on how consumers use available information to make better decisions. One seminal work that inspired consumer behavior researchers is the Elaboration Likelihood Model (ELM), which posits two routes for consumers processing information: one more central, based on the quality of the arguments on the piece of information, and one more peripheral, based on the characteristics of the source of the information (Petty & Cacioppo, 1986). The authors were more focused on how consumers respond to persuasion and on attitude changes. They showed that when we receive and process information through the central route, there can be a resistant, predictive change in attitude. When we process information through the peripheral route, there is a temporary, peripheral change in attitude (Petty & Cacioppo, 1986).

This work, along with the Technological Acceptance Model (TAM) from the information systems field (Davis, 1989), served as the basis for models in consumer behavior that examine how individuals accept and adopt information, such as the Information Acceptance Model (Erkan & Evans, 2016). The Information Acceptance Model is an evolution of the Information Adoption Model (Sussman & Siegal, 2003). It proposes that we adopt information based on its credibility and quality, our needs for it, and our attitude towards it. These variables affect our information adoption through information usefulness. In the end, information adoption will predict behavioral intentions, like purchase intention, leading to its acceptance (Erkan & Evans, 2016). This model has studied normally electronic Word-Of-Mouth (eWOM)

information on social media (Erkan & Evans, 2016; Tien et al., 2019) and has been used in different consumption contexts as travel choices (Tseng & Wang, 2016), female fashion (Peng et al., 2016) and food choices (Hussain et al., 2017), to cite a few.

Another theory that addresses how people process information and may be central to the role of fake news belief and sharing is the Cognitive Load Theory (Sweller, 2011). The theory posits that all learning and information processing occurs within our working memory, a system that is severely limited in both capacity and duration when handling novel information. Cognitive load refers to the total amount of mental effort being used in this working memory (Sweller, 2011). Cognitive load is a psychological concept, but it is often used in consumer behavior research.

Focusing on what makes people share content online, Berger & Milkman (2012) analyzed the central role of the emotion the content evokes in sharing behavior and identified characteristics of content that goes viral. They showed that people often share information online to entertain, inform, or boost their mood, in a way that surprising, interesting, useful, and positive content is more viral (Berger & Milkman, 2012). Another finding from them is that content that is highly arousing (i.e., that evokes anxiety and anger) is also more shared (Berger & Milkman, 2012). Although their work predates the “boom” of fake news, we can observe several characteristics of this kind of misinformation (i.e., fake news) that are related to Berger and Milkman's findings and that make it highly shared, such as evoking fear and anger.

## 2.2. MISINFORMATION, RUMORS, AND FAKE NEWS

Misinformation is false and inaccurate information, not necessarily intended to cause harm (Greifeneder et al., 2021; Southwell et al., 2019). We can observe studies about misinformation on diverse subjects, such as health, dealing with medications, tobacco consumption, vaccination, viral diseases like COVID-19 and AIDS, and cancer (Amazeen & Krishna, 2023; Chen et al., 2018; Islam et al., 2020; Krishna & Thompson, 2019); business, such as the impact of misinformation on reviews, brands, and consumers (Cham et al., 2023; Chen & Cheng, 2020; Costa Filho et al., 2023; Talwar et al., 2019; Visentin et al., 2019; Zhang et al., 2016); and politics, subject that is the most fertile terrain for misinformation in the form of fake news (Allcott & Gentzkow, 2017; Azzimonti & Fernandes, 2023; Gil de Zúñiga et al., 2022).

When created, fake news is disinformation, that is, false information with a clear, deceptive intention (Marwick, 2018). Nevertheless, they can be disseminated both as disinformation (when a political party knows that they are spreading fake news to induce voters) or, when there is no intent to cause harm or intentionally deceive someone, as misinformation (when a relative shares some news saying that Coca-Cola contains rat poison to alert their loved ones) (Marwick, 2018). However, because the intention to cause harm through information sharing is difficult to determine, misinformation is used to refer to false information produced by fake news in general (Greifeneder et al., 2021). On the other hand, despite the intention of who is sharing, the fake news *per se* always "[…] carries an intention to deceive in service of an ulterior motive." (Nyilasy, 2019, p. 337).

One kind of misinformation related to fake news is a rumor. The definition of rumor is "a specific (or topical) proposition for belief, passed along from person to person, usually by word of mouth, without secure standards of evidence being present" (Allport & Postman, 1947). However, a rumor differs from fake news because it is not necessarily false. They are unconfirmed information that may be true or false and do not always follow the news format when circulated (Prasad, 1935; Sudhir & Unnithan, 2019). Some studies of psychological factors from the early XX century examined why people shared rumors, such as the emotional charge of the subject and the instability of the group in which the rumor is present (Prasad, 1935), and these factors also apply to fake news sharing.

The definition of fake news is also debated in academia. However, the most cited article defines fake news as "news articles that are intentionally and verifiably false and could mislead readers" (Allcott & Gentzkow, 2017, p. 213). In the same way, Tandoc et al. (2018) depart from a definition of news as an account of facts that are "expected to include accurate and real information" to define fake news as an "oxymoron," that is, a term formed by the conjunction of contradictory words. More than that, Tandoc et al. (2018) extend the term "fake news" to include media such as radio and television, rather than focusing only on print news. Lazer et al. (2018) defined fake news as "fabricated information that mimics news media content in form but not in organizational process or intent." In research on how fake news affects behavioral intention toward brands, Visentin et al. (2019) defined the phenomenon as "fabricated stories that are intentionally false, realistically portrayed, and potentially verifiable". Another broader concept is that of Zhang & Ghorbani (2020, p. 4): "Fake news refers to all kinds of false stories or news that are mainly published and distributed on the Internet, in order to purposely mislead, befool or lure readers for financial, political or other gains." As we can see, a key characteristic

of this kind of misinformation is that it leverages the legitimacy of traditional news media to pass as credible. Table 1 presents a summary of the conceptual definitions of fake news. For this dissertation, based on the conceptual definitions of Table 1, we define fake news as "*misinformation that uses the news format, or the mainstream news mainstream's social media way to inform, to seem credible to purposely mislead, befool or lure readers for financial, or other gains and has the potential to cause negative consequences to consumers and firms in general.*"

**Table 1:** Conceptualization of Fake News

| Authors | Definition |
|---|---|
| Allcott & Gentzkow (2017) | *news articles that are intentionally and verifiably false, and could mislead readers* |
| Lazer et al. (2018) | *fabricated information that mimics news media content in form but not in organizational process or intent* |
| Tandoc, Lim & Ling (2018) | *News is supposed to—and normatively—be based on truth, which makes the term "fake news" an oxymoron. Fake news is "not genuine; imitation or counterfeit" news.* |
| Visentin, Pizzi & Pichierri (2019) | *fabricated stories that are intentionally false, realistically portrayed, and potentially verifiable* |
| Zhang & Gorbani (2020) | *all kinds of false stories or news that are mainly published and distributed on the Internet, in order to purposely mislead, befool, or lure readers for financial, political, or other gains* |
| Our conceptualization: | *misinformation that uses the news format, or mimics the mainstream news social media way to inform, to seem credible to purposely mislead, befool, or lure readers for financial, or other gains, and has the potential to cause negative consequences to consumers and firms in general* |

Source: Elaborated by the author (2025)

Verifiably false news articles are not new or something that started only with the Internet. One of the first known instances of fake news appeared in The New York Sun in 1835, which reported that the moon was home to living beings, such as giant man-bats, that spent their days collecting fruit and holding animated conversations (Standage, 2017). Also, in 1938, a radio play by Orson Welles that mimicked news broadcasting and claimed that aliens had invaded Earth was believed to be a genuine news story and caused panic in the United States (Cantril, 1940).

However, the shift in how information is consumed contributed to the spread of this kind of misinformation (Allcott & Gentzkow, 2017). A worrying thing about fake news is that it spreads farther, faster, deeper, and more broadly than accurate news, which is not, as common sense typically believes, because of artificial intelligence (Vosoughi et al., 2018). As mentioned, misinformation has increased with social media and the concern about combating it (Nekmat, 2020). Many false stories are about celebrities (Marwick, 2018) or medicinal treatments (Waszak et al., 2018), as well as about politics, with news related to government or election campaigns, as was made clear by debate on this topic after the US presidential elections in 2016 (Allcott & Gentzkow, 2017). Other topics, such as science and business, are also among the main targets of false news (Vosoughi et al., 2018).

### 2.2.1. Fake news, marketing, and consumer research

After defining fake news, it is worth analyzing how marketing and consumer research generally address the phenomenon. So, this subsection focuses on studies that analyzed fake news from a marketing perspective.

In a broader sense, marketing as a discipline is concerned (and should be) with the impact of fake news on firms. The first studies about marketing and misinformation focused on deceptive advertising (Bernacchi, 1976; Pollay, 1983). The first article we found on fake news and marketing is by Rotfeld (2005), who criticizes journalist programs, saying they were becoming too marketing-oriented. The article is focused on politics and argues that the media were giving their audience what they wanted to hear, avoiding "problematic" themes, not what they should hear. Fake news is used in this context because of a parody program in the format of news broadcasting, and was more informative than the "real" news programs (Rotfeld, 2005). We can see that this paper is far from the boom of “fake news” but offers important warnings that people should not be misled by fake news, even if it is a parody.

As the theme became more popular after 2016, so did the academic research about it. Most of the publications are from after 2019. One of them is Talwar and colleagues (2019), who listed several reasons related to social media's "dark side" for why people share fake news, such as fear of missing out, social media fatigue, and online trust. As Apuke & Omar (2021) and Laato et al. (2020) found, online trust is strongly correlated with the sharing of fake news (Talwar et al., 2019). They argued that this was one of the first studies to “model the behavior of social media users in sharing fake news and authenticating it before sharing online" (Talwar

et al., 2019, p. 79). They based their model on self-determination theory, social comparison theory, and the theory of rational choice.

Visentin et al. (2019) adopted a view based on the effect of fake news on brand attitudes and behavior. Through a series of experiments, they showed no direct effect of a brand announcement on a fake news website on behavioral intentions toward that brand. However, they found indirect effects of news truthfulness on brand-related behavior through news and source credibility, brand trust, and brand attitudes. They draw on theories of news credibility and spillover effects to test their model. Focusing not on brand but product evaluation and political positioning, Kwon & Barone (2020) found that exposure to fake news negatively affects product evaluation for liberals but not conservatives because it instigates general mistrust. They extend the findings of (2019) by exposing the product on a different site from the fake news, rather than first exposing respondents to fake news. After this, participants had to evaluate a product unrelated to the fake news.

King and Auschaitrakul (2020) analyzed the effect of sequential fluency on perceived brand truthfulness. When confronted with statements about brands they have never seen before, consumers assume that statements that are more symbolically sequential (like "Clistin delights Eyes" because C comes before E in the alphabet) are more factual than those that are not ("Glistin delights Eyes"). The implication of this research for fake news and consumer areas is that, even if a statement is not accurate, if it is fluent and sequential, it can be perceived as authentic and lead consumers to follow false advice.

## 2.3. INDIVIDUAL'S RESPONSE TO FAKE NEWS

There are two central bodies of research on mitigating the dissemination of fake news. One is more directed toward the use of algorithms and focuses on using machine learning to prevent misinformation from getting to the consumer (Ciampaglia et al., 2015; Shu et al., 2017), and another focuses on empowering consumers and understanding the psychological principles that make people spread them, to avoid it (Muda et al., 2023; Pennycook & Rand, 2019; Roozenbeek et al., 2022; Soetekouw & Angelopoulos, 2022). This dissertation focuses on the second body of knowledge and proposes investigating how misinformation affects bilingual news consumers when they consume news on social media.

For instance, people who focus more on their emotions tend not to distinguish well between true and false news headlines (Martel et al., 2020). This aligns with previously

discussed studies that show emotions are central to online content sharing (Berger & Milkman, 2012). So, if people discern real and fake news poorly, focusing more on emotion can lead to greater dissemination of fake news. Also, more emotionally charged fake news is more credible (Fernández-López & Perea, 2020). One way to reduce this reliance on emotions is to make people think analytically. People with more analytic thinking have less propensity to believe in and share fake news. We can nudge analytical thinking to better discern between real and false news before reading it (Pennycook et al., 2020; Pennycook & Rand, 2019). Pennycook and Rand (2020) also found that people who overclaim their knowledge and are more receptive to pseudo-profound sentences have lower levels of discernment between real and fake news. The dual-process theory, that posits that we have two systems of rationale in our brains: System 1, which is more intuitive and responds to ordinary, everyday tasks, and System 2, which is more analytic and used when dealing with complicated process cognitive information (Kahneman, 2011; Tversky & Kahneman, 1974), is the base to this research stream that focuses on analytical thinking to prevent fake news diffusion.

On the other hand, some studies argue that motivated reasoning makes people believe and share fake news. The credibility of fake news does not depend on the characteristics of the "news," like sensationalism or inconsistency (Schaewitz et al., 2020). More than that, when there are strong opinions about the theme the misinformation addresses, even correcting the misinformation with facts can increase its perceived believability (Nyhan & Reifler, 2010). The role of *confirmation bias*, when people tend to agree and believe in things that are congruent with their thoughts, is not undermined in health-related misinformation as well. In their comprehensive literature review on the dissemination of health-related misinformation via social media, Wang et al. (2019) identified multiple studies suggesting that confirmation bias contributes to the proliferation of inaccurate information and the formation of echo chambers.

Research on misinformation often draws on the theory of motivated reasoning and shows that it affects the effectiveness of fake news corrections, for example (Walter et al., 2020). However, there may be cases when the information consumer does not have an opinion or sufficient knowledge about the subject of the news they are exposed to. In situations like this, factors other than a prior attitude toward the subject of the news may be relevant to the credibility and spread of possible fake news. For instance, recognizing when a message is trying to persuade or has motives other than informing (Kirmani & Campbell, 2009) may be one way to keep news consumers aware of fake news.

The literature states two categories of studies in countering fake news: one focused on empowering individuals and the other on detecting and intervening on social media platforms (Lazer et al., 2018). In addition, some authors propose a hybrid approach between those categories (Soetekouw & Angelopoulos, 2022).

Inoculation theory is the basis of another line of work that uses prior interventions to counter the diffusion of fake news. This line of work draws on medicine, more specifically vaccination, to inoculate against misinformation that will not change people's minds but will increase their ability to discern between false and factual information (van der Linden et al., 2020). Usually, in this line of work, inoculation occurs through a game about creating fake news. After playing the game, which involved creating fake news about a highly politicized issue, students were better able to discern it. They rated it as less reliable and persuasive than a group that did not play the game (Roozenbeek & van der Linden, 2019).

More recently, studies have shown that another possible explanation for why people share fake news is related to news-sharing habits in general, and that those who share more true news are also those who share more fake news (Ceylan et al., 2023). To counter this, we can change the rewards on social media (e.g., engagement, followers) so that behaviors related to false news dissemination are discouraged, and those related to actual news dissemination are rewarded (Ceylan et al., 2023).

Central to this dissertation is the work of Muda and colleagues (2023), which showed that reading news in a foreign language led to poorer news discernment. In other words, when news is presented in a foreign language, the ability to discern true from false is impaired, and consumers are more vulnerable to the dangers of fake news (Muda et al., 2023). The findings from Muda and colleagues (2023) will be discussed further in the next section, where we present our hypothesis development.

## 2.4. THE FOREIGN LANGUAGE EFFECT

The idea that a person's language may change how they make decisions and process moral challenges may seem unreasonable at first glance. However, recent research is supporting this idea, now widely known as the Foreign Language Effect (FLE; Costa et al., 2014; Hayakawa et al., 2017; Keysar et al., 2012). The first mention of the FLE appeared in Keysar and colleagues (2012), who showed that people responded differently to moral problems in their native and foreign languages.

This effect describes the phenomenon in which bilingual and multilingual individuals make demonstrably different choices when presented with a problem in their second language (L2) compared to their native language (L1). This is not a matter of misunderstanding; in some cases, the effect persists even among highly proficient bilinguals who fully comprehend the task (Maschio et al., 2022).

The initial and perhaps most influential demonstrations of the FLE emerged from the domain of economic decision-making and cognitive biases. Following Keysar and colleagues' (2012) study, other works, such as Costa, Foucart, Arnon, and colleagues (2014), robustly replicated and extended their findings, showing that the classic “framing effect” is significantly attenuated in an L2. When a choice is framed in terms of gains, individuals are typically risk-averse; when the same choice is framed in terms of losses, they become risk-seeking. This intuitive, emotionally driven bias is substantially reduced when individuals operate in their second language, leading to more consistent choices that align more closely with rational, utilitarian principles. This suggests that the L2 context induces a more detached, analytical mindset, less swayed by the superficial presentation of information (Costa, Foucart, Arnon, et al., 2014).

The primary context in which the FLE was studied was moral psychology. Several studies have employed sacrificial moral dilemmas (most notably *the footbridge problem*, where one must decide whether to personally cause the death of one individual to save a greater number of people; and *the trolley problem*, similar to the footbridge problem, but the individual has to choose between pushing a button to deviate a trolley from killing a group of people to killing only one person). The consistent finding, as shown by Costa, Foucart, Hayakawa, et al. (2014) and extensively replicated by Corey et al. (2017) across nine experiments, is that individuals are substantially more likely to endorse the utilitarian outcome—sacrificing one life to save five—when the dilemma is presented in their second language. The rationale portrayed by the authors is that in their native language, the emotionally aversive nature of the harmful act prompts a more deontological response, rooted in the moral rule against killing in general, as they become more averse to harm in any form. In a foreign language, this intuitive aversion appears to be blunted, allowing for a more calculated, consequence-based decision. This effect is remarkably consistent across diverse linguistic and cultural pairings, including Spanish-English, German-English, and Serbian-English, suggesting it could be a cognitive phenomenon rather than a cultural artifact (Cipolletti et al., 2016; Stankovic et al., 2022).

However, the manifestation of the FLE is not equal across all conditions and appears to be moderated by several contextual and individual factors. For instance, the very modality of presentation may influence the effect, particularly for highly proficient bilinguals. Brouwer (2019) has presented compelling evidence that for this group, the moral FLE may be more pronounced, or perhaps only present, in the auditory modality compared to the written one. This suggests that spoken language, being the more primary and socially embedded form of communication, may carry greater emotional weight; thus, the emotional distinction between native and foreign languages is more salient when dilemmas are heard rather than read. Furthermore, language can affect and change even cultural influences. Marian and Kaushanskaya (2004) found that language can endorse individualistic or collectivistic values, thereby influencing how individuals respond. For instance, Russian-English bilinguals exhibit more collective values when recording autobiographical events in Russian (a more collectivist culture) than in English (Marian & Kaushanskaya, 2004).

More recent and sophisticated analyses have also begun to refine the understanding of the FLE outcome. The initial interpretation that a second language makes the individual "more utilitarian" has been challenged. Using a process-dissociation approach, Hayakawa et al. (2017) found that foreign language use primarily reduces deontological inclinations without necessarily increasing utilitarian ones. Taking this a step further, Białek et al. (2020) employed the CNI model to disentangle sensitivity to consequences (C), norms (N), and general inaction (I). Their findings suggest that a second language context reduces sensitivity to *both* consequences and norms, indicating a more general blunting of moral intuitions rather than a simple promotion of utilitarian calculation (Białek et al., 2020). This body of work collectively paints a picture of a powerful cognitive shift, where the use of a foreign language creates a psychological distance that detaches the decision-maker from the immediate, intuitive, and emotional aspects of a problem, leading to choices that are more dispassionate, consistent, and, in the case of moral dilemmas, mainly different.

Table 2 summarizes the findings from empirical studies on individuals' responses to fake news and the foreign language effect, and explains how our research contributes to the literature.

**Table 2.** Previous studies regarding cognitive responses to fake news and the foreign language effect

| Reference | Method | Cognitive Responses or Characteristics Influencing Fake News Credibility | Cognitive Responses or Characteristics Influencing Fake News Sharing | Foreign Language Influencing Behavior | Mediation or Moderation Mechanisms for FLE | Results |
|---|---|---|---|---|---|---|
| *The current dissertation* | *Experimental Studies* | *Yes* | *Yes* | *Yes* | *Mediation: News reading difficulty and attractiveness; Moderation: Proficiency level, News Cultural Incongruence (Sharing Intentions Only)* | *Individuals are more vulnerable to fake news in their second language across different language pairs and cultures. Fake news in a foreign language is harder to read, which leads to greater perceived credibility and sharing intentions, but this does not occur among highly proficient individuals. Fake news is more attractive in an FL, which leads to greater perceived credibility and sharing intentions. Consumers are most resistant to sharing true information when it is foreign and culturally distant.* |
| Costa et al. (2014). | Experimental Studies | No | No | Yes | Mediation: Emotional distance. Moderation: Proficiency level. | Using a foreign language reduces decision-making biases, such as framing effects. This is driven by increased emotional distance rather than by increased cognitive effort alone. |
| Allcott & Gentzkow (2017). | Secondary data analysis and survey | Yes | Yes | No | No | Average US adults saw and remembered roughly 1.14 fake news stories. Belief in fake news is influenced by education, age, and total media consumption. Both Democrats and Republicans are more likely to believe headlines aligned with their ideology. |
| Hayakawa et al. (2017). | Experimental Studies | No | No | Yes | Mediation: Emotional distance/blunted emotional reactions. Moderation: Proficiency level. | Foreign-language use decreased deontological responding but did not increase utilitarian responding. |

| | | | | | | |
|---|---|---|---|---|---|---|
| Pennycook & Rand (2019). | Experimental Studies | Yes | Yes | No | No | Analytic thinking (high CRT) is negatively correlated with perceived accuracy of fake news, regardless of political ideology. Susceptibility is driven by "lazy thinking" rather than partisan bias. |
| Talwar et al. (2019). | Cross-sectional survey | Yes | Yes | No | No | Online trust, self-disclosure, fear of missing out (FoMO), and social media fatigue are positively associated with the sharing of fake news. Social comparison has a negative association. |
| Schaewitz, Kluck, & Krämer (2020) | Experimental Studies | Yes | Yes | No | No | Individual traits such as Need for Cognition (NFC) reduce vulnerability, whereas Faith in Intuition (FII) increases it. Message cues (sensationalism, image manipulation) had little to no impact on credibility evaluations or likelihood of sharing. |
| Bago et al. (2020). | Experimental Studies | Yes | No | No | No | Deliberation significantly reduces belief in false headlines but not true ones. |
| Białek et al. (2020). | Experimental Study | No | No | Yes | Mediation: Reduced emotional reactions and high cognitive load. | Foreign language reduced sensitivity to consequences and sensitivity to norms, while not affecting general action aversion. |
| Dylman & Champoux-Larsson (2020). | Experimental Studies | No | No | Yes | Moderation: Cultural influence and linguistic similarity. | The Foreign Language Effect (FLE) has boundaries. It disappears when the foreign language is culturally influential or linguistically similar. |
| Muda et al. (2023). | Experimental Studies | Yes | No | Yes | No | People are worse at detecting fake news in a foreign language. Using a foreign language increased the perceived believability of false headlines, whereas true headlines were judged as less or equally believable. |

Source: elaborated by the author (2025)

# 3. HYPOTHESES DEVELOPMENT

In this chapter, we present the rationale for our hypothesis about how a foreign language can affect news consumption. At first glance, we can see that bilinguals change the way they think and act depending on which language they use. We will begin this section linking foreign language and fake news, and arguing that bilingual consumers may be more vulnerable to misinformation in their second language. Then, we will discuss some explanatory mechanisms for why it should happen and when the effect of a foreign language on fake news credibility and sharing intentions should not apply.

## 3.1. FOREIGN LANGUAGE AND FAKE NEWS CREDIBILITY AND SHARING

As seen on the previous section, studies about how a foreign language affects behavior state that foreign language reduces heuristics and intuition mainly in emotional contexts (Costa, Foucart, Arnon, et al., 2014) and affects moral judgment towards a more utilitarian way of thinking (Costa, Foucart, Hayakawa, et al., 2014), both aspects that are deeply connected with fake news consumption on social media. Two primary mechanisms traditionally explain the FLE. The first is a cognitive account, suggesting that the increased difficulty of processing a foreign language reduces reliance on fast, intuitive thinking (System 1) and promotes more effortful, deliberative analysis (System 2) (Costa, Foucart, Hayakawa, et al., 2014; Zhang et al., 2023). As lack of deliberation is a key predictor of susceptibility to fake news (Pennycook & Rand, 2019), this account predicts improved discernment. The second is an emotional distance account, which posits that because a foreign language is typically learned in less emotionally charged contexts than a native tongue, it blunts the affective resonance of stimuli, leading to more calculated and utilitarian judgments (Caldwell-Harris, 2015). Given that fake news often leverages strong emotional appeals (Tandoc et al., 2018), this mechanism also predicts improved discernment.

However, the few studies that analyzed fake news and foreign languages together found results that go in the opposite direction. Most notably, the key study by Muda et al. (2023) not only found that the FLE worsened discernment, but also that this effect was not moderated by perceived news arousal (challenging the emotional distance account) or by individual

differences in cognitive reflection[2] (challenging the deliberation account). Muda and colleagues (2023) presented Polish-English bilinguals with news in both languages and found that they were more likely to believe fake news in their foreign language (English). Nevertheless, they failed to explain why this happens. Their theoretical explanation is that the foreign language blunts individuals' recall of prior intuitions about what constitutes true and false news, leading to greater perceived credibility of fake news in that language.

Following this rationale, recent studies on foreign language use have shown that using a second language significantly decreased deontological inclinations (associated with System 1) but, crucially, did not increase utilitarian inclinations (associated with System 2) (Hayakawa et al., 2017). Similarly, Białek et al. (2020) found that foreign language use reduced sensitivity to consequences, the opposite of what would be predicted by an account based on enhanced deliberation and calculation.

Taking this together with previous studies that analyzed what leads to fake news credibility and sharing, and that it is because people fail to deliberate about it (Lazer et al., 2018; Pennycook & Rand, 2021; Talwar et al., 2019), we argue that a foreign language will lead to greater fake news credibility and sharing. So, we hypothesize:

*H1: When reading social media news in their foreign (vs. native) language, consumers will present higher (a) credibility and (b) sharing intentions of fake news.*

## 3.2. SIGNAL DETECTION THEORY

Most psychological studies on fake news have operationalized their dependent variable as a simple credibility rating, typically on a Likert scale. This approach tests whether an individual characteristic, such as analytical thinking (Pennycook & Rand, 2019), or an intervention, such as gamified inoculation (Roozenbeek & van der Linden, 2019), reduces the perceived credibility of false headlines. While informative, this method has a significant limitation: a reduction in fake news credibility does not necessarily translate into improved ability to discern truth from falsehood. For example, an intervention could make consumers more skeptical of *all* news. This would successfully reduce their belief in fake news. However,

[2] It is worth noting that in this study a greater cognitive reflection did not lead to less fake news credibility as it was on Pennycook and Rand (2019).

it would do so at the cost of reducing their belief in true news, indicating a shift in overall skepticism rather than an improvement in discernment.

To overcome this limitation and disentangle the ability to discriminate between true and false news from a general response bias, Signal Detection Theory (SDT) provides a more robust analytical framework (Green & Swets, 1966). SDT is a well-established method for quantifying an individual's ability to distinguish a "signal" (e.g., true news) from "noise" (e.g., fake news) (Stanislaw & Todorov, 1999). Its value in clarifying findings in misinformation research has been demonstrated. For example, by applying an SDT analysis to the data from Pennycook and Rand (2019), Batailler et al. (2022) revealed a more complex picture: while more analytical individuals did indeed show better discernment, they were also generally more skeptical of all news, regardless of its veracity. More recently, a review by Modirrousta-Galian & Higham (2023) using SDT concluded that specific gamified interventions may not improve discernment at all, but rather make individuals more skeptical overall.

SDT allows for the independent analysis of two key parameters: sensitivity (or *discernment, d'*) and response criterion (or *bias, c*). These parameters are calculated from the rates of correct and incorrect responses to stimuli, as outlined in Table 3, which was adapted from Batailler and colleagues (2022).

**Table 3.**. Stimuli and Response Possibilities for SDT

| | Response | |
|---|---|---|
| | "Target" | "Distractor" |
| Stimulus | (e.g., response "real") | (e.g., response "fake") |
| Target (e.g., real news) | Hit | Miss |
| Distractor (e.g., fake news) | False Alarm | Correct Rejection |

Source: adapted from Battailler et al., 2022

The sensitivity index, d', quantifies the ability to distinguish between true and false news. To calculate d', which is the distance between the stimulus (true news) and the noise (fake news), that represents discernment capacity, we subtract the inverse cumulative distribution function (z) of the False Alarms divided by the total number of fake news in the stimuli (FA), of the z of the Hits divided by the total number of true news in the stimuli (H). A score of d' = 0 indicates performance at chance level, while higher positive scores indicate better discernment. In other words, if there is a difference between zero and the score of d', it means that individuals can better discern between true and false news than by chance. If the

discernment criterion is negative, it means that individuals were worse than “by chance” at detecting fake news. So, it is calculated by measuring the standardized distance between the distributions of "signal" and "noise":

$$d' = z(HitRate) - z(FalseAlarmRate)$$

The response criterion, c, measures an individual's general tendency to respond "true" or "false," independent of their actual ability to discern. A negative c value indicates a liberal bias (a tendency to accept news as true; naïveté), while a positive c value indicates a conservative bias (a tendency to reject news as true; skepticism). It is calculated as:

$$c = -0.5 * [z(HitRate) + z(FalseAlarmRate)]$$

By employing SDT, we can move beyond simple credibility ratings to precisely measure whether using a foreign language affects true discernment, response bias, or both.

Following our previous rationale regarding the cognitive effects of foreign language use, we expect a foreign language to impact both discernment and the response criterion.

The rationale for our first hypothesis is grounded in the cognitive resource depletion model. Processing information in a foreign language imposes a higher cognitive load, which consumes the working memory resources necessary for critical evaluation and fact-checking against prior knowledge. This directly impairs the cognitive ability to distinguish the "signal" of truth from the "noise" of falsehood. This exact mechanism was tested and confirmed by Muda et al. (2023), who used SDT to analyze the effect of a foreign language on the evaluation of fake news. Their study concluded that the detrimental effect of using a foreign language was driven by a decreased sensitivity to the truth (d') rather than a shift in response bias (c). Based on this strong theoretical and empirical precedent, we hypothesize:

*H2: Individuals will exhibit poorer discernment (d') between true and fake news when evaluating them in their foreign language compared to their native language.*

The prediction for the response criterion (c) is less straightforward. On the one hand, the cognitive load induced by a foreign language could impair deep analysis, leading individuals to rely more heavily on peripheral cues (e.g., likes, shares) or the emotional pull of a headline

when making judgments (Petty & Cacioppo, 1986). Since fake news is often designed to be emotionally evocative, this heuristic reliance could lead to a more liberal criterion (a greater tendency to accept any news as true). On the other hand, the difficulty of processing might induce a general sense of uncertainty, promoting a more conservative or skeptical approach. It is noteworthy that Muda et al. (2023) found no significant effect on the response criterion (c), suggesting it may be stable across language contexts. Given the exploratory nature of this question and the plausible reliance on peripheral cues in a state of cognitive load, we tentatively follow the first line of reasoning and hypothesize:

*H3: When evaluating news on social media, individuals will exhibit a more liberal response criterion (c) in their foreign language compared to their native language.*

Although the hypothesis of a direct effect is critical to this dissertation, we aim to advance knowledge in this emerging area by offering possible explanations for this effect. We propose mediating and moderating mechanisms: mediation through reduced cognitive capacity due to reading difficulty, and moderation through the individual's foreign-language proficiency.

### 3.3. READING DIFFICULTY AS A MEDIATOR

When considering the Foreign Language Effect (FLE), the existing literature proposes two primary mechanisms rooted in dual-process theory: a reduction in emotional resonance and an increase in cognitive deliberation (Keysar et al., 2012). While the FLE often leads to more rational or utilitarian outcomes by mitigating emotional biases, we hypothesize that, in the context of fake news evaluation, the cognitive mechanisms associated with foreign language use produce the opposite effect. Specifically, we propose that using a foreign language will lead to higher perceived credibility of fake news and greater sharing intentions, and that this effect will be mediated by increased perceived reading difficulty.

The foundation of this hypothesis rests on the well-established premise that processing information in a foreign language imposes a higher cognitive load (Takano & Noda, 1993). This added cognitive burden, stemming from slower processing and the complexities of unfamiliar vocabulary and grammar, depletes the limited cognitive resources available for higher-order analytical tasks (Takano & Noda, 1993). This is the central argument of a cognitive resource depletion model. Recent research provides direct support for this in the context of

misinformation. As previously discussed, the study by Muda and colleagues (2023) found that proficient bilinguals were consistently worse at detecting fake news in their foreign language. The authors argue that this is because the cognitive effort of second language processing "hampers access to [...] cues" and makes it "harder to compare news to previously held beliefs" (Muda et al., 2023, p. 713). The process of retrieving one's own knowledge for verification is a resource-intensive task that is further taxed when working memory is already taxed by reading. This aligns with findings that less reflective individuals, a state that can be situationally induced by high cognitive load, are more likely to believe and share fake news (Pennycook & Rand, 2019). Therefore, the reading difficulty experienced in a second language is expected to consume the cognitive resources necessary for critical evaluation, leading to greater reliance on heuristics and, consequently, higher credibility ratings for fake news.

This hypothesis must, however, be reconciled with the seemingly contradictory illusory truth effect, which posits that information processed more easily (fluently) is judged as truer (Reber & Schwarz, 1999). This would imply that difficulty should trigger skepticism, not increase belief. The resolution to this paradox lies in distinguishing between two types of processing difficulty. A minor metacognitive cue, such as a hard-to-read font, can prompt more careful, systematic processing (Lee & Labroo, 2003). In contrast, the sustained cognitive effort required by reading in a foreign language represents a more substantial, resource-depleting form of disfluency. This level of difficulty does not merely signal a need for more effort; it actively consumes the very working memory capacity required for that effortful analysis. In this state of cognitive depletion, the ability to perform analytical checks is impaired, overriding any potential cue to be more skeptical.

Nevertheless, a recent study found that perceptual disfluency leads consumers to rely more on intuitive information (Mohsenin & Munz, 2025). The authors argue that perceptual disfluency leads to less analytical processing, causing consumers to rely more on heuristic cues, such as a familiar brand or a trusted country of origin (Mohsenin & Munz, 2025).

So, when the cognitive load of reading difficulty hinders analytical processing, individuals are likely to default to simpler, more powerful heuristics to judge credibility. Aside from the study by Mohsennin and Munz (2025) on foreign language and fake news, Fernández-López and Perea (2020) provide evidence supporting this. Their study found that while language did not directly affect the credibility of fake news, the news's negative emotionality was a strong predictor of belief. This suggests that when cognitive resources are exhausted by

the difficulty of the text, individuals may bypass logical evaluation and rely instead on their "gut feeling" or the emotional resonance of the headline.

Because fake news is often designed to be emotionally evocative, this reliance on affect as a default heuristic would further enhance its perceived credibility in a foreign-language context. Thus, we argue that the reading difficulty inherent in second-language processing will mediate the effect of foreign-language use on the credibility and sharing intentions of fake news by impairing analytical evaluation and promoting reliance on heuristic cues. Specifically, we predict that using a foreign language will lead to higher perceived reading difficulty, which in turn will increase perceived fake news credibility and sharing intentions. So, we hypothesize:

*H4: Fake news in a foreign (vs. native) language will present more reading difficulty.*

*H5: Reading difficulty will lead to more (a) credibility and (b) sharing intentions, therefore positively mediating the effect of the foreign language on consumers' reactions to fake news.*

### 3.4. FOREIGN LANGUAGE PROFICIENCY AS A MODERATOR

While our previous hypothesis posits that reading difficulty mediates an increase in fake news credibility in a foreign-language context, this mechanism is unlikely to be universal among all bilinguals. The cognitive resource depletion model assumes that using a foreign language imposes a significant cognitive load. However, the magnitude of this load is fundamentally tied to an individual's proficiency in that language. Therefore, we argue that foreign language proficiency will moderate the indirect effect of foreign language use on fake news credibility and sharing intentions, such that mediation through reading difficulty will be attenuated or absent among highly proficient bilinguals.

For individuals with lower to intermediate second language proficiency, we expect the cognitive resource depletion mechanism to be fully active. For this group, reading in a foreign language is an effortful, non-automatic process that consumes substantial working memory resources. This cognitive load, experienced as high reading difficulty, impairs the analytical functions necessary to compare new information with existing knowledge and critically evaluate its veracity (Muda et al., 2023; Sweller, 2011). For this subgroup, we predict that the positive indirect effect of foreign language use on fake news credibility, mediated by reading difficulty, will be significant.

In contrast, for highly proficient bilinguals, the cognitive architecture of foreign language processing is fundamentally different. As proficiency increases, language processing becomes more automatic, requiring fewer cognitive resources and imposing a much lower cognitive load (Pavlenko, 2017). For these individuals, the second language is no longer a significant source of resource-depleting disfluency. This is supported by findings that the Foreign Language Effect (FLE) is often diminished or absent in highly proficient and immersed populations, suggesting that their second-language processing more closely resembles that of their native language (Dylman & Champoux-Larsson, 2020; Maschio et al., 2022). When cognitive load is negligible, the resource-depletion mechanism is not triggered, and the proposed mediation pathway through reading difficulty should be weakened or absent. So, we hypothesize:

*H6: Language proficiency will moderate the effect of foreign language on fake news reading difficulty, so that this effect will be weaker for extremely proficient individuals.*

# 4. EXPERIMENTAL STUDIES

In this chapter, we will present the experimental studies that we conducted during the dissertation to test our proposed hypotheses. Also, we will propose two additional hypotheses after the discussion of Study 3, regarding how attractiveness and cultural incongruence can act as mediators and moderators, respectively, of the effect. We conducted five experimental studies to empirically test our model. Before our main studies, we conducted a pilot study to test our hypotheses related to discernment and response criterion using a set of news articles already developed to test misinformation susceptibility (Maertens et al., 2024). After this pilot study, we improved our stimuli and proceeded to the main experiments. All of our experiments were pre-registered, and their pre-registration is available at the Researchbox: https://researchbox.org/3950&PEER_REVIEW_passcode=YINFDK.

Our first experiments, studies 1A and 1B, examine how different foreign-language news is perceived in a social media environment. Therefore, they analyze the main effects and the mediation of reading difficulty in a within-subjects design. Study 2 advances our knowledge by isolating the effect of news language in a mixed-subjects design. Study 3 presents different, more accurate stimuli to test the moderated mediation effects through reading difficulty (H4, H5, and H6). Study 4 introduces a new language pair, adds the cultural incongruence condition, and tests the moderated mediation through attractiveness.

Across all experiments, participants were presented with true and false news headlines. True headlines were gathered from mainstream news sites (e.g., cnn.com; nysun.com; elmundo.es), and fake headlines were taken from independent fact-checkers (e.g., politifact.com; snopes.com; newtral.es). As stated before, our focus is on climate change misinformation, so across the main studies, all the news was about climate change.

Misinformation about climate change is relatively new compared with the first known piece of fake news (Standage, 2017). However, it has become increasingly important as climate change affects more populations worldwide. As it happens with "general" fake news, we have diverse approaches to climate change misinformation. However, one of the most accepted definitions of what is climate change misinformation is from the Climate Action Against Misinformation, a global coalition of over 90 leading climate and anti-disinformation organizations, which states that it is deceptive content that undermines scientific consensus, misrepresents climate data, or falsely promotes ineffective solutions (Center for an Informed Democracy and Social-cybersecurity (CIDS), 2021).

While this study is primarily concerned with the cognitive effects of language on the evaluation of misinformation, the literature robustly demonstrates that susceptibility to fake news is not uniform across individuals. A range of demographic and dispositional factors can influence how people interact with, believe, and share false information. To isolate the effects of our experimental manipulations, it is therefore methodologically crucial to account for the variance introduced by these key individual differences. Based on a review of the relevant literature, our analysis will control for political orientation, age, and gender.

Political orientation is arguably one of the most powerful and consistently documented predictors of engagement with fake news. The dissemination of misinformation in real-world contexts is often highly partisan, as shown by Allcott & Gentzkow (2017) in their analysis of the 2016 U.S. election. The mechanism behind this effect is not just a simple preference but a fundamental cognitive bias. Using Signal Detection Theory, Batailler et al. (2022) demonstrated that while analytical thinking predicts the ability to discern truth from falsehood (sensitivity, d'), political orientation is a primary driver of response bias (c). This means individuals are more likely to accept any news—whether true or false—that aligns with their pre-existing political worldview. Given its powerful influence on an individual's criterion for belief, controlling for political orientation is critical.

Age has also been identified as a significant factor related to the spread of fake news. The seminal study by Allcott and Gentzkow (2017) found that the sharing of fake news articles on social media was disproportionately common among older adults, with users over 65 sharing significantly more than younger cohorts. This relationship may be linked to underlying cognitive factors; for example, the literature on memory suggests that older adults can be more susceptible to false memories due to age-related declines in the cognitive functions that support memory monitoring (Grant et al., 2023). Other studies have also confirmed that age is a factor influencing an individual's susceptibility to disinformation (Soetekouw & Angelopoulos, 2022). On the other hand, research has found that older individuals are better at detecting false information (Grace & Hone, 2019; Ramos & Van Boven, 2026). Because age can serve as a proxy for both cognitive differences and media consumption patterns, it is an essential variable to include in the analysis.

Finally, while the evidence regarding gender is more mixed, it is frequently included as a standard control variable in studies of misinformation. Some research identifies gender as a factor associated with susceptibility to misinformation (Sindermann et al., 2020; Soetekouw & Angelopoulos, 2022). Other large-scale analyses have included it in their statistical models even

when it did not emerge as a significant predictor on its own (Allcott & Gentzkow, 2017). Therefore, controlling for gender is a prudent methodological step to account for any potential variance it may introduce and to ensure that the findings related to the primary variables of interest are robust. Including these three variables as covariates allows the statistical model to more accurately estimate the unique effect of foreign language use on the credibility of fake news and on sharing intentions.

All five studies were lab experiments with surveys created in Qualtrics. Studies 1 to 3 were conducted with Prolific users. Study 4 gathered participants in a more natural social media news-consumption environment featuring sponsored posts. The studies presented true and fake news in different formats and asked participants about their perceptions of it.

## 4.1. PILOT STUDY

This pilot study was designed to test the effects of a foreign language, specifically on discernment and response criteria for fake news. In this study, we sought to test whether the findings from Muda et al. (2023) hold across different language pairs. Therefore, we proceeded with a set of news items not specifically about climate change, but with true and false information from the Misinformation Susceptibility Test (MIST-8, Maertens et al., 2024), not necessarily in a social media news format.

### 4.1.1. Participants and Design

Two hundred and sixty-four undergraduate students (112 women and 152 men; Mean age = 23.03) were recruited in exchange for course credits. Those students had different native languages, with most being native German (135) or Portuguese (88) and fluent in English. Other students (41) presented 16 different native languages, including Italian, Spanish, and Norwegian. In this study, we used Portuguese and German as native languages and English as the foreign language. The study used a 2 (Language: Foreign x Native) x 2 (News Type: True x Fake) mixed-subjects design. The language condition was a between-factor, and the news type was a within-factor.

### 4.1.2. Procedure

Participants were randomly allocated to one of the language conditions. They were presented with 8 news (4 true and 4 false) retrieved from Maertens et al. (2024), that are available on Appendix A. Participants who were native in Portuguese or German were subjected to either Native or Foreign language condition, while those who were native in other languages were subjected to the Foreign Language (English) condition Participants were required to assess the veracity of each news item. All eight items were presented randomly and simultaneously, as illustrated in Appendix A. Political Ideology was measured on a 9-point scale (1 = extremely left-wing to 9 = extremely right-wing) from Fernandes (2020). We also measured, in an exploratory manner, participants' subjective knowledge of their abilities to identify fake news on a 7-point single-item Likert scale, "How would you rate your ability to discern between true and fake news? (1-7, anchored by "No ability at all = 1" and "Perfect ability = 7").

### 4.1.3. Results

To analyze this experiment, we used SDT. If the participant signaled a true news item (e.g., Global Warming Age Gap: Younger Americans Most Worried) as "true," we counted it as a "hit". If he stated that the true news was "fake," we considered it a "miss." For the fake news (e.g., *"Government Officials Have Manipulated Stock Prices to Hide Scandals"), if the participant said it was "true," it was considered a "false alarm."* Otherwise, it was a "correct rejection". Following this, we used the procedure described in the Signal Detection Theory section of this dissertation to calculate discernment (d′) and response criterion (c). As we had a small number of stimuli (4 true and 4 false), we applied Hautus' (1995) correction to extreme scores in hit and false-alarm rates. In our case, if the participant had a perfect score, he would have 4 hits, 0 misses, 0 false alarms, and 4 correct rejections, which would result in a "Hit Rate" of 1 and a "False Alarm Rate" of 0, resulting in infinite values from the inverse normal transform function ($z$). To address this, Hautus (1995) recommends that, for small SDT stimuli, sum 0.5 across each line and row of the SDT table to avoid extreme scores.

*Discernment* For the MIST (Maertens et al., 2024) set of news, our sample showed that they could, in general, differentiate false from true news (d' = 0.952; $t(263) = 16.498$; $p < 0.001$; 95%CI[0.842; 1.070]). After this, we conducted an ANCOVA to analyze the effect of language

on discernment. An initial check of the assumption of homogeneity of variances was conducted. Levene's test was not significant, $F(3, 260) = 0.753$, $p = .521$, indicating that the assumption was met. The results of the ANCOVA indicated a significant effect of the covariate subjective knowledge on truth discernment (*d'*), $F(1, 258) = 11.806$, $p < .001$, partial $\eta^2 = .044$. No other covariates were significant predictors: political orientation, $F(1, 258) = 1.286$, $p = .258$; gender, $F(1, 258) = 0.103$, $p = .749$; and age, $F(1, 258) = 0.256$, $p = .613$. After adjusting for the covariates, the main effect of Language was not statistically significant, $F(1, 258) = 0.123$, $p = .726$, partial $\eta^2 = .000$. The estimated marginal means show that the *d'* score for the foreign language condition ($M = 0.969$, $SE = 0.069$) was slightly higher than for the Native language condition ($M = 0.928$, $SE = 0.101$), but this difference was not significant. Even when removing the controls, the difference was not statistically significant, $F(1, 262) = 0.054$; $p = 0.815$. Table 4 shows the complete model for truth discernment.

*Response Criterion*: Our sample showed no bias toward a more conservative (skeptical) or liberal (naïve) view of the news in general. In fact, the response criterion was practically 0 ($c = 0.005$; $t(263) = 0.236$; $p = 0.814$; 95% CI: [-0.040; 0.051]), indicating a good balance between skepticism and naïveté in the sample for this set of news.

**Table 4.** ANCOVA results for truth discernment (d') for Pilot Study

| | Sum of Squares | df | Mean Square | F | p | $\eta^2p$ |
|---|---|---|---|---|---|---|
| Language | 0.1041 | 1 | 0.1041 | 0.123 | 0.726 | 0.000 |
| Gender | 0.0872 | 1 | 0.0872 | 0.103 | 0.749 | 0.000 |
| Subj_Knowledge | 10.0260 | 1 | 10.0260 | 11.806 | < .001 | 0.044 |
| Pol_Orient | 1.0921 | 1 | 1.0921 | 1.286 | 0.258 | 0.005 |
| Age | 0.2175 | 1 | 0.2175 | 0.256 | 0.613 | 0.001 |
| Residual | 219.1012 | 258 | 0.8492 | | | |

Next, we ran the same ANCOVA we used for discernment, with response criterion as the DV (Table 5). The assumption of homogeneity of variances was met, as indicated by a non-significant Levene's test, $F(3, 260) = 0.958$, $p = .413$. The analysis revealed that the covariate Age had a marginally significant effect on the response bias (*c*), $F(1, 258) = 3.171$, $p = .076$, partial $\eta^2 = .012$. A linear regression showed that younger individuals were slightly more skeptical, at the marginal level of significance ($b = 0.023$; $t = 1.781$; $p = 0.076$; 90% CI [0.001; 0.045]). The other covariates—gender, subjective knowledge, and political orientation—were

not significant predictors (ps > .750). After controlling for the covariates, the main effect of Language was marginal, $F(1, 258) = 2.873$, $p = .091$, partial $\eta^2 = .011$. The estimated marginal means indicate that participants showed a more conservative response bias (a higher c value) in the Native Language condition ($M = 0.062$, $SE = 0.041$) compared to the Foreign Language condition ($M = -0.021$, $SE = 0.028$).

**Table 5.** ANCOVA results for response criterion (c) for Pilot Study

| | Sum of Squares | df | Mean Square | F | p | $\eta^2p$ |
|---|---|---|---|---|---|---|
| Language | 0.39631 | 1 | 0.39631 | 2.87339 | 0.091 | 0.011 |
| Gender | 0.00130 | 1 | 0.00130 | 0.00943 | 0.923 | 0.000 |
| Subj_Knowledge | 0.00405 | 1 | 0.00405 | 0.02940 | 0.864 | 0.000 |
| Pol_Orient | 0.01327 | 1 | 0.01327 | 0.09618 | 0.757 | 0.000 |
| Age | 0.43741 | 1 | 0.43741 | 3.17136 | 0.076 | 0.012 |
| Residual | 35.58466 | 258 | 0.13793 | | | |

### 4.1.4. Discussion

The results of our pilot experiment present a more complex picture of the Foreign Language Effect (FLE) in the context of misinformation than initially hypothesized. Our primary prediction, based on the cognitive resource depletion model (Muda et al., 2023), was that increased foreign-language reading difficulty would impair participants' ability to distinguish true from false news. However, our findings showed that while participants could distinguish true from false news at a rate better than chance, this discernment capacity ($d'$) was not significantly affected by language context. This null finding differs from the results of Muda et al. (2023), who found that a foreign language impaired news discernment. The only significant predictor of discernment in our study was participants' self-reported subjective knowledge; those who believed they were better at spotting fake news were, in fact, more discerning.

One plausible explanation for the absence of a language effect on discernment relates to the specific characteristics of our sample. Participants were university students enrolled in English-based courses, many of whom lived abroad and used their second language daily. Such high proficiency and immersion can significantly attenuate the FLE. As processing in a highly proficient second language becomes more automatic, cognitive load decreases, making the

cognitive experience more akin to that of a native language (Pavlenko, 2017). This aligns with the boundary conditions for the FLE identified by Dylman and Champoux-Larsson (2020), who found no effect when the foreign language was either linguistically similar or highly influential and familiar within the participants' culture—a profile that fits our sample of European students using English. It is therefore possible that our participants' high level of proficiency and exposure mitigated the cognitive load that would otherwise impair discernment.

Regarding response criterion (c), our marginal results were consistent with our hypothesis (H3). We predicted that a foreign language would lead to a more liberal bias, making participants more likely to accept any news as true. Even though our sample included highly proficient individuals living abroad, they tended to be less skeptical in their foreign language. Furthermore, our analysis revealed that age was also a marginally significant predictor of response bias, with older participants showing a more liberal criterion. This is consistent with the findings of Allcott and Gentzkow (2017), who found that older adults are significantly more likely to share fake news. This behavior aligns with a more accepting or naive response bias.

Although this pilot study yielded informative results, several methodological limitations must be acknowledged; we addressed them in our main experiments. First, the news items were presented as simple blocks of text, without peripheral cues (e.g., likes, shares, comments, source branding) typical of a social media feed. Without these heuristics to rely on, participants' judgments may have been driven by processes different from those used in more ecologically valid settings. Second, the stimuli were adapted from a set developed for an American audience and presented to European students, which may have reduced their personal relevance and emotional salience (Fernández-López & Perea, 2020). Finally, our dependent variable was a binary "real" vs. "fake" choice, which does not capture the more nuanced constructs of perceived credibility and sharing intentions.

Following this, we present the main studies of this dissertation, focusing on investigating our model.

## 4.2. STUDY 1A

The main goal of this first study was to examine how the foreign language could affect news consumption in a more realistic social media environment. So, this study tested H1a and H1b (main effects), H2 and H3 (discernment and response bias), and H4 and H5 (mediation through reading difficulty).

We also wanted to look at how consumers react to news in different languages. To address the multiple language pairs in the pilot study, we chose Spanish and English. This was done because those are the most widely spoken Western languages (Statista, 2025). Also, they have different linguistic origins: Spanish is Latin-based, and English is Germanic. With this, we avoid confounds of linguistic origins, which could affect FLE (Dylman & Champoux-Larsson, 2020).

### 4.2.1. Participants and Design

This study employed a 2 (News Type: True vs. Fake) × 2 (Language: Native vs. Foreign) within-subjects experimental design. For this experiment, the native language was Spanish and the foreign language was English.

Participants were recruited through the online platform Prolific, which allows for pre-screening based on linguistic background. A total of 201 native Spanish speakers who self-identified as proficient in English were recruited. As previously registered and in accordance with established practices for ensuring data quality in laboratory and online experiments (Muda et al., 2023; Oppenheimer et al., 2009), some exclusion criteria were applied. Participants who self-reported a proficiency level below 3 (on a 7-point scale) were excluded to ensure adequate comprehension. Additionally, participants with response times three standard deviations above or below the mean were excluded to exclude inattentive or overly rapid responses.

This resulted in a final sample of 199 participants (75 women; $M_{age}$ = 33.1 years). We had a high-English-proficiency sample: on a 10-point scale, participants reported a mean of 8.17 (SD = 1.26). Also, the sample was slightly liberal politically oriented (M = 4.08; SD = 1.80).

A post hoc power analysis was performed using GPower 3.1 to assess the sensitivity of our F-test for the multiple regression model. Given our sample of 199 participants, an alpha of .05, and a small-to-medium effect size ($f^2 = 0.10$), the achieved power was .80. This confirms the study had sufficient power to detect a significant effect.

### 4.2.2. Materials

To enhance ecological validity, the stimuli for this study were designed to mimic the format of news on social media. Eight news headlines concerning climate change were sourced

from real-world outlets in English and Spanish. True headlines were extracted from established mainstream news organizations (e.g., cnn.com, elmundo.es), while fake news headlines were sourced from articles that had been formally debunked by independent fact-checking organizations (e.g., snopes.com, newtral.es). All headlines were presented in their original language without translation to preserve their natural linguistic properties.

The stimulus set was balanced for veracity and language using a 2x2 design: each participant evaluated eight headlines, consisting of four true and four false items, with equal numbers in English and Spanish. Participants viewed eight headlines — four true and four false — split evenly between English and Spanish, presented in a standardized Twitter (X) interface. To ensure focus on linguistic processing, images were omitted; however, peripheral social cues, such as engagement metrics (likes, retweets, and comments), were included to maintain ecological validity. To isolate the effect of language from the influence of source credibility, all headlines were attributed to a generic source (e.g., "News Feed"). Participants were explicitly informed at the outset that source names had been anonymized. The complete set of stimuli as presented to participants is available in Appendix B.

### 4.2.3. Procedure

When participants joined the study, they first provided consent, affirming that they were native Spanish speakers who understood English as a second language. After providing informed consent, they were briefed on the nature of the study, which involved exposure to content typically circulating on social media and the answering of questions about that content. Then, participants were presented with the eight news headlines. To mitigate potential order effects in the within-subjects design, the presentation order of the headlines was counterbalanced across participants using a Balanced Latin square (Edwards, 1951).

After each headline was presented, participants responded to a series of questions. First, sharing intention was measured using a single-item 7-point Likert scale (1 = Extremely Unlikely to 7 = Extremely Likely), adapted from Pennycook et al. (2021). Second, perceived credibility was assessed on a 6-point scale (ranging from "definitely false" to "definitely true"). This scale was adapted from Light et al. (2022) by removing the midpoint to facilitate the subsequent conversion into a binary "real" vs. "fake" judgment for the Signal Detection Theory (SDT) analysis. Third, the mediating variable, perceived reading difficulty, was measured using a single-item 7-point scale (Graf et al., 2018).

Finally, after evaluating all headlines, participants completed a demographic questionnaire that captured our primary control variables: age, gender, and political orientation, using a single-item 9-point scale from Fernandes (2020). We also collected data on their self-reported proficiency in Spanish and English, as well as on familiarity (whether they had seen the headlines before) and the emotionality of the headlines. The operationalization of all variables is detailed in Table 6.

**Table 6.** Operationalization of the variables used in all studies

| Variable | Item | Authors | Studies Used |
|---|---|---|---|
| Spanish/*English* Proficiency | How would you rate your Spanish/*English* proficiency? Ten-point scale, from 1 – No at all proficient, to 10 – Extremely Proficient | (Muda et. al, 2023) | All studies |
| Political Ideology | Using the 9-point scale below, please indicate which better describes your political ideology: (From 1 = "Extremely left-wing" to 9 = "Extremely right-wing") | (Fernandes et. al, 2020) | All Studies |
| Credibility | Using the 6-point scale below, please indicate what you think about the headline you just read: (From 1 = 'definitely false', to 6 = 'definitely true') | (Light et al., 2022) | Studies 1, 2, 3, and 4[3]. |
| Sharing | Using the 7-point scale below, if you were to see the above article on social media, how likely would you be to share it? (From 1 = Extremely Unlikely, to 7 = "Extremely Likely") | (Pennycook et al., 2021) | All Studies |
| Reading Difficulty | Using the 7-point scale below, please rate the process of evaluating this headline: (From 1 = Easy, to 7 = Difficult) | (Graf et al., 2017) | Studies 1, 2, and 3 |
| Familiarity | Are you familiar with the news fragment above (have you seen or heard it before)? (3-point scale: No - Unsure - Yes) | (Pennycook et al., 2021) | Studies 1 and 2 |
| Attractiveness | Participants rated each headline on a 7-point semantic differential scale anchored by the following pair: Unattractive - Attractive. | (Ohanian, 1990) | Study 4 |

### 4.2.4. Results

[3] In study 4, we used a 7-point scale because we had a binary choice for the SDT.

*Credibility* A 2 (Language: Foreign vs. Native) × 2 (News Type: True vs. Fake) repeated measures Analysis of Covariance (ANCOVA) was conducted to examine the effects on perceived credibility. Participants' age, gender, and political ideology were included as covariates.

The analysis revealed no significant main effect of Language $F(1, 195) = .906$; $p = .302$, partial $\eta^2 = .005$, indicating that overall credibility ratings did not significantly differ between the foreign language condition ($M = 3.42$) and the native language condition ($M = 3.39$) after adjusting for covariates. There was, however, a significant main effect of News Type, $F(1, 195) = 15.503$; $p < .001$; $\eta^2p = .074$. As expected, true news headlines ($M = 3.99$) were rated as significantly more credible than fake news headlines ($M = 2.82$).

We also found a significant Language × News Type interaction effect, $F(1, 195) = 4.403$; $p = .037$; $\eta^2p = .022$. An examination of the descriptive statistics reveals the nature of this interaction. In the native language (Spanish), the difference in credibility between true news ($M = 4.30$, $SD = 0.82$) and fake news ($M = 2.48$, $SD = 0.96$) was substantial (a difference of 1.82 points). In the foreign language (English), while true news ($M = 3.67$, $SD = 0.82$) was still rated as more credible than fake news ($M = 3.16$, $SD = 1.12$), this difference was considerably smaller (a difference of 0.51 points). This pattern suggests that the ability to distinguish between true and fake news based on credibility ratings was attenuated in a foreign-language context.

More than that, a paired-sample t-test showed that the true news in the foreign language ($M = 3.67$) was seen as *less* credible than in the native language ($M = 4.30$; $t(198) = -9.122$; $p < .001$; 95%CI[-.760; -.490), and fake news in foreign language ($M = 3.16$) was seen as *more* credible than in the native language ($M = 2.48$; $t(198) = 7.246$; $p < .001$; 95%CI[.501; .876]). Figure 1 shows this interaction.

Regarding the covariates, only age was a significant predictor of credibility ratings, $F(1, 195) = 9.566$, $p = .002$, whereas political ideology ($p = .873$) and gender ($p = .369$) were not.

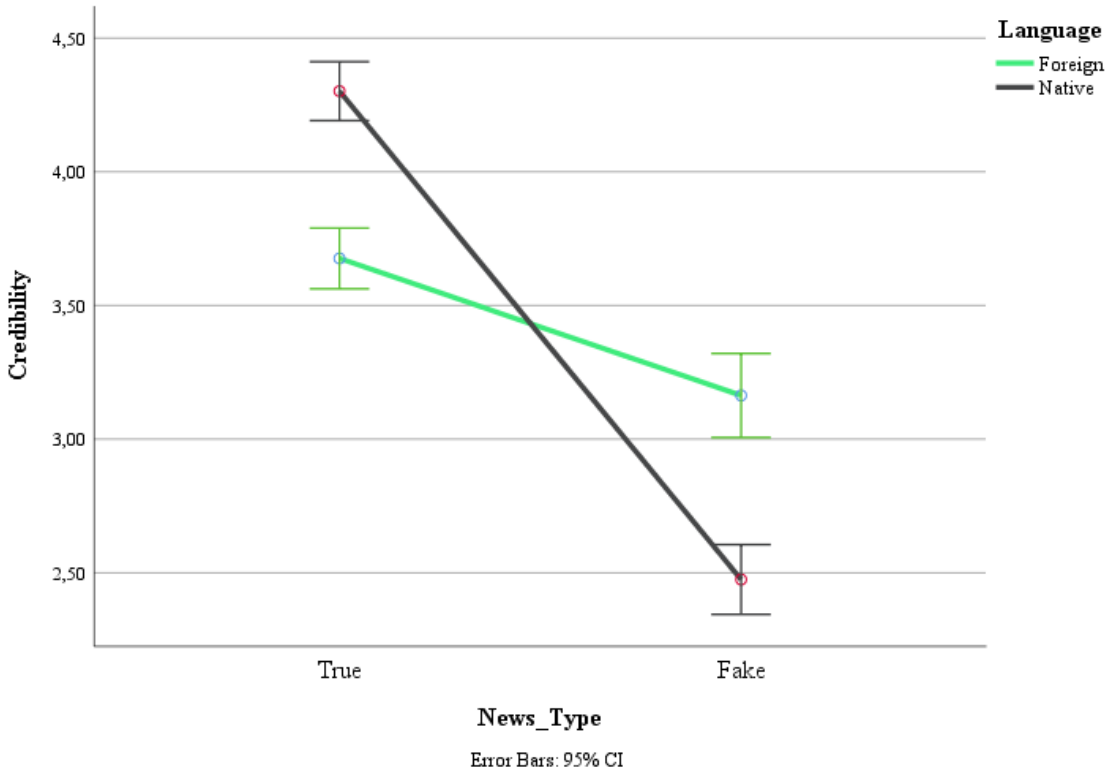



**Figure 1.** Results of the effects of news type and language on credibility for Study 1A

A preliminary 2 (Language: Foreign vs. Native) × 2 (News Type: True vs. Fake) repeated measures ANOVA was conducted on participants' intentions to share the news. The analysis revealed no significant main effect of Language ($F(1, 198) = 0.02$, $p = .876$, partial $\eta^2 < .001$). There was a significant main effect of News Type ($F(1, 198) = 6.27$; $p = .013$; $\eta^2p = .031$) and, more importantly, a significant Language × News Type interaction effect ($F(1, 198) = 22.13$, $p < .001$; $\eta^2p = .100$). This interaction effect indicated that the intention to share true versus fake news differed depending on the language of presentation. Specifically, in the native language (Spanish), participants reported a higher intention to share true news ($M = 2.92$, $SD = 1.53$) than fake news ($M = 2.25$, $SD = 1.31$), consistent with findings on credibility. In contrast, in the foreign language (English), this pattern was reversed, with participants reporting a slightly higher intention to share fake news ($M = 2.63$, $SD = 1.45$) than true news ($M = 2.53$, $SD = 1.30$).

However, to account for the potential influence of demographic and dispositional factors, the primary analysis was conducted using a repeated measures ANCOVA with age, gender, and political ideology as covariates. In this more stringent model, the main effect of News Type became marginally significant, $F(1, 195) = 2.77$, $p = .098$, partial $\eta^2 = .014$, and the

previously significant Language × News Type interaction was also reduced to marginal significance, $F(1, 195) = 3.66$, $p = .057$, partial $\eta^2 = .018$. Of the covariates, political ideology was a highly significant predictor of sharing intentions, $F(1, 195) = 17.84$, $p < .001$, while age ($p = .120$) and gender ($p = .954$) were not. To determine the direction of this effect, a follow-up Pearson correlation was conducted between political ideology (where 1 = Extremely left-wing and 9 = Extremely right-wing) and an overall average of sharing intentions. The analysis revealed a negative, marginally significant correlation ($r = -0.129$, $p = .070$), indicating that a more left-wing political orientation was associated with slightly higher intentions to share news. Age ($p = .120$) and gender ($p = .954$) were not significant covariates.

*Signal Detection Theory (SDT) Analysis.* To move beyond credibility ratings and formally test for differences in discernment, a Signal Detection Theory (SDT) analysis was conducted. For this purpose, the 6-point credibility scale was converted into a binary variable. Responses of 1 ("definitely false"), 2 ("probably false"), or 3 ("maybe false") were operationalized as a "distractor" response (i.e., the participant judged the news as "fake"). Conversely, responses of 4 ("maybe true"), 5 ("probably true"), or 6 ("definitely true") were operationalized as a "target" response (i.e., the participant judged the news as "true"). Following this conversion, we calculated discernment (d') and response criterion (c) to assess the effect of language on these measures.

*Overall Discernment and Response Bias.* First, an analysis of the overall sample performance was conducted. The mean discernment score was $d' = 0.81$, which was significantly greater than zero ($t(198) = 15.36$, 95% CI [0.71, 0.92], $p < .001$). This indicates that, overall, participants were able to distinguish between true and false news headlines at a level significantly better than chance. The overall response criterion was $c = -0.09$, a value that was also significantly different from zero, $t(198) = -2.85$, 95% CI [-0.16, -0.03], $p < .01$. This negative c value reveals a slight but statistically significant liberal response bias across the sample, suggesting a general tendency to accept headlines as true, regardless of their actual veracity.

*The Effect of Language on Discernment and Response Criterion.* To test our primary hypotheses regarding discernment (H2) and response criterion (H3) of the Foreign Language Effect, d ' and c scores were calculated separately for headlines presented in the native (Spanish)

and foreign (English) language for each participant. Subsequent paired-samples t-tests revealed a significant effect of language on discernment. Consistent with our hypothesis and the findings of Muda et al. (2023), participants exhibited significantly poorer news discernment when evaluating news in their foreign language (d' = 0.29) compared to their native language (d' = 1.05), t(198) = -9.66, 95% CI [-0.92, -0.61], p < .001. This result supports the hypothesis that second-language information processing impairs the ability to distinguish truth from falsehood.

In contrast to the findings from the pilot study, but consistent with the findings of Muda et al. (2023), there was no significant difference in the response criterion between the foreign (c = -0.05) and native language (c = -0.09) conditions, t(198) = 1.04, p = .295, 95% CI [-0.04, 0.14]. This fails to support our hypothesis that a second language would induce a more liberal bias. However, the criterion remained negative in both language conditions, indicating that the general tendency to be less skeptical was stable and not significantly modulated by the linguistic context in this more ecologically valid experiment.

*Linear Mixed-effects Models.* Since we have a full within-subjects experiment, we used linear mixed effects models (LMMs) to test our mediation hypotheses. In this design, each participant provides multiple responses (one for each news item), and observations from the same participant are likely to be more similar to each other than to observations from different participants. Linear mixed-effects models are specifically designed to handle this non-independence by simultaneously modeling both fixed effects and random effects. The fixed effects represent our primary experimental manipulations of interest (e.g., the effect of Language and News Type). The random effects account for the systematic, non-independent variability associated with the individual units of observation. Specifically, we included crossed random intercepts for Participant ID and ran the model. Also, since we were interested only in the difficulty of reading fake news, and our ANCOVA showed a significant difference between languages for this kind of news, we split our sample and analyzed mediation only for this kind of news.

The model successfully arrived at a stable solution for the 796 observations nested within 199 participants. Results from the omnibus tests revealed a significant main effect of Language on reading difficulty, F(1,595) = 12.598, p < 0.001. This finding indicates that language significantly influenced participants' perception of how difficult was to evaluate the

fake news[4]. An examination of the model's fixed coefficients showed that news in Spanish (the native language) were seen as less difficult to read than news in English (the foreign language; $\beta = -0.289$, SE = 0.081, $t(595) = -3.549$, $p < .001$), as expected, confirming H4. The estimated marginal means further clarified this effect, with native-language (Spanish) fake news showing an average difficulty of 2.10, compared with 2.39 for foreign-language (English) fake news. It is worth noting that reading difficulty was low in both languages, as participants were evaluating only news headlines, which are not very complex texts.

In contrast, no other fixed effects were statistically significant. Counterintuitively, English proficiency ($p = .416$) didn't influence reading difficulty or interacted with language ($p = .278$). Regarding our controls, there was no significant influence of political identity ($p = .492$), age ($p = .213$), or gender ($p = .557$) on reading difficulty[5].

The analysis of the model's random components underscored the substantial variability between participants. The intraclass correlation coefficient (ICC = 0.387) indicated that 38.7% of the total variance in reading difficulty was attributable to participant-level differences. Table 7 shows the model's results on reading difficulty.

Following this, we tested whether reading difficulty affected the credibility of fake news[6]. We used the same specified LMM model, but added reading difficulty as a predictor and fake news credibility as a dependent variable. Also, we included the full model's fake news emotionality and familiarity to see whether they affected fake news credibility.

**Table 7.** Summary of the results of the Linear Mixed Model for Reading Difficulty for Study 1A

| Predictor | Estimate (β) | SE | df | t | p | 95%CI[LL,UL] |
|---|---|---|---|---|---|---|
| Intercept | 2.25 | 0.15 | 195 | 15.22 | < .001 | [1.96, 2.54] |
| Language (Native vs. Foreign) | -0.28 | 0.08 | 601 | -3.51 | < .001 | [-0.44, -0.13] |
| Political Identity | 0.03 | 0.04 | 195 | 0.69 | .492 | [-0.06, 0.12] |
| Age | 0.01 | 0.01 | 195 | 1.25 | .213 | [-0.01, 0.02] |
| English Proficiency | -0.05 | 0.06 | 195 | -0.82 | .416 | [-0.17, 0.07] |

[4] As a proxy of reading difficulty, we also ran a repeated-measures ANOVA on total fake news reading time. Fake news in English (FL) presented more reading time (M = 12.676 seconds), than those on Spanish (M = 10.956 seconds), $F(1, 198) = 4.102$; $p = 0.044$.

[5] If we remove the controls, the main results remain the same. Language influences reading difficulty, $F(1, 595) = 12.60$; $p < .001$). English proficiency, $F(1, 197) = 1.05$; $p = .308$, and their interaction $F(1, 595) = 1.08$; $p = .300$, remain insignificant.

[6] Since our full model with the covariates showed no significant results for the DV sharing, we proceeded with the Linear Mixed Models only for credibility

| | | | | | | |
|---|---|---|---|---|---|---|
| Gender (Female vs. Male) | -0.03 | 0.16 | 195 | -0.16 | .872 | [-0.34, 0.29] |
| Gender (Non-binary vs. Male) | -0.46 | 0.43 | 195 | -1.08 | .280 | [-1.31, 0.38] |
| Language × English Proficiency | -0.07 | 0.06 | 601 | -1.09 | .278 | [-0.20, 0.06] |

| Random Effects | Variance | SD |
|---|---|---|
| Participant Intercept (ID) | 0.83 | 0.91 |
| Residual | 1.31 | 1.14 |

| Model Fit | |
|---|---|
| Observations | 804 |
| Participants (ID) | 201 |
| Marginal R2 | .230 |
| Conditional R2 | .401 |
| ICC | .387 |

The results of this full model indicated that several predictors significantly influenced credibility ratings. The strongest effects were observed for Familiarity ($F(1, 710) = 82.743$ , $p < .001$) and Emotionality ($F(1, 630) = 35.183$, $p < .001$). Parameter estimates revealed that higher familiarity ($\beta = 0.64$, $SE = 0.07$,$t(710) = 9.10$, $p < .001$) and higher emotionality ($\beta = 0.18$, $SE = 0.03$, $t(630) = 5.93$, $p < .001$) were both associated with significant increases in credibility ratings.

Furthermore, language remained a significant predictor of credibility ($F(1, 617) = 19.623$, $p < .001$). Specifically, fake news in Spanish (the native language) received significantly lower credibility ratings than fake news in English (the foreign language; $\beta = -0.44$, $SE = 0.10$, $t(617) = -4.43$, $p < .001$).

Reading Difficulty also showed a significant positive effect ($F(1, 617) = 5.927$, $p = 0.015$), where greater perceived difficulty was linked to higher credibility ($\beta = 0.09$, $SE = 0.04$, $t(617) = 2.44$, $p = 0.015$), confirming H5a. Finally, regarding our controls, a significant negative effect of Age was observed ($F(1, 185) = 5.390$, $p = 0.021$), suggesting that older participants tended to give lower credibility ratings ($\beta = -0.01$, $SE = 0.005$, $t(185) = -2.32$, $p = .021$). In contrast, neither Gender ($p = .705$) nor Political Identity ($p = .459$) was a significant predictor in the full model.

An analysis of the model's random components showed minimal participant-level heterogeneity, with an intraclass correlation coefficient (ICC) of 0.0625. This indicates that approximately 6.3% of the total variance in credibility ratings was attributable to between-

participant differences. The model fit suggests that the fixed effects alone explain 20.6% of the variance (Marginal $R^2 = 0.206$) and the full model explain 25.6% (Conditional $R^2 = 0.256$). Table 8 shows the results of the full model.

**Table 8.** Summary of the results of the Linear Mixed Model for Credibility for Study 1A

| **Predictor** | **Estimate (β)** | **SE** | **df** | **t** | **p** | **95%CI[LL, UL]** |
|---|---|---|---|---|---|---|
| Intercept | 2.77 | 0.10 | 184 | 26.52 | < .001 | [2.57, 2.98] |
| Language (Native vs. Foreign)[1] | -0.44 | 0.10 | 617 | -4.43 | < .001 | [-0.63, -0.24] |
| Reading Difficulty | 0.09 | 0.04 | 617 | 2.44 | .015 | [0.02, 0.16] |
| Gender (Female vs. Male) | -0.08 | 0.11 | 183 | -0.72 | .470 | [-0.31, 0.14] |
| Gender (Non-binary vs. Male) | -0.16 | 0.30 | 185 | -0.54 | .588 | [-0.76, 0.43] |
| Age | -0.01 | 0.01 | 185 | -2.32 | .210 | [-0.02, 0.00] |
| Political Identity | 0.02 | 0.03 | 185 | 0.74 | .459 | [-0.04, 0.08] |
| Emotionality | 0.18 | 0.03 | 630 | 5.93 | < .001 | [0.12, 0.24] |
| Familiarity | 0.64 | 0.07 | 710 | 9.10 | < .001 | [0.50, 0.78] |
| Random Effects | Variance | SD | | | | |
| Participant Intercept (ID) | 0.12 | 0.35 | | | | |
| Residual | 1.83 | 1.35 | | | | |
| Model Fit | | | | | | |
| Observations | 796 | | | | | |
| Participants (ID) | 199 | | | | | |
| Marginal R2 | .206 | | | | | |
| Conditional R2 | .256 | | | | | |
| ICC | .063 | | | | | |

### 4.2.5. Discussion

In our first study, we innovated by employing original, untranslated news content in English and Spanish, thereby enhancing ecological validity. Unlike the pilot study, this study provides evidence of the influence of language on news credibility and discernment, particularly in the context of social media consumption. As expected, overall participants rated true news as more credible than fake news, confirming the main effect of the news type. However, a significant interaction between language and news type revealed a nuanced pattern:

true news was perceived as *less* credible in a foreign language, whereas fake news was perceived as *more* credible. This replication and strengthening of earlier findings (Muda et al., 2023) suggests a persistent cognitive bias induced by language context. This also confirmed H1a, which predicted that fake news would be perceived as more credible in a foreign language.

As previously found and consistent with H2, the present study revealed a significant decrease in news discernment in the foreign-language condition. Participants demonstrated a lower ability to distinguish true from false news when reading in a second language, supporting the notion that foreign language processing reduces analytical engagement (Hayakawa et al., 2017) and increases susceptibility to misinformation. Although response bias (criterion c) remained slightly liberal across both language conditions, no significant differences emerged, suggesting that exposure to news in both native and foreign languages affects discriminability more than general response tendencies.

Furthermore, although we observed a difference in sharing intentions between native and foreign languages, controlling for political ideology made the effect insignificant. The results suggest that political ideology, rather than language, was the primary driver of sharing behavior. While previous literature has often associated misinformation susceptibility with right-wing orientation (Allcott & Gentzkow, 2017), our findings showed a slight tilt toward left-wing participants. This is likely a result of our effort to balance the political valence of the news set; specifically, we included false items designed to align with left-leaning viewpoints, such as exaggerated claims regarding climate change.

Regarding our mediation hypothesis (H5), we saw that individuals reported more difficulty evaluating the fake news in their second language, consistent with our hypothesis that the foreign language impairs the cognitive resources used to evaluate whether the news was true or false (Mirhoseini et al., 2023; Pennycook & Rand, 2019; Sweller, 2011). Consequently, this reading difficulty led to greater belief in fake news, suggesting that consuming cognitive resources enhances vulnerability to misinformation.

Although this is a full-within-subjects design, which is an ecologically valid way to experiment on the effects of the foreign language, the main limitation of this study concerns the news set *per se*. Because the news is different, the effect we found may be moderated (or driven by) the set of news we chose. Acknowledging this, we replicated the study with English-native speakers proficient in Spanish using the same set of news articles, which we report in Study 1B.

## 4.3. STUDY 1B

As previously stated, in this study, we sought to determine whether the specific set of news influenced our previous findings. Here, we focus on understanding the main effects of language on fake news credibility and sharing intentions, while controlling for age, gender, and political ideology, in a different population: English native Speakers who are proficient in Spanish.

### 4.3.1. Participants and Design

Two hundred and four Prolific participants were recruited. In this experiment, participants were native English speakers who had Spanish as a second language. The design was the same as Study 1A: a 2 (Language: native x foreign) x 2 (News Type: true x fake) within-subjects experiment. Using the same pre-registered exclusion criteria from Study 1A (proficiency lower than 3, and reading time more or less than 3SD), we had a final sample of 191 participants (Gender: 98 Female, 90 Male, 2 Non-binary/third gender, 1 prefer not to say; M Age: 36.5).

### 4.3.2. Materials and Procedures

Materials and procedures were the same as those of Study 1A.

### 4.3.3. Results

*Credibility.* The same 2 (Language: Foreign vs. Native) × 2 (News Type: True vs. Fake) repeated measures Analysis of Covariance (ANCOVA) was conducted to examine the effects on perceived credibility. Participants' age, gender, and political ideology were included as covariates.

The results of this ANCOVA showed a significant direct effect of News Type on credibility, $F(1, 185) = 6.030$, $p = .015$, $n^2p = 0.032$. As expected, true news ($M = 4.15$) was seen as more credible than fake news ($M = 3.33$). However, differently from Study 1A, we had a main effect of language, $F(1, 185) = 8.165$; $p = 0.005$; $n^2p = .042$, in a way that the foreign language Spanish news ($M = 3.81$) was seen as *more credible* than the native language English

news (M = 3.67). The interaction that was statistically significant on Study 1A, was repeated in Study 1B, F(1, 185) = 7.756; p = 0.006; $n^2p$ = 0.04. However, we observed a different pattern than in Study 1A. A paired-samples t test showed that while the foreign language Spanish true news (M = 4.25; SD = 1.03) was seen *more credible* than the native language English news (M = 3.69; SD = .77; t(190) = 6.613; p < .001; 95%CI[ .386; .713]), there was no significant difference for the fake news, as foreign language Spanish news (M = 3.32; SD = 1.09) presented almost equal credibility of native language English news (M = 3.31; SD = 0.99; t(190) = .090; p = 0.928; 95%CI[-.163; .179]). Figure 2 shows this result.

Regarding the controls, age (F(1, 185) = 11.898; p < .001) strongly influenced news credibility. A Pearson correlation test showed a significant negative correlation between age and news credibility (r = -0.233; p < 0.01), suggesting that younger individuals perceived news as more credible. Gender (p = 0.086) influenced credibility at the marginal level of significance, and Political Ideology (p = 0.351) did not predict changes in credibility means.

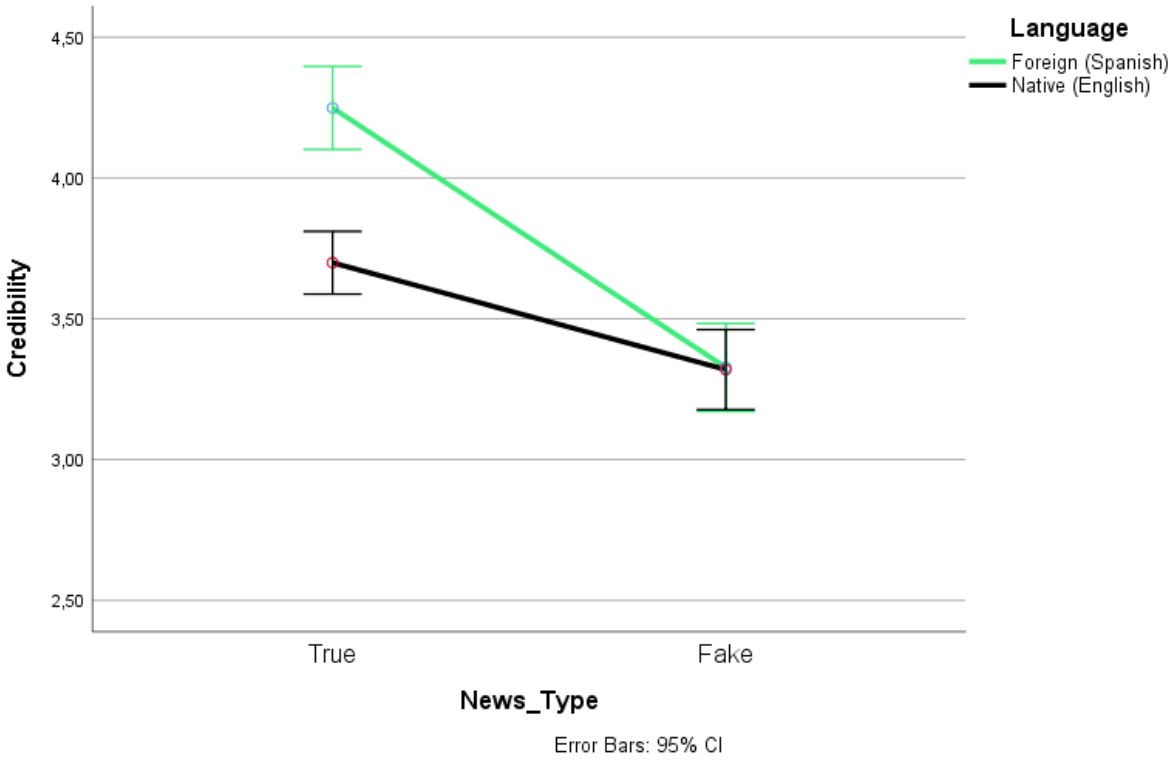



**Figure 2.** Results of the effects of news type and language on credibility for Study 1B

*Sharing* Proceeding with the same ANCOVA that we analyzed credibility, we found no direct effect neither from language ($M_{For}$ = 2.56 x $M_{Nat}$ = 2.80; F(1, 185) = 0.334; p = 0.564) or

news type ($M_{True}$ = 2.72 x $M_{Fake}$ = 2.80; F(1, 185) = 0.536; p = 0.428) on sharing intentions. However, we had a significant interaction between those two independent variables (F(1, 185) = 9.63; p = .002; $n^2p$ = .049). A paired-sample t test showed that for the true news participants reported *more sharing intentions* on the Spanish foreign language (M = 3.05) than on the English native language (M = 2.77; t(190) = 3.213; p = .002; 95%CI[ .108; .452]), while for the fake news they presented *less sharing intentions* on the Spanish foreign language (M = 2.67) when compared to the English native language (M = 2.94; t(190) = -3.459; p = .001; 95%CI[-.427; -.117]).

### 4.3.4. Discussion

This second experiment, which serves as a conceptual replication and extension of Study 1A, shows that the effects of language on news credibility are complex and should be interpreted carefully. In our previous study, native and foreign-language news items were necessarily different, creating a significant stimulus-based confound. This second study was designed to address this by presenting the same news items to a new group: native English speakers who report proficiency in Spanish, allowing us to observe how they evaluate Spanish news (their second language) and English news (their native language). The main finding was that the credibility of true news was significantly higher when presented in a foreign language (Spanish) than in the native language (English). This suggests a strong item effect, where specific true news items in our Spanish-language set were perceived as highly credible, regardless of individuals' first language, because they were seen as more credible in both native (Study 1A) and foreign (Study 1B) languages. More central to our hypothesis, the difference in credibility for fake news between native and foreign language conditions was not statistically significant. This implies that the inherent properties of the news items themselves play a major role in determining credibility.

However, this replication allows for a valuable comparison with the results of Study 1A. By comparing the ratings of the same Spanish fake news items, we can see how they were evaluated by native Spanish speakers (Study 1A) and by native English speakers (Study 1B). This comparison showed that when presented in their native language, Spanish speakers rated the fake news with a mean credibility rating of 2.47 (Study 1A). In contrast, when presented as a foreign language, English speakers rated the same news at a mean of 3.32 (Study 1B). This 0.85-point difference for identical stimuli points in the direction of our hypothesis, suggesting

that a foreign-language context can indeed increase susceptibility to misinformation (Muda et al., 2023). This aligns with a cognitive resource depletion model, where increased difficulty in processing a second language impairs the ability to detect falsehoods (Białek et al., 2020).

For sharing intentions, a different pattern emerged. The first notable finding was that true news did not elicit significantly higher sharing intentions than fake news. This supports the growing body of research suggesting that the mechanisms behind credibility are different from those behind sharing (Pennycook & Rand, 2019, 2021).

We found that the effect of a foreign language depends heavily on whether the news is true or false. For true news, Spanish (foreign language) increased both credibility and sharing intentions compared to English. However, this effect did not carry over to fake news: language did not significantly affect its credibility, and sharing intentions actually decreased in the foreign-language condition. This discrepancy suggests that the specific content of these news pieces may have overridden the language effect.

Sharing is often a social action driven less by careful truth assessment and more by factors like emotional appeal, partisan bias, or the desire to signal group identity (Duffy et al., 2019; Talwar et al., 2019). Additionally, overall sharing intentions were quite low across all conditions (M = 2.68 on a 7-point scale) compared to credibility ratings (M = 3.74 on a 6-point scale). This is common (Ceylan et al., 2023; Pennycook & Rand, 2019) and indicates that social media users tend to be more passive consumers rather than active news sharers. It's likely that the inherent properties of the news set (the "item effect") influence sharing more than subtle cognitive effects of language.

To clarify these remaining uncertainties and directly compare the effects of language versus the news items themselves, we moved on to our next study. In this third experiment, we isolate the language variable by presenting the same news in either their native or foreign language, allowing a direct, balanced test of our hypotheses. We also updated our news set to ensure relevance and salience. Next, we describe and discuss our third experiment.

## 4.4. STUDY 2

Our third experiment was designed to isolate the effect of language on social media news consumption. So, the primary goal of this experiment was to understand what happens when bilingual consumers consume the same news in their native and foreign languages. For this, half of our sample was exposed to news only in their native language, and the other half to that same news in their foreign language. We also innovated in foreign language studies by

using English as the native language and Spanish as the second language. We did this first to eliminate the possibility that English as a second language could lead to greater fake news credibility, and second, because Spanish is the second language most commonly learnt in America (DerManuelian, 2025), our population for this study. Also, we updated the stimuli (e.g., the set of news pieces) for this study (presented in Appendix C).

### 4.4.1. Participants and Design

Two hundred Prolific participants were recruited to take part in this experiment, with compensation of a small fee (0.6 pounds for a 6-minute questionnaire). Our sample consisted of native English speakers fluent in Spanish. This study was a 2 (language: native vs. foreign) x 2 (news: true vs. fake) mixed-design experiment. Participants were randomly assigned to one of two conditions: native or foreign language (between-subjects design), and each participant saw 8 news items (4 true and 4 false; within-subjects design). However, following the same pre-registered criteria from our previous studies (https://aspredicted.org/4gyt-cthc.pdf), which were based on previous research (Muda et al., 2023; Oppenheimer et al., 2009) 4 participants who reported less than 3 on a 10-point proficiency scale and 3 participants who took too long to read the news (z-score > 3), suggesting that they stopped in the middle of the experiment, were excluded, leaving us with a final sample of 193 participants (104 women; μAge = 35,4). As in previous studies, we used GPower 3.1 to analyze the power of our sample to detect an effect. The post hoc power analysis showed that, given our sample of 193 participants and using the same parameters as in the other studies ($\alpha = 0.05$, $f^2 = 0.10$), the achieved power of 0.78 was slightly below the ideal (0.80).

### 4.4.2. Materials and Procedure

As in our previous studies and in the focus of this dissertation, our study examined climate change news. All true news was taken from mainstream news media sites, searching for “climate change” or in the “environment” section of these sites. We gathered news from English (e.g., bbc.com) and Spanish (e.g., cnnespanol.com) news sites, used artificial intelligence to translate it into the other language, and then had a native Spanish speaker backtranslate it. For the fake news, the procedure was the same: we gathered it from

independent fact-checkers (e.g., Snopes.com, Newtral.es) by searching for "climate change" or in the "environment" section.

Regarding how this study was conducted, participants were briefed on the survey in the same way as the first studies, but now they were randomly assigned to one of two conditions: native- or foreign-language news headlines. Hence, they saw the news only in English or Spanish. We did this to avoid adding a potential confound: switching between languages, which can, in some cases, influence the FLE (Barbu et al., 2020; Contemori & Zuniga, 2025). Then they were presented with the 8 news items in random order, so they saw 4 true and 4 false items, to avoid a spurious effect of presentation order. After reading each headline, participants were asked about their intention to share that news on a 7-point Likert scale adapted from Pennycook et al (2021), their credibility on a 6-point scale, which we adapted from Light et al. (2022), removing the central point, so the first 3 points represented "false" levels, and the last 3 "true", from "definitively" to "maybe"; their difficulty of reading the news, one item from Graf et al. (2018), and if they have seen the headlines before, to measure the familiarity. Basically, the same measures we used in our first studies. After reading all the headlines, participants were also asked about their proficiency in Spanish, their political orientation, gender, and age. The operationalization of the variables was presented in Table 6.

### 4.4.3. Results

*Descriptive:* In our sample, participants were highly proficient in Spanish, with a mean score of 7.95 on a 10-point scale. Also, in the realm of political ideology, we had a more liberal sample; on a 9-point scale, we had a mean of 4.40, which was significantly different from the mean point of the scale, 5 ($t(192) = -3.74$; $p < 0.001$; 95%CI[-0.601; -0.092]). The means for all the variables of Study 3 are presented in Table 9.

**Table 9.** Descriptive of the sample and means of the dependent variables (DVs) for Study 2.

| | Descriptive |
|---|---|
| N | 193 |
| Gender | 86 Male - 104 Female - 3 Non-Binary/Did not Inform |
| | M (SD) |
| Age | 35.4 (12.1) |
| NL Proficiency | 7.95 (1.61) |

| | | | | | |
|---|---|---|---|---|---|
| Political Identity | | | 4.40 (2.32) | | |
| | | | Main DVs | | |
| | | | | News Type | |
| | | | | True | False | *Total* |
| Credibility | Language | Native Language (Eng) | | $3.56^{a}_{i}$ | $3.59^{a}_{i}$ | *$3.57^{a}$* |
| | | Foreign Language (Spa) | | $3.87^{b}_{i}$ | $3.94^{b}_{i}$ | *$3.91_{b}$* |
| | | | *Total* | *$3.71_{i}$* | *$3.77_{i}$* | **3.74** |
| | | | | News Type | |
| | | | | True | False | *Total* |
| Sharing | Language | Native Language (Eng) | | $2.77^{a}_{i}$ | $2.88^{a}_{i}$ | *$2.83^{a}$* |
| | | Foreign Language (Spa) | | $2.86^{a}_{i}$ | $3.04^{a}_{i}$ | *$2.95^{a}$* |
| | | | *Total* | *$2.81_{i}$* | *$2.96_{i}$* | **2.89** |
| | | | | News Type | |
| | | | | True | False | *Total* |
| Reading Difficulty | Language | Native Language (Eng) | | $2.94^{a}_{i}$ | $2.84^{a}_{i}$ | *$2.89^{a}$* |
| | | Foreign Language (Spa) | | $2.98^{a}_{i}$ | $2.58^{a}_{i}$ | *$2.78^{a}$* |
| | | | *Total* | *$2.96_{i}$* | *$2.71_{i}$* | **2.83** |
| | | | SDT Analysis | | |
| | | Native Language (Eng) | | Foreign Language (Spa) | *Total* |
| Discernment (d′) | | $-0.06_{i}$ | | $-0.05_{i}$ | *-0.06* |
| Response Criterion (c) | | $-0.20_{i}$ | | $-0.40_{ii}$ | *-0.31* |

Note: different superscript letters (a, b) mean significant difference ($p < 0.05$) between rows; different subscript letters (i, ii) mean significant difference ($p < 0.05$) between columns

*Linear Mixed Models* To investigate the influence of language and news type on credibility and sharing intentions, a Linear Mixed Model (LMM) was employed. The model was specified to predict credibility ratings based on the fixed effects of Language (Foreign vs. Native), News Type (True vs. Fake), and their interaction. To account for the non-independence of observations nested within participants, a random intercept was included for each subject. This approach allowed for an examination of the primary research questions while statistically controlling for baseline individual differences in credibility ratings. The detailed results of the fixed and random effects are presented below. We also controlled for gender, age, and political orientation, including them as covariates in our models.

*Credibility:* The full model results indicated that some of our predictors significantly influenced credibility ratings. Regarding our independent variables, Language ($F(1, 187.60) = 6.095$; $p = .014$) emerged as a significant predictor of credibility. Results from the coefficient analysis show that foreign language Spanish news ($M = 3.91$) was seen as more credible than native language English news ($M = 3.57$; $\beta = -0.22$, $SE = 0.09$, $t(187.60) = -2.47$, $p = .014$). In contrast, the main effect of News Type ($F(1, 5.99) = 0.007$, $p = .937$) and the Language x News Type interaction ($F(1, 1341.82) < 0.001$, $p = .999$) were not significant.

A post-hoc analysis revealed that fake news was seen as more credible in the foreign language condition ($M = 3.94$) than in the native language condition ($M = 3.59$; *diff* = .2157; $t(382.7) = 2.051$; $p = .041$), supporting H1 for credibility. Likewise, true news was seen as more credible in the foreign language condition ($M = 3.87$) than in the native language condition ($M = 3.56$; *diff* = .2155; $t(380.47) = 2.055$; $p = .041$).

Regarding our covariates, the strongest effect was observed for Familiarity ($F(1, 1250.6) = 124.067$, $p < .001$). Parameter estimates revealed that higher familiarity ($\beta = 0.53$, $SE = 0.05$, $t(1250.58) = 11.14$, $p < .001$) was associated with a significant increase in credibility ratings. Furthermore, Political Ideology ($F(1, 184.61) = 5.520$, $p = .020$) also emerged as a significant predictor. A significant negative effect was also observed for Political Ideology ($\beta = -0.05$, $SE = 0.02$, $t(184.61) = -2.35$, $p = .020$), suggesting that participants with higher scores on this measure (e.g., more conservative or right-wing) tended to give *lower* credibility ratings. Finally, neither Gender ($p = .247$) nor Age ($p = .110$) was a significant predictor in the full model[7].

An analysis of the model's random components showed that variance was attributable to both participants and news items. The intraclass correlation coefficient (ICC) for Participant was 0.130, indicating that 13.0% of the total variance in credibility ratings was attributable to between-participant differences. A further 7.5% of the variance was attributable to differences across the News_ID (ICC = 0.075). The model fit suggests that the fixed effects alone explain 10.6% of the variance (Marginal $R^2 = 0.106$), and the full model, including random effects, explains 27.3% of the variance (Conditional $R^2 = 0.273$). The Likelihood Ratio Test for the Marginal Model (LRT, $X^2(9) = 142.956$; $p < .001$) indicates a statistically significant improvement and provides a much better fit for explaining the credibility ratings than a model with no predictors. Table 10 presents the results for the Credibility model.

[7] If we remove all the controls, the main results remain the same, as the only significant main effect is from language on credibility ($\beta = -0.335$; $t(191) = 26.482$; $p < .001$)

**Table 10**. Summary of the results: Linear Mixed Model for Credibility for Study 2

| **Fixed Effects** | | | | | | |
|---|---|---|---|---|---|---|
| **Predictor** | **Estimate (β)** | **SE** | **df** | **t** | **p** | **95%CI[LL, UL]** |
| Intercept | 3.46 | 0.22 | 58.16 | 15.84 | < .001 | [3.04, 3.89] |
| Language (Native vs. Foreign)[1] | -0.22 | 0.09 | 187.60 | -2.47 | .014 | [-0.39, -0.04] |
| News Type (True vs. Fake)[2] | -0.02 | 0.24 | 5.99 | -0.08 | .937 | [-0.48, 0.45] |
| Gender (Female vs. Male) | 0.12 | 0.09 | 187.43 | 1.29 | .199 | [-0.06, 0.29] |
| Gender (Non-binary vs. Male) | -0.12 | 0.43 | 185.26 | -0.27 | .784 | [-0.96, 0.73] |
| Gender (Prefer not to say vs. Male) | -0.88 | 0.61 | 184.96 | -1.45 | .149 | [-2.06, 0.31] |
| Age | -0.01 | 0.00 | 184.47 | -1.61 | .110 | [-0.01, 0.00] |
| Political Identity | -0.05 | 0.02 | 184.61 | -2.35 | .020 | [-0.08, -0.01] |
| Familiarity | 0.53 | 0.05 | 1250.58 | 11.14 | < .001 | [0.43, 0.62] |
| Language × News Type | 0.00 | 0.12 | 1341.82 | <0.01 | .999 | [-0.23, 0.23] |
| **Random Effects** | **Variance** | **SD** | **ICC** | | | |
| Participant Intercept (ID) | .195 | .442 | .130 | | | |
| News Intercept (News_ID) | .106 | .325 | .075 | | | |
| Residual | 1.312 | 1.146 | | | | |
| **Model Fit** | | | | | | |
| Observations | 1544 | | | | | |
| Participants (ID) | 193 | | | | | |
| News (ID) | 8 | | | | | |
| Marginal $R^2$ | .106 | LRTX² | 142.95 | df | 9 | |
| Conditional $R^2$ | .273 | LRTX² | 295.90 | df | 11 | |

*Sharing Intentions.* For sharing intentions, we had no effects of the Independent Variables (IVs) in this experiment. Running the same model that we ran for credibility, the results of the indicated that only one predictor had a significant influence on ratings. A strong, significant effect was observed for Familiarity ($F(1, 1520.1) = 82.488$, $p < .001$). Parameter estimates revealed that higher familiarity ($\beta = 0.54$, $SE = 0.06$, $t(1520.07) = 9.08$, $p < .001$) was associated with a significant increase in the likelihood to share. In contrast, the main hypotheses were not supported, as neither Language ($F(1, 186.98) = 0.067$, $p = .796$), News Type ($F(1, 5.98) = 0.267$, $p = .624$), nor the Language x News Type interaction ($F(1, 1341.89) = 0.157$, $p = .692$) were significant. Furthermore, none of the control variables, including Age ($p = .593$),

Political Identity (p = .962), or Gender (p = .685), were found to be significant predictors in the model. An analysis of the model's random components showed substantial participant-level heterogeneity, with an intraclass correlation coefficient (ICC) for Participant of 0.481. This indicates that 48.1% of the total variance in sharing intention was attributable to between-participant differences. A small additional variance of 4.9% was attributable to the News_ID (ICC = 0.049). The model fit suggests that the fixed effects alone explain 5.6% of the variance (Marginal $R^2 = 0.056$), though the full model, including the strong random effect of participant, explains 52.3% of the total variance (Conditional $R^2 = 0.523$). The overall significance test for the fixed effects was significant (LRT $\chi^2(9) = 85.612$, $p < .001$).

*Signal Detection Theory (SDT) Analysis* To have a better comprehension of the findings from our main models, and test for H2 and H3, we used the same procedure of the second experiment: we converted the 6-point credibility scale into a binary variable, with the first 3 points regarding a “false” response to the news item and the last 3 regarding a “true” response to the news item. Again, we followed Hautus' (1995) correction to extreme scores in hit and false alarm rates.

*Overall Discernment and Response Bias* The SDT analysis showed that for this set of news, individuals couldn’t differentiate between true and false news more than chance in general (d’ = -0.057; t(192) = -0.989; p = .324; 95%CI[-1.72; 0.05]). Regarding the response criterion, they showed a high response bias towards a more liberal approach (c = -0.303; t(192) = -7.418; p < .001.; 95%CI[-0.39; -0.22]), that is, they tended to see the news as true, independent of their status.

*The Effect of Language on Discernment and Response Criterion* To account for the difference of language on news discernment, we ran an independent samples t-test, which showed no difference in discernment between foreign (d’ = -0.05) and native (d’ = -0.06) languages (t(191) = 0.130; p = 0.897; 95%CI[-0.214; 0.244]). This indicates that individuals couldn’t better differentiate between true and fake news in their native or foreign languages, revealing no support for H2. We did the same independent samples t-test for the response criterion (c), which showed that foreign language individuals (M = -0.40) presented a more liberal response criterion than those individuals on the native language condition (M = -0.20)

(t(191) = -2.485; p = 0.014; 95%CI[-0.36; -0.04]), meaning that they were less skeptical when reading news in their foreign language and supporting H3.

*Mediation* In this third experiment, to test for mediation, we used Model number 4 of Process v. 3.5 for SPSS 25 (Hayes, 2017) with 5000 bootstraps. As our focus was on the effects of language on fake news reading difficulty, and consequently of this reading difficulty on fake news credibility and sharing intentions, we split our sample between fake and true news, and we ran a model with Foreign (coded as -1) x Native language (coded as 1) as our independent variable, credibility scale as our depended variable, and reading difficulty as the mediator. Following the same procedure from the Linear Mixed Models, we kept controlling for age, gender and political ideology. In this study, we didn't run a mediation model for sharing because we had no direct effects on this variable.

The results of the model show that none of the predictors affected reading difficulty. There was no significant difference between native (M = 2.84) and foreign (M = 2.58) languages for difficulty in evaluating the news (β = -0.12; t(188) = 1.35; p = .179; 95%CI[-0.059; 0.319]), providing no support for H4. Also, neither Age (p = .598), Gender (p = .632) nor Political Ideology (p = .778) affected reading difficulty. With this, the model for the effects on reading difficulty was not significant ($R^2$ = .013; F(4, 188) = 0.599; p = .664).

Regarding the effects on credibility, language kept influencing credulity of fake news (β = -0.175; t(187) = -3.160; p = 0.002) even when reading difficulty was added to the model. In contrast, reading difficulty didn't affect credibility (β = 0.007; t(187) = 0.165; p = 0.869; 95%CI[-0.075; 0.089]), which offered no support for H5. This, consequently, revealed no indirect effect from language on credibility trough reading difficulty (β = 0.001; SE = 0.055; 95%CI[-0.014;0.017]).

### 4.4.4. Discussion

Study 2 isolated the effect of language from the specific content of the news set by presenting stimuli to participants in either their native or foreign language. The results indicated that the foreign language context increased the perceived credibility of news, confirming H1a. This suggests that consumers may be more vulnerable to fake news on social media when reading in their second language. However, unlike the recent findings of Muda et al. (2023), individuals did not exhibit worse discernment accuracy in their foreign language compared to

their native language. This discrepancy may be due to the presence of a main effect of language but no main effect of news type. In essence, while foreign language news was perceived as more credible overall, this did not translate into a difference in discernment (i.e., no interaction effect).

The finding that both true and fake news were rated as more credible in a foreign language supports our rationale that foreign language processing impairs consumers' capacity to analyze the core message (the central route), prompting them to rely more on peripheral cues (Petty & Cacioppo, 1986). This is plausible given that these cues (e.g., "likes," "shares") were held constant across both true and fake news items in our stimuli. In line with this, results from the Signal Detection Theory (SDT) analysis showed that individuals adopted a more liberal response criterion (i.e., were less skeptical) in their second language. This finding aligns with prior research suggesting that foreign language processing does not increase deliberation, but hinders intuition (Hayakawa et al., 2017), therefore it could shift focus from message accuracy to other values (Talwar et al., 2019). Moreover, this pattern may reflect a greater willingness to take risks, a characteristic often associated with foreign language decision-making (Hayakawa et al., 2017).

It is important to note, however, that this study showed no evidence for our reading difficulty mediation hypotheses (H4 and H5). We argue that this could be due to our stimulus selection, which resulted in a general lack of discernment between true and fake news. Our stimuli set was intentionally "tricky," as we looked for fake news that were not obvious, which may have made discernment somewhat difficult for all participants, without they actually perceiving it (because they informed a low level of reading difficulty). Consequently, this high baseline difficulty (a potential floor effect) may have masked any influence of language on the proposed mediators. Our stimuli attempted to balance true and fake news items that were both "pro" and "anti" climate change (e.g., one fake item exaggerated its effects, stating 90% of Atlantic plankton is gone). This design choice may have influenced our results. Further evidence of this is the small but significant effect of political ideology, wherein conservatives reported lower credibility, a finding that diverges from some literature on misinformation (Allcott & Gentzkow, 2017; Nyhan & Reifler, 2010).

To address these limitations and test the moderated mediation model through reading difficulty and individual’s second language proficiency, we designed Study 3. In this experiment, we adapted our stimuli in two key ways. First, to enhance ecological validity, we selected high-circulation fake news items related to climate change, which are predominantly

"climate denial" in nature (Center for an Informed Democracy and Social-cybersecurity (CIDS), 2021). Second, we added accompanying images to all news items to more accurately reflect how content is typically encountered on social media platforms.

## 4.5. STUDY 3

As previously stated, the main goal of this fourth study was to test the first part of the moderated mediation model using a more realistic news set, since our previous stimuli didn't show changes in reading difficulty between native and foreign languages. To do this, we conducted a similar experiment to Study 2, using the same language pair (Native English x Foreign Spanish) but changing the news we used. The news we used in this fourth experiment is presented in Appendix D.

### 4.5.1. Participants and Design

Excluding participants from Studies 1B and 2, we recruited 201 Prolific participants who were native English speakers and proficient in Spanish. Those participants received a small compensation of 0.8 pounds for completing an eight-minute experiment. The design was identical to the second experiment, with a 2 (language: native x foreign) x 2 (news type: true x fake) mixed design, in which language was a between-subjects factor and news type was a within-subjects factor. Participants were also exposed to 8 news stories, 4 of which were false and 4 of which were true, in random order to avoid presentation effects. Following the pre-registered (https://aspredicted.org/7fdb-73zr.pdf) exclusion criteria, removing those who had lower proficiency (less than 3 on a 10-point scale), and those who took too long or too short to answer (response time greater or lesser than three SD) we had a final sample of 186 participants (85 Male - 97 Female - 4 Non-Binary/Didn't Inform; $M_{Age} = 37.5$), which, according to GPower 3.1, gives us a power of 0.8, gives us a minimum effect size of 0.1.

### 4.5.2. Materials and Procedure

The procedure was similar to Study 2. After agreeing to participate in the experiment, participants were randomly assigned to one of the two conditions.

However, they were presented with a different news format and content. Besides changing our news set to a more credible one, we also updated our news to include more recent content and translated the "source" in our social media post. We did this to pass more authenticity in the laboratory environment, as Spanish news generally comes from Spanish sources (participants who were in the foreign language condition saw the news source as "Mundo de Noticias", and those who were in the native language condition saw it as "World News").

### 4.5.3. Results

*Descriptive* Regarding the sample for this fourth study, and similar to the third experiment, we had highly proficient Spanish participants, with a mean of 7.81 on a 10-point scale. In the realm of political ideology, we had a more liberal sample, in a 9-point scale, we had a mean of 4.51, which was slightly more conservative than the Study 2, but still significantly different from the mean point of the scale, 5, (t(185) = -3.15; p = 0.002; 95%CI[-0.805; -0.184]). The means for all the variables of Study 3 are presented in Table 11.

**Table 11.** Descriptive of the sample and means of the dependent variables (DVs) for Study 3

| | | | | | |
|---|---|---|---|---|---|
| | | Descriptive | | | |
| N | | 186 | | | |
| Gender | | 85 Male - 97 Female - 4 Non-Binary/Didn't Inform | | | |
| | | M (SD) | | | |
| Age | | 37.5 (12.8) | | | |
| NL Proficiency | | 7.81 (1.61) | | | |
| Political Identity | | 4.51 (2.32) | | | |
| | | Main DVs | | | |
| | | | News Type | | |
| | | | True | False | *Total* |
| Credibility | Language | Native Language (Eng) | $4.06^{a}_{i}$ | $2.78^{a}_{ii}$ | $3.42^{a}$ |
| | | Foreign Language (Spa) | $4.19^{b}_{i}$ | $3.14^{b}_{ii}$ | $3.66_{b}$ |
| | | *Total* | $4.13_{i}$ | $2.96_{ii}$ | **3.55** |
| | | | News Type | | |
| Sharing | | | True | False | *Total* |

| | | | | | |
|---|---|---|---|---|---|
| | Language | Native Language (Eng) | $2.76^{a}_{i}$ | $2.07^{a}_{ii}$ | *2.42*$^{a}$ |
| | | Foreign Language (Spa) | $3.11^{a}_{i}$ | $2.55^{b}_{ii}$ | *2.83*$^{b}$ |
| | | *Total* | *2.94*$_{i}$ | *2.31*$_{ii}$ | **2.89** |

| | | | News Type | | |
|---|---|---|---|---|---|
| | | | True | False | *Total* |
| Reading Difficulty | Language | Native Language (Eng) | $2.51^{a}_{i}$ | $2.27^{a}_{i}$ | *2.39*$^{a}$ |
| | | Foreign Language (Spa) | $3.00^{b}_{i}$ | $2.87^{b}_{i}$ | *2.94*$^{b}$ |
| | | *Total* | $2.76_{i}$ | $2.57_{i}$ | **2.66** |

| SDT Analysis | | | |
|---|---|---|---|
| | Native Language (Eng) | Foreign Language (Spa) | *Total* |
| Discernment (d′) | $0.91_{i}$ | $0.76_{i}$ | *0.83* |
| Response Criterion (c) | $-0.11_{i}$ | $-0.71_{ii}$ | *-0.25* |

Note: different superscript letters (a, b) mean significative difference ($p < 0.05$) between rows; different under script letters (i, ii) mean significative difference ($p < 0.05$) between columns

*Linear Mixed Models (LMMs):* We ran the same LMMs for our dependent variables, credibility and sharing intentions of Study 2, including our control variables, gender, age, and political orientation, as covariates in all analyses.

*Credibility:* The first model's results indicated that several predictors significantly influenced credibility ratings. The strongest effect was observed for News Type ($F(1, 6.00) = 37.62$, $p < .001$). As expected, the parameter estimates ($\beta = 1.17$, $SE = 0.19$, $t(6.00) = 6.13$, $p < .001$) showed that true news ($M = 4.13$) was rated significantly higher than fake news ($M = 2.96$). Significant main effects were also found for Language ($F(1, 179.00) = 4.75$, $p = .031$). Following our previous findings, parameter estimates ($\beta = -0.22$, $SE = 0.10$, $t(179.00) = -2.18$, $p = .031$) indicated that native language news ($M = 3.42$) was seen as less credible than foreign language news ($M = 3.66$).

A marginally significant Language x News Type interaction was observed ($F(1, 1294.00) = 3.60$, $p = .058$). A post-hoc test was conducted to decompose this interaction. The results showed that the effect of language was significant for fake news ($F(1, 326) = 8.091$, $p = .005$), where native language fake news ($M = 2.78$) were seen as less credible than foreign language fake news ($M = 3.14$; $\beta = -0.34$, $SE = 0.12$, $t(326) = -2.85$, $p = .005$). However, this language effect was not significant for true news ($F(1, 326) = 0.793$, $p = .374$).

Regarding our controls, Political Ideology ($F(1, 179.00) = 8.13$, $p = .005$), and Age ($F(1, 179.00) = 4.55$, $p = .034$) influenced news credibility. The parameters estimate show that more conservative individuals ($\beta = 0.07$, $SE = 0.02$, $t(179.00) = 2.85$, $p = .005$), and younger individuals ($\beta = -0.01$, $SE = 0.00$, $t(179.00) = -2.13$, $p = .034$) presented higher credibility ratings.

An analysis of the model's random components showed that 17.2% of the total variance in credibility ratings was attributable to between-participant differences (ICC = 0.172). An additional 4.4% of the variance was attributable to differences across news items (ICC = 0.044). The model fit suggests that the fixed effects alone explain 18.5% of the variance (Marginal $R^2 = 0.185$), and the full model, including random effects, explains 35.0% of the variance (Conditional $R^2 = 0.350$). The overall test for the fixed effects was statistically significant (LRT $\chi^2(8) = 39.598$, $p < .001$). These results, along with their confidence intervals, are presented in Table 12.

**Table 12**. Summary of the results of the Linear Mixed Model for Credibility for Study 3

| **Fixed Effects** | | | | | | |
|---|---|---|---|---|---|---|
| **Predictor** | **Estimate (β)** | **SE** | **df** | **t** | **p** | **95%CI[LL, UL]** |
| Intercept | 3.29 | 0.19 | 77.07 | 16.89 | < .001 | [2.91, 3.67] |
| Language (Native vs. Foreign) | -0.22 | 0.10 | 179.00 | -2.18 | .031 | [-0.42, -0.02] |
| News Type (True vs. Fake) | 1.17 | 0.19 | 6.00 | 6.13 | < .001 | [0.79, 1.54] |
| Age | -0.01 | 0.00 | 179.00 | -2.13 | .034 | [-0.02, 0.00] |
| Political Identity | 0.07 | 0.02 | 179.00 | 2.85 | .005 | [0.02, 0.11] |
| Gender (Female vs. Male) | 0.05 | 0.10 | 179.00 | 0.50 | .619 | [-0.15, 0.25] |
| Gender (Non-binary vs. Male) | -0.07 | 0.49 | 179.00 | -0.14 | .892 | [-1.03, 0.90] |
| Gender (Prefer not to say vs. Male) | -0.93 | 0.49 | 179.00 | -1.89 | .610 | [-1.89, 0.04] |
| Language × News Type | 0.23 | 0.12 | 1294.00 | 1.90 | .058 | [-0.01, 0.47] |
| **Random Effects** | **Variance** | **SD** | **ICC** | | | |
| Participant Intercept (PART_ID) | 291 | 540 | 172 | | | |
| News Intercept (News_ID) | 65 | 255 | 44 | | | |
| Residual | 1.402 | 1.184 | | | | |
| **Model Fit** | | | | | | |
| Observations | 1488 | | | | | |
| Participants (ID) | 186 | | | | | |

| | | | |
|---|---|---|---|
| News (ID) | 8 | | |
| Marginal R2 | .185 | LRT$\chi^2$ | 39.59 |
| Conditional R2 | .350 | LRT$\chi^2$ | 425.30 |

*Sharing:* Since the sharing variable showed a moderate positive skew (skewness = 0.763), we applied a logarithmic transformation to the data before the LMM analysis to reduce skewness and better meet model assumptions. The analysis using the log-transformed sharing intention variable revealed two significant main effects. Specifically, there were significant main effects for both News Type ($F(1, 6) = 46.176$, $p < .001$) and Language ($F(1, 179) = 5.054$, $p = .026$). Overall, participants were more likely to share true news ($M = 2.94$) than fake news ($M = 2.31$; $\beta = 0.11$, $p < .001$), and native language news ($M = 2.42$) had lower sharing intentions than foreign language news ($M = 2.83$; $\beta = -0.08$, $p = .026$).

However, the Language x News Type interaction, which was significant for credibility, was not significant for sharing intentions ($F(1, 1294) = 0.731$, $p = .393$), suggesting that the effect of language on sharing intentions did not differ between fake and true news. A simple effects analysis confirmed this pattern. The main effect of Language appeared for both fake news, where native language fake news ($M = 2.07$) had significantly lower sharing intentions than foreign fake news ($M = 2.55$; $\beta = -0.089$, $p = .017$), and true news, where the same pattern was marginally significant ($M_{Nat} = 2.76$, $M_{For} = 3.11$, $\beta = -0.072$, $p = .055$). Because this negative effect of native language was consistent across both news types, the difference between these two simple effects was not significant, which explains the non-significant interaction.

All control variables, including Age ($p = .884$), Political Identity ($p = .543$), and Gender ($p = .556$), were not significant predictors. Analyzing the model's random components showed that a large portion of the variance (58.0%) was due to differences between participants (ICC = 0.580). In contrast, the variance attributable to the news items was minimal (ICC = 0.008). The model fit indicates that the fixed effects alone account for only a small part (5.5%) of the variance (Marginal $R^2 = 0.055$), while the full model, which includes the strong participant random effect, explains 60.4% (Conditional $R^2 = 0.604$). The overall significance test for the fixed effects was statistically significant (LRT $\chi^2(8) = 24.250$, $p = .002$). Table 13 displays these results in summary.

**Table 13.** Summary of Linear Mixed Model Results for Sharing Intentions (Log-Transformed) for Study 3

| **Fixed Effects** | | | | | | |
|---|---|---|---|---|---|---|
| **Predictor** | **Estimate (β)** | **SE** | **df** | **t** | **p** | **95%CI[LL, UL]** |
| Intercept | 0.23 | 0.06 | 181.05 | 3.84 | <.001 | [0.11, 0.35] |
| Language (Native vs. Foreign) | -0.08 | 0.04 | 179.00 | -2.25 | .026 | [-0.15, -0.01] |
| News Type (True vs. Fake) | 0.11 | 0.02 | 6.00 | 6.80 | <.001 | [0.08, 0.14] |
| Age | 0.00 | 0.00 | 179.00 | 0.15 | .884 | [-0.00, 0.00] |
| Political Identity | 0.01 | 0.01 | 179.00 | 0.61 | .543 | [-0.01, 0.02] |
| Gender (Female vs. Male) | -0.01 | 0.04 | 179.00 | -0.38 | .706 | [-0.08, 0.06] |
| Gender (Non-binary vs. Male) | -0.14 | 0.17 | 179.00 | -0.81 | .418 | [-0.48, 0.20] |
| Gender (Prefer not to say vs. Male) | -0.20 | 0.17 | 179.00 | -1.19 | .236 | [-0.54, 0.13] |
| Language × News Type | 0.02 | 0.02 | 1294.00 | 0.86 | .393 | [-0.02, 0.06] |
| Random Effects | Variance | SD | ICC | | | |
| Participant Intercept (PART_ID) | .053 | .229 | .580 | | | |
| News Intercept (News_ID) | < .0001 | .017 | .008 | | | |
| Residual | 0.038 | 0.195 | | | | |
| Model Fit | | | | | | |
| Observations | 1488 | | | | | |
| Participants (ID) | 186 | | | | | |
| News (ID) | 8 | | | | | |
| Marginal R2 | 0.055 | LRT$\chi^2$ | 24.25 | | | |
| Conditional R2 | 0.604 | LRT$\chi^2$ | 883.33 | | | |

*Signal Detection Theory (SDT) Analysis.* As in previous studies, we conducted Signal Detection Theory analysis to examine the ability to distinguish between native and foreign languages, as well as the response criteria participants used when evaluating news in their native and foreign languages.

*Overall Discernment and Response Criterion:* The SDT analysis showed that, for this set of news, unlike Study 2, individuals distinguished between true and false news more than chance (d' = 0.84; t(185) = 11.18; p < .001; 95% CI [0.691; 0.987]). At the same time, they

displayed a response bias toward a more liberal approach (c = -0.25; t(185) = -5.58; p < .001; 95% CI [-0.335; -0.160]), indicating that, as in our previous studies, individuals were not skeptical about news regarding climate change in general.

*The Effect of Language on Discernment and Response Criterion.* To account for differences in news discernment by language, we conducted an independent-samples t-test with language as the grouping variable. Results showed that although the discernment rate was higher for the native language (d' = 0.91), this difference was not statistically significant from the foreign language (d' = 0.76; t(184) = -0.999; p = .319; 95% CI [-0.446, 0.146]), offering no support for H2 and again disputing the findings of Muda et al. (2023). Regarding the response criterion, foreign language individuals (M = -0.73) were more liberal than native language individuals (M = -0.11; t(184) = -2.98; p = .003; 95% CI [-0.430, -0.088]), reaffirming H3.

*Mediation.* We used the same Process Model number 4 for SPSS (Hayes, 2017) in the third study. Since our goal here was to examine reading difficulty as a mediator of fake news (H4 and H5), we focused only on the responses related to fake news. We considered credibility and sharing intentions as our dependent variables.

The model for foreign language's influence on reading difficulty was significant ($R^2$ = 0.053; F(4, 181) = 2.510; p = .044). Fake news was harder to read in a foreign language (B = -0.303; t(181) = -3.067; p = .003; 95%CI[-0.499; -0.108]), confirming H4. The full model was also statistically significant ($R^2$ = 0.322; F(5, 180) = 17.121; p < .001), showing that reading difficulty increased fake news credibility (B = 0.303; t(180) = 5.762; p < .001; 95%CI[0.199; 0.407]), confirming H5a. As a result, we identified an indirect effect of language on fake news credibility through reading difficulty (B = -0.092; SE = 0.035; 95% CI: [-0.166; -0.029]). This, along with the fact that the effect of language on credibility became non-significant (B = -0.054; t(1, 180) = -0.746; p = .456; 95% CI [-0.195; 0.088]), indicates full mediation.

The same pattern was observed with sharing (Model Specificity: $R^2$ = 0.216; F(5, 180) = 9.937; p < .001), which was influenced by news reading difficulty (B = 0.410; t(1, 180) = 5.610; p < .001; 95%CI[0.266; 0.554]), but not by language (B = -0.094; t(1, 180) = -0.945; p = .346; 95%CI[-0.291; 0.103]), resulting in a significant indirect effect (B = -0.124; SE = 0.047; 95%CI[-0.229; -0.042]), confirming H5b.

Considering the mediation through news reading difficulty, we tested our moderated mediation hypothesis, H6. The main idea was that for highly proficient individuals, the indirect

effect via reading difficulty would not be observed. We used Process Macro Model 7 and included Spanish Proficiency (measured on a 10-point self-assessment scale) as the moderator between language and difficulty. Notably, there was a positive correlation between Spanish Proficiency and Reading Difficulty, although it was small and on the edge of significance ($r = 0.14$; $p = .05$). The model ($R^2 = 0.085$; $F(6, 179) = 2.781$; $p = 0.013$) showed an interaction between language and Spanish proficiency at the marginal significance level (90%CI) ($B = 0.102$; $t(179) = 1.660$; $p = .099$; 90%CI[0.000; 0.204]). This indicated that the indirect effect was not significant at 1 SD above the mean of Spanish proficiency ($B = -0.053$; $SE = 0.065$; 95% CI: [-0.190; 0.071]). The graphical depiction of the moderated mediation model for this study is shown in Figure 3.

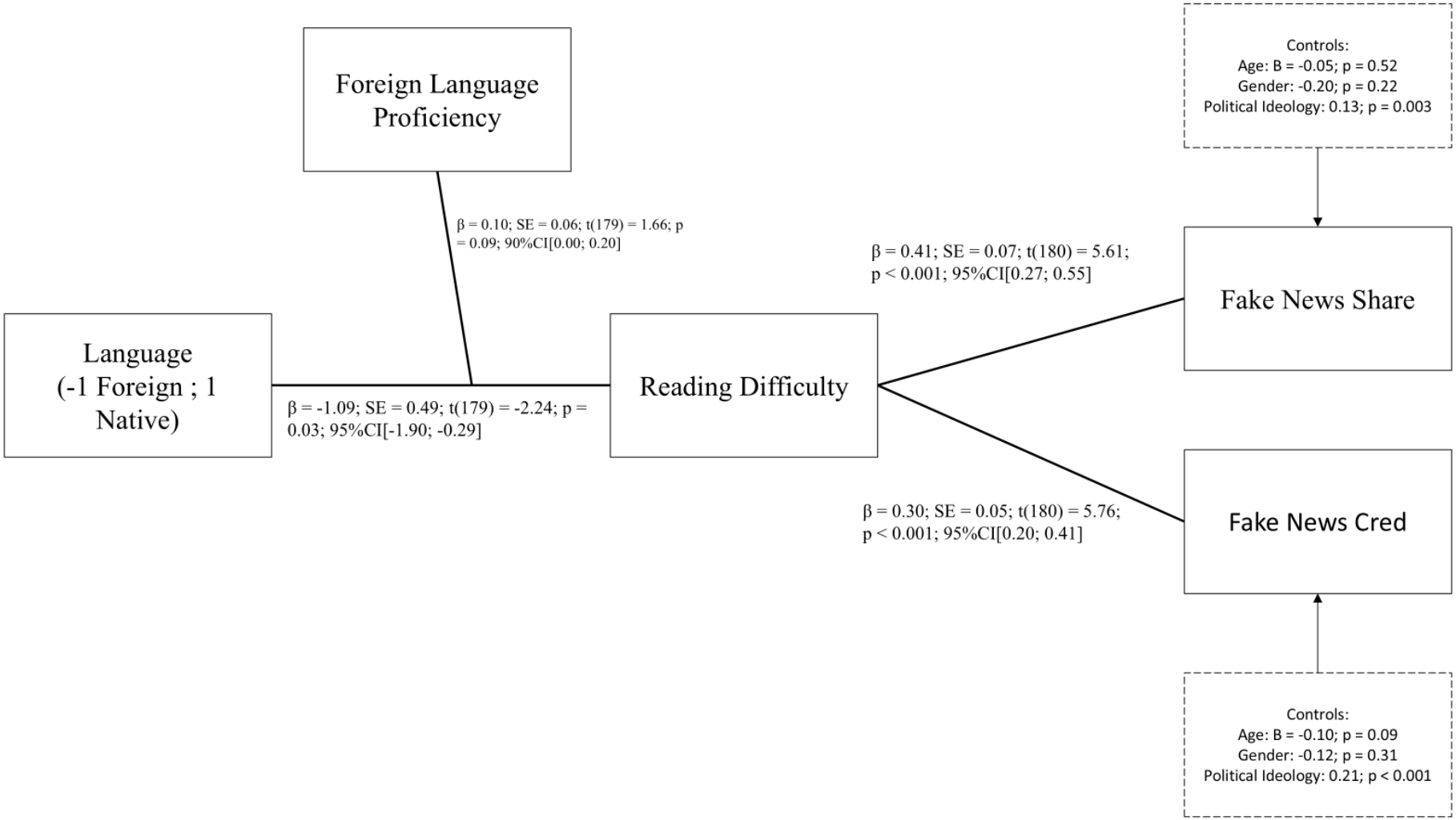



**Figure 3.** Moderated Mediation Model for Study 3.

To determine the exact point of proficiency at which individuals are not influenced by reading difficulty, we conducted a floodlight analysis, which showed that this point was 8.572, as shown in Johnson's Newmann graph in Figure 4. This result is interesting because it shows that highly proficient consumers are not affected by cognitive load in a foreign language.

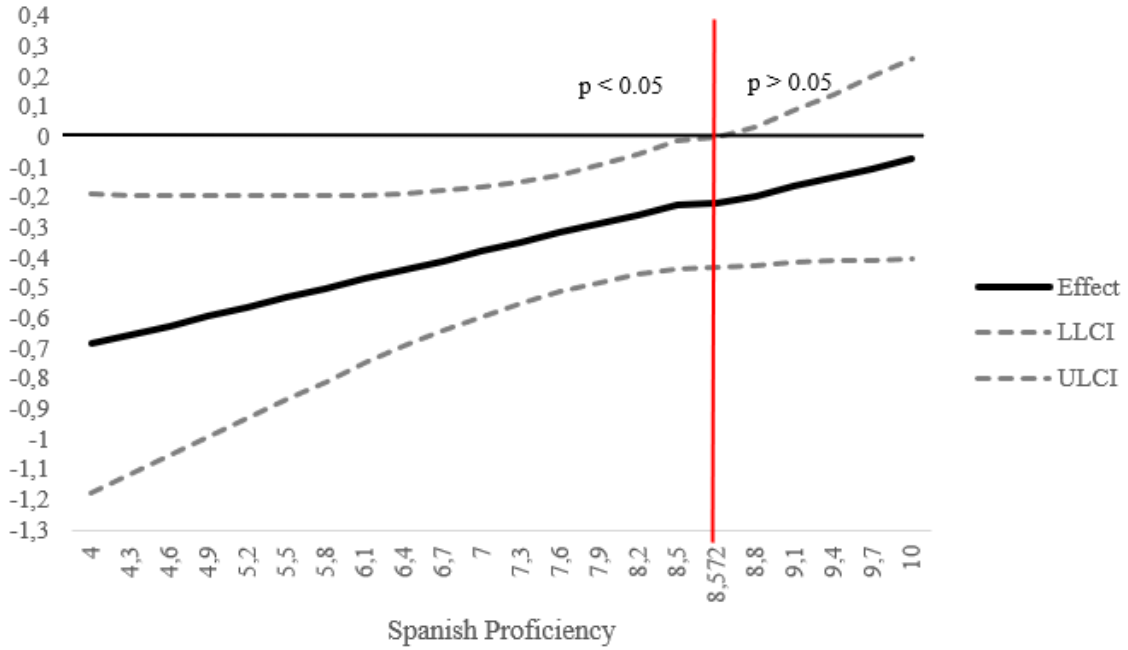



**Figure 4.** Johnson's Newmann graphic representation of the moderation effect of foreign language proficiency on fake news reading difficulty

### 4.5.4. Discussion

In Study 3, we successfully replicated key findings from our previous studies while addressing methodological limitations by using stimuli with higher ecological validity and relevance. Our results provide strong evidence supporting H1a: consumers find fake news more credible when presented in a foreign language. This further supports the idea that processing information in a non-native language can increase reliance on peripheral cues, such as source heuristics or presentation format, at the expense of careful content evaluation. This aligns with dual-processing theories like the Elaboration Likelihood Model (ELM), which suggests that reduced processing ability or motivation—potentially caused by the cognitive demands of a foreign language (cf. Sweller, 2011)—shifts individuals away from evaluating argument quality (the central route) toward relying on cues (the peripheral route) (Petty & Cacioppo, 1986). Peripheral cues, such as source credibility, become especially important when the likelihood of

elaboration is low (Petty & Cacioppo, 1986). This effect is also seen in electronic word-of-mouth (eWOM) contexts, where source credibility influences the usefulness of information (Erkan & Evans, 2016) intentionsentions.

### 4.5.5. Perceived Attractiveness of the News as a Mediator

The second proposed mediation mechanism is the perceived attractiveness of foreign-language information. We draw from the Elaboration Likelihood Model (ELM), in which attractiveness is a classic peripheral cue (Petty & Cacioppo, 1986). When an individual's motivation or ability to process a message is low, they are more likely to be persuaded by superficial cues, such as source attractiveness, rather than by the quality of the arguments themselves (Petty & Cacioppo, 1986). Foreign-language news can be more attractive, making the news seem more important and boosting its credibility in ways that make it seem too good to be true (Duffy et al., 2019). As stated by ELM (Petty & Cacciopo, 1986) and supported by several studies (Labroo & Pocheptsova, 2016; Reber & Schwarz, 1999; Schwarz, 2004), more attractive content is perceived as more credible, which in turn should influence the credibility of fake news and sharing intentions. In summary, if a foreign language is perceived as attractive, sophisticated, or prestigious, a halo effect can occur. The positive feelings associated with the language are misattributed to the news content, inflating its perceived credibility without systematic analysis. For sharing intentions, the mechanism is similar: if the fake news appears "better" because it is more attractive, its social utility for sharing increases, leading to greater intentions to share. Therefore, we hypothesize:

*H7: Fake news presented in a foreign language will be perceived as more attractive than fake news presented in a native language.*

*H8: Attractiveness will lead to increased (a) credibility and (b) sharing intentions, mediating the effect of the foreign language on consumers' reactions to fake news.*

### 4.5.6. Cultural Incongruence of the News as a Moderator

Construal Level Theory (CLT; Trope & Liberman, 2012) explains how consumers' perception of news in a foreign language is influenced by its perceived distance. CLT suggests that events can be psychologically close or distant across four dimensions: temporal, social,

spatial, and hypothetical. Individuals tend to perceive psychologically proximal events, objects, and people more concretely (Trope & Liberman, 2012; Williams & Bargh, 2008). Conversely, psychologically distant events are seen as more abstract, making them harder to record and compare with prior knowledge.

Additionally, culture can influence how consumers perceive and respond to stimuli (Luna & Gupta, 2001), even among bilingual individuals (Luna et al., 2008). Therefore, we aim to untangle the effects of foreign language and culture on news consumption and fake news evaluation by examining the cultural alignment between the news and the consumer. We define cultural congruence of news along a spectrum, from culturally congruent (i.e., domestic news) to culturally incongruent (i.e., news about the politics or social events of a foreign country) (Luna & Gupta, 2001; Straubhaar, 2021; Zaharopoulos, 1990).

We argue that culturally congruent news, due to its concrete processing (Trope & Liberman, 2010), is easier to evaluate against existing knowledge and intuitive feelings. This may result in a weaker influence of the foreign language on the credibility of fake news.

Conversely, culturally incongruent news is both socially and often spatially distant, relating to an out-group. It can also be perceived as hypothetically distant (the events depicted in the news are unlikely to affect the consumer) (Liberman & Trope, 2008). Such distance should elicit a more abstract construal, making the content seem less personally relevant and more difficult to scrutinize for factual accuracy. Consequently, this increases the psychological distance imposed by the foreign language, strengthening its effect on fake news credibility and sharing intentions. We hypothesize that:

*H9: The effect of a foreign language on (a) credibility and (b) sharing intentions of fake news will be significantly stronger for culturally incongruent news than for culturally congruent news.*

Regarding how cultural incongruence affects attractiveness, our second moderated mediation hypothesis argues that cultural incongruence and foreign-language presentation create a ‘double foreignness’, which simultaneously violates content-based expectations and the fluency of linguistic processing, thereby increasing the story’s attractiveness — something that could also heighten arousal (Berger & Milkman, 2012; Burgoon, 2015). Therefore, culturally incongruent foreign language fake news will also be perceived as more attractive than culturally congruent news. As mentioned, this increased attractiveness is likely to serve as a

peripheral cue, leading recipients toward peripheral (heuristic) processing rather than effortful central elaboration (Petty & Cacioppo, 1986). Consequently, the indirect effect through attractiveness will be stronger for culturally incongruent news. The more distant the events depicted in the news are, the more attractive they will seem because of their exoticism. With this, we hypothesize:

*H10: Cultural incongruence will moderate the indirect effect of foreign language on fake news credibility and sharing intentions through attractiveness, so that this effect will be stronger for a culturally incongruent fake news than for a culturally congruent fake news.*

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Our full conceptual model is presented in Figure 5.

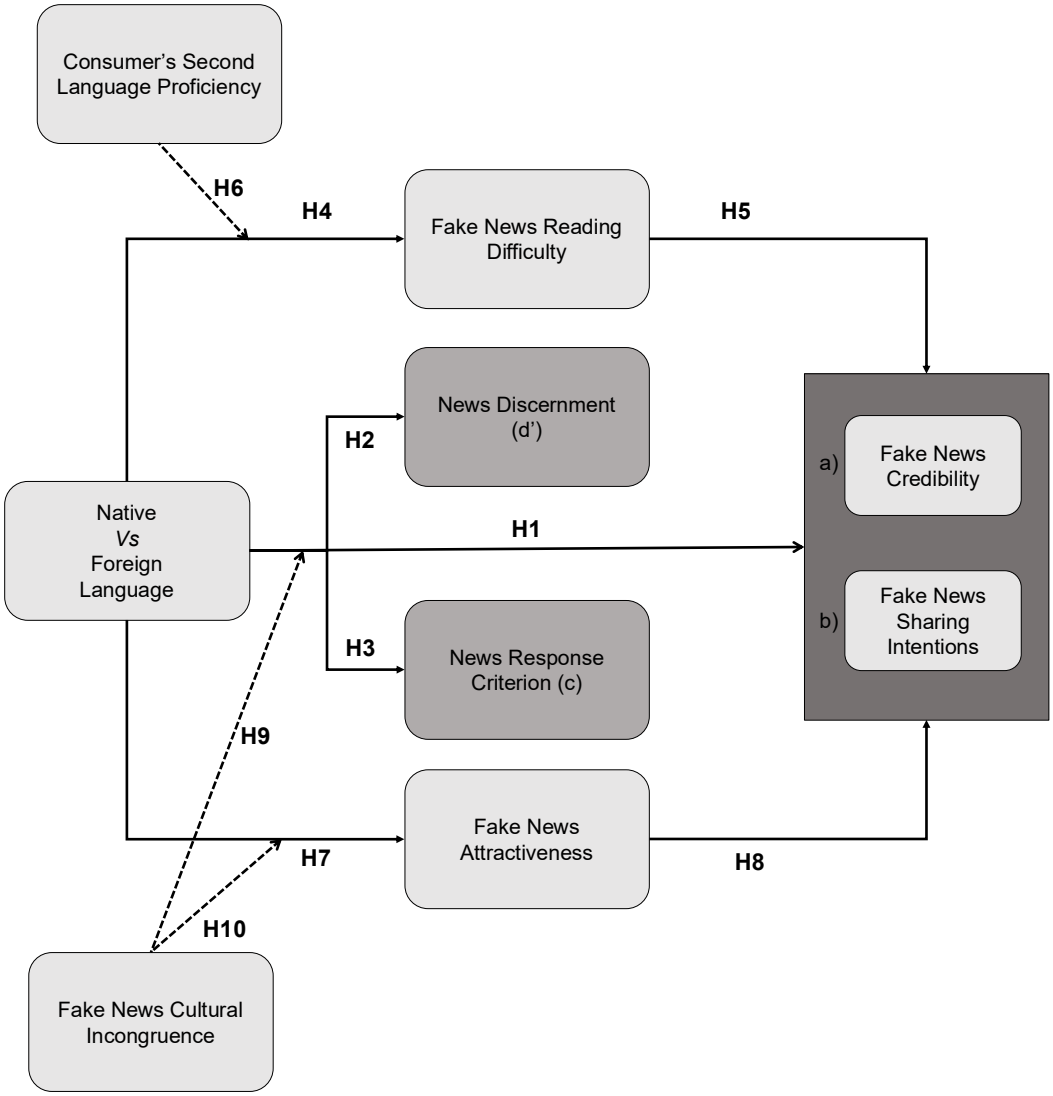



**Figure 5.** Full conceptual model.

## 4.6. STUDY 4

This fifth experiment aims to broaden our understanding of foreign language and news consumption. The main goal of this experiment is to test the path from news attractiveness to news cultural incongruence. Also, we improved the quality of our respondents by adding a translation test and attention checks.

### 4.6.1. Participants and Design

In this experiment, we recruited Portuguese-English bilinguals through sponsored social media posts. Unlike the other experiments, where Prolific offers a qualified sample, social media posts require more careful review of responses. We added an attention check based on Oppenheimer et al.'s guidelines, asking participants about their favorite sports. They were instructed to answer “I don't know” and complete a translation test in which they had to correctly translate the sentence “She's leaving home after living alone for so many years” into their native language, Portuguese.

For this last experiment, we received 583 responses on Qualtrics. However, as is common with sponsored social media research posts, 233 responses were incomplete and discarded right away. Following our pre-registration (https://aspredicted.org/nn9ts9.pdf), of the remaining 350 responses, 12 failed the attention check and 2 failed the translation test, leaving us with a final sample of 2688 observations from 336 participants (79 Male, 239 Female, 18 Non-Binary/Did not Inform; Age = 34.2).

The experiment used a 2 (language: native vs. foreign) x 2 (news type: fake vs. true) x 2 (cultural incongruence: congruent vs. incongruent) mixed design. Language and cultural incongruence were between-subjects factors to control for demand characteristics, while news type was a within-subjects factor. Participants saw a total of 16 news items (4 culturally congruent true, 4 culturally congruent false, 4 culturally incongruent true, and 4 culturally incongruent false). However, each individual saw only 8 items (either culturally congruent or incongruent) in their native language (Portuguese) or a foreign language (English). All news items adhered to the same selection criteria from previous studies (true ones from mainstream media, fake ones from fact checkers) and are listed in Appendix E. Across the between- subject conditions, the sample was divided as follows: 85 participants in the foreign language culturally congruent condition; 87 in the foreign language culturally incongruent condition; 81 in the

native language culturally congruent condition; and 83 in the native language culturally incongruent condition.

### 4.6.2. Materials and Procedure

As stated, participants were recruited through social media-sponsored posts. If the participant clicked the link in the post or scanned the post's QR Code, they landed on the research's Qualtrics page, where they were briefed on the survey, the requirements, and their rights, and could choose to start.

After this, the procedure was similar to that in previous studies, but with some modifications. The first modification was the cultural incongruence condition, in which, in addition to being randomly assigned to a native or foreign language, participants were also randomly assigned to a congruent or incongruent condition. Another modification concerned the binary response used to measure discernment and response bias in SDT. After seeing every piece of news, participants were first asked about their sharing intention (same 7-point scale used in previous studies from Pennycook et al., 2021), and before stating their credibility on a 7-point single item scale used in several studies (Light et al., 2022; Muda et al., 2023; Pennycook et al., 2021; Pennycook & Rand, 2019), they had a binary question asking "Is this headline real?" (Yes/No). We did this to capture more subtle changes in the credibility scale and to better account for discernment and response bias. Another change was the inclusion of a news attractiveness scale. To measure attractiveness, we drew on previous work on source attractiveness (Ohanian, 1990) and advertising evaluation (Richins, 1991) to develop a single bipolar 7-point scale (unattractive-attractive) for headlines. Also, as a manipulation check, we included 2 items based on Spence et al.'s (2012) psychological distance scale related to climate change: one about how specific the news is about the participant's country and the other about how the news impacts their country (Reverse-Coded).

We also included, in addition to the same demographic variables as in other studies (age, gender, and political orientation), other variables to characterize our sample. We measured participants belief on global warming (7-point single scale); exposure to fake news in a foreign language on social media (7-point single scale from 1 = never to 7 = always, "Please indicate how often you encounter news in a foreign language on your social media."); and belief that English news were in general more credible than Portuguese news (7-point, 2 items scale [r =

0.678; p < .001], i.e. “I believe that Portuguese news has more probability to contain fake news than English news”). Lastly, we measured participants' education level.

### 4.6.3. Results

To examine our main effects and interactions, we ran the same Linear Mixed Models for our dependent variables. However, since we included another condition, Cultural Incongruence (-1 congruent x 1 incongruent), it was added as an additional independent variable in the models. First, we will describe our sample before moving on to the manipulation check analysis, our main effects analysis, SDT analysis, and the moderated mediation model.

*Descriptive.* Although the sample for this study involved a different language pair, we had highly self-rated English-proficient participants, with a mean score of 8.61 (SD = 1.43) on a 10-point scale, the highest between our studies. Politically, the sample was more liberal, with a mean of 3.14 on a 9-point scale, which was significantly different from the midpoint of 5 (t(335) = -19.61; p < 0.001; 95% CI [-2.05; -1.68]).

Regarding control variables, this sample was highly educated: 130 participants (38.7%) reported completing a full degree, and 97 participants (28.9%) had at least an undergraduate degree. Participants strongly believed in global warming (M = 6.74; SD = 0.83) and were frequently exposed to news in a foreign language (M = 6.05; SD = 1.23). They also reported low belief that English news is more credible than Portuguese news (M = 2.87; SD = 1.59). This brief overview indicates that they were a highly qualified sample for this experiment.

*Manipulation Check.* The results of our manipulation check model indicated that the cultural manipulation was successful. The most pronounced effect was observed for Cultural Incongruence (F(1, 21.1) = 343.90, p < .001). As expected, the parameter estimates (β = 3.35, SE = 0.18, t(21.1) = 18.55, p < .001) showed that incongruent news (M = 5.50) was rated as significantly more culturally distant than congruent news (M = 2.15). No significant main effects were found for Language (F(1, 332.0) = 0.52, p = .471) or the interaction terms, although a marginally significant effect was noted for News Type (F(1, 12.0) = 4.31, p = .060).

An analysis of the model's random components indicated that 45.0% of the total variance in cultural distance ratings was due to differences between participants (ICC = 0.450), while 10.1% was attributable to differences across news items (ICC = 0.101). The model fit

suggests that the fixed effects alone explain 63.9% of the variance (Marginal $R^2 = 0.639$), and that including the random effects increases this to 81.3% (Conditional $R^2 = 0.813$). The overall test for the model was statistically significant (LRT $\chi^2(9) = 3773.35$, $p < .001$). Table 14 presents the results from our manipulation check model.

**Table 14.** Summary of the results of the Manipulation Check Model for Study 4

| **Fixed Effects** | | | | | | |
|---|---|---|---|---|---|---|
| **Predictor** | **Estimate (β)** | **SE** | **df** | **t** | **p** | **95%CI[LL, UL]** |
| (Intercept) | 3.82 | 0.09 | 21.1 | 42.38 | <.001 | [3.65, 4.00] |
| News Type (True x Fake) | -0.32 | 0.16 | 12.0 | -2.08 | 0.060 | [-0.63, -0.02] |
| Language (Native vs. Foreign) | -0.07 | 0.10 | 332.0 | -0.72 | 0.471 | [-0.26, 0.12] |
| Cultural Incongruence (Incongruent x Congruent) | 3.35 | 0.18 | 21.1 | 18.55 | <.001 | [2.99, 3.70] |
| News Type × Language | -0.04 | 0.07 | 2336.0 | -0.62 | 0.537 | [-0.18, 0.09] |
| News Type × Cult. Incongruence | 0.25 | 0.31 | 12.0 | 0.79 | 0.446 | [-0.37, 0.86] |
| Language × Cult. Incongruence | -0.21 | 0.19 | 332.0 | -1.09 | 0.278 | [-0.59, 0.17] |
| News Type × Lang. × Cult. Inc. | 0.19 | 0.14 | 2336.0 | 1.38 | 0.167 | [-0.08, 0.47] |
| **Random Effects** | **Variance** | **SD** | **ICC** | | | |
| Participant (Intercept) | 0.68 | 0.82 | 0.450 | | | |
| News ID (Intercept) | 0.09 | 0.31 | 0.101 | | | |
| Residual | 0.83 | 0.91 | | | | |
| **Model Fit** | | | | | | |
| Observations | 2688 | | | | | |
| Participants (ID) | 366 | | | | | |
| News (ID) | 16 | | | | | |
| Marginal R2 | 0.639 | LRT$\chi^2$ | 61.57 | | | |
| Conditional R2 | 0.813 | LRT$\chi^2$ | 3773.35 | | | |

*Credibility*. The linear mixed model results for credibility indicated that News Type had the strongest influence on credibility ratings ($F(1, 12.00) = 101.46$, $p < .001$). As expected, the parameter estimates ($\beta = 2.87$, $SE = 0.29$, $t(12.00) = 10.07$, $p < .001$) showed that true news ($M = 4.97$) was rated significantly higher than fake news ($M = 2.09$). Unlike study 3, the main effect for Language was not significant ($F(1, 328) = 0.84$, $p = .359$). A significant News Type

× Language interaction was observed (F(1, 2336) = 4.53, p = .033). A post hoc test was conducted to examine this interaction, revealing that language influenced the magnitude of the difference between true and false news. While participants rated true news as more credible than fake news in both conditions, the credibility gap between true and fake news was smaller in the foreign language condition (ΔM = 2.76, SE = 0.29, t = 9.51, p < .001) compared to the native language condition (ΔM = 2.99, SE = 0.29, t = 10.28, p < .001). This decrease in discernment was driven by the fact that fake news was rated marginally more credible when in the foreign language condition (M = 2.19) than when in the native language condition (M = 2.00, p = .053). In contrast, ratings for true news remained stable across languages ($M_{For}$ = 4.95 vs. $M_{Nat}$ = 4.99, p = .680). Regarding our moderation hypothesis, H9a, we did not find a three-way interaction among language, news type, and cultural incongruence (F(1, 2336) = 0.767, p = .381), nor an interaction between language and cultural incongruence (F(1, 328) = 0.735; p = .392), suggesting that this hypothesis was not supported. Table 15 shows the estimated marginal means by condition, and Figure 6 presents a violin plot illustrating the spread of credibility scores for native and foreign languages for true and fake news.

**Table 15.** Estimated Marginal Means for Credibility Scores in Study 4

| News_Type | | | | 95% CI | |
|---|---|---|---|---|---|
| | Mean | SE | df | LL | UL |
| Fake | 2.09 | 0.211 | 14.4 | 1.64 | 2.55 |
| True | 4.97 | 0.211 | 14.4 | 4.52 | 5.42 |

| Language | | | | 95% CI | |
|---|---|---|---|---|---|
| | Mean | SE | df | LL | UL |
| Foreign (Eng) | 3.57 | 0.161 | 19.5 | 3.23 | 3.91 |
| Native (pt) | 3.49 | 0.161 | 19.3 | 3.16 | 3.83 |

| Cultural_Incongruence | | | | 95% CI | |
|---|---|---|---|---|---|
| | Mean | SE | df | LL | UL |
| Congruent | 3.71 | 0.215 | 15.3 | 3.25 | 4.17 |
| Incongruent | 3.35 | 0.212 | 14.7 | 2.90 | 3.81 |

| Interaction News_Type ✻ Language | | | | | 95% CI | |
|---|---|---|---|---|---|---|
| News_Type | Language | Mean | SE | df | LL | UL |
| Fake | Foreign (Eng) | 2.19 | 0.217 | 16.0 | 1.73 | 2.65 |
| Fake | Native (pt) | 2.00 | 0.217 | 16.0 | 1.54 | 2.46 |
| True | Foreign (Eng) | 4.95 | 0.217 | 16.0 | 4.49 | 5.41 |
| True | Native (pt) | 4.99 | 0.217 | 16.0 | 4.53 | 5.45 |

| Interaction News_Type ✻ Language ✻ Cultural_Incongruence | | | | | | 95% CI | |
|---|---|---|---|---|---|---|---|
| News_Type | Language | Cultural_Incongruence | Mean | SE | df | LL | UL |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Fake | Foreign (Eng) | Congruent | 2.44 | 0.302 | 15.0 | 1.80 | 3.08 |
| Fake | Foreign (Eng) | Incongruent | 1.94 | 0.301 | 14.9 | 1.30 | 2.58 |
| Fake | Native (pt) | Congruent | 2.22 | 0.303 | 15.3 | 1.58 | 2.87 |
| Fake | Native (pt) | Incongruent | 1.77 | 0.300 | 14.8 | 1.13 | 2.42 |
| True | Foreign (Eng) | Congruent | 5.13 | 0.302 | 15.0 | 4.48 | 5.77 |
| True | Foreign (Eng) | Incongruent | 4.77 | 0.301 | 14.9 | 4.13 | 5.41 |
| True | Native (pt) | Congruent | 5.05 | 0.303 | 15.3 | 4.40 | 5.69 |
| True | Native (pt) | Incongruent | 4.93 | 0.300 | 14.8 | 4.29 | 5.57 |

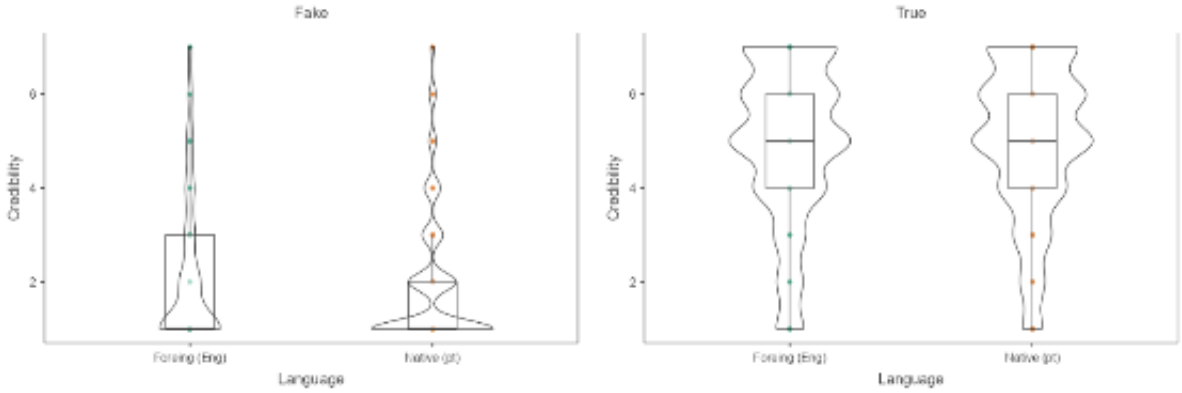



**Figure 6.** Violin plot for Native and Foreign Languages split by News Type

Regarding our controls, neither Political Orientation ($F(1, 328) = 3.01$, $p = .084$), Age ($F(1, 328) = 0.06$, $p = .807$), nor Gender ($F(2, 328) = 2.26$, $p = .106$) significantly influenced news credibility in this model. An analysis of the model's random components showed that 13.5% of the total variance in credibility ratings was due to differences between participants (ICC = 0.135). An additional 13.7% of the variance was due to differences across news items (ICC = 0.137). The model fit indicates that the fixed effects alone account for 44.9% of the variance (Marginal $R^2 = 0.449$), while the full model, including random effects, accounts for 58.1% (Conditional $R^2 = 0.581$). These results are shown in Table 16.

**Table 16.** Summary of the results of the Model for Credibility for Study 4

| **Fixed Effects** | | | | | | |
|---|---|---|---|---|---|---|
| **Predictor** | **Estimate (β)** | **SE** | **df** | **t** | **p** | **95%CI[LL, UL]** |
| (Intercept) | 3.53 | 0.16 | 17.0 | 22.68 | < .001 | [3.23, 3.84] |
| News Type (True - Fake) | 2.87 | 0.29 | 12.0 | 10.07 | < .001 | [2.31, 3.43] |
| Language (Native - Foreign) | -0.08 | 0.08 | 328.0 | -0.92 | 0.359 | [-0.24, 0.09] |
| Cultural Incongruence. (Incong. - Cong.) | -0.36 | 0.29 | 13.1 | -1.22 | 0.243 | [-0.93, 0.22] |
| Political Orientation | -0.04 | 0.02 | 328.0 | -1.74 | 0.084 | [-0.09, 0.01] |
| Age | < -0.01 | < 0.01 | 328.0 | -0.25 | 0.807 | [-0.01, 0.01] |
| Gender (Fem - Masc) | 0.19 | 0.10 | 328.0 | 1.95 | 0.53 | [-0.00, 0.38] |
| Gender (Other - Masc) | 0.31 | 0.20 | 328.0 | 1.53 | 0.127 | [-0.09, 0.70] |
| Interactions | | | | | | |
| News Type × Language | 0.23 | 0.11 | 2336.0 | 2.13 | 0.033 | [0.02, 0.44] |
| News Type × Cultural Incong. | 0.23 | 0.57 | 12.0 | 0.41 | 0.688 | [-0.88, 1.35] |
| Language × Cultural Incong. | 0.14 | 0.17 | 328.0 | 0.86 | 0.392 | [-0.18, 0.47] |
| News Type × Lang. × Cultural Incong. | 0.19 | 0.22 | 2336.0 | 0.88 | 0.381 | [-0.24, 0.62] |
| **Random Effects** | **Variance** | **SD** | | **ICC** | | |
| Participant (Part_ID) | 0.308 | 0.555 | | 0.135 | | |
| News Item (News_ID) | 0.314 | 0.560 | | 0.137 | | |
| Residual | 1.978 | 1.407 | | | | |
| **Model Fit** | | | | | | |
| Observations | 2688 | | | | | |
| Participants (ID) | 366 | | | | | |
| News (ID) | 16 | | | | | |
| Marginal R2 | 0.449 | LRT$\chi^2$ | 51.68 | df | 11 | |
| Conditional R2 | 0.581 | LRT$\chi^2$ | 1971.61 | df | 13 | |

*Sharing*. As in Study 3, because the sharing intentions were even more skewed (skewness = 1.13), we used the same logarithmic transformation for the Linear Mixed Model. The analysis revealed significant main effects for both News Type ($F(1, 12) = 49.910$, $p < .001$) and Cultural Incongruence ($F(1, 18) = 10.383$, $p = .005$). However, the main effect for Language was not significant ($F(1, 328) = 2.045$, $p = .154$), as it happened for credibility in this study. Overall, participants were more likely to share true news (M = 2.88) than fake news (M = 1.57; $\beta = 0.54$, $p < .001$), and congruent news (M = 2.54) generated higher sharing intentions than incongruent news (M = 1.91; $\beta = -0.27$, $p = .005$). Furthermore, a significant News Type ×

Language interaction was observed ($F(1, 2336) = 6.899$, $p = .009$), indicating that the effect of language on sharing intention differed between fake and true news. A simple-effects analysis confirmed this pattern. The effect of Language was significant for fake news: native-language fake news ($M = 1.44$) elicited significantly fewer sharing intentions than foreign-language fake news ($M = 1.70$; $p = .017$). Conversely, for true news, the difference between native ($M = 2.92$) and foreign news ($M = 2.85$) was not significant ($p = .840$). This also replicated the credibility results.

It is worth noting that we observed a moderation of cultural incongruence, shown by a three-way interaction among News Type, Language, and Cultural Incongruence, which was also significant ($F(1, 2336) = 4.315$; $p = .038$). This positive interaction ($\beta = 0.156$) indicates that the sharing intentions difference between foreign language true and fake news is smaller on the incongruent condition ($M_{True} = 2.61$ x $M_{Fake} = 1.45$, *diff* = 0.92) than on the congruent condition ($M_{True} = 3.32$ x $M_{Fake} = 1.94$, *diff* = 1.38), pointing in the expected path of H9b. However, this smaller difference was driven more by the decrease in incongruent foreign-language true-news sharing intentions than by the increase in incongruent foreign-language fake-news sharing intentions (which did not occur). So, both H9a (due to the non-significant interaction for credibility) and H9b were rejected. Figure 7 shows the difference between foreign- and native-language true and fake news in sharing intentions, split by cultural incongruence.

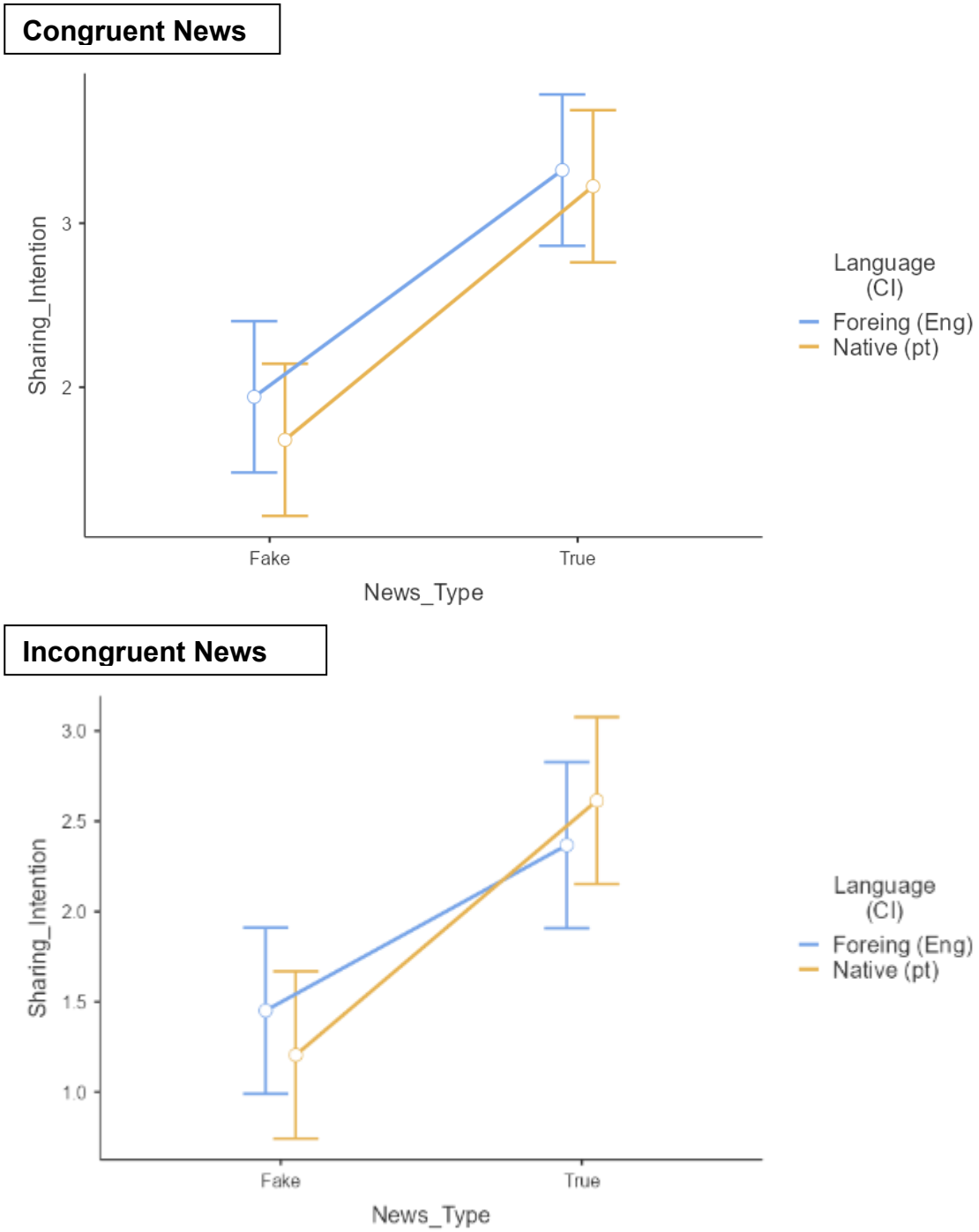



**Figure 7.** Sharing Intentions Means for Congruent and Incongruent News

Regarding the control variables, Age was a significant predictor ($F(1, 328) = 15.67$, $p < .001$), with older participants demonstrating higher sharing intentions ($\beta = 0.01$). Political orientation also significantly predicted sharing ($F(1, 328) = 4.92$, $p = .027$); results indicated that sharing intentions decreased as participants identified more with the political right ($\beta = -0.03$).

An analysis of the model's random components showed that a considerable portion of the variance was attributable to between-participant differences (ICC = 0.315), while the variance attributable to the news items was smaller (ICC = 0.084). The model fit suggests that the fixed effects alone explain a moderate portion of the variance (21.9%; Marginal $R^2 = 0.219$), while the full model, including the random effects, explains 49.7% (Conditional $R^2 = 0.497$). The overall significance test for the model was statistically significant (LRT $\chi^2 = 1243.172$, $p < .001$). Table 17 presents the summary of the model for the logarithmic transformation of sharing intentions.

**Table 17.** Summary of the results of the Model for Sharing Intentions (Log-Transformed) for Study 4

**Fixed Effects**

| Predictor | Estimate (β) | SE | df | t | p | 95%CI[LL, UL] |
|---|---|---|---|---|---|---|
| (Intercept) | 0.62 | 0.05 | 35.4 | 12.343 | < .001 | [0.53, 0.72] |
| News Type (True - Fake) | 0.54 | 0.08 | 12.0 | 7.065 | < .001 | [0.39, 0.69] |
| Language (Native - Foreign) | -0.06 | 0.04 | 328.0 | -1.430 | 0.154 | [-0.14, 0.022] |
| Cultural Incongruence. (Incong. - Cong.) | -0.27 | 0.08 | 18.0 | -3.222 | 0.005 | [-0.44, -0.11] |
| Political Orientation | -0.03 | 0.01 | 328.0 | -2.218 | 0.027 | [-0.05, -0.01] |
| Age | 0.01 | 0.001 | 328.0 | 3.959 | < .001 | [0.003, 0.009] |
| Gender (Fem - Masc) | 0.02 | 0.05 | 328.0 | 0.357 | 0.721 | [-0.07, 0.11] |
| Gender (Other - Masc) | 0.31 | 0.10 | 328.0 | 3.028 | 0.003 | [0.11, 0.50] |
| Interactions | | | | | | |
| News Type × Language | 0.10 | 0.04 | 2336.0 | 2.627 | 0.009 | [0.03, 0.17] |

| | | | | | | |
|---|---|---|---|---|---|---|
| News Type × Cultural Incong. | -0.08 | 0.15 | 12.0 | -0.526 | 0.608 | [-0.38, 0.22] |
| Language × Cultural Incongruence. | 0.13 | 0.08 | 328.0 | 1.521 | 0.129 | [-0.04, 0.29] |
| News Type × Lang. × Cultural Incong. | 0.16 | 0.08 | 2336.0 | 2.077 | 0.038 | [0.01, 0.30] |
| **Random Effects** | **Variance** | **SD** | | **ICC** | | |
| Participant (Part_ID) | 0.110 | 0.331 | | 0.315 | | |
| News Item (News_ID) | 0.022 | 0.148 | | 0.084 | | |
| Residual | 0.238 | 0.488 | | | | |
| **Model Fit** | | | | | | |
| Observations | 2688 | | | | | |
| Participants (ID) | 366 | | | | | |
| News (ID) | 16 | | | | | |
| Marginal R2 | 0.219 | LRT$\chi^2$ | 69.78 | df | 11 | |
| Conditional R2 | 0.497 | LRT$\chi^2$ | 1243.17 | df | 13 | |

*Signal Detection Theory (SDT) Analysis.* As in previous studies, we conducted a Signal Detection Theory analysis to account for the discernment capacity between native and foreign languages and the response criterion participants used when evaluating news in their native and foreign languages. However, in this study, we also seek to analyze the discernment and response criteria based on the cultural incongruence between the news and language. For this, we used t-tests for the main effects and a One-way ANOVA for the interaction.

*Overall Discernment and Response Criterion: The SDT analysis showed that, as in Study 3, for this set of news items, individuals differentiated between true and false news more than chance (d' = 1.48; t(335) = 32.70; p < .001; 95% CI* [1.39; 1.57]). At the same time, different from the other experiments, they had a response bias slightly towards a more conservative approach (c = 0.13; t(335) = 4.99; p < .001; 95%CI[0.078; 0.180]), indicating that

in this sample and set of news individuals were more skeptic about the news in general, sacrificing the credibility of trustworthy news not to fall for fake news.

*The Effect of Language and Cultural Incongruence on Discernment and Response Criterion.* To account for differences in language and cultural distance in news discernment and response criteria, we ran two One-way ANOVAs with those as independent variables. The first model for discernment showed marginal overall significance ($F(3, 332) = 2.46$; $p = .063$). Regarding the main effects, language was the only significant predictor, with consumers who read news in a native language ($M = 1.56$) presenting more discernment capacity than those who read foreign ones ($M = 1.39$; $F(1, 332) = 4.86$; $p = .028$; $\eta^2p = .014$), confirming H2. Neither Cultural Incongruence ($F(1, 332) = 2.34$; $p = .127$) or their interaction ($F(1, 332) = 0.18$; $p = .674$) were significant. Table 18 presents these results.

**Table 18.** Results of the ANOVA for discernment of Study 4

| | Sum of Squares | df | Mean Square | F | p | $\eta^2p$ |
|---|---|---|---|---|---|---|
| Language | 3.32 | 1 | 3.32 | 4.86 | 0.030 | 0.014 |
| Cult_Inc | 1.60 | 1 | 1.60 | 2.33 | 0.127 | 0.006 |
| Language * Cult_Inc | 0.12 | 1 | 0.12 | 0.178 | 0.674 | 0.001 |
| Residual | 231.723 | 332 | 0.68 | | | |

The second model also showed marginal overall significance ($F(3, 332) = 2.31$; $p = .076$), but revealed a different pattern. Although the means for foreign language were smaller ($M_{For} = 0.108$ x $M_{Nat} = 0.158$), this difference was not significant since we did not have a main effect of language on response criterion ($F(1, 332) = 0.665$, $p = .415$). However, cultural incongruence in the news made individuals more skeptical ($M_{Con} = 0.064$, $M_{Inc} = 0.193$; $F(1, 332) = 6.27$; $p = .013$; $\eta^2p = .019$). The interaction between cultural incongruence and language was not significant ($F(1, 332) = 0.004$; $p = .952$). Table 19 shows the results of this model.

**Table 19.** Results of the ANOVA for the response criterion of Study 4

| | Sum of Squares | df | Mean Square | F | p | $\eta^2p$ |
|---|---|---|---|---|---|---|
| Language | 0.15 | 1 | 0.15 | 0.66 | 0.415 | 0.001 |
| Cult_Inc | 1.40 | 1 | 1.40 | 6.27 | 0.012 | 0.019 |
| Language * Cult_Inc | < 0.001 | 1 | < 0.001 | < 0.001 | 0.952 | < 0.001 |
| Residual | 73.864 | 332 | 0.222 | | | |

*Mediation.* In this last experiment, mediation analysis was conducted using the jAMM (jamovi Advanced Mediation Models) module (Gallucci, 2019) within the jamovi statistical platform. This package estimates path models using a General Linear Model (GLM) framework to assess direct and indirect effects. It uses bootstrap resampling (e.g., 5,000 samples) to generate confidence intervals for indirect effects.

We used this approach to look at all the sample at the same time and, mainly, analyze a possible three-way interaction between news type, language and cultural incongruence for the mediator attractiveness. The model included language (native vs. foreign) as the independent variable, perceived attractiveness as the mediator, and credibility as the dependent variable, with news type and cultural incongruence as moderators. Age, political orientation, and gender were entered as covariates to control for potential confounding effects. All path coefficient analysis was done using 5,000 samples bootstrap.

First, we looked at the path estimates predicting the mediator. The results indicated that the effect of language on attractiveness was negative ($\beta = -0.16$, SE = 0.07; $p = 0.022$), meaning that foreign language news was seen as more attractive in general. Also, this relationship was significantly moderated by news type ($\beta = 0.35$, SE = 0.14, $p = 0.012$). Given the significant interaction between language and news type, the conditional indirect effects were examined to interpret the mediation. For fake news, the analysis supported the mediation hypothesis, revealing a significant indirect effect of language on credibility through attractiveness ($\beta = -0.12$; SE = 0.04; $p < 0.001$). As the interaction was on the a-path of the mediation, we also observed an indirect effect of language on sharing intentions through its attractiveness to fake news ($\beta = -0.04$; SE = 0.01; $p < 0.001$). The negative coefficient for the component path (a-path) indicates that, relative to native news, foreign fake news was perceived as significantly more attractive, which in turn led to increased credibility. This supports H7 and H8. Conversely,

for true news, the indirect effect was not significant for credibility (β = 0.006; p = 0.873) and sharing (β = 0.003; p = 0.866), as language did not significantly predict the attractiveness of true news stories. Table 20 resumes these indirect effects.

**Table 20.** Moderated Mediation Effects for Study 4

| News Type | Cultural Incongruence | Outcome Variable | Path a: Language → Attractiveness | Path b Attractiveness → Outcome | Indirect Effect (SE) |
|---|---|---|---|---|---|
| *Fake News* | Congruent | Credibility | -0.26* | 0.36*** | -0.09* (0.04) |
| | Incongruent | | -0.40** | 0.36*** | -0.14** (0.05) |
| | Average | | -0.33*** | 0.36*** | -0.12*** (0.04) |
| | Congruent | Sharing Intentions | -0.34** | 0.15*** | -0.05** (0.09) |
| | Incongruent | | -0.33** | 0.16*** | -0.05** (0.02) |
| | Average | | -0.34*** | 0.12*** | -0.05*** (0.02) |
| *True News* | Congruent | Credibility | -0.06 | 0.36*** | -0.02 (0.05) |
| | Incongruent | | 0.09 | 0.36*** | 0.03 (0.05) |
| | Average | | 0.02 | 0.36*** | < 0.01 (0.03) |
| | Congruent | Sharing Intentions | 0.01 | 0.16*** | < 0.01 (0.02) |
| | Incongruent | | 0.02 | 0.16*** | < 0.01 (0.02) |
| | Average | | 0.02 | 0.16*** | < 0.01 (0.02) |

Note: * p < .05; ** p < .01; *** p < .001

However, contrary to H10, which stated that cultural distance would amplify these effects, the interaction between language and cultural incongruence was not statistically significant (p = 0.947), nor was the three-way interaction between language, news type, and cultural incongruence (p = 0.319). Regarding the dependent variables, there was a significant positive relationship between attractiveness and credibility (β = 0.36, SE = 0.02, p < 0.001), and sharing intentions (β = 0.16, SE = 0.01, p < 0.001), confirming that higher perceived attractiveness is associated with higher credibility assessments regardless of the experimental condition. Thus, while the mediation mechanism explained the credibility of foreign fake news, the hypothesized moderation by cultural incongruence was not supported, suggesting the effect holds across both culturally congruent and incongruent contexts. Figure 8 represents this mediation model.

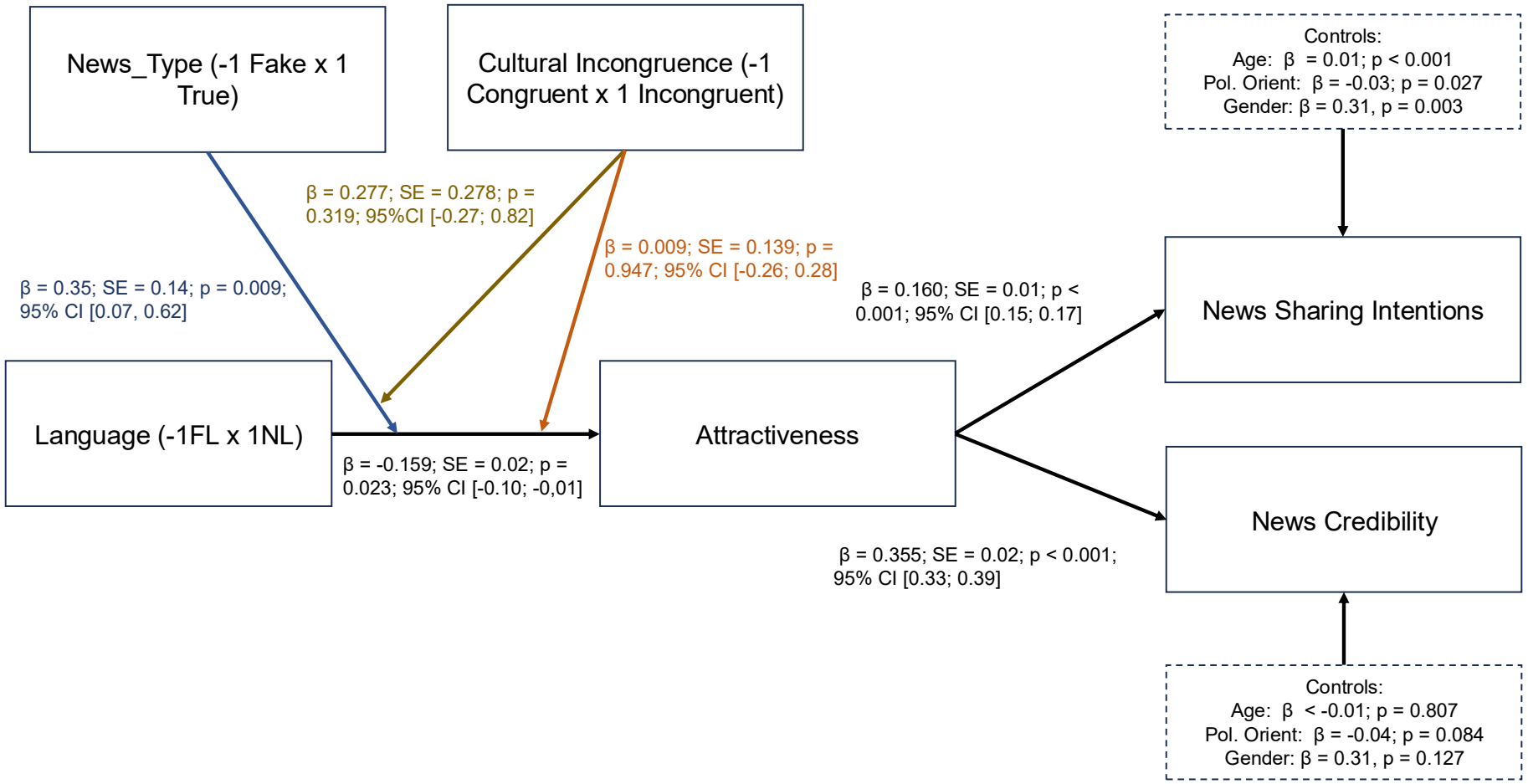



**Figure 8.** Moderated Mediation Model for Study 4

### 4.6.4. Discussion

Study 4 reinforced that bilingual consumers are more vulnerable to fake news in their second language. We used a different sample, with a different language pair and from a different culture, and the main results were replicated. Despite not having the main direct effect of language on news credibility, as it happened in some of our previous studies (1B, 2, and 3), this study showed that specifically fake news was seen as more credible and presented more sharing intentions in the foreign language context, as in Study 1A, confirming H1. The lack of a main effect of language may be due to a more skeptical sample, as indicated by the positive response criterion (c) in the SDT analysis, and to the absence of a difference between true news credibility and sharing intentions.

Despite having a more skeptical sample, SDT also showed that individuals in this study could distinguish true from false news with high accuracy. However, consistent with H2, although they were still able to distinguish true from false news in their foreign language, their discernment capacity was significantly lower. This, along with the finding that consumers reported higher perceived credibility and greater sharing intentions toward fake news, reinforces the conclusion that they are more vulnerable when consuming foreign-language social media news.

Also, in this study, we conducted a moderated mediation to test an alternative explanation for why consumers are more vulnerable when consuming social media news in their second language. Nevertheless, this study supported our second proposed mechanism: fake news was perceived as more attractive in a foreign language (H7), and this increased attractiveness led to higher credibility and sharing intentions, thereby mediating the effect of language (H8). This supports the notion that when linguistic processing becomes more difficult or distant (as in a foreign language), users may rely more heavily on heuristic cues, such as visual appeal or “likes”, to evaluate content (Erkan & Evans, 2016; Petty & Cacioppo, 1986; Sussman & Siegal, 2003). Following Muda and colleagues (2023) rationale, it appears that the foreign language acted as a distancing mechanism, stripping away the immediate, intuitive recognition of the fake news as "low quality" or "nonsense," and instead allowing it to be perceived as more aesthetically pleasing and, by extension, more credible, also leading to more sharing intentions (Zou & Tang, 2021).

However, this study also showed that some of our hypotheses require more investigation. Contrary to our hypotheses (H9 and H10), cultural incongruence did not

moderate the direct effect or the attractiveness mechanism; the effect of attractiveness on foreign fake news functioned similarly regardless of whether the news was culturally familiar or distinct. Instead, cultural congruence directly influenced sharing intentions, particularly for true news.

While we hypothesized that cultural incongruence might act as an even more distant mechanism, reinforcing the foreignness of the news and enhancing fake news credibility and sharing intentions, it instead served as a barrier to sharing the truth. When participants encountered true news in a foreign language that was also culturally incongruent, sharing intentions severely dropped. This suggests that the combination of a foreign language and an unfamiliar cultural context likely creates a threshold of ambiguity that users are unwilling to cross, even when the information is factual. Although this work focused on the effects of foreign language on fake news vulnerability, this result suggests that while cultural incongruence did not facilitate fake news as predicted, it significantly hindered the dissemination of true global information, going in the direction of previous works that discuss at what cost we stop fake news dissemination (Modirrousta-Galian & Higham, 2023).

In the subsequent general discussion, we will synthesize the findings across all studies. We aim to discuss how this dissertation contributes to both practice and theory: by highlighting implications for public policy aimed at consumer protection in the multilingual online space, and by advancing the under-researched intersection of consumer foreign-language processing and misinformation vulnerability.

# 5. GENERAL DISCUSSION

The present research investigated the influence of foreign language processing on news consumption, specifically examining how a foreign language (vs. a native language) impacts vulnerability to misinformation. Through a series of experiments, this study assessed whether misinformation is perceived as more credible when presented in a foreign language and explored the underlying mechanisms of this effect.

The data, collected across three countries (Spain, the United States, and Brazil) and involving three languages (English, Spanish, and Portuguese), indicated that individuals perceive fake news as more credible in their second language. This finding was consistent across different cultural contexts and linguistic pairings, supporting H1a. Table 21 summarizes the results of the hypothesis testing across the experimental series.

Regarding sharing intentions, Studies 1A, 3, and 4 supported H1b, which predicted that news presented in a foreign language would elicit higher sharing intentions than news in the native language. Existing literature suggests that the mechanisms driving sharing behavior often diverge from those influencing credibility, with sharing being subject to distinct interventions (Duffy et al., 2019; Pennycook & Rand, 2021; Talwar et al., 2019). Nevertheless, these results corroborate the observation that a foreign-language context may facilitate the spread of misinformation.

The present research employed Signal Detection Theory (SDT) to analyze participant discernment *(d')* and response criterion *(c)*. Hypothesis H2, which predicted that a foreign language would impair discernment, was supported in Studies 1A and 4. Conversely, Studies 2 and 3 found that while *d'* was not significantly impacted, the foreign language led to a more liberal (naïve) response bias *(c)*, supporting H3. A primary distinction between these results appears to be the language pairing and cultural context: Studies 2 and 3 utilized Spanish as the foreign language with English as the native language, whereas Studies 1a and 4 utilized English as the foreign language with Spanish or Portuguese as the native language.

**Table 21.** Summary of the experimental studies' main results

| | | Experimental Studies | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Study 1A** | | **Study 1B** | | **Study 2** | | **Study 3** | | **Study 4** | | |
| **Variables** | *IVs* | *Language (FL x NL)* | *News Type (Fake x True)* | *Language (FL x NL)* | *News Type (Fake x True)* | *Language (FL x NL)* | *News Type (Fake x True)* | *Language (FL x NL)* | *News Type (Fake x True)* | *Language (FL x NL)* | *News Type (Fake x True)* | *Cultural Incongruence (Congruent x Incongruent)* |
| *DVs* | | | | | | | | | | | | |
| *Credibility* | | *ns (p = .302)* | Fake < True (p < .001) | FL > NL (p = .005) | Fake < True (p = .015) | FL > NL (p = .014) | *ns* (p = .937) | FL > NL (p =.031) | Fake < True (p < .001) | *ns* (p = .359) | Fake < True (p < .001) | ns (p = .243) |
| | | *Interaction: p = .037* | | *Interaction: p = .006* | | *Interaction: ns (p = .999)* | | *Interaction: p = .058* | | *Interaction: p = .033* | | Three-way interaction: ns (p = .381) |
| *Sharing Intentions* | | Ns (p = .876) | Fake < True (p = .098) | *ns (p = .564)* | *Ns (p = .428)* | ns (p = .796) | ns (p = .624) | FL > NL (p =.026) | Fake < True (p < .001) | *ns* (p = .154) | Fake < True (p < .001) | Cong > Incong (p = .005) |
| | | *Interaction: p = .057* | | *Interaction: p = .002* | | *Interaction: ns (p = .692)* | | *Interaction: ns (p = .393)* | | *Interaction: β = 0.10; p = .009* | | Three-way interaction: β = 0.16; p = .038 |
| *Discernment (d')* | | FL < NL (p < .001) | | | | ns (p = .897) | | *ns* (p = .319) | | FL < NL (p = .028) | | ns (p = .127) |
| *Response Criterion (c)* | | *ns* | | | | FL < NL (p = .014) | | FL < NL (p = .003) | | ns (p = .415) | | Cong < Incong (p = .013) |
| *Reading Difficulty* | | FL > NL (p = .015) | | | | ns (p = .179) | | FL > NL (p = .003) | | ns (p = .246) | | |
| *Attractiveness* | | | | | | | | | | FL > NL (p = .012) | | ns (p = .947) |

While these interpretations require caution, the results suggest that participants may maintain a more skeptical response criterion when processing information in English, yet experience reduced discernment due to the cognitive load associated with second-language processing. This reduction in sensitivity aligns with Gawronski et al. (2023), who observed that truth sensitivity can be overridden by factors such as partisan bias, particularly in the context of sharing. Our findings suggest that the cultural context associated with the second language may modulate this sensitivity. However, it is important to note that the moderation of cultural incongruence was inconclusive, suggesting that the distance between the consumer and the news he reads was insufficient to increase perceived credibility of fake news. Nevertheless, this could be due to our news subject, climate change. Although they perceived culturally incongruent news as more distant, even climate-related events not occurring in a consumer's country can influence their lives.

The analysis further confirmed two mediation mechanisms: reading difficulty (Studies 1A and 3) and stimulus attractiveness (Study 4). Processing news in a foreign language is cognitively demanding (Białek et al., 2020; Geipel et al., 2015; Muda et al., 2023; Takano & Noda, 1993), which increases the perceived credibility of misinformation. Furthermore, fake news in a foreign language was perceived as more attractive, supporting the notion that a foreign language context encourages reliance on peripheral cues (Petty & Cacioppo, 1986). This perceived attractiveness, in turn, correlated with increased credibility and sharing intentions.

Although the hypothesis regarding cultural incongruence as a moderator was not supported, the results for this variable remain relevant. Rather than amplifying the foreign language effect, cultural incongruence appeared to serve as a proxy for unfamiliarity and uncertainty, thereby reducing sharing intentions (Pennycook et al., 2018). Interestingly, Study 2 corroborated this by demonstrating that familiarity positively influenced both news credibility and sharing behavior. The reduction in sharing intentions for true news in culturally incongruent contexts aligns with Mohsenin and Munz (2025), suggesting that individuals may avoid information in cognitively demanding, unfamiliar contexts.

Additionally, we identified a boundary condition regarding second language proficiency. The mediation through reading difficulty was moderated by the participant's second-language proficiency (H6); cognitive burden and subsequent vulnerability to misinformation were absent among individuals with high proficiency. This finding refines the cognitive resource depletion argument, suggesting that vulnerability stems from processing

effort rather than the foreign language itself. When proficiency allows for automatic processing, the cognitive resources required for discernment appear to be preserved.

A further finding concerns the influence of specific news stimuli. While previous studies regarding foreign language and misinformation used the same content in both native and foreign languages (Fernández-López & Perea, 2020; Muda et al., 2023), this dissertation used a more ecologically valid approach, where participants were exposed to different news in their native and foreign languages (Studies 1A and 1B). The results indicate that the language effect may be subject to item effects, in which the inherent credibility of a story overrides linguistic shifts. This is consistent with Dylman and Champoux-Larsson (2020), who argue that the foreign language effect is context-dependent and may diminish when content is highly familiar. In this study, highly salient true news stories maintained their credibility across languages, suggesting that the disadvantage associated with foreign-language consumption is most pronounced in ambiguous contexts.

The consistency of these findings across multiple language pairs (English-Spanish, Portuguese-English, Spanish-English) suggests a robust effect. Although the underlying mechanisms varied, manifesting either as impaired discernment *(d')* or a shift toward a liberal response bias *(c)*, the outcome remained the same: consuming information in a second language increased vulnerability to misinformation.

## 5.1. THEORETICAL IMPLICATIONS

The findings of this dissertation make significant contributions to three main streams of literature: the Foreign Language Effect (FLE), the psychology of fake news, and information processing in marketing.

First, regarding the Foreign Language Effect (FLE), this research challenges the utilitarian advantage often associated with bilingual processing. The dominant view in FLE literature has been that a foreign language promotes deliberation and reduces cognitive biases by engaging System 2 thinking (Costa, Foucart, Arnon, et al., 2014; Keysar et al., 2012). However, our results revive the seminal perspective of Takano and Noda (1993), who originally posited that processing in a foreign language imposes a temporary decline of thinking ability due to increased working memory load, and align with more recent research that it may decrease

intuitive reasoning but not necessarily increase analytical thinking (Białek et al., 2020; Geipel et al., 2015; Hayakawa et al., 2017).

We demonstrate that rather than triggering beneficial deliberation, the foreign language imposes a “cognitive tax”. This aligns with the findings of Muda et al. (2023), who stated that this load hampers the retrieval of prior knowledge necessary for verification. Our confirmation of the reading difficulty mediation extends this theory, showing that in the high-speed environment of social media, this cognitive load effectively "occupies" the resources required for reality monitoring, reducing consumers' capacity for skepticism. Furthermore, we extended the findings from the only study that specifically analyzed the role of foreign language on social media fake news by providing explanatory mechanisms (reading difficulty and attractiveness) for why consumers are more vulnerable to misinformation in their second language.

Second, we contribute to theories of fake news and information processing by linking linguistic difficulty to reliance on heuristics. Previous research by Pennycook & Rand (2019, 2021) suggests that susceptibility to fake news is largely driven by lazy thinking or a failure to engage in analytical reasoning. Our findings complement this by identifying a structural cause for this laziness: the foreign language itself acts as a barrier to analytical engagement. As one of our moderators showed, when individuals are highly proficient, this barrier diminishes, and the effect of the foreign language on fake news credibility and sharing intentions becomes insignificant.

Furthermore, we add to the work of Talwar et al. (2019) and Duffy et al. (2019), who highlight the social utility and Fear of Missing Out (FOMO) as drivers of sharing. Our Study 4 results, in which foreign fake news was seen as more attractive, suggest that foreignness in the text serves as a heuristic for sophistication or novelty. This creates a leaning towards the GIST of the news, where the consumer excuses the lack of literal accuracy because the content feels intuitively appealing enough to share (Langdon et al., 2024).

Third, we extend theories about information processing (Erkan & Evans, 2016; Kirmani & Campbell, 2009; Petty & Cacioppo, 1986; Sussman & Siegal, 2003) into the domain of bilingual news consumption. This dissertation suggests that information processing is fundamentally contingent upon the language of delivery. We provide novel evidence that the way a message is processed and evaluated is intrinsically linked to its linguistic context. For instance, the attractiveness of a news headline is directly linked to the language used to present it. Furthermore, while reading difficulty may be a significant factor in certain contexts, it is only one facet of a broader, more complex processing experience. As the consumption of news in

foreign languages becomes an increasingly global phenomenon, understanding these dynamics becomes even more critical; the language of the message does not merely accompany the information, but actively shapes the evaluative paths through which individuals discern and share news.

## 5.2. PRACTICAL IMPLICATIONS

The strategic dissemination of fake news often mirrors marketing tactics, targeting specific demographics to exploit trust for ideological or financial gain, making it a pernicious form of consumer manipulation. So, we focused this dissertation on fake news about climate change, as misinformation about this societal issue can hinder well-being for citizens around the globe. Also, climate change impacts more vulnerable populations, even though they are not responsible for most of it. Although highly focused on consumer vulnerability, the findings of this dissertation also offer practical implications, primarily for policymakers, social media governance, and media literacy interventions.

First, we can discuss the implications for social media platforms regarding the major problem of misinformation. Current content moderation algorithms largely focus on textual analysis and source verification. However, our findings suggest that the language of consumption (native or foreign) is a risk factor in its own right. Following Pennycook et al. (2021), who found that simply nudging people to think analytically reduces misinformation online, and Capraro and Celadin (2023), who showed that endorsing accuracy by a prompt not only reduces misinformation sharing but also enhances true news spreading, platforms could implement design elements that prompt this analytical thinking when consumers engage with news in a non-native language. For example, rather than a passive "Translate" button, platforms could use active prompts such as, "You are reading this in a foreign language. Would you like to see verified context in your native language?", or “Foreign language fake news tends to be more shared. Are you sure you want to proceed with sharing this information?” Furthermore, given that Study 4 showed that foreign fake news is viewed as more attractive, platforms should consider reducing the visual salience (e.g., by greying out "like" counts or reducing image size) of unverified viral content when displayed to non-native speakers, thereby reducing the impact of peripheral cues.

Second, the findings from our studies could assist policymakers and educators in developing media literacy education programs that focus not only on source checking and bias

identification. This curriculum could be updated to include linguistic awareness regarding misinformation. Because bilingual consumers can be vulnerable (e.g., refugees), it is important to create educational programs to prevent them from becoming easy targets of misinformation. Finland, for example, is one successful case of combating misinformation through education and media literacy since preschool ages (Mackintosh, 2019). One suggestion to improve bilinguals' accuracy is to promote media literacy as part of a second-language course, since people often learn a second language in school (Costa, Foucart, Arnon, et al., 2014; Keysar et al., 2012).

As with people who fall for scams (Deevy et al., 2012), it is difficult to identify a single profile of who is most susceptible to fake news, but we should pay special attention to those in vulnerable situations. As our results showed, people with less proficiency, generally the group that contains refugees and immigrants, suffer a higher impact of foreign language on misinformation belief and sharing because of the reading difficulty.

Furthermore, fake news about climate change is of greater importance, especially to those who are in a vulnerable situation. As they are the most susceptible to the consequences of a climate disaster (Intergovernmental Panel on Climate Change (IPCC), 2023), if they believe false information about climate change, they are more likely to be manipulated by those who do not want this situation to change.

A pertinent example of this phenomenon occurred during the 2023 Maui wildfires. In the aftermath of the disaster, a surge of disinformation, including claims that the fires were caused by 'direct energy weapons' to facilitate '15-minute smart cities', diverted public attention from climate-related causes. This manipulation led to increased distrust in emergency management agencies among the affected population, directly hindering recovery efforts and long-term climate adaptation planning (Rudgard & Zuidijk, 2023).

The finding that cultural incongruence reduces the sharing of true news (Study 4) is critical for organizations communicating global risks like climate change. When communicating with international audiences, simply translating the text may not be sufficient. To ensure true news is shared, it must be culturally localized to reduce psychological distance and prevent the source's foreignness from inhibiting the truth's dissemination.

## 5.3. LIMITATIONS AND FUTURE STUDIES

While this dissertation offers robust evidence across five experiments, several limitations remain for future research. First, although we used data from different sources (Prolific and social media-sponsored posts), all our experiments were conducted in a laboratory environment. We tried to emulate, as closely as possible, how a social media post would appear to participants and offer different, more realistic conditions, as in Studies 1A and 1B. However, in the real-world context of social media news consumption, many factors could influence how consumers perceive misinformation. Also, our measure of sharing intentions was self-reported, as is often the case in laboratory environments. While this is standard in psychology research, there is often a gap between intention and action. Future studies could conduct field experiments on social media platforms to observe the actual sharing behavior of foreign-language content in a naturalistic setting. Given that field experiments in social media are almost impossible, future work could use more advanced experimental simulations of social media posts that better simulate the social media environment, such as the Digital In-Context Experiments (DICE; Roggenkamp et al., 2025) or the Truman Platform (https://truman.gitbook.io/the-truman-platform) tools.

Second, regarding our stimuli, while we focused on climate change due to its global relevance, it is a highly polarized and high-arousal topic. It remains to be seen if the Foreign Language Effect persists in low-arousal contexts (e.g., financial news or celebrity gossip) where the attractiveness mechanism might play a different role. Future studies should test whether the effect holds across different news topics.

Third, our samples consisted largely of Western, educated, bilingual populations (using English, Spanish, and Portuguese). Although they have different roots, these languages share similar alphabets and structures. It is unknown if the effect would be amplified or reversed in linguistically distant pairs (e.g., Chinese-English), where the cognitive load of reading (reading difficulty) would be significantly higher. Future research should investigate these distant language pairs to test the boundaries of the reading difficulty mediation.

Following this, we compared only bilinguals across all of our samples. Although there are cases of vulnerable bilingual consumers, generally, those who speak more than one language are more educated. Future research could compare bilinguals and monolinguals to investigate whether bilinguals generally present less belief in fake news.

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# APPENDIXES

## APPENDIX A – NEWS USED IN THE PILOT STUDY

**Please categorise the following news headlines as either 'Fake News' or 'Real News'.**

*Some items may look credible or obviously false at first sight, but may actually fall in the opposite category. However, for each news headline, only one category is correct.*

| | Real | Fake |
|---|---|---|
| Republicans Divided in Views of Trump's Conduct, Democrats Are Broadly Critical | ○ | ○ |
| Hyatt Will Remove Small Bottles from Hotel Bathrooms | ○ | ○ |
| Government Officials Have Manipulated Stock Prices to Hide Scandals | ○ | ○ |
| Global Warming Age Gap: Younger Americans Most Worried | ○ | ○ |
| The Government Is Knowingly Spreading Disease Through the Airwaves and Food Supply | ○ | ○ |
| Certain Vaccines Are Loaded with Dangerous Chemicals and Toxins | ○ | ○ |
| Attitudes Toward EU Are Largely Positive, Both Within Europe and Outside It | ○ | ○ |

## APPENDIX B – NEWS USED IN STUDIES 1A AND 1B

### B.1. FAKE NEWS




Source: https://www.snopes.com/fact-check/flowers-blooming-antarctica/




Source: https://www.politifact.com/factchecks/2023/aug/24/vivek-ramaswamy/vivek-ramsaswamys-misleading-gop-debate-claim-abou/




Source: https://www.newtral.es/ruta-maritima-norte-cerrada-hielo-artico/20240410/




Source: https://maldita.es/malditobulo/20250318/foro-economico-mundial-agricultura-urbana-prohibicion/

**B.2. TRUE NEWS**




Source: https://edition.cnn.com/2024/06/25/climate/antarctic-ice-sheet-tipping-point-sea-level-rise-climate-intl




Source: https://www.foxnews.com/politics/left-wing-climate-group-shady-backing-prominent-role-gas-stoves




Source: https://www.elmundo.es/ciencia-y-salud/medio-ambiente/2023/03/20/64181ff121efa0650f8b4572.html




Source: https://cnnespanol.cnn.com/video/cambio-climatico-amenaza-a-millones-de-personas-en-zonas-costeras-de-america-latina

## APPENDIX C – NEWS USED IN STUDY 2

### C.1. TRUE NEWS




Source: https://www.bbc.co.uk/newsround/articles/cwyg2996z1do







Source: https://www.foxnews.com/politics/us-energy-giant-sounds-alarm-bidens-climate-rules-targeting-power-plants







Source: https://cnnespanol.cnn.com/2024/04/17/cambio-climatico-te-hara-mas-pobre-nuevo-informe-trax







Source: https://www.nbcnews.com/science/environment/climate-change-made-heat-wave-more-likely-warmer-rcna158275

## C.2. FAKE NEWS




**Source:** [https://www.factcheck.org/2022/07/faulty-research-paper-leads-to-unfounded-claims-about-health-of-atlantic-ocean/](https://www.factcheck.org/2022/07/faulty-research-paper-leads-to-unfounded-claims-about-health-of-atlantic-ocean/)







**Source:** [https://www.usatoday.com/story/news/factcheck/2023/06/24/post-exaggerates-carbon-emissions-from-canadian-wildfires-fact-check/70339350007/](https://www.usatoday.com/story/news/factcheck/2023/06/24/post-exaggerates-carbon-emissions-from-canadian-wildfires-fact-check/70339350007/)




**Source:** [https://www.newtral.es/ciclos-interior-tierra-cambio-climatico-bulo/20240109/](https://www.newtral.es/ciclos-interior-tierra-cambio-climatico-bulo/20240109/)




**Source:** [https://www.snopes.com/fact-check/100-corporations-greenhouse-gas/](https://www.snopes.com/fact-check/100-corporations-greenhouse-gas/)

## APPENDIX D – NEWS USED IN STUDY 3

### D.1. TRUE NEWS







Source: https://www.scientificamerican.com/article/climate-fueled-disasters-are-raising-insurance-rates/







Source: https://edition.cnn.com/2024/10/01/climate/melting-glaciers-border-switzerland-italy







Source: https://www.usatoday.com/story/news/weather/2023/04/19/asia-heat-wave-worst-ever-recorded-april-climate-change/11697652002/







Source: https://edition.cnn.com/2024/10/16/climate/global-water-cycle-off-balance-food-production

## D.2. FAKE NEWS







Source: https://factcheck.afp.com/doc.afp.com.36K674V







Source: https://www.breitbart.com/politics/2017/10/24/delingpole-now-400-scientific-papers-in-2017-say-global-warming-is-a-myth/ (debunked by https://science.feedback.org/review/breitbart-misrepresents-research-58-scientific-papers-falsely-claim-disprove-human-caused-global-warming-james-delingpole/)







Source: https://www.usatoday.com/story/news/factcheck/2022/06/10/fact-check-study-consistent-increased-rate-global-warming/7476077001/







Source: https://www.pitchstonewaters.com/un-says-melting-arctic-ice-is-a-key-indicator-of-climate-change-but-its-not-melting/ (debunked by https://www.reuters.com/fact-check/cherry-picked-antarctic-ice-data-does-not-disprove-climate-change-2025-02-11/)

## APPENDIX E – NEWS USED IN STUDY 4

### E.1. CULTURALLY CONGRUENT FAKE NEWS





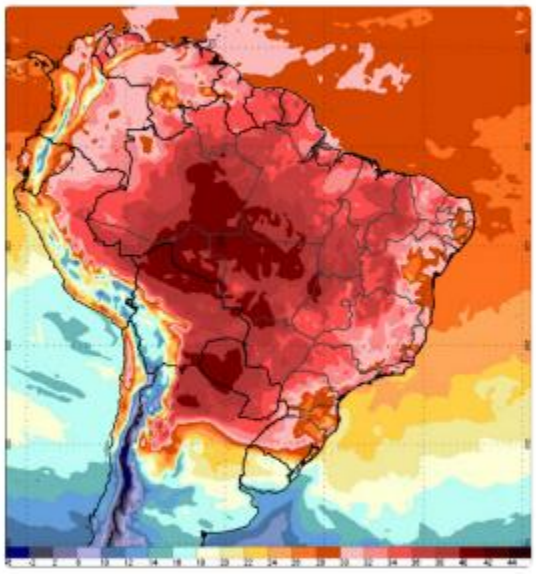







**Breaking News**
@breakingnews

NASA study indicates that Brazil could become inhabitable in 50 years.

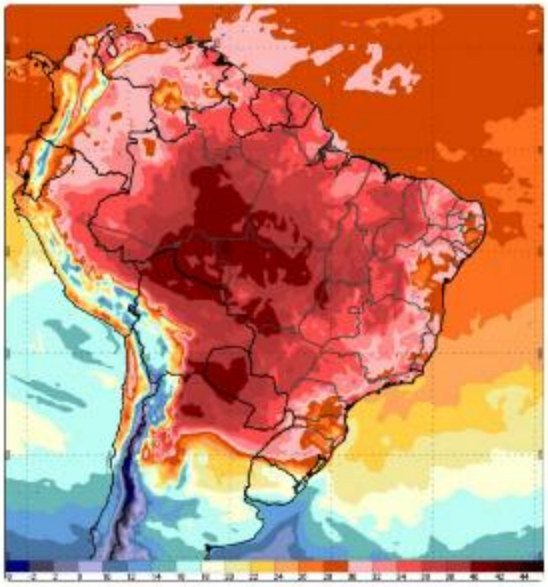


10:09 AM · Sep 02, 2025 · **10K** Views

**20** Retweets **10** Quotes **102** Likes **12** Bookmarks

**Breaking News**
@breakingnews

Estudo da NASA aponta que o Brasil pode ficar inabitável em 50 anos.



10:09 AM · Sep 02, 2025 · **10K** Views

**20** Retweets **10** Quotes **102** Likes **12** Bookmarks

**Breaking News**
@breakingnews

As piores enchentes no sul do Brasil, que ocorreram em 2024, foram causadas pelo deslocamento dos polos e pelo enfraquecimento do campo magnético da Terra.



10:09 AM · Sep 02, 2025 · **10K** Views

**20** Retweets **10** Quotes **102** Likes **12** Bookmarks

**Breaking News**
@breakingnews

The worst floods in southern Brazil, which occurred in 2024, were caused by the shifting of the poles and the weakening of the Earth's magnetic field.



10:09 AM · Sep 02, 2025 · **10K** Views

**20** Retweets **10** Quotes **102** Likes **12** Bookmarks

## E.2. CULTURALLY INCONGRUENT FAKE NEWS












**Breaking News**
@breakingnews

Four workers from Spain's State Meteorology Agency revealed that the entire country is being sprayed by airplanes releasing lead dioxide, silver iodide, and diatomite into the atmosphere.



10:09 AM · Sep 02, 2025 · **10K** Views

**20** Retweets **10** Quotes **102** Likes **12** Bookmarks

**Breaking News**
@breakingnews

Quatro trabalhadores da Agência Estatal de Meteorologia da Espanha divulgaram que o país inteiro está sendo pulverizado por aviões que espalham na atmosfera dióxido de chumbo, iodeto de prata e diatomita.



10:09 AM · Sep 02, 2025 · **10K** Views

**20** Retweets **10** Quotes **102** Likes **12** Bookmarks

**Breaking News**
@breakingnews

Antarctica is gaining ice globally, so climate models are wrong



10:09 AM · Sep 02, 2025 · **10K** Views

**20** Retweets **10** Quotes **102** Likes **12** Bookmarks

**Breaking News**
@breakingnews

A Antártica está ganhando gelo globalmente, então os modelos climáticos estão errados.



10:09 AM · Sep 02, 2025 · **10K** Views

**20** Retweets **10** Quotes **102** Likes **12** Bookmarks

## E.3. CULTURALLY CONGRUENT TRUE NEWS












**Breaking News**
@breakingnews

Research: 34% of Brazilians do not know what climate change is

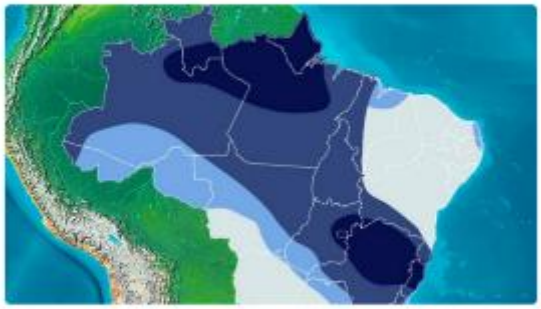


10:09 AM · Sep 02, 2025 · **10K** Views

**20** Retweets **10** Quotes **102** Likes **12** Bookmarks

**Breaking News**
@breakingnews

Pesquisa: 34% dos brasileiros não sabem o que são mudanças climáticas



10:09 AM · Sep 02, 2025 · **10K** Views

**20** Retweets **10** Quotes **102** Likes **12** Bookmarks

**Breaking News**
@breakingnews

Climate change caused two extra months of heat in Brazil in one year, according to a study



10:09 AM · Sep 02, 2025 · **10K** Views

**20** Retweets **10** Quotes **102** Likes **12** Bookmarks

**Breaking News**
@breakingnews

Mudanças climáticas provocaram dois meses a mais de calor no Brasil em um ano, diz estudo



10:09 AM · Sep 02, 2025 · **10K** Views

**20** Retweets **10** Quotes **102** Likes **12** Bookmarks

## E.4. CULTURALLY INCONGRUENT TRUE NEWS












**Breaking News**
@breakingnews

As ondas de calor do verão de 2025 custaram à França mais de 10 bilhões de euros



10:09 AM · Sep 02, 2025 · **10K** Views

**20** Retweets **10** Quotes **102** Likes **12** Bookmarks

**Breaking News**
@breakingnews

Summer 2025 heat waves cost France over €10 billion



10:09 AM · Sep 02, 2025 · **10K** Views

**20** Retweets **10** Quotes **102** Likes **12** Bookmarks

**Breaking News**
@breakingnews

Espanha sofreu com o verão mais quente já registrado em 2025, diz agência meteorológica



10:09 AM · Sep 02, 2025 · **10K** Views

**20** Retweets **10** Quotes **102** Likes **12** Bookmarks

**Breaking News**
@breakingnews

Spain sweltered under hottest summer on record in 2025, weather agency says



10:09 AM · Sep 02, 2025 · **10K** Views

**20** Retweets **10** Quotes **102** Likes **12** Bookmarks