MATCHING CONSISTENCY EFFECTS IN PERSUASION: DISTINGUISHING BETWEEN CONSISTENT AND MIXED FRAMED MESSAGES

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Resumo

Alinhar o conteúdo de mensagens com características dos destinatários (i.e., matching) é uma estratégia persuasiva frequentemente associada a atitudes favoráveis e intenções comportamentais. Contrariamente a estudos anteriores focados em exposições a mensagens únicas, adotamos uma abordagem original. Controlámos diferenças de necessidade de cognição (NC) e expusemos os participantes a dois anúncios. Nas condições consistentes, as mensagens de ambos os anúncios alinhavam-se ou não ao traço de extroversão. Nas condições inconsistentes, uma alinhava-se e a outro não (ou vice-versa).

Previsões em relação às atitudes nas condições consistentes foram contrariadas. Especificamente, anúncios matching consistentes não resultaram em atitudes mais favoráveis, desafiando o efeito de favorabilidade para mensagens matching, habitualmente retratado na literatura.

Diferenças na certeza das atitudes com base na consistência dos anúncios também não foram confirmadas. Esperávamos que as condições consistentes promovessem níveis mais elevados de certeza, mas não encontrámos diferenças na certeza entre condições consistentes e inconsistentes. Adicionalmente, indivíduos com NC elevado não relataram maior certeza. Assim, os resultados contrariaram estudos anteriores que relacionam a inconsistência à redução da certeza e o NC elevado ao aumento da certeza.

Apesar de não apoiarem as nossas previsões em relação às atitudes e certeza, os dados obtidos revelaram uma relação significativa entre ambas. As atitudes exerceram uma influência notável nas intenções comportamentais, especialmente quando os indivíduos estavam muito certos das suas atitudes, reforçando evidencias anteriores da existência desta moderação.

De forma exploratória, descobrimos padrões interessantes nas condições inconsistentes, com variações em NC a resultarem em efeitos distintos nas três variáveis em estudo.

Palavras-chave: *Matching*; Consistência; Atitudes; Certeza nas Atitudes; Intenções comportamentais

Abstract

Aligning message content with recipients' characteristics (i.e., matching), is a persuasive strategy often associated with favorable attitudes and behavioral intentions. Unlike previous research focusing on single message exposures, we employed a unique approach. We controlled for differences in need for cognition (NC) and exposed participants to two advertisements. In consistent conditions the frames of both advertisements either consistently matched or mismatched their extroversion trait. In inconsistent conditions, one matched and the other mismatched (or vice versa).

Our predictions regarding attitudes in response to the exposure of consistent frames were contradicted. Specifically, consistent matching advertisements did not yield more favorable attitudes, challenging the established literature showing a favorability effect for matching messages.

Anticipated differences in attitude certainty based on ads consistency were also not supported. We expected consistent conditions to lead to higher certainty levels, but our results revealed no difference in certainty between consistent and inconsistent conditions. Furthermore, we did not find that high NC individuals reported greater certainty than low NC individuals. These findings contrast previous literature linking inconsistency to reduced certainty and high NC to increased certainty.

Despite not providing support to our predictions regarding attitudes or attitude certainty, obtained data revealed a significant relationship between the two. Attitudes notably influenced behavioral intentions, particularly when individuals were highly certain about their attitudes, thus reinforcing prior evidence supporting the existence of this moderation.

In an exploratory endeavor of the inconsistent conditions, we uncovered interesting patterns, with variations in NC leading to distinct effects across the three variables under study.

Key words: Matching; Consistency; Attitudes; Attitude Certainty; Behavioral Intentions

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Introduction

"You can please some of the people all of the time, you can please all of the people some of the time, but you can't please all of the people all of the time."

John Lydgate

Personalizing messages to an audience is a persuasive strategy with a long tradition across various contexts. From government initiatives to promote healthier behaviors, marketers' efforts to acquire and retain consumers, political parties' strategies for mobilizing the voting population, this approach has demonstrated its versatility and impact (Teeny et al., 2021). This topic is of paramount importance in today's digital age, as the deployment of such techniques has become increasingly convenient. Social media and various online platforms now have the capacity to meticulously collect user information, creating profiles that contain details about their preferences, needs, identities, and more (Shankar et al., 2022). Leveraging robust computational systems, this information is stored and made available for purchase, enabling individuals or entities to direct their persuasive messages (e.g., advertisements) to their desired targets (Yun et al., 2020).

In the communication and persuasion domain, the field of social psychology has explored this method (often referred to as "matching"), as a procedure that involves aligning elements from at least two factors within the persuasive setting (i.e., source, message, recipient, context; McGuire, 1969; 1985). However, it has been primarily studied as an alignment between some aspect of the message and some aspect of the recipient (Teeny et al., 2021). Insights from this literature might serve as a valuable resource for anyone seeking to comprehend the impact of personalized appeals on attitudes and, ultimately, behavior.

Although there are various studies exploring matching effects, we adopted a distinct approach by applying a paradigm that encompasses the exposure of the message recipient to both matching and mismatching messages. Therefore, our research seeks to expand the current literature on matching by investigating how the asynchronous exposure to mixed-framed messages influence three critical dependent variables: attitudes, attitude certainty, and behavioral intentions.

Matching Favorability Effect

The study of matching has encompassed a wide array of variables, with the literature revealing an extensive range of recipient characteristics that can be matched with a persuasive message. For instance, Loureiro (2021) found that people can vary in their tendency to

perceive validity in analytical decision-making (i.e., rational decisions that require organization and analysis of the information) versus intuitive judgment (i.e., quick decisions based on what feels right). Furthermore, the research also revealed that individuals with higher levels of perceived validity in intuition (PVI) exhibited more favorable attitudes toward car advertisements featuring intuition appeals (e.g., "Elysium Intuition – Take the road that feels right"), compared to those with lower PVI levels. Conversely, participants with higher levels of Perceived Validity in Analysis (PVA) demonstrated more favorable attitudes toward advertisements featuring analytical appeals (e.g., "Elysium Cognition – Take the wise road"), as opposed to those with lower PVA levels.

Similar effects were also found for individuals with different personality traits. Hirsch et al. (2012) crafted five different advertisements for a mobile phone, each matching one different personality trait (Big Five personality traits; Goldberg, 1990). For instance, when matching extroversion, the advertisement highlighted the idea that "With XPhone, you'll always find yourself where the excitement resides". Independently of the specific dimension, when the advertisements matched with an individual's predominant trait, they consistently rated it as more impactful and expressed more intentions to purchase the product. Interestingly, this strategy didn't go unnoticed, as messages matching the Big Five traits were reportedly used as method to influence the U.S political elections in 2016 (Hern, 2018).

Numerous other studies have examined a variety of additional variables, including but not limited to attitude functions (e.g., Debono, 1987), motivational orientations (e.g., Jeong et al., 2011), moral foundations (e.g., Wolsko et al., 2016), political affiliations (e.g., Eschert et al., 2017), and cultural orientations (e.g., Uskul & Oyserman, 2010). What these studies share in common is a consistent observation of the favorability effect, wherein messages aligned with specific recipient characteristics consistently yield more favorable attitudes and/or behavioral intentions.

Matching and Need for Cognition – Engagement and Favorability

In the persuasion domain, one individual difference that has been widely studied is the Need for Cognition (NC) which reflects one's motivation and enjoyment in engaging with complex cognitive activities and critical thinking (Cacioppo & Petty, 1982). Individuals with high need for cognition (HNC) are more prone to deep thinking, while those with low need for cognition (LNC) prefer less intensive cognitive effort (see Petty et al., 2009, for a review). The importance placed on this variable stem from the fact that attitudes formed via effortful

thinking tend to be stronger (i.e., more resistant over time and impactful of behavior; see Petty & Krosnick, 1995), and those high in need for cognition tend to be more motivated to engage in such processes.

In addition to the favorability effect, various studies have found that message matching stimulates deeper engagement with persuasive content (e.g., DeBono & Harnish, 1988; Petty & Wegener, 1998; Wan & Rucker, 2013; Wheeler et al., 2005). This heightened engagement can be attributed to matching messages being seen as more personally relevant, which enhances motivation to process (Petty & Cacioppo, 1990; Petty et al., 2000). This phenomenon has predominantly been investigated with the argument quality paradigm[1], revealing that when a message matches with recipient characteristics, it bolsters persuasion when accompanied by strong arguments (i.e., favorability effect) but weakens persuasion when the arguments are weak (i.e., reverses the favorability effect). Intriguingly, evidence suggests that this phenomenon is more pronounced among individuals with low need for cognition (e.g., Petty & Wegener, 1998), indicating that those less inclined to deliberate on persuasive messages are more susceptible to this matching engagement effect. Although it remains uncertain in the literature, we can speculate that the matching favorability effect can also be more pronounced among individuals LNC.

Exploring the dual impact: simultaneous exposure to matching and mismatching messages

An angle that has not been covered by the literature is the scenario where a recipient encounters both matching and mismatching messages for the same attitudinal object. As previously described, various studies have demonstrated the possibility of crafting persuasive messages, advocating for the same attitudinal object, that either match or mismatch from a recipient's characteristics. Indeed, in real-world scenarios there are a variety of products, services (or other attitudinal objects of any kind) that can be desired by people with diverse and sometimes opposing characteristics. Although, personalized communication has become

[1] In the context of matching, an argument quality paradigm requires the inclusion of strong (i.e., compelling) and weak arguments (i.e., specious) in both matching and mismatching messages. This procedure roots in the Elaboration Likelihood Model's (ELM; Petty & Cacioppo, 1981, 1986) well-stablished proposition that people can be persuaded through two routes that represent two ends of a continuum of elaboration (i.e., the amount of relevant thinking regarding a persuasive appeal). In the high end of this continuum (i.e., central route), people tend to think deeply about the persuasive appeal and persuasion should occur if the overall message contains strong arguments. On the low end of the continuum (i.e., peripheral route), people do not engage in thorough processing and tend to be persuaded by peripheral cues that do not concern the merits of the persuasive proposal. In other words, if people are processing, the quality of the arguments should determine their attitudes.

more accessible and efficient in the digital age, it still faces challenges (e.g., ensuring data accuracy; Shankar et al., 2022). Moreover, the abundance of communication channels can also lead to inconsistencies and occasional mismatches in the delivery of personalized content. For example, individuals may encounter a targeted advertisement on social media that aligns perfectly with one of their characteristics, because that platform has accurately collected and utilized their data. Yet, in a different channel, such as television, where audience control is more challenging and information is limited, they may be exposed to messages that don't particularly resonate or even oppose their personal characteristics, resulting in mismatches.

When considering the favorability effect, it's logical to assume that receiving consistently matching messages would lead to favorable attitudes, while consistent mismatching messages would result in unfavorable attitudes. This is the typical matching effect found in the literature when strong (or no) arguments are presented in the persuasive message (Teeny et al., 2021). However, in scenarios of inconsistency, predicting specific attitude outcomes becomes challenging.

On the other hand, when considering the impact on attitude certainty, existing literature suggests that perceived inconsistency in the information underpinning attitudes tends to reduce the level of certainty (see Rucker et al., 2014). For instance, Maheswaran and Chaiken (1991) conducted a study in which participants received information about a cell phone's attributes, with some participants receiving a list with predominantly positive attributes and others predominantly negative. Participants also learned about customer satisfaction, with some being informed of high satisfaction rates and others of low rates. The results indicated that participants exhibited higher attitude certainty when the information was evaluatively consistent (e.g., negative attributes paired with low customer satisfaction rates) and lower certainty when it was evaluatively inconsistent (e.g., positive attributes paired with low customer satisfaction rates). Similarly, Smith et al. (2008) found that participants' attitudes towards a department store were held with greater certainty when the information presented about the store was evaluatively consistent, either entirely positive or entirely negative. Conversely, participants displayed lower levels of certainty regarding their attitudes when the information was evaluatively inconsistent, incorporating a mixture of positive and negative aspects.

Expanding upon this idea, if we conceptualize matching messages as favorable aspects of the information and mismatching messages as unfavorable aspects, we can

hypothesize that when individuals encounter a combination of matching and mismatching messages, their attitude certainty may be lower compared to those who receive exclusively matching or mismatching messages. In other words, the presence of mixed-framed messages may introduce greater uncertainty into individuals' attitudes.

Furthermore, since attitude certainty is inherently a metacognitive process that typically occurs in situations of extensive cognitive elaboration (e.g., Rucker et al., 2008; Tormala & Petty, 2004a,b), it is imperative to closely examine the influence of need for cognition. This is especially crucial because higher levels of certainty tend to manifest among individuals with a high need for cognition (e.g., Tormala & Petty, 2004a).

Finally, if we consider that inconsistent exposure to matching and mismatching messages affects attitude certainty, we can also speculate that it will impact the predictive power of those attitudes on the behavioral intentions (Tormala & Rucker 2007; 2018; Rucker et al., 2014). This is true because literature has demonstrated that attitude certainty plays a pivotal role as a moderator in the correlation between attitudes and behavior (e.g., Fazio & Zanna, 1978; Tormala et al., 2006; Tormala & Petty, 2002). As an illustrative example of this conjecture, in a study by Rucker and Petty (2004), participants were exposed to a persuasive advertisement (featuring strong arguments) for a new aspirin product. Some were instructed to think about the product without specific guidance (undirected thinking condition), while others were asked to generate positive thoughts (positive-directed thinking condition), and some others had to generate negative thoughts (negative-directed thinking condition). Interestingly, it was found that participants developed generally positive attitudes towards the aspirin product regardless of their instruction (i.e., no differences in the valence of the attitudes). However, those who had to counterargue in the face of compelling arguments (i.e., those in the negative-directed thinking condition), displayed higher levels of attitude certainty. Notably, those same individuals with greater attitude certainty also expressed a stronger intention to use the product, highlighting the link between attitude certainty and enhanced behavioral intentions.

Present study

In the present study, we sought to explore a scenario where individuals are exposed to a series of ads regarding the same service. Those ads could either consistently match or mismatch with their personality trait of extroversion (referred to as consistent conditions), or feature one ad that matches and another that mismatches with their trait (referred to as

inconsistent conditions). Our primary objective was to examine how these different scenarios could influence three key dependent variables: individuals' attitudes, the certainty of their attitudes, and their behavioral intentions.

Hypotheses regarding attitudes

We predict that participants attitudes will reflect favorability effects, but only in the consistent conditions[2]. Meaning that participants presented with consistently matching messages will exhibit more favorable attitudes than those who consistently saw mismatching messages. Moreover, we speculate that this effect should be more pronounced among participants with low (rather than high) need for cognition. Our rationale stems from the findings of the previously described study of Petty and Wegener (1998). Although we didn't employ an argument quality paradigm, we speculate that the favorability effect of matching under consistent conditions will also be more pronounced in participants low in need for cognition because those high tend to process regardless of matching.

Hypotheses regarding attitude certainty

For the attitude certainty, we hypothesize that when individuals encounter a mix of matching and mismatching messages (i.e., inconsistent conditions), their attitude certainty will be lower compared to those who receive fully matching or mismatching messages (i.e., consistent conditions). Additionally, we hypothesize that the preceding hypothesis will be particularly accentuated among participants characterized by a high need for cognition.

Hypotheses regarding behavioral intentions

Lastly, for behavioral intentions, we anticipate replicating the patterns observed for attitudes, because matching has previously been linked to both more favorable attitudes and increased behavioral intentions. Additionally, we expect this pattern to be especially pronounced for attitudes held with high certainty, since existing literature indicates that greater certainty in attitudes has a positive impact on the strength of the correlation between attitudes and behavior.

[2] The hypotheses regarding attitudes are specifically directed at "consistent conditions" because in these conditions, participants were exposed to two messages that either both matched or mismatched, resulting in a "pure" match or mismatch scenario. The matching effects as documented in the literature are not applicable to scenarios where participants encounter a mix of matching and mismatching messages, which characterizes the "inconsistent conditions". Thus, we will not make any predictions regarding the attitudes under inconsistent conditions.

Method

Participants

Our sample selection was informed by a G*Power analysis, utilizing an "ANOVA - Fixed Effects, special, main effects and interactions" test model (Faul et al., 2007). We set the error probability at .05 and the test power at .80, considering four groups with an effect size of $f = .25$[3]. The computation indicated that, in order to attain the desired level of power, a sample size of approximately 128 participants was necessary.

Data was collected from an initial sample of 363 Portuguese-speaking individuals through online recruitment, aiming to meet specific inclusion and exclusion criteria. The eligibility requirements necessitated fluency in Portuguese, an age range of 18 to 30 years, a non-random response pattern (such as not consistently selecting identical responses for all items regardless of the item's content, or failing to distinguish responses for reverse-coded items indicating a lack of engagement with the survey), and completion of all survey stages (excluding recall and control checks). Furthermore, we analyzed the response time distribution on a histogram graph and excluded outliers with unusually short (< 300 seconds) or excessively long durations (> 1500 seconds).

After applying all of these criteria, the final sample consisted of 161 participants (91 females, 68 males, 2 unspecified) with ages between 18 and 30 years old (M = 25.10, SD = 2.88). In terms of educational background, the majority held at least a bachelor's degree (47.8%), while 31.7% had obtained a master's degree. Only one participant held a Ph.D. (0.6%), and the remaining participants had completed high school (19.9%).

Design

The study employed a 2 (first ad: match vs. mismatch)[4] X 2 (second ad: consistent vs. inconsistent) between-subjects factorial design. Participants were randomly and evenly distributed across four conditions. The match consistent condition involved exposure to match frames in both advertisements ($n = 35$). The mismatch consistent condition ($n = 46$) involved viewing mismatch frames in both instances. In the match inconsistent condition ($n = 43$),

[3] As no literature was found on the intended effect size, an average size effect of $d = .25$ was adopted based on the recommendation of Cohen (1992).

[4] In the experimental design, matching and mismatching was determined by aligning extrovert and introvert frames with participants' extroversion scores. This categorization was achieved through a median split, where participants equal to or above the median were labeled as introverts, while those below were labeled as extroverts. Matching occurred when extroverts viewed an ad tailored for extroverts or when introverts viewed an ad tailored for introverts. Conversely, mismatching applied in the opposite scenarios.

participants initially encountered a match frame followed by a mismatch one. Lastly, in the mismatch inconsistent condition (n = 37) participants first saw a mismatch frame and then a match one.

In addition to the described factorial design, the study also incorporated the covariate of need for cognition (NC) to account for individual differences in cognitive engagement and information processing.

Materials

Target Ads

A total of eight banner advertisements were designed for a fictitious mobile application named “TripPlanner”, that aimed to help users with trip planning. The eight different ads resulted from the combination of two different layouts with four unique frames.

As a first step, the attitudinal object was chosen as it met the criteria of being suitable for advertising to both extroverts and introverts, ensuring that it possesses characteristics that can appeal to individuals of both personality types. Subsequently, four unique frames were crafted. Two of those were tailored for extroverts, highlighting group trips and social gatherings - elements that resonate with extroverted individuals' preference for social interaction and communal experiences. The other two frames were customized for introverts, emphasizing solo trips and relaxation, aiming to appeal to their preference for solitude, tranquility, and individual experiences.

Further distinguishing the ads, two different layouts were created using Canva[5]. This process offered visual diversity while maintaining consistent the logo, brand name, and slogan across all advertisements. Each of the four frames were employed in the two different layouts, resulting in the aforementioned eight distinct banner advertisements.

Finally, to ensure the appropriateness of the materials developed, a panel of five judges validated all decisions and creations, confirming their suitability for the respective personality types they were designed to target.

These materials can be found in the appendix B (figure B1 to B8).

[5] Canva is an online graphic design tool that allows users to create digital graphics and visual content.

Filler Ads

To divert participants' attention away from the study's main objective and enhance the ecological validity, we included six additional filler ads. These were designed for three different mobile applications, each having two distinct versions. These ads were also created using Canva and aimed to simulate real-world conditions where people are exposed to a diversity of advertisements for different products and services. Importantly, these ads had similar characteristics to the target ads, but the frames were not intended to be related to the personality trait of extroversion.

These filler ads are also available in the appendix B (figure B9 to B14).

Individual Differences Measures

Big Five Inventory – Short Version (BFI-10)

We selected the BFI-10 to assess participants' levels of introversion-extroversion, one of the scale's dimensions. This scale evaluates five critical personality traits: Extroversion, Agreeableness, Conscientiousness, Neuroticism, and Open-Mindedness.

Initially, the measurement of these Big Five personality traits involved a large number of items, such as the 240-item NEO Personality Inventory—Revised from Costa and McCrae (1992), the 100-item trait-descriptive adjectives from Goldberg et al. (2006), and the 44-item Big Five Inventory from John et al. (1991). While comprehensive, these scales are also time-consuming, rendering them less suitable for research settings with time restrictions. The short-form scale, BFI-10 (Rammstedt & John, 2007), comprises only two items per trait. Each item is rated on a 5-point scale, ranging from 1 ("Disagree strongly") to 5 ("Agree strongly"). In this study, we employed the Portuguese version of the Big Five Inventory – Short Version (BFI-10), as adapted by Bártolo-Ribeiro (2017).

Despite the potential reliability challenges due to its reduced number of items (Cronbach's $\alpha < .7$), the Portuguese BFI-10 exhibits strong construct validity, confirmed by both Exploratory and Confirmatory Factor Analyses, with all items scoring above .70 on their original dimensions.

A comprehensive and detailed psychometric analysis can be located in the appendix C.

Need For Cognition Scale (NCS-6)

In this research, we operationalized the assessment of need for cognition through a translated version of a 6-item scale (Coelho et al., 2020). The original NC scale, developed by Cacioppo and Petty (1982), encompassed 34 items and was designed to measure an individual's tendency to engage in and enjoy cognitive efforts. However, due to the demand for a more streamlined measure, an 18-item version of the NC scale was subsequently developed (Cacioppo et al., 1984). Recently, an even more concise 6-item scale has been developed for English-speaking populations. This scale has demonstrated strong psychometric robustness, with consistency in the USA (ω and α = .90) and the UK (ω and α = .86) (Coelho et al., 2020). This further refinement of the NC measure accommodates diverse research settings without compromising its quality.

For this study, we adapted the Portuguese version of the 18-item NC (Silva & Garcia-Marques, 2006) scale to match the 6-item structure. This adaptation was feasible as the 18-item Portuguese version encompassed the same six items featured in the more condensed English version. Each item is rated on a 5-point Likert scale, ranging from 1 "Nothing like me" to 5 "Completely like me," with higher scores indicating a greater need for cognition. This approach allowed us to use a more compact scale while ensuring it was culturally and linguistically suitable for our Portuguese-speaking participants.

The appendix C contains the English version of the NCS-6 and the Portuguese adaptation with a detailed psychometric analysis.

Procedure

Participants were invited via social media (mainly Instagram and WhatsApp) to participate in this experiment through a link that directed them to the Qualtrics[6] platform, which was compatible with multiple devices including laptops, smartphones, and tablets. The first page briefly explained the experiment and requested informed consent. Participants were informed that they would be participating in two independent studies[7], the first one concerning individual characteristics and the second about preferences for mobile applications. After proceeding on the first page that guaranteed informed consent, participants began by answering demographic characterization questions (age, gender, and education

[6] Qualtrics is a cloud-based platform that enables survey creation, distribution, and data collection.
[7] To avoid potential biases in responses, the two studies were presented as independent, but were in fact related. This was done to ensure that participants did not form any expectations or make assumptions about the relationship between the different tasks involved in the tasks.

level). After that, participants completed the BFI-10 scale followed by the NCS-6 as part of the first study. Right upon completing the two scales, a message appeared on the screen thanking participants for their participation in the first study, followed by a new message that introduced the second study: "Today there are mobile applications with different purposes. Next, you will be presented with ads for four new applications that will be launched on the market.". The disclaimer that these applications were not yet available aimed to deter participants from seeking additional information during the experiment.

On proceeding to the second study, participants were instructed that they would see a set of four advertisements for different applications and that their task was to observe these ads (ads displayed for 10 seconds minimum, then skippable). The first two ads were fillers, the third ad was the target, and then another filler ad was displayed. After viewing the first set of four advertisements, a message was presented informing them that various versions of advertisements were typically created and tested, and that they would see a new set of four advertisements. The new set of ads represented the same mobile applications and were displayed in the same order as the first set (two fillers, then the target, and finally another filler).

Following the viewing of all eight advertisements (six fillers and two targets), participants were directed to respond to the dependent measures and a control measures, by the order presented below.

In addition to this description, we have included screenshots displaying the questionnaire in Appendix D.

Dependent Measures

Attitudes Towards the TripPlanner App

To measure participants' attitudes towards the TripPlanner application, they were presented with the statement “I would like to know your opinion about the TripPlanner app (travel planning app). Please use the following response scales to answer the question below.”, followed by the question “How do you rate the TripPlanner app?”. Participants rated the app using five seven-point semantic differentials with the anchors: Bad/Good, Negative/Positive, Undesirable/Desirable, Unattractive/Attractive, and Useless/Useful.

Attitudes certainty

To evaluate the certainty that participants had in their attitudes, three questions were introduced, answered through three rating scales (anchored in 1 = “Not at all” and 7 = “Completely”). The questions were (in this order): "How certain are you of your feelings regarding the TripPlanner application?"; "How convinced are you of your evaluation regarding the TripPlanner application?"; "How certain are you of your opinion regarding the TripPlanner application?".

Behavioral Intentions

Behavioral intentions were measured by the response to two questions, using a seven-point rating scale with the anchors 1 = “Not at all” and 7 = “Extremely”. The questions used were (in this order): "If you needed a travel planning app, how likely would you be to use TripPlanner?" and "How likely would you be to recommend TripPlanner to someone else?".

Control Measures

Recall

Participants were asked to indicate at least one relevant aspect they remembered about the advertisements, with five spaces provided for their response (although only one was mandatory)[8].

Control

As a control measure, participants were asked whether they perceived any connection between the tasks they performed in the two studies, and if they answered "yes", they were requested to provide a justification.

After completing all measures, participants were provided with a debriefing on the last page of the study. The debriefing explained the purpose of the study and invited participants to contact via email if they had any questions or concerns. Additionally, they were invited to voluntarily share the survey with others.

[8] Although we included this measure, participants' responses were often vague and did not appear to warrant further in-depth analysis. Consequently, these responses were not subjected to a detailed analysis and will not be reported in the results section of this study.

Results

Sample Analysis

Before proceeding with our main analyses, we conducted several checks to ensure that our participants sample met the predefined inclusion criteria. These criteria were established to maintain the integrity of our study and ensure the reliability of our data.

Participants who were not fluent in Portuguese or fell outside the age range of 18 to 30 years old, were unable to proceed with the study. Following the application of these criteria, we initially received a total of 363 responses.

Participants were also required to have at least a 96% progress, meaning that they had to complete all survey stages (excluding the recall and control checks). A total of 179 participants were excluded due to this criterion. Moreover, to detect outliers in response time, we plotted the response time distribution on a histogram graph. We identified 22 responses with unusually short durations (less than 300 seconds) or excessively long durations (greater than 1500 seconds) as outliers and excluded them from the dataset. After applying these two criteria, we were left with 162 responses.

To identify potential random response patterns, we carefully reviewed participants' responses. Specifically, we checked whether respondents consistently selected identical responses for all items, regardless of their content. Additionally, we examined whether participants failed to distinguish responses for reverse-coded items, which could indicate a lack of engagement with the survey. After this examination, one participant was excluded, leaving us with 161 participants.

At the end of the survey, we asked participants whether they suspected any relationship between the tasks from the two studies presented as independent. Although some participants answered yes, none of them provided a correct justification for the study's purpose. Therefore, no participants were excluded based on this criterion.

Descriptive statistics of the final sample can be found in the appendix E.

Psychometric Properties of the Individual Differences Measures

After analyzing our sample, we assessed the psychometric properties of the scales employed in this study, namely the Big Five Inventory – Short Version (BFI-10) and the Need for Cognition Scale (NCS-6), to ensure their sensitivity, reliability and validity.

Psychometric Properties of the Big Five Inventory – Short Version (BFI-10)

In general, the BFI-10 demonstrated acceptable psychometric properties in our study. Given our primary focus on the introversion/extroversion dimension, we will limit the description of our analysis to the two items (items 1 and 6) representing this dimension. However, a more detailed description can be consulted in the appendix C.

Regarding the sensitivity of the items, both items garnered responses across all five possible levels of the scale. We adhered to Marôco's (2018) recommendations, ensuring that the two items, as well as the overall dimension, conformed to acceptable skewness (|7|) and kurtosis (|3|) ranges. Specifically, for the two items, skewness values were -0.36 (item 6) to 0.15 (item 1), and kurtosis were -0.78 (item 6) to -0.49 (item 1). The score based on the average of these two items also revealed good sensitivity (specifically 0.09 for skewness, and -0.87 for kurtosis).

In terms of reliability, since this dimension encompassed 2 items, we followed Eisinga et al.'s (2013) recommendations and conducted a split-half analysis, resulting in a Spearman-Brown coefficient of .636.

In the final step, we conducted a confirmatory factor analysis (CFA), which confirmed that the model was well-suited to represent the five expected dimensions. The analysis yielded satisfactory fit indices, including X^2/df = 1.55, CFI = .92, TLI = .86, and RMSEA = .059.

Psychometric Properties of the Need for Cognition Scale (NCS-6)

We assessed the psychometric properties of NCS-6 using the same procedure as described for the BFI-10, with a detailed analysis available in the appendix C.

Initially, we verified that all items received responses across the entire five-level scale. Additionally, we confirmed that both the individual items and the total score adhered to acceptable levels of skewness and kurtosis (Marôco, 2018). Skewness for the items ranged from -1.29 to -0.11, with kurtosis values falling between -0.51 and 1.37. The total score, calculated as the average of the six items, exhibited skewness at -0.39 and kurtosis at -0.05.

Internal consistency of the scale, consisting of a single dimension measured by six items, was evaluated using Cronbach's alpha. The obtained alpha coefficient was .82, indicating good reliability for the scale.

Due to the unavailability of the NCS-6 scale for the Portuguese population, we adapted six identical items from a previously validated Portuguese 18-item scale. To ensure the suitability of this adaptation, an exploratory factor analysis (EFA) was conducted. All Kaiser-Meyer-Olkin (KMO) values exceeded .800, with an overall value of .848. Bartlett's sphericity test yielded a value of 276 (*df* 15; $p < .001$). The one-factor structure of the scale was confirmed, as indicated by the fact that only one factor had an eigenvalue greater than 1 and the scree plot inflection point. Despite the percentage of explained variance being slightly below expectations (42.8%), the initial eigenvalues, Scree Plot, and theoretical expectations support the scale's validity in capturing the one-dimensional nature of the NC construct.

Psychometric Properties of the Materials used to Assess the Dependent Variables

Next, we will examine the psychometric properties of the scales used to assess the dependent variables, namely, attitudes, attitudes certainty, and behavioral intentions. Our analysis focused on evaluating the sensitivity, reliability, and validity of these scales. For detailed statistics of these measures see appendix.

Attitudes

We assessed attitudes using five 7-point semantic differentials, each differential received responses across all seven levels of the scale. The skewness of the items ranged from a minimum of -0.67 to a maximum of -0.21, and the kurtosis ranged from a minimum of -0.75 to a maximum of 0.25, all of which fell within acceptable ranges. We also calculated attitude scores by averaging the five items, and ensured coverage across the entire 1 to 7 scale range. The skewness of the attitude scores was -0.43, and the kurtosis was -0.12. Moreover, all five attitude items loaded onto a single factor, explaining 70% of the variance, with high internal consistency ($\alpha = .92$).

Attitude Certainty

To assess attitude certainty, we utilized three questions that were answered using a 7-point scale. Responses for all three questions encompassed the full range of scale levels, suggesting measure sensitivity. Skewness values for the responses ranged from a minimum of -0.20 to a maximum of -0.14, and kurtosis values ranged from -0.85 to -0.63, all well within the expected range for. In terms of scores, just like for attitudes, we averaged the items, and the entire range of the scale was covered. Besides, skewness and kurtosis values were within the acceptable interval (-0.15 and -0.66, respectively). Notably, all three items loaded significantly onto a single factor, collectively accounting for 88.3% of the variance.

Furthermore, the internal consistency of this factor was high, with a Cronbach's alpha (α) of .96.

Behavioral intentions

For measuring behavioral intentions, we utilized two questions answered through a seven-point rating scale. Both questions had responses across all seven levels of the scale. Skewness values for the responses were -0.23 (item 1) and 0.05 (item 2), while kurtosis values were -0.71 (item 1) and 0.72 (item 2), all of which fell within the range typically associated with normal distribution. The average scores spanned the entire scale distribution, with skewness and kurtosis values of -0.12 and -0.66, respectively, affirming a normal distribution. To assess internal consistency, we computed the correlation between both items, yielding a Pearson coefficient of $r = .82$, indicative of strong reliability.

Predicting Attitudes: Exploring the Matching Favorability Effect under Consistency and the Moderating Role of Need for Cognition

To examine the influence of matching and consistency on attitudes, we conducted an ANOVA with attitudes as the dependent variable, and we introduced matching and consistency as the two factors. In addition, we incorporated need for cognition (NC) as a covariate to assess its potential moderating effect. All main effects were non-significant (see appendix E, table E4). More important to our hypothesis, the interaction between matching and consistency was also non-significant, $F < 1$.

Furthermore, we observed a marginally significant three-way interaction among matching, consistency, and NC, with $F(1, 153) = 2.62$, $p = .107$, $\eta_p^2 = 0.02$. Therefore, because we aimed to specifically test whether participants in a consistent matching condition exhibited more favorable attitudes compared to those in a consistent mismatching condition, we isolated the consistent conditions[9] ($n = 81$) and performed an ANOVA, using attitudes as the dependent variable, matching as the factor, and NC as covariate. The results revealed that main effects of matching and NC were both not statistically significant $F < 1$ (see appendix E, table E5). Thus, our hypothesis wasn't confirmed, there was no significant difference in attitudes between participants in the consistent matching ($M = 4.66$, $SD = 0.23$) and consistent mismatching ($M = 4.88$, $SD = 0.20$) conditions.

[9] We conducted a separate analysis of the inconsistent conditions, which will be presented in the additional analysis subsection at the end of the results section.

Additionally, we also predicted that the effects of matching on attitudes should be moderated by NC, however, that the interaction effect between matching and NC was not statistically significant $F < 1$. This indicates that the influence of matching on attitudes did not significantly vary based on participants' levels of need for cognition.

Hence, both hypotheses concerning attitudes were not supported. It appears that neither matching had an impact on attitudes under consistent conditions, nor did need for cognition exhibit any moderating influence on these effects.

Attitude Certainty: The Influence of Framing Consistency and Need for Cognition

We posited two hypotheses for attitude certainty. Firstly, we hypothesized that individuals exposed to inconsistent message conditions would demonstrate decreased levels of attitude certainty when compared to their counterparts in consistent framing conditions. Additionally, we expected that variations in attitude certainty would also be influenced by participants' individual differences in need for cognition.

To test those hypotheses, we ran an ANOVA with attitude certainty as the dependent variable, using the same two factors (matching and consistency) and covariate (NC) that we employed for attitudes. Based on the results of the analysis, there was no statistically significant main effect of matching or consistency ($F < 1$), on attitude certainty (see appendix E, table E6). Thus, we have to reject our hypothesis, attitude certainty of those in consistent conditions ($M = 4.54$, $SD = 0.17$) didn't vary from those under inconsistent frame conditions ($M = 4.44$, $SD = 0.18$).

While the main effect of NC was in the expected direction, with higher levels of need for cognition promoting greater attitude certainty, this effect was non-significant, $F(1, 153) = 1.94$, $p = .166$, $\eta_p^2 = 0.01$.Therefore, we must also refute our hypothesis that there would be a difference in certainty, with individuals HNC having greater certainty compared to those LNC.

There was an intriguing three-way interaction between matching, consistency, and NC, as indicated by a significant result, $F(1, 153) = 7.00$, $p = .009$, $\eta_p^2 = 0.04$. While we did not formulate specific hypotheses for this interaction, we will further explore it through contrast analysis in the additional analysis subsection. We are taking this approach because, in the additional analysis, we will focus on the inconsistent conditions where significant effects were observed.

The Influence of Attitudes on the Behavioral Intentions and the Moderating Role of Certainty

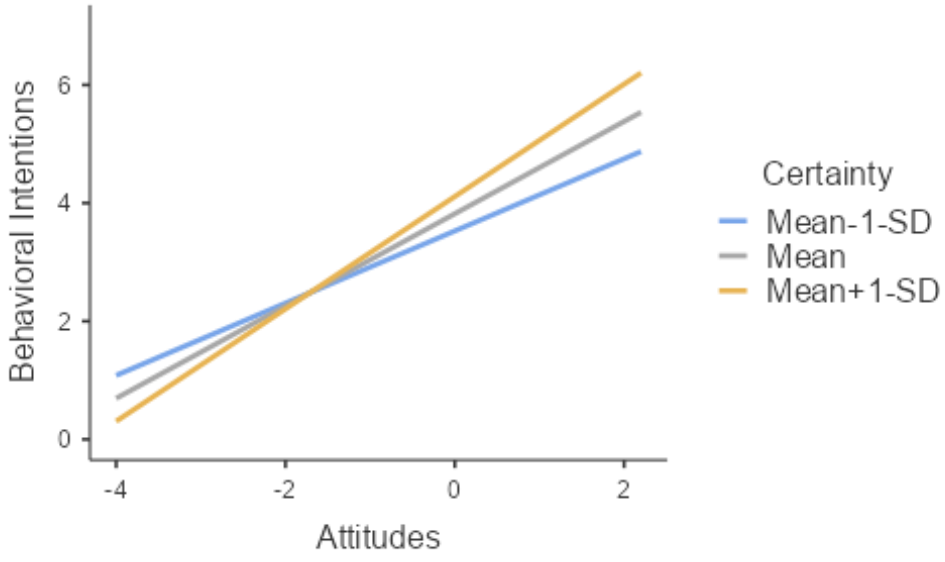
For the analysis of behavioral intentions, we sought to replicate the observed patterns in attitudes. To achieve this, we conducted an ANOVA that included attitudes and attitude certainty as covariates (see appendix E, table E7). The results showed a highly significant effect of attitudes on behavioral intentions, F (1, 157) = 124.79, $p < .001$, $\eta_p^2 = 0.44$, revealing that as participants displayed more favorable attitudes, their expressed behavioral intentions also increased.

Furthermore, we observed a significant main effect of certainty on behavioral intentions, F (1, 157) = 11.59, $p < .001$, $\eta_p^2 = 0.07$, signifying that the level of certainty associated with attitudes also played a role in shaping behavioral intentions. Notably, the interaction effect between attitudes and certainty was also statistically significant, F (1, 157) = 7.95, $p = .005$, $\eta_p^2 = 0.05$ (see figure 1). This finding demonstrates that the relationship between attitudes and behavioral intentions was moderated by the level of certainty individuals had in their attitudes, such that attitudes held with higher levels of certainty demonstrated a stronger relation with subsequent behavioral intentions.

In conclusion, our results support both of our hypotheses, providing evidence for the impact of attitudes on behavioral intentions and the moderating role of certainty in this relationship.

Figure 1

Behavioral Intentions as Function of Attitudes and Attitude Certainty



Additional Analysis: Inconsistent Conditions

In this section, we analyze attitudes, attitude certainty, and behavioral intentions under inconsistent matching conditions while also examining the influence of the NC. Although we did not formulate specific hypotheses for these conditions, we embark on this exploratory journey to gain insights of the dynamics at play in scenarios where participants encounter a mix of matching and mismatching messages.

As we explore the effects within the two inconsistent conditions, it's essential to highlight that the sole distinction between them is the sequence in which the frames (either matching or mismatching) were presented to the participants, with one group exposed to a matching frame followed by a mismatching frame, and the other in the reverse order.

Attitudes Under Inconsistent Conditions

As previously reported, we obtained a non-statistically significant three-way interaction between matching, consistency and NC. Moreover, when we isolated the consistent conditions, we couldn't find any effect ($F < 1$). However, by isolating the inconsistent frame conditions, we found a statistically significant interaction effect between matching and NC, $F(1, 76) = 4.79$, $p = .032$, $\eta_p^2 = 0.06$ (see appendix E, table E8). To interpret this intriguing finding, we conducted a simple effects analysis. This approach allowed us to delve deeper into the nature of this interaction, specifically by exploring how the order of receiving the matching message (whether before or after the mismatching one) may influence the impact of matching, considering participants' differences in NC.

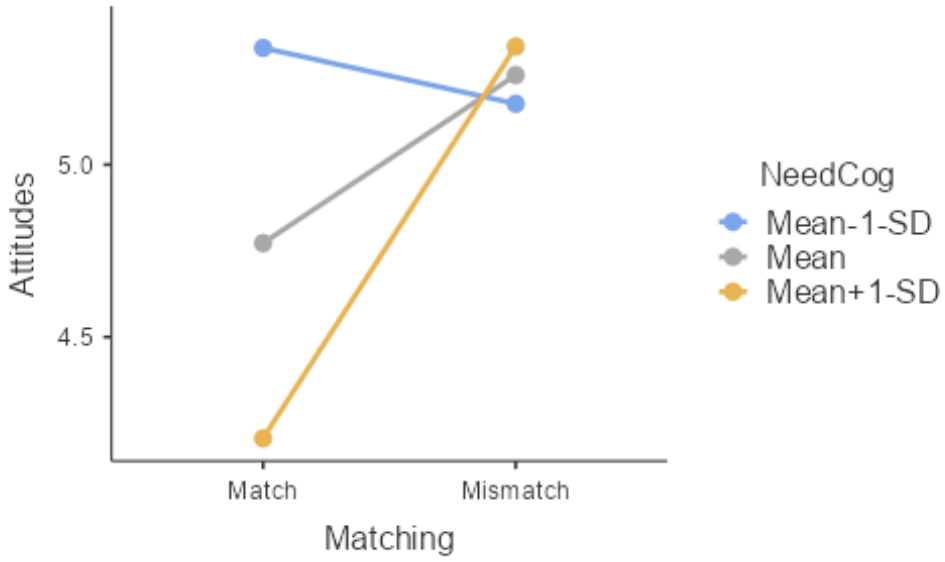
In analyzing the impact of message order on attitudes, we found that for participants with low need for cognition (LNC), the order in which they received the messages did not significantly influence their attitudes, $b = -1.20$, $t(76) = -0.39$, $p = .701$. Whether they received a matching message before ($M = 5.34$, $SD = 0.28$) or after ($M = 5.18$, $SD = 0.32$) the mismatching message, their attitudes remained generally positive[10]. However, among participants with high need for cognition (HNC), the order of message receipt had a significant influence, $b = 0.84$, $t(76) = 2.72$, $p = .008$. Those who received a matching message first reported less favorable attitudes ($M = 4.21$, $SD = 0.31$) compared to those who received a mismatching message first ($M = 5.34$, $SD = 0.28$) (see figure 2).

[10] Mean attitudes under inconsistent conditions (n = 80) was 5.04 ($SD = 1.36$).

Furthermore, within the subset of participants who received the matching message first, individual differences in NC also played a role, b = -0.42, $t(76)$ = -2.67, p = .010. Participants LNC reported more favorable attitudes (M = 5.34, SD = 0.28) than those HNC (M = 4.21, SD = 0.31) (see figure 2, differences within the matching condition).

Figure 2

Attitudes under Inconsistent Conditions



Note. The horizontal axis represents the first ad participants were exposed to (either match or mismatch), and the lines indicate differences in NC (blue line for LNC and orange line for HNC).

Attitude Certainty Under Inconsistent Conditions

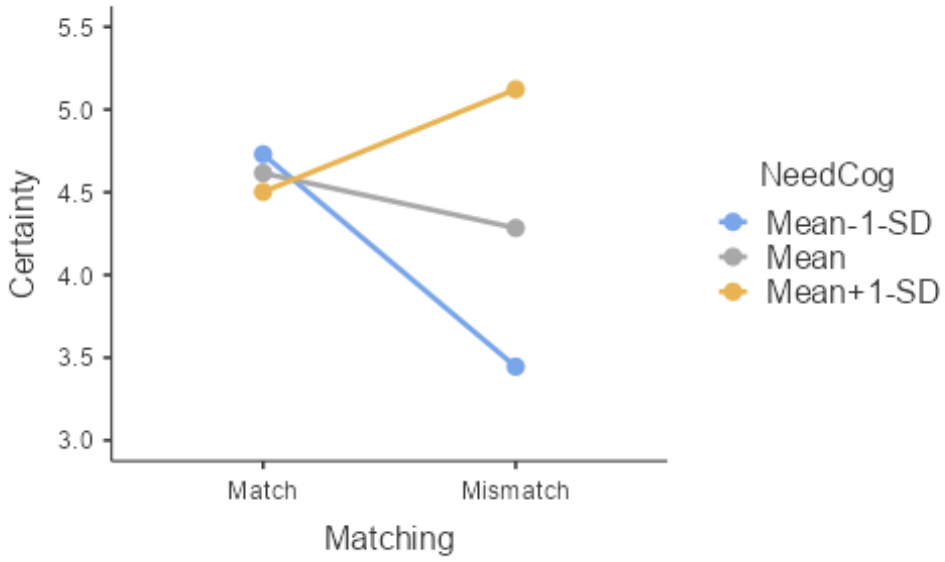
As noted in the analysis of attitude certainty, we uncovered an intriguing three-way interaction between matching, consistency, and NC. Although specific hypotheses were not formulated for this interaction, we now turn our attention to a detailed examination of this effect.

First, we segregated the consistent conditions within our sample (n = 81) and conducted ANOVA, but no statistically significant effects emerged from this analysis. Yet, when we tested for the inconsistent conditions (n = 81) we found a main effect of NC, $F(1, 76) = 4.89$, p = .030, η_p^2 = .06 (see appendix E, table E9), revealing that higher levels of NC promoted more attitude certainty, under these conditions.

Additionally, just like for attitudes, we found an interaction effect between matching and NC, $F(1,76) = 8.45$, $p = .005$, $\eta_p^2 = .10$. However, this one with different nuances from the other one, and to understand it further we went for the simple effects analysis. It seems like attitude certainty of those HNC didn't differ as function of the order of the message received (whether matching first or vice versa), $b = 0.40$, $t(76) = 1.34$, $p = .183$. But the order had an impact for those LNC, $b = -0.83$, $t(76) = -2.77$, $p = .007$. Specifically, their attitude certainty was higher when the first message was match ($M = 4.73$, $SD = 0.31$), than when it was a mismatch ($M = 3.45$, $SD = 0.35$) (see figure 3). Furthermore, when the first message was a mismatch, mean differences as a function of NC were also significant, $b = 0.54$, $t(76) = 3.68$, $p < .001$, with those HNC reporting more attitude certainty ($M = 5.12$, $SD = 0.31$) than their LNC counterparts ($M = 3.45$, $SD = 0.35$) (see figure 3, differences within the mismatching condition).

Figure 3

Attitude Certainty under Inconsistent Conditions



Note. The horizontal axis represents the first ad participants were exposed to (either match or mismatch), and the lines indicate differences in NC (blue line for LNC and orange line for HNC).

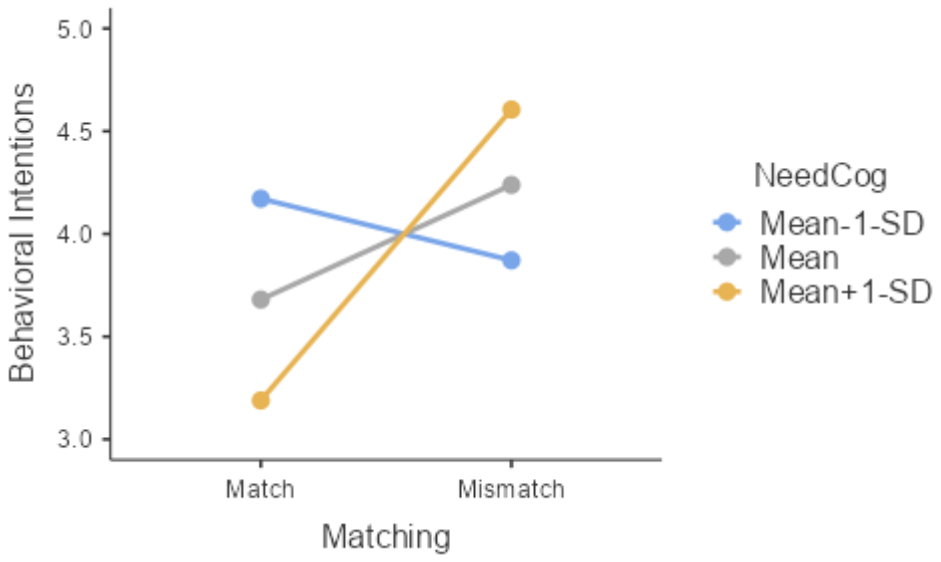
Behavioral Intentions Under Inconsistent Conditions

When examining our model with behavioral intentions as dependent variable, we didn't find any significant main effects. However, we found a marginally significant three-

way interaction between matching, consistency and NC $F(1,153) = 2.72$, $p = .101$, $\eta_p^2 = .02$. To interpret this interaction, we examined both the consistent and inconsistent conditions. Notably, no significant effect was observed for the consistent conditions ($F < 1$). However, a two-way interaction between matching and NC did emerge in the inconsistent conditions, $F(1,76) = 6.20$, $p = .015$, $\eta_p^2 = .08$ (see appendix E, table E10). This interaction indicates that both the order of presentation for matching and mismatching messages and participants' levels of NC significantly influenced their behavioral intentions. Specifically, we discovered that for HNC participants under inconsistency, receiving a matching message first resulted in fewer behavioral intentions ($M = 3.19$, $SD = 0.36$) compared to receiving a mismatching message first ($M = 4.61$, $SD = 0.33$), as indicated by a significant simple effects analysis, $b = 0.90$, $t(76) = 2.92$, $p = .005$ (see figure 4). On the other hand, for LNC participants under inconsistency, the order of message receipt did not yield significant differences, whether it was matching first ($M = 4.17$, $SD = 0.32$) or mismatching first ($M = 3.87$, $SD = 0.37$), as no significant effect was observed, $b = -0.19$, $t(76) = -0.62$, $p = .540$.

Figure 4

Behavioral Intentions under Inconsistent Conditions



Note. The horizontal axis represents the first ad participants were exposed to (either match or mismatch), and the lines indicate differences in NC (blue line for LNC and orange line for HNC).

Discussion

With this study, we aimed to investigate the impact of personalized message sequences on attitudes, attitude certainty, and behavioral intentions. We utilized a paradigm that involved exposing participants to both matching and mismatching messages, with exposure conditions categorized as consistent (involving only matching and mismatching messages) or inconsistent (involving both matching and mismatching messages in different orders).

Attitudes

We initially anticipated a favorability effect, such that the attitudes from participants that received consistently matching messages would be more favorable than those who received consistently mismatching messages. This has been the finding of numerous studies on matching, demonstrating that receiving a matching message led to more favorable attitudes than receiving a mismatching one (see Teeny et al., 2021 for a review). However, in our study we observed that attitudes under consistent conditions didn't differ as a function of matching.

To understand why we didn't observe the matching favorability effect, it's crucial to consider our unique approach. Unlike prior research that exposed participants to a single message, we asynchronously exposed our participants to two messages. Delving into less-explored literature that highlights instances when matching undermines persuasion might give us clues about this unexpected finding.

An important question to consider is whether the exposure to two matching messages raised participants' awareness of being targeted and prompted them to seek correctness. When Cesario et al. (2004) directed participants attention to the correct source of their "feeling right experience" (i.e., matching), attitudes were even slightly lower when the message matched participants than when it didn't, although differences weren't statistically significant. They suggested that the obtained effect could be a version of overcorrection, a phenomenon that occurs when people pay attention to and then become concerned about a possible bias in their judgments (e.g., Petty & Wegener, 1993). Although Cesario et al. (2004) explicitly manipulated this aspect before presenting the persuasive message, it is conceivable that in our study, the dual exposure to matching messages, following questions about their personality, might have signaled to them that they were being targeted. We also observed a slight reversal of the favorability effect (though not statistically significant), wherein two matching messages resulted in less favorable attitudes than two mismatching messages.

Further evidence of matching reducing persuasion can be found in a study by Kim et al. (2019). Their research revealed that when individuals became aware that an advertisement was targeted at them using information collected from a different website, it raises privacy concerns that mediate a negative impact on their intentions to visit the website and make purchases[11]. We have to consider the possibility that our participants, even though we led them to believe they were participating in two distinct studies, may have suspected otherwise. It's conceivable that our supposedly separate studies produced effects akin to those observed in Kim et al.'s (2019) research, which involved distinct websites.

To investigate whether participants in the consistent matching condition became aware that they were being targeted, we examined their responses to our control check. When asked whether they suspected the two alleged studies to be related, although 53.1% (n = 17) answered “yes”, none of them provided justifications linking their answers in the first study to the exposure of the target ad. Thus, the hypothesis of awareness of being targeted remains inconclusive.

In addition to the absence of the favorability effect, our data didn’t support the prediction of a moderation by NC. We based our assumption on Petty and Wegener's (1998) study, which emphasized the impact of matching in enhancing message elaboration, especially among individuals who typically engage less in this process. Our aim was to extend this notion to the favorability effect, but our findings did not align with this hypothesis. Further research is needed to explore this idea within paradigms involving single message exposures.

We consider it essential to investigate the impact of multiple matching messages on attitudes in greater detail. Although limitations of our study prevent definitive conclusions, these results underscore the potential for future research in this area.

Attitude Certainty

We hypothesized that participants in consistent conditions (whether matching or mismatching) would report more certainty in their attitudes, than those under inconsistent conditions. If a matching message elicits a more positive response (reflecting the favorability effect) than a mismatching message, it’s conceivable that the presence of both matching and mismatching messages can introduce evaluative inconsistency about the attitudinal object. We

[11] It is important to note that the study conducted by Kim et al. (2019) used behavioral intentions as their main dependent variable. Nevertheless, we also included this variable in our study and the results will be discussed further.

made this prediction because previous research has consistently demonstrated that evaluative inconsistency significantly diminishes the level of attitude certainty. When individuals are exposed to a mixture of positive and negative information about an attitudinal object, their level of certainty tends to be lower compared to situations where the information is evaluatively consistent, either entirely positive or negative (e.g., Maheswaran & Chaiken, 1991; Smith et al., 2008).

Our findings yielded no significant main effect of message consistency on attitude certainty, implying that the consistency between the two messages did not exert a discernible impact on participants' levels of attitude certainty. To gain insights about these unexpected results, we delved into the appraisal-based framework for attitude certainty introduced by Rucker et al. (2014). This model outlines six-key appraisals that individuals make when assessing the information that shapes their attitudes. Indeed, our hypothesis was built upon one of these appraisals, specifically the appraisal of information accuracy, given that consistency of the information is recognized as one of three antecedents proposed to be related to this particular appraisal.

One possibility is that we may have placed excessive emphasis on one specific antecedent of accuracy, and neglected the potential influence of the other two proposed factors: direct experience and social consensus. In our study participants did not have the opportunity to personally try the app (lacking direct experience) nor received information about the experiences of other users (lacking social consensus). We can speculate that even if consistency was positive, the absence of the other two antecedents contributed to a more neutral overall accuracy appraisal, ultimately resulting in no differences from the inconsistent framed conditions.

Another possibility is that we might have overemphasized the role of the accuracy appraisal itself. The task assigned to the participants was to form attitudes regarding new mobile applications. Given that the primary purpose of having attitudes is to create appropriate behavioral guides (Petty & Cacioppo, 1986), it is reasonable to assume that participants may have prioritized accuracy. Nevertheless, it's important to consider that other appraisals may have also come into play. Taking into account another appraisal introduced by Rucker et al. (2014) related to information completeness, one of its antecedents is the perceived consideration of both sides (i.e., the pros and cons of an attitudinal object). This consideration has been shown to result in greater certainty than the exclusive focus on one side. For example, Rucker et al. (2008) found that individuals exposed to two-sided messages

about a product, which presented both the positive and negative attributes of the product, exhibited greater attitude certainty compared to those exposed to one-sided messages. If we consider matching messages as representing the positive aspects of the attitudinal object and mismatching messages as signifying the negative aspects, it's reasonable that inconsistent conditions may resemble a manipulation akin to two-sided messages, potentially increasing attitude certainty. However, it's important to note that the effects observed in Rucker et al. (2008) were only significant when participants were explicitly informed that the message source had acknowledged both positive and negative aspects, a condition we did not replicate in our study.

In summary, we can reason that a combination of various appraisals influenced by distinct antecedents might collectively explain the unexpected results we obtained. It's possible that the introduction of inconsistency, representing a negative appraisal, was balanced by the consideration of both sides, introducing a positive appraisal. This equilibrium resulted in no statistically significant differences in overall attitude certainty between consistent and inconsistent conditions. Further research is needed to investigate whether mixed-framed messages, as operationalized by matching, can enhance certainty similarly to two-sided messages, even without explicit source acknowledgment of both positive and negative aspects. Moreover, exploring how these appraisals may interact in attitude formation paradigms and potentially offset each other's effects warrants further examination.

We also postulated that attitude certainty would vary with participants' NC levels, anticipating higher certainty among HNC individuals compared to their LNC counterparts, as evidenced by Tormala and Petty (2004a). The rationale for this hypothesis was also aligned with the understanding that assessing information about an attitude inherently involves metacognitive processes, which, in turn, demand cognitive effort (Petty et al., 2007). Hence, we expected that individuals with a natural inclination for engaging in cognitively demanding tasks, a characteristic commonly associated with HNC (Cacioppo & Petty 1982), would be more prone to experiencing heightened attitude certainty. While there was a trend towards greater attitude certainty among HNC participants compared to LNC participants, the main effect of NC did not reach statistical significance.

Even though hypothesis aligns with theoretical expectations, it's worth noting that the empirical evidence of HNC individuals displaying more attitude certainty than LNC, comes

from a study that employed a different paradigm than ours. Tormala and Petty (2004a)[12] demonstrated this effect by initially exposing participants to negative information about an aspirin and then prompting them to counterargue after viewing an advertisement containing positive information (either believed to contain weak or strong arguments). Unlike their study, we didn't instruct participants to counterargue the second message or manipulate argument quality.

Another factor that might have confounded the results related to our expectations for NC is the tendency of matching messages to enhance information processing, particularly among individuals LNC (Petty & Wegener, 1998). This complicates the interpretation and could be a contributing factor to the somewhat inconclusive results.

To sum up, our hypothesis regarding the influence of participants' NC on attitude certainty did not yield significant results, despite its theoretical foundation. We can speculate that two key factors contribute for it: firstly, the empirical evidence supporting this hypothesis comes from a study that employed a different paradigm than ours, and secondly, the potential confounding effect of matching messages on information processing, particularly among individuals LNC.

Behavioral Intentions

We anticipated that the pattern seen in attitudes would extend to behavioral intentions. This expectation was grounded in numerous studies within the field demonstrating that matching messages, in contrast to mismatching ones, tend to boost not only attitude favorability but also behavioral intentions (e.g., Hirsch et al., 2012; Paek et al., 2012; Wheeler et al., 2005). In the present study, we observed that more favorable attitudes toward the app were associated with greater intentions to use it and recommend it to others.

Moreover, in line with findings from previous studies (e.g., Fazio & Zanna, 1978; Rucker & Petty, 2004; Tormala et al., 2006; Tormala & Petty, 2002), we expected and successfully replicated a moderating effect of attitude certainty on the relationship between attitudes and behavioral intentions. This moderation revealed that more favorable attitudes, particularly when held with higher levels of certainty, were associated with greater behavioral intentions.

[12] We will revisit this study when discussing the results related to attitude certainty under inconsistent conditions.

In conclusion, while we couldn't predict the valence of attitudes or their certainty based on matching, consistency, and need for cognition, attitudes did have the expected impact on behavioral intentions, and attitude certainty played a moderating role in this relationship.

Exploratory Analysis – Effects under Inconsistent Conditions

Attitudes Under Inconsistent Matching Conditions

Even though we did not initially formulate any hypotheses for inconsistent conditions, the intriguing effects observed in our results prompted us to examine how the order in which participants received matching and mismatching messages influenced attitudes and the role of NC in these effects. In these particular mixed-framed conditions, attitudes appeared to be generally positive among LNC participants and no significant differences were observed in attitudes as function of the order by which they received the matching (or mismatching) message. However, for those HNC, the order significantly affected their attitudes. Specifically, receiving a mismatching message first resulted in more favorable attitudes compared to receiving a matching message at the beginning.

Existing literature suggest that the more motivation there is to analyze the information initially (i.e., the higher the likelihood of elaboration), the higher the probability of observing primacy effects (i.e., judgments formed based on that first information). For example, in a study by Haugtvedt and Wegener (1994), a group of university students was exposed to sequence of messages, each containing information about pros and cons of implementing senior comprehensive exams as a graduation requirement. The researchers manipulated the order in which the students received the message with pros and cons, as well as the perceived relevance of the topic. As anticipated, when the message topic was highly personally relevant, primacy was observed, as attitudes aligned more closely with the content of the first message, regardless of whether it was in favor of implementing senior comprehensive exams or against it. These results are consistent with theoretical predictions from the Elaboration Likelihood Model (ELM; Petty & Cacioppo, 1986) – attitudes formed through careful and thoughtful processing tend to be stronger, as compared to attitudes formed without much thinking about the issue. Which entails that those attitudes are more persistent and resistant to change in the face of attacks (see Petty & Krosnick, 1995).

Expanding on this evidence and applying it to our results, we might reasonably anticipate that the attitudes of LNC participants would reflect the frame of the second

message. This would suggest more favorable attitudes when the second message matches and less favorable attitudes when it mismatches. However, because matching messages can boost message elaboration, especially among LNC individuals, it's also conceivable that when the first message matches, their attitudes may align more with the frame of the first message rather than the second. In summary, for LNC individuals, we shouldn't expect significant differences in their attitudes based on the order of message presentation. When the first message mismatches, we might anticipate increased favorability influenced by the second message (matching), and when the first message matches and prompts elaboration, we might also expect favorable attitudes. Indeed, the results confirm that the attitudes of LNC participants showed no significant differences whether they received a matching message before or after.

Although one might expect that HNC individuals, who inherently process information and form their attitudes primarily (regardless of matching), would exhibit a pattern akin to Haugtvedt and Wegener (1994) study, where attitudes align with the first message, and therefore, resulting in more favorable attitudes when the first message matches and less favorable when it mismatches, the opposite occurred. Surprisingly, attitudes of HNC participants were less favorable when the first message matched and more favorable when it mismatched. The evidence from Haugtvedt and Wegener (1994) study, suggests that when individuals are exposed to conflicting messages presented asynchronously and are motivated to engage in deep thinking (which is more common among HNC individuals), their attitudes tend to align with the first message encountered, known as a primacy effect. However, the introduction of matching adds another layer of complexity, as it can influence the perceived relevance of the topic and, subsequently, motivation to think about the issue. This additional factor may have confounded our results and prevents us to draw definitive conclusions from our data.

Attitude Certainty Under Inconsistent Matching Conditions

In the analysis of attitude certainty, our results revealed an intriguing three-way interaction involving matching, consistency, and NC. To further understand this interaction, we examined both consistent and inconsistent conditions separately, having found only a significant interaction effect that occurred under inconsistent conditions, specifically, between matching and NC. Attitude certainty among participants HNC remained relatively stable, regardless of the order in which they received the messages (i.e., whether the matching message was presented first or vice versa). In contrast, for LNC participants, the order of

message presentation exhibited a significant influence. Notably, when the first message matched, they reported higher attitude certainty compared to when the first message was a mismatch.

The current data doesn't provide a definitive explanation for why the order of receiving matching and mismatching messages affects attitude certainty, specifically among individuals LNC. However, we can speculate that the initial matching message may have stimulated more elaboration, establishing an initial favorable and strong attitude. When the subsequent frame contradicted the first one (i.e., mismatched), it might have triggered cognitive dissonance, prompting individuals to resolve it. If they believed they successfully resisted the second message counter attitudinal message, this may have increased attitude certainty.

Behavioral Intentions Under Inconsistent Matching Conditions

On our analysis for the behavioral intentions under inconsistency, we found that no significative differences were displayed by the LNC participants, such that their behavioral intentions were relatively the same whether they received matching or a mismatching message first. In the analysis of attitudes among LNC participants in these inconsistent conditions, we observed no differences based on the order of message receipt. However, we did find distinctions in the certainty they held regarding those attitudes. Specifically, they exhibited significantly higher certainty when the first message matched. Given this observation, it would be reasonable to anticipate that their behavioral intentions might also differ. Indeed, as we mentioned earlier, certainty as recognized role as moderator in the relationship between attitudes and behavioral intentions. Given this, we would anticipate that participants would report higher levels of behavioral intentions when the first message matched, primarily because their attitudes, while equally favorable in both cases (matching and mismatching first), were held with greater certainty in the matching condition. However, this was not the case, as although there was a tendency for matching first resulting in slightly higher behavioral intentions this wasn’t statistically significant.

On the other hand, among participants with HNC, we observed significant differences in their behavioral intentions. Specifically, when they received a matching message first, they reported lower levels of behavioral intentions, compared to when they received a mismatching message first. This pattern was consistent with what we found for their attitudes. Consequently, these results can be well explained. We observed that their

attitudes varied based on the order in which they received the messages. Since they were equally and highly certain about their attitudes (whether favorable or unfavorable), it makes sense that the behavioral intentions of those HNC mirrored the pattern of their attitudes.

Conclusion

Our study aimed to unravel the narrative of predicting attitudes based on whether individuals were asynchronously exposed to consistent matching or mismatching messages. We initially hypothesized that in these pure matching and mismatching scenarios, a favorability effect would manifest, with consistent matching messages resulting in more favorable attitudes compared to consistent mismatching messages. However, our results took an unexpected turn. We couldn't find significant differences, and if anything, the effect appeared to be slightly reversed, with attitudes in the consistent mismatching conditions slightly surpassing those in consistent matching conditions. This outcome deviated from the expectations set by existing literature. While we can speculate that the double exposure may have contributed to these results, we can't draw definitive conclusions, as we didn't include a control condition where participants were singly exposed to either matching or mismatching messages.

Furthermore, we aimed to predict that attitude certainty would vary as a function of consistency. We hypothesized that consistent conditions would yield higher certainty levels than inconsistent conditions because perceived evaluative inconsistency has previously been linked to decreased certainty. However, once again, our results did not support our expectation, as attitude certainty did not differ between consistent and inconsistent conditions. We also posited that individuals HNC would report more attitude certainty than their LNC counterparts. Contrary to our expectations, this hypothesis didn't hold.

In our final set of predictions, we turned our attention to behavioral intentions. Despite our inability to make accurate predictions regarding attitudes or attitude certainty, a significant relationship between the two did emerge. We observed that attitudes exerted a substantial influence on behavioral intentions, especially when individuals held a high degree of certainty about their attitudes. Therefore, our findings underscore the previously reported evidence supporting the existence of this moderation.

In an exploratory endeavor, we delved into the realm of inconsistent conditions to unravel the potential influence of the order by which individuals received matching and mismatching messages, and whether this impact varied based on NC. Our findings shed light

on intriguing dynamics. For participants with LNC, the sequence of message presentation appeared to have no discernible effect on their attitudes. Whether they encountered a matching or mismatching message first, their attitudes remained consistent and generally positive. In contrast, participants with HNC showcased a different pattern. Here, the order of message presentation played a pivotal role. Remarkably, when participants received a mismatching message as their initial exposure, followed by a matching message as the final exposure, it resulted in more favorable attitudes compared to the reverse pattern.

In examining attitude certainty within this context of inconsistency, distinct patterns emerged, differing from those observed in attitudes. Notably, participants HNC demonstrated consistent levels of certainty, regardless of the order of message exposure. On the other hand, participants with LNC, who had previously exhibited no disparities in their attitudes, now displayed a noteworthy variation in certainty. Specifically, when they were initially exposed to a matching message, they reported higher levels of attitude certainty.

Moreover, the observed pattern of attitudes was faithfully replicated in behavioral intentions for both HNC and LNC participants. However, it became apparent that certainty held a greater sway among HNC participants. For this group, their less favorable yet highly certain attitudes, resulting from encountering a matching message first, were mirrored in their reduced behavioral intentions. The inverse held true for their more favorable and highly certain attitudes, born from a mismatching message's initial exposure, which corresponded to heightened behavioral intentions.

Limitations and Future Research

We acknowledge that our study has limitations that warrant further investigation to gain a deeper understanding of how the interplay between multiple exposures to matching and mismatching messages, as well as the consistency of those exposures, affects individuals' attitudes, attitude certainty, and behavioral intentions.

First of all, our paradigm involved exposing individuals to two messages, which differs from the single exposures typically found in literature on personalized matching. The impact of double exposure to matching messages may produce different results compared to the favorability effect seen in single exposure paradigms. However, due to the absence of a control condition featuring a single exposure to either matching or mismatching messages, we cannot definitively confirm the messages were actually able to induce a matching favorability

effect[13]. Future studies should include such control conditions or conduct pretests before the main study to help clarify the impact of these multiple exposures.

Moreover, we tried to control for message elaboration by incorporating a self-reported measure of NC to identify individuals more inclined toward elaborate thinking. Additionally, we included a recall task to gain insight into the relevant aspects generated by participants after viewing the ads. Unfortunately, upon initial examination, the recall content proved to be irrelevant, leading us to forego further analysis of this data. In the end we were left with a self-report scale that doesn't measure message elaboration, and only tries to infer who are most likely to it. To enhance our understanding of message elaboration, a paradigm incorporating argument quality could have been advantageous. Such a paradigm would feature messages with varying argument strengths, allowing us to identify individuals who elaborated more about the messages.

Another potential improvement could have involved collecting dependent measures after exposure to each set of ads rather than just after the final exposure. This approach would have allowed us to assess the changes in each variable specifically following the second exposure, providing a more detailed understanding of the effects of each exposure separately.

In summary, avenues for future research include ensuring materials result in a favorability effect, enhancing control over message elaboration, and analyzing the impact of changes in the sequence of ads on attitudes, attitude certainty, and behavioral intentions. These steps would contribute to a deeper understanding of the intricate dynamics involving multiple exposures, consistency of exposures, matching effects, and the extent of message elaboration.

[13] Although the alignment of message frames with the personality trait of extroversion was validated by a panel of judges, due to time constraints, we were unable to conduct a pretest to verify whether the assumed matching messages indeed induced a favorability effect, resulting in more favorable attitudes compared to mismatching messages.

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Appendices

Appendix A – Literature Review

Attitudes

Attitudes is a term used to refer to one's general assessments about objects (e.g., products), people (oneself included), or ideas (e.g., political ideologies) (Petty & Wegener, 1998a; Tormala & Briñol, 2015). Stating differently, attitudes convey an individual's level of favorability or unfavourability towards something, be it a person, a concept, or a tangible item. The concept is central within social psychology literature since the early 20th century, continuing to be an object of comprehensive theoretical and empirical investigation up to the present (Petty & Wegener, 1998a). The reason for it is that attitudes guide people's choices and actions, which conveys that all else being equal, people will support the party they hold the most favorable attitude toward or purchase the product they prefer the most (Petty & Briñol, 2008).

Although there were times when the utility of the attitude construct was called into question, with researchers doubting its predictive power over behavior, due to an accumulation of disappointing results (see Wicker, 1969 for a review), the faith in the attitudes concept and its connection to behavior was restored after some early failures to demonstrate it had been attributed to methodological limitations, such as the use of overly general scales that failed to pinpoint specific behaviors of interest (see Ajzen & Fishbein, 1977). Additionally, the recognition of moderating factors that influence this relationship, such as individual differences in traits like need for cognition (Petty & Cacioppo, 1982), the contextual conditions under which behavior occurs (Jamieson & Zanna, 1989), and the inherent characteristics of the attitude itself (e.g., attitude strength; Petty & Krosnick, 1995), played a pivotal role in this restoration process and are well documented (see Ajzen & Fishbein, 2005; see also Briñol et al., 2019).

Before proceeding further, one must acknowledge that attitudes may differ across several significant dimensions. The most straightforward is the *valence*, which determines whether an attitude is inclined towards positivity, negativity, or remains more neutral (Fabrigar & Wegener, 2010). For instance, in the context of solar energy, one might have a positive attitude due to its sustainability, a negative attitude due to the initial costs and storage challenges, or a neutral stance acknowledging both its benefits and drawbacks without feeling particularly swayed either way.

Along with valence, another important aspect in which attitudes can differ is in their inherent *strength*. Although attitude strength can be generally defined as the persistence and resistance of the attitude, as well as its impact on thoughts and behaviors (Petty et al., 1995), it has been theorized and operationalized in many ways (*see* Petty & Krosnick, 1995). Some authors (e.g., Petty & Krosnick, 1995) considered *durability* (i.e., attitude persistence over time and resistance to change) and *impact* (i.e., attitude influence on thoughts and behaviors). Others have considered different aspects, such as *extremity* (i.e., the distance from neutrality in terms of valence; Abelson, 1995), *accessibility* (i.e., the immediacy to which an attitude is retrieved from memory; Fazio, 1995), or *ambivalence* (i.e., existence of positive and negative valence towards the same attitudinal object; Thompson et al., 1995).

Of most importance, strength indicators have been shown to moderate the relationship between attitudes and behaviors (see Ajzen & Fishbein, 2005; and Petty & Krosnick, 1995, for comprehensive reviews), which means that stronger attitudes are better predictors of behaviors congruent with those attitudes. The antecedents of a strong attitude, specifically the level of cognitive processing involved in its formation, will be discussed later in the persuasion section.

Attitude Certainty

The aforementioned attitude strength indicators can be seen as relatively objective, as they do not necessitate individuals to engage in introspection and express their personal perceptions regarding the strength of their attitudes (Tormala & Briñol, 2015). Nonetheless, there are other aspects that can be deemed more subjective in nature. Attitude *certainty* is one of those and has recently attracted more interest in the literature. It pertains to the subjective feeling of confidence one holds regarding an attitude (Tormala & Rucker, 2018). Certainty can be viewed as a metacognitive process, as it constitutes a secondary evaluation of the primary assessment, which is the attitude itself (Petty & Briñol, 2006). This implies that people have to think about their own thoughts and assess the information they have regarding the attitudinal object. It's important to recognize that even when two individuals share the same attitude in terms of valence (e.g., liking a specific car), just like any other attitude strength indicator, variations in their levels of certainty can influence their behavioral intentions toward the attitudinal object (e.g., willingness to purchase the car) (Rucker et al., 2014; Tormala & Rucker, 2018). The antecedents of attitude certainty will be discussed next.

Drawing from a comprehensive review of attitude certainty studies in both psychology and marketing, Rucker et al. (2014) proposed that people appraise their attitudes along six fundamental dimensions to gauge their level of attitude certainty. In essence, the authors propose that when the information that supports their attitudes is impressive (e.g., accurate and important), positive appraisals will emerge, which will result in increased attitude certainty. Conversely, when the information fails to impress (e.g., inaccurate or irrelevant), negative appraisals emerge, leading to decreased attitude certainty. If individuals neither find the evidence impressive nor unimpressive, or they are not engaged in the appraisal process, a neutral or absent appraisal occurs, and their attitude certainty is likely to remain unchanged. Importantly, although this framework has not been subject of direct testing, it integrates considerable evidence from the last few decades indicating that individuals adapt their attitude certainty in reaction to situational factors. We will now provide an overview of the six fundamental evaluations proposed by the researchers (for a more comprehensive examination, see Rucker et al., 2014).

One of the proposed appraisals concerns the "accuracy of the information", which can originate from various variables (known as antecedents of attitude certainty), including: "social consensus" (where learning that a majority of peers shares one's attitude compared to a minority enhances attitude certainty, e.g., Festinger, 1954; Petrocelli et al., 2007); "consistency of information" (as the information supporting an attitude becomes more consistent or evaluatively congruent, individuals tend to increase their attitude certainty, e.g., Maheswaran & Chaiken, 1991; Tormala & DeSensi, 2009); and "direct experience" (people often exhibit higher certainty about attitudes formed through personal interactions with the attitude object, e.g., Fazio & Zanna, 1978).

Another appraisal concerns the "completeness of the information", and it can originate from: "the amount of information" (the more individuals perceive their attitude-relevant information as complete, the higher their attitude certainty, e.g., Smith et al., 2008); the "consideration of both sides" (individuals tend to be more certain of their attitudes when they believe they have considered both the positive and negative aspects of an attitude object, e.g., Rucker & Petty, 2004; Rucker et al., 2008); and the "perceived amount of thought" (higher certainty in attitudes can stem from the belief that one has carefully and thoroughly processed attitude-relevant information, rather than superficially, e.g., Smith et al., 2008).

An additional key appraisal pertains to the "relevance of the information" at hand. Arguably, the most fundamental aspect of a piece of information, in terms of gauging its

impact on attitude certainty, is its alignment with attitudes. For instance, Snyder and Kendzierski (1982) found that when attitudes are perceived as more relevant to a particular behavior, are more likely to influence that behavior.

The “legitimacy of the information” presents another appraisal that can impact attitude certainty. Individuals can assess whether information is credible (i.e., acceptable) or not credible (i.e., unacceptable) forming an attitude (e.g., Tormala et al., 2007). For instance, consider a political debate where a candidate expresses their position on healthcare reform. A voter primarily concerned with economic policies might not view the candidate's healthcare stance as pertinent to their overall attitude toward the candidate. Consequently, the voter might overlook the healthcare information while forming their attitude toward the candidate.

People can also assess the “importance of the information” underlying their attitudes. Attitudes based on information deemed important (e.g., core values) are likely to be held with heightened certainty (see Blankenship & Wegener, 2008). For example, in a study by Zakay (1985), participants were presented with medical scenarios involving two patients seeking help. The scenarios included details about patients' overall health, mental state, and age. Pretesting indicated that overall health was considered the most crucial factor in determining priority. When choosing between assisting an anxious 25-year-old with poor health and a depressed 55-year-old with moderate health, participants displayed greater certainty in their decision when it aligned with the most critical factor (overall health), rather than secondary factors (age or mental state).

Lastly, instead of fixating on the cognitive aspects of an attitude, individuals can alternatively introspect on their own personal emotional responses associated with the attitude to assess their level of certainty. For instance, someone might experience a strong sense of certainty about an attitude because it resonates with a feeling of moral correctness (e.g., Cesario et al., 2004). This form of assessment was labeled "affective validation" by Petty and Briñol (2006), wherein an individual's attitude is either validated or invalidated through their own subjective emotional experience. Unlike the other categories of assessments that rely on cognitive evaluations of the information underpinning an attitude, affective validation revolves around the emotional reactions linked to the attitude.

Rucker et al. (2014) also propose that a hierarchy of appraisals can exist. Meaning that, when multiple appraisals are present, the relative weight of one appraisal can be stronger or weaker than the weight of another. However, they also suggest that this speculative

hierarchy is dependent upon individual differences and contextual factors, which leads to a more complex interplay between these variables. Although this framework may not possess extensive predictive capabilities, it does offer a valuable foundation for understanding and addressing the factors contributing to attitude certainty. This will facilitate the discussion of some of the findings derived from the experiment conducted in this dissertation.

Persuasion

Considering the significant impact of attitudes on individuals' behaviors, it is not surprising that researchers have conducted extensive investigations to explore the methods through which attitudes can be shaped or modified. Among the various approaches, in the field of social psychology there is a vast body of literature that explores methods to influence attitudes, within the context of persuasive communications (Tormala & Briñol, 2015).

Persuasion is a form of social influence that involves intentional efforts made by individuals, groups, or social entities (e.g., governments, religious institutions, businesses) to alter a person's beliefs, attitudes, or behaviors by communicating information, feelings, or reasoning (Cacioppo et al., 2018). Nevertheless, within the area of social psychology, the study of persuasion has predominantly centered on attitudes (Petty & Briñol, 2008).

We can find persuasion everywhere as it holds a significant role across all realms of society, such as politics, marketing, religion, and daily social interactions (Cacioppo et al., 2018; Petty & Briñol, 2008; Petty & Wegener, 1998a). For instance, global advertisers expended over US$590 billion in 2015, while political campaigns in 2016 dedicated approximately US$6.6 billion to ads (Cacioppo et al., 2018). Throughout history, humans have shown a longstanding fascination with persuasion (Petty, 1997), as early attempts to understand it can be tracked to the Greek philosophers (e.g., Aristotle’s Rhetoric; see McGuire, 1969). Those first approaches primarily revolved around straightforward main-effect questions, implying that each variable (e.g., expert source or emotional appeals) was expected to have a single effect on persuasion, either enhancing or reducing it (Petty & Briñol, 2008). For instance, whether a message containing logical arguments would be more persuasive compared to appeals based on emotions. These early interrogations sought to identify and understand the basic factors influencing persuasive communication and the effects they had on individuals' attitudes.

It was not until the last century that scholars began to subject the main effects questions, initially pondered by philosophers, to systematic testing through behavioral

experiments. A notable landmark is the work of Carl Hovland alongside with his Yale team, during and after the World War II (Petty & Briñol, 2008; Petty & Wegener, 1998a). Hovland and his team conducted an extensive research program that explored various variables that continue to be investigated in modern times. These variables include source credibility, one-sided versus two-sided messages, individual differences, and many others (see Hovland et al., 1949). Notably, this early work also played a pivotal role in shaping the enduring conceptual framework for categorizing variables within the persuasion setting, which remains widely accepted today (i.e., variables related to the source, message, recipient, and context; McGuire 1969, 1985).

By these times, the prevailing notion was that there was only one process through which persuasion could take place. The Yale team explained the observed effects on their research program using a learning theory (see Hovland et al., 1953). In essence, this theory proposed that anything that facilitated the attention, comprehension, and learning of the persuasive message's contents would promote attitude change, and on the other hand, any factor that disrupted these learning processes would hinder attitude change.

As time progressed, additional processes were proposed in the literature to explain persuasion beyond the initial learning theory. For instance, the "cognitive response theory" put forth by Greenwald (1968), proposed that the amount of favorable or unfavorable thoughts generated in response to a persuasive message plays a crucial role in shaping attitudes. Essentially, the more positive thoughts evoked, the more likely an individual is to be persuaded by the message.

These theories expanded the understanding of psychological processes that contribute to persuasion and are still influential today (Petty & Wegener, 1998a). However, by the 1970s the field encountered significant challenges. The extensive research on persuasion led to a proliferation of theories and a multitude of conflicting findings, resulting in a lack of conceptual coherence (Petty & Briñol, 2008; Petty & Wegener, 1998a). Despite numerous empirical efforts, researchers were unable to identify a singular process that could explain persuasion consistently nor discover a specific effect that could be reliably predicted by a single variable, as multiple single variables were shown to enhance persuasion in some instances and decrease in others (Petty, 1997). This led to a period of uncertainty and a realization that a more comprehensive and integrated understanding of persuasion was needed.

Following a period of confusion and skepticism in the field, a relatively established understanding emerged: variables could generate multiple and contradictory effects, and diverse processes could underlie these various outcomes (Petty & Briñol, 2008; Petty & Briñol, 2012; Petty & Wegener, 1998a). In alignment with this perspective, new multiple process frameworks emerged to accommodate the seemingly contradictory findings. Notably, the elaboration likelihood model (ELM; Petty & Cacioppo, 1981, 1986) and the heuristic-systematic model (HSM; Chaiken, Liberman & Eagly, 1989)[1] introduced a groundbreaking idea to the field of persuasion: any one variable could trigger persuasion through multiple processes (Petty & Briñol, 2008). By recognizing that different cognitive pathways could lead to attitude change, these models opened up new avenues of exploration, enabling a more nuanced and comprehensive understanding of the persuasive communication.

Elaboration Likelihood Model. One of the most prominent and influential contemporary models of persuasion is the Elaboration Likelihood Model (ELM; Petty & Cacioppo, 1981, 1986) (Kitchen et al., 2014). This model places significant emphasis on examining the moderation and mediation effects that influence attitude change. It elucidates how a single variable can lead to distinct effects on attitudes in diverse situations, and how the same variable can produce the same outcomes by different processes. Additionally, the model delves into the consequences of attitudes achieved through distinct processes, providing valuable insights into the complexities of persuasive communication and its effects on individual's attitudes and behaviors.

A key concept of this model is the elaboration likelihood continuum, that represents the extent to which one invests cognitive effort in evaluating the merits of a persuasive communication (Petty & Cacioppo, 1986). The authors designated the high end of this continuum as the central route (high elaboration) and the low end as the peripheral route (low elaboration). The recipient's relative position along this continuum is influenced by their level of motivation and ability to analyze the persuasive proposal. If individuals possess both the motivation (e.g., information is perceived as self-relevant) and ability (e.g., knowledge about topic, distraction) to elaborate, a high degree of elaboration is anticipated. When individuals

[1] For the purposes of this dissertation, the focus will be on the Elaboration Likelihood Model (ELM). Although the ELM and the HSM share similarities in predicting that persuasion can occur through either effortful thinking or low-effort reliance on simple heuristics (Chaiken, 1980), it is essential to acknowledge that the two models differ in their terminologies and sometimes the assumed mediating processes (see Eagly & Chaiken, 1993; Petty & Briñol, 2012; Petty & Wegener, 1998a, for further discussions on these differences).

lack either the ability or the motivation to engage in deep processing, we should expect lower levels of elaboration.

Additionally, the model postulates that when persuasion occurs through a peripheral route, people tend to rely in simple cues available from the source (e.g., attractiveness; Petty et al., 1983), message (e.g., number of arguments; Petty & Cacioppo, 1984), or context (e.g., induced emotional states; Petty et al., 1993) of the persuasive communication. This form of persuasion involves reliance on rules of thumb or heuristics that the individual generates or retrieves from memory, for instance, an individual that is in low elaboration state might simply count the number of arguments and conclude that "if there are eight reasons supporting it, it must be worthwhile" (e.g., Petty & Cacioppo, 1984; see also Chaiken, 1987, for a review on heuristic processing). A wide variety of other low-elaboration processes can lead to attitude change without careful consideration of the available information, including but not limited to classical conditioning (e.g., Staats & Staats, 1958; Cacioppo et al., 1992) or misattribution of affect to the message (e.g., Petty & Cacioppo, 1983).

On the other hand, under circumstances of high elaboration, individuals are more prone to engaging in thorough information analysis, and the quality of the information plays a determinant role in influencing persuasion outcomes (i.e., when the elaboration likelihood is high, stronger arguments leads to increased persuasiveness). In a classic and illustrative study, Petty et al. (1976) manipulated the quality of arguments presented in the messages (strong vs. weak), while also examining the influence of distraction on participants during the message presentation (while listening to the message, they simultaneously had to record the quadrant where an "X" randomly appeared). The rationale behind this investigation was to test how distraction might impact participants' ability to analyze the merits of the message and subsequently affect their attitude differentiation concerning argument quality. It was hypothesized that distraction would impair participants' capacity to carefully process the information, leading to less discrimination between strong and weak arguments, resulting in similar attitudes regardless of the argument quality. Conversely, when participants were not distracted, they would be more attentive to the message content, resulting in more favorable attitudes with strong arguments and the opposite with weak arguments (i.e., argument quality effects; see Petty & Briñol, 2012; Petty & Wegener, 1998a). When participants were not distracted, they demonstrated the ability to differentiate between strong and weak arguments, with strong arguments leading to higher persuasion. In contrast, when participants were distracted, no significant differences in persuasion between strong and weak arguments were

observed, indicating a diminished ability to discern the quality of the arguments under distraction.

Importantly, the model predicts that attitudes formed via central route (i.e., when the individual engage in high levels of attitude relevant thinking – elaboration) are stronger, which as previously explained, entails that those attitudes are more resistant to counter-persuasion and more predictive of behavior (see Petty et al., 1995).

There are numerous contextual factors and individual differences that can affect one's position along the continuum (Petty & Cacioppo, 1986). One important variable for the study employed in this dissertation is the "need for cognition", which refers to an individual difference that reflects one's inclination and enjoyment in engaging with complex cognitive activities and critical thinking (Cacioppo & Petty, 1982). Individuals with high need for cognition are more prone to deep thinking, while those with low need for cognition prefer less intensive cognitive effort (see Petty et al., 2009, for a review). It's logical to think that people high in need for cognition tend to form attitudes via central route which ultimately will have consequences in the strength of those attitudes (e.g., Cacioppo et al., 1986; Haugtvedt & Petty, 1992).

Another variable that will be deeply focused on this dissertation is "matching", which can entail many effects (including impacting the amount of thinking one has regarding a persuasive proposal) that will be explained in the following sections.

Multiple Roles of Persuasion Variables – Emphasis on Matching. As previously mentioned, a central tenet of the ELM is that any given variable can exert varying effects on attitudes through different processes across the elaboration continuum (Petty & Cacioppo, 1986; Petty & Wegener, 1998a). This implies that the impact of a specific variable doesn't necessarily amplify as one moves alongside the elaboration continuum. This stems from the multiple roles postulate – irrespective of the specific process in play, whether it involves a low-thought assessment or a thorough scrutiny of the message, any given variable can exert its influence on attitudes in different points of the elaboration continuum, either enhancing or diminishing persuasion (Petty & Cacioppo, 1986).

To illustrate this principle, we will explore the diverse manners in which a variable can impact attitudes through varied processes along the continuum. Specifically, we will use "matching" as a representative instance of a persuasion variable. First, we'll define this

variable and provide a brief overview of its primary study, and then explore its effects in low, high, and unconstrained elaboration contexts, aiming to clarify its roles within the ELM.

What is Matching? Matching can be defined as a procedure that involves the alignment of elements from at least two components of the persuasion setting (Teeny et al., 2021), as we outlined earlier: the source, message, recipient, and context (McGuire 1969, 1985). The most common way of studying matching effects, and perhaps the most employed in real-world situations, is the alignment of the content of a message with a characteristic of the recipient, also referred as "personalized matching" (Teeny et al., 2021). For instance, Wheeler et al. (2005) conducted a study that employed this technique by manipulating the message framing of a VCR system advertisement to match either extroverts (e.g., "With the Mannux VCR you'll be the life of the party, whether the party is in your home or out of it") or introverts (e.g., "With the Mannux VCR, you can have all of the luxuries of a movie theater without having to deal with the crowds").

While this technique (initially documented in Aristotle's Rhetoric) has a longstanding history in marketing, politics, and various other persuasive contexts, it has garnered renewed attention and significance in modern times due to the increasing availability of personal data and the advent of social media platforms and other online communication channels (Dijkstra, 2008). The popularity of this procedure is sustained by the literature, which generally suggests that personalized matching constitutes an effective method for enhancing the persuasiveness of messages particularly when the content aligns with the recipient's attitudinal functions (Carpenter, 2012; Petty et al., 2000). Nevertheless, it's important to acknowledge that there are situations where matching has yielded unintended adverse consequences.

Matching the content of a message with characteristics of the recipient have consistently been linked favorable outcomes. This phenomenon is primarily ascribed to factors like an increased self-relevance of the appeal to the recipient (e.g., Petty & Wegener, 1998b) or the fluency in processing the proposal (e.g., Labroo & Lee, 2006). These elements, when interpreted positively, tend to elicit positive emotions that subsequently influence attitudes toward the attitudinal object. However, this phenomenon can also be associated with negative implications, undermining persuasion. For instance, it can be perceived as an intrusion into privacy (e.g., van Doorn & Hoekstra, 2013), manipulative behavior (e.g., Briñol et al., 2015), stereotyping (e.g., Derricks & Earl, 2019), or even seen as redundant (e.g., Maheswaran & Chaiken, 1991). These unfavorable outcomes tend to manifest when individuals become aware of the personalized matching process, potentially leading to

negative perceptions about the source of the personalized information or its underlying motivations (Cesario et al., 2004).

The following subsections will provide further elucidation on different ways in which matching can either enhance or weaken persuasion along the continuum of elaboration, and also how it can influence individuals' positions along this continuum.

Matching Under Low Elaboration – Serving as Peripheral Cue. According to ELM, when individuals find themselves in low elaboration states, lacking the motivation or cognitive resources to engage in-depth processing, matching can influence their attitudes through simple cue processes (Petty & Cacciopo, 1986). Regardless of the specific process involved, whether the matching effect occurs through direct affect transfer (such as classical conditioning; Staats & Staats, 1958) or striving for self-consistency (e.g., Horcajo et al., 2010; Simon et al., 2004), it is based on connecting the emotional significance of the match to the attitudinal object, using relatively low thought mechanisms that don't involve detailed evaluation of the appeal's merits (Teeny et al., 2021).

In a classic study, Debono (1987) exposed undergraduate students in low elaboration states to persuasive appeals concerning a "mental health week" event. These message appeals had no actual arguments, but were framed to either match or mismatch participants with high and low levels of self-monitoring[2]. The results indicated that attitudes toward the event were more favorable when the message matched the participants' tendencies, highlighting a connection between the positive meaning of the match and attitudes toward the attitudinal object.

However, it's possible that if a match triggers negative meanings, the recipient might link these with the attitudinal object, potentially undermining persuasion (Teeny et al., 2021). The fundamental insight to gather from this, is that in situations where individuals lack the motivation or cognitive resources for thorough processing, the emotional connotation of the match (whether positive or negative) becomes crucial in shaping its persuasive impact. This is achieved by serving as a straightforward peripheral cue, irrespective of the specific argument content (if any) that is presented.

[2] Self-monitoring is a trait that reflects an individual's sensitivity to social cues and adaptability to different social contexts (Snyder, 1974). High self-monitors tend to adjust their behavior and expressions to fit the expectations of various situations, aiming to enhance their social image. In contrast, low self-monitors tend to exhibit more consistent behavior across different situations, focusing less on conforming to social norms, and aiming to express their true values.

Matching Under High Elaboration – Serving as an Argument and Biasing Thoughts. In situations of high elaboration, where individuals are motivated and capable of critically assessing the proposal's merits, the ELM proposes that matching can encompass implications that extend beyond the mere connection of the emotions elicited by the match with the attitudinal object.

Imagine a scenario where an individual comes across an advertisement for a dating app that utilizes data from third parties to understand their preferences. The ad indicates that the app recognizes their affinity for adventure and commitment to certain religious values, and promises to assist in finding suitable connections. In a state of high elaboration, this person might logically conclude, "They've accurately gathered information about me, which is essential for connecting me with other people" finding the match a compelling argument. The app not only acknowledges their interests but also aligns these interests with potential matches. Consequently, they might be more inclined to using it. This is because information about the individual's identity becomes relevant when the objective is to connect with someone who shares similar interests and values. However, if the same type of appeal were made for a toothpaste, the fact that someone enjoys adventure and has religious values might still be a match, but it would likely not be a compelling argument for buying the toothpaste. In this case, the connection between the matched traits and the product is tenuous, leading to a weaker influence on persuasion in high elaboration states. However, it could still bolster persuasion among individuals in a low elaboration state, particularly if that match had evoked positive feelings.

Currently, there is limited or perhaps no prior research that has directly concentrated on instances of personalized matches functioning as arguments (Teeny et al., 2021). However, extensive research conducted over several decades suggests that personalized matches can indeed function in this capacity under specific conditions (see Teeny et al., 2016).

Beyond its role as an argument, matching also has the capacity to influence the direction of thoughts triggered by the communicated proposition, leading them toward either positivity or negativity (Petty et al., 1993). Lavine and Snyder (1996) conducted a study involving participants with different levels of self-monitoring, evaluating their responses to claims appealing to either image or values. The focus was on a relevant topic (voting in both local and national elections of the same year), thereby amplifying participants' motivation for elaboration. The study found that greater persuasion was observed when the message matched, rather than mismatched, the participants' levels of self-monitoring. Moreover, the

valence of thoughts directed at the proposal served as a mediator for participants' attitudes. Specifically, matched (/mismatched) appeals led to more favorable (/unfavorable) thoughts, which consequently produced more favorable (/unfavorable) attitudes. This evidence provides empirical support for the notion that matching induces a biased processing mechanism that affects the valence of thoughts and ultimately the attitudes.

While personalized matching in scenarios of high elaboration has generally demonstrated a propensity to incline recipients' thoughts positively, there are also instances where a negative connotation in the match can lead to an opposing outcome. For instance, if the match elicits feelings of stereotyping (e.g., White & Argo, 2009) or privacy invasion due to information acquired intrusively (e.g., Kim et al., 2019), it might engender negative thoughts towards the proposal and undermine persuasion. It's important to note that both negative and positive biased processing effects tend to emerge when the quality of the arguments presented in the appeal are somewhat ambiguous (see Chaiken & Maheswaran, 1994).

Matching Under High Elaboration – Correcting for Bias (Metacognition). So far, our focus has been on primary thoughts concerning an attitudinal object. However, individuals experiencing high elaboration can also engage in metacognitive processes, wherein they contemplate their own primary thoughts and endeavor to rectify any perceived biases (Wegener & Petty, 1997). Following the same principle of Festinger (1950) that "People are motivated to hold correct attitudes", the ELM explicitly posits that individuals aspire to maintain accurate attitudes, as incorrect attitudes are generally counterproductive and can result in adverse behavioral, affective, and cognitive outcomes (Petty & Cacioppo, 1986).

Consider a scenario where an individual in a high elaboration state encounters a persuasive message that addresses him by name, claiming to understand his preferences and needs. Despite the apparent personalization, he may become aware that he was targeted and skeptical about the match between his name and the message content. For instance, he may question whether this alignment is a genuine attempt to connect or just a superficial ploy to catch his attention. In this case, the mere fact that his name is matched in the message triggers a sense of caution. If he perceives the match as an attempt to manipulate his perception and potentially bias his attitude, then he may react by critically analyzing the message, seeking to correct any unwanted bias that could have resulted from the personalized matching.

Cesario et al. (2004) demonstrated this process by manipulating message alignment with participants' goal pursuit strategies. When unaware of the positive influence of the match, a matched message enhanced persuasion; in contrast, awareness of the match's impact led to correction and reduced attitude change. While Cesario et al. (2004) did not directly manipulate participants' levels of elaboration, the process of recognizing and addressing unwanted bias typically requires high-thought processes. This involves individuals being motivated and having the cognitive capacity to detect potential bias, acknowledge the influence of a match as inappropriate, and hold a relevant lay theory regarding this bias (McCaslin et al., 2010; Wegener & Petty, 1997).

Unconstrained Elaboration – Influencing the Degree of Elaboration. When elaboration is not constrained to be high or low, personalized matching can influence persuasion by either intensifying or diminishing the recipient's cognitive involvement with a message. By aligning aspects of the message with characteristics of the recipient, it does have the potential to increase the perceived relevance of the message to the individual. This, in turn, can serve as a technique to heighten the motivation for elaboration about the persuasive appeal (Petty & Cacioppo, 1990).

Employing the argument quality paradigm (as explained earlier), Petty and Wegener (1998b) conducted a study that shed light on the influence of personalized matching in scenarios of unconstrained elaboration. In this study, participants were presented with two types of shampoo advertisements: an image ad that emphasized the cosmetic aspects of the shampoo and a quality ad that focused on its cleaning effectiveness. Depending on their self-monitoring tendencies, participants received either a matched or mismatched advertisement – the image ad was a match for high self-monitors, while the quality ad was a match for low self-monitors. Moreover, the strength of the arguments used in these advertisements was manipulated, varying between strong and weak. The critical outcome of the study was the observed enhancement of elaboration through matching. Those who received matched advertisements demonstrated a greater differentiation in their attitudes between strong and weak arguments, indicating heightened engagement with the message content. Interestingly, this effect was more pronounced for individuals with lower need for cognition – those who typically engage in less extensive thinking. The presence of this effect among individuals with lower need for cognition suggests that matching can amplify message processing in cases where individuals might otherwise be less inclined to engage in thorough thought due to their cognitive tendencies, but still have the capacity to do it. Whereas individuals high in need for

cognition tend to engage in extensive processing regardless of matching, thus, the message enhancement effect is not significantly accentuated for them (Petty & Wegener, 1998b).

Despite ample evidence that matching can heighten message elaboration (e.g., Debono & Harnish, 1988; Wan & Rucker, 2013; Wheeler et al., 2005), there are instances where it decreases elaboration. For instance, if an advertisement is perceived as manipulative, individuals might reduce exposure and elaboration (Xu, 2015). Moreover, when content matches expectations, it can lower elaboration (Smith & Petty, 1996), as alignment suggests prior knowledge, reducing novelty and motivation for deeper thought (Clark et al., 2008).

In conclusion, matching can have multiple roles along the elaboration continuum and the potential to influence one's position on that continuum. When elaboration is low, it is expected to work as a simple peripheral cue and influence persuasion under relatively low-thought processes. As elaboration increases, matching can be assessed for its strength as an argument, bias thoughts, and may trigger correction due to perceived bias. Also, when elaboration is not constrained to be either high or low, it has been shown to normally increase motivation for message elaboration, although in some instances it can decrease.

Multiple Exposures and Mixed-Framed Messages. In real-world situations, individuals are often exposed to the same persuasive proposal (e.g., an advertisement), or multiple proposals related to the same attitudinal object (e.g., product). Evidence suggests that excessive exposure to the same advertisement can lead to boredom and reduced effectiveness (e.g., Calder & Sternthal, 1980). However, making slight alterations to the proposal can counteract this effect (e.g., Schumann et al., 1990). For instance, Haugtvedt et al. (1994) have examined various variations of ads. Their studies demonstrated that message content variations, like different reasons to buy a product, resulted in attitudes more resistant to subsequent counter-attitudinal persuasion compared to variations in aesthetic features or moderate repetition (3x) of the same ad. However, these studies did not control for matching effects, leaving open the question of whether the results hold when the reasons presented for buying a product are inconsistent with the recipient's characteristics.

Investigation has also given some attention to order effects, that is, the effects that can occur through different placements of persuasive messages that advocate analogous or opposing positions (Haugtvedt & Wegener, 1994). Two effects have been particularly focused on: primacy (i.e., judgments consistent with the first received information) and recency (i.e., judgments consistent with the last received information). Generally, the more motivation

there is to analyze the information initially (i.e., the higher the likelihood of elaboration), the higher the probability of observing primacy effects (e.g., Haugtvedt & Wegener, 1994; Lana, 1963). Furthermore, attitudes associated with primacy, formed under high elaboration processes, tend to be more resistant than those associated with recency, which are generated under low elaboration processes (Haugtvedt & Wegener, 1994).

Order effects have primarily been studied with messages advocating opposing positions. Conversely, Brunel and Nelson (2003) examined two messages that appealed to the same behavior but differed in relevance to participants (i.e., matching). In a first experiment conducted in a context of low likelihood of elaboration (task presented as of little relevance), men and women read two donation appeals, one with self-centered arguments (used as a match for men) and the other altruistic (employed as a match for women). The objective was to show that women typically engage more in elaboration (regardless of matching). Results indeed demonstrated that women (compared to men) preferred the first appeal (primacy), even when it was a mismatch (self-centered). On the other hand, men showed recency effects, regardless of the type of appeal. However, it's important to note that the broader context of the appeals (i.e., centered around charity), might inherently align more with women's preferences (Mesch et al., 2011). This alignment could have prompted increased message elaboration among women, yielding a higher number of primacy judgments. This unexpected outcome could be attributed to a matching effect that wasn't originally anticipated by the researchers. In other words, even though the authors believed they were invoking a match by varying the claims (self-centered vs. altruistic), the very nature of the charity topic itself might have functioned as a form of matching, leading to heightened message elaboration among women, regardless of the specific condition they were in.

Moreover, Brunel and Nelson (2003) conducted a second experiment in a context of high likelihood of elaboration, where participants were informed that their responses were crucial for a real international aid society's research. The results showed that men equally preferred the different appeals, and recency effects ceased to occur. In the case of women, they favored the altruistic appeal over the self-centered one, and the differences were more pronounced when it was evaluated secondly.

To our knowledge the aforementioned study is the only one to link order effects with matching. However, it has some limitations that restrict broader generalization. First, the topic of charity could be particularly susceptible to desirability effects, besides, as already referred, being more relevant to women (Mesch et al., 2011). The results reflect attitudes toward

appeals (i.e., the message) rather than the attitudinal object (i.e., donating to charity). Furthermore, including a measure of attitude strength that provides some information about potential behavioral consequences could have been beneficial.

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Appendix B – Materials

This study featured various versions of advertisements for a mobile application, each with unique layouts and frames, resulting in a total of eight distinct variations of the target ad (1_EA; 1_EB; 1_IA; 1_IB; 2_EA; 2_EB; 2_IA; 2_IB), as illustrated in the figures below (figure B1 to B8).

Two distinct layouts (represented by the number 1 and 2), were used to avoid participant's confusion during the presentation of two similar ads. Without noticeable differences, participants might have perceived them as repetitive and disengaged from the second ad.

We used two different frames - extroverted (E) and introverted (I) - to accommodate both extroverted and introverted participants. We created two versions (A and B) for both the consistent match and consistent mismatch conditions, avoiding the use of the exact same frames. These conditions allowed participants to encounter ads that either matched or mismatched their personality traits on two occasions.

The extroverted and introverted frame versions were designed to be opposites, incorporating similar structural phrases and antonyms where possible. However, we ensured that participants were not presented with directly conflicting messages. For instance, in inconsistent conditions where both extroverted and introverted messages were presented, if an extroverted frame was shown first (e.g., 1_EA), the subsequent introverted frame was not the exact inverse of the initial extroverted ad (e.g., 2_IA).

Additionally, we incorporated ads for three other mobile applications, each with two versions, creating a total of six distinct filler ads. These are depicted in the figures below (Figures B9 to B14).

Figure B1

Target Ad Tailored for Extroverts, Layout 1, Version A (1_EA)

Figure B2

Target Ad tailored for Extroverts, layout 1, Version B (1_EB)

Figure B3

Target Ad Tailored for Introverts, Layout 1, Version A (1_IA)

Figure B4

Target ad Tailored for Introverts, Layout 1, Version B (1_IB)

Figure B5

Target Ad Tailored for Extroverts, Layout 2, Version A (2_EA)

Figure B6

Target Ad tailored for Extroverts, layout 2, Version B (2_EB)

Figure B7

Target Ad Tailored for Introverts, Layout 2, Version A (2_IA)

Figure B8

Target ad Tailored for Introverts, Layout 2, Version B (2_IB)

Figure B9

Filler Ad 1, Version A (first set)

Figure B10

Filler Ad 1, Version B (second set)

Figure B11

Filler Ad 2, Version A (first set)

Figure B12

Filler Ad 2, Version B (second set)

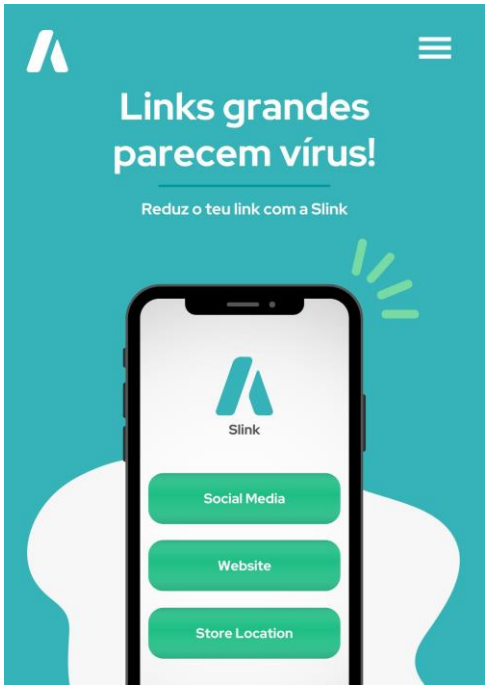


Figure B13

Filler ad 3, Version A (first set)

Figure B14

Filler Ad 3, Version B (second set)

Appendix C – Individual Differences Measures

Psychometric Properties of the Big Five Inventory – Short Version (BFI-10)

Regarding items sensitivity, given the polytomous nature of the items (Likert-type scale), we initially explored and confirmed that all items had responses spanning all five possible levels on the scale. Moreover, we conducted a thorough examination of descriptive statistics, including mean, median, mode, standard deviation, minimum, maximum, skewness, and kurtosis (as detailed in the table C1). Skewness ranged from a minimum of -1.063 (item 7) to a maximum of 0.146 (item 1), while kurtosis ranged from a minimum of -0.923 (item 3) to a maximum of 1.542 (item 2). Notably, all skewness and kurtosis values fell within the acceptable range of -7 to 7 for skewness and -3 to 3 for kurtosis, respectively (Marôco, 2018). These findings collectively indicate that the items exhibited good sensitivity without gross deviations from a normal distribution.

Table C1

Descriptive Statistics of BFI-10 Items.

	N	Missing	Mean	Median	Mode	SD	Min	Max	Skewness	Kurtosis
BFI_1_E	161	0	2.81	3	3.00	1.022	1	5	0.1462	-0.493
BFI_2_A	161	0	4.21	4	4.00	0.745	1	5	-0.9148	1.542
BFI_3_C	161	0	3.03	3	4.00	1.217	1	5	-0.1443	-0.923
BFI_4_N	161	0	3.11	3	3.00	1.127	1	5	-0.1042	-0.702
BFI_5_O	161	0	3.82	4	5.00	1.183	1	5	-0.6089	-0.832
BFI_6_E	161	0	3.33	3	4.00	1.224	1	5	-0.3638	-0.770
BFI_7_A	161	0	4.19	4	5.00	0.963	1	5	-1.0627	0.342
BFI_8_C	161	0	3.11	3	3.00	0.998	1	5	0.0534	-0.443
BFI_9_N	161	0	3.71	4	4.00	0.959	1	5	-0.5017	-0.279
BFI_10_O	161	0	3.53	4	3.00	0.981	1	5	-0.1392	-0.647

To evaluate the sensitivity of the scores, which encompass the five dimensions of the scale, we conducted a comprehensive assessment that included descriptive statistics: median, standard deviation, skewness, and kurtosis, along with frequency histograms featuring normality curves (see table C2). Subsequently, Shapiro-wilk normality tests were performed for each score. In all instances, H_0 was rejected (p = .001). For skewness, the range spanned from a minimum value of -0.797, observed in the Agreeableness dimension, to a maximum of 0.091, found in the Extroversion dimension. As for kurtosis, the minimum value was -0.861, identified in the Extraversion dimension, while the maximum was 0.461, associated with the

Agreeableness dimension. It is important to highlight that the Kolmogorov-Smirnov (K-S) test revealed deviations from normality assumptions, as evidenced by the rejection of H_0. However, it is worth noting that non-parametric methods often maintain their reliability even in the presence of such deviations, especially when distributions do not display pronounced skewness or flatness, and the sample sizes are sufficiently substantial.

Table C2

Descriptive Statistics of BFI-10 Scores

	Mean	Median	Mode	SD	Min	Max	Skewness	Kurtosis
Extroversion Score	3.07	3.00	2.50	0.963	1.00	5.00	0.0909	-0.861
Agreeableness Score	4.20	4.50	4.50	0.697	1.50	5.00	-0.7968	0.461
Conscientiousness Score	3.07	3.00	3.00	0.894	1.00	5.00	-0.1751	-0.628
Neuroticism Score	3.41	3.50	3.50	0.921	1.00	5.00	-0.2694	-0.552
Openness Score	3.67	3.50	3.50	0.874	1.00	5.00	-0.4467	-0.232

We evaluated the internal consistency of the scale using a split-half method, considering the two items per dimension (Eisinga et al., 2013). The obtained Spearman-Brown coefficients for each dimension were as follows: Extroversion (.64), Agreeableness (.48), Conscientiousness (.46), Neuroticism (.71), and Openness (.46).

A confirmatory factor analysis (CFA) was conducted, confirming the presence of the expected five-factor structure in the scale. The analysis yielded satisfactory fit indices, including X2/df = 1.55, CFI = .92, GFI = .96, PCFI = .51, PGFI = .54, TLI = .86, and RMSEA = .059.

The following table lists the items for the Portuguese version of the BFI-10.

Table C3

BFI-10 Portuguese Version

Item	Vejo-me como alguém que…
1	... é reservado(a). (R)
2	... é amável e atencioso(a) com a maioria das pessoas.
3	... tende a ser desorganizado(a). (R)
4	... é descontraído(a), lida bem com o stress. (R)
5	... tem poucos interesses artísticos. (R)
6	... é conversador(a).
7	... é, por vezes, mal-educado(a) com os outros. (R)
8	... faz planos e segue-os cuidadosamente.
9	... por vezes, fica tenso(a).
10	…é inventivo(a).

Psychometric Properties of the Need for Cognition Scale (NCS-6)

We employed the same procedure previously described for the BFI-10. First, we confirmed that all items had at least one response in each of the five levels of the scale. After that, we also examined statistics, including mean, median, mode, standard deviation, minimum, maximum, skewness, and kurtosis, as detailed in the table C4. Skewness ranged from a minimum -0.108 (item 1) to a maximum of -1.294 (item 3) and kurtosis values ranged from a minimum of -0.514 (item 1) to a maximum of 1.361 (item 3), which indicates that there were no deviations from the acceptable range of -7 to 7 and -3 to 3, respectively.

Table C4

Descriptive Statistics of NCS-6 Items

	N	Missing	Mean	Median	SD	Min	Max	Skewness	Kurtosis
NC_1	161	0	3.07	3	1.096	1	5	-0.108	-0.514
NC_2	161	0	3.37	3	1.054	1	5	-0.373	-0.301
NC_3	161	0	4.12	4	1.015	1	5	-1.294	1.361
NC_4	161	0	3.91	4	0.941	1	5	-0.496	-0.445
NC_5	161	0	3.97	4	0.890	1	5	-0.800	0.362
NC_6	161	0	3.40	3	1.039	1	5	-0.163	-0.450

To assess the sensitivity of the Need for Cognition (NC) score, which represent a single dimension of the scale, a comprehensive evaluation was conducted. This assessment included various descriptive statistics such as the median, standard deviation, skewness, and kurtosis, as outlined in the Appendix. Subsequently, a Shapiro-wilk normality test was performed for the NC score. In this case, H_0 was rejected (p = .001). The skewness and kurtosis values were -0.388 and -0.0469, respectively, which fell withing the acceptable range previously mentioned (see table C5). Thus, although K-S test indicated a violation of normality, applying the same criteria mentioned earlier for skewness and kurtosis, and following a meticulous analysis of descriptive statistics and frequency histograms, it can be concluded that there were no significant deviations from normality for the total NC scores. This reaffirms the sensitivity of the NC scores for further analysis and interpretation.

Table C5

Descriptive Statistics of NCS-6 Score

	N	Missing	Mean	Median	SD	Min	Max	Skewness	Kurtosis
NeedCog	161	0	21.8	22.0	4.36	10.0	30.0	-0.388	-0.0469

Internal consistency of the scale, consisting of a single dimension measured by six items, was evaluated using Cronbach's alpha. The obtained alpha coefficient was 0.815, indicating good reliability for the scale.

Due to the unavailability of the 6-item scale (NCS-6) for the Portuguese population, we utilized six identical items that had previously undergone validation as part of a Portuguese 18-item scale. To ensure the appropriateness of this adaptation, an exploratory factor analysis (EFA) was conducted (factor loadings can be consulted in table C6). In the initial step, we assessed the values of Bartlett's sphericity test and the Kaiser-Meyer-Olkin (KMO) measure (see table C7). All values exceeded .800, with an overall KMO of .848, indicating a favorable condition for proceeding with the analysis. Bartlett's sphericity test evaluates whether there is a sufficiently strong correlation to support factor analysis. In this test, a value of 276 (df 15; $p < .001$) was obtained, leading to the rejection of H_0 and confirming the presence of correlations among variables. Based on these criteria, we proceeded with the factor analysis.

Table C6

EFA – FactorLloadings of NCS-6

	Factor	
	1	**Uniqueness**
NC_1	0.650	0.578
NC_2	0.780	0.391
NC_3	0.584	0.659
NC_4	0.626	0.608
NC_5	0.584	0.659
NC_6	0.681	0.537

Table C7

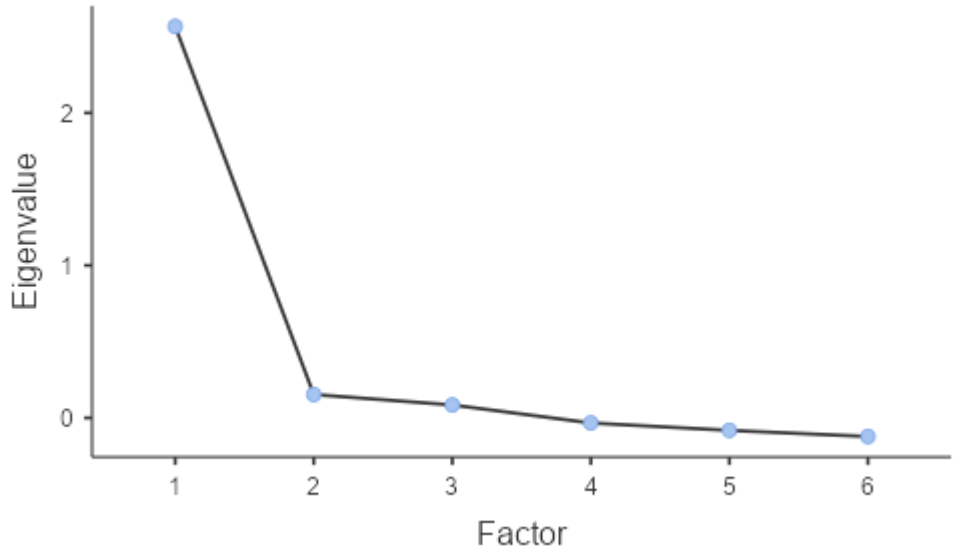
KMO Measure of Sampling Adequacy for NCS-6

	MSA
Overall	0.848
NC_1	0.849
NC_2	0.821
NC_3	0.862
NC_4	0.880
NC_5	0.844
NC_6	0.843

Next, we determined which factors to retain based on eigenvalues. We examined the initial eigenvalues, the Scree Plot, and the percentage of total variance explained (see Appendix). The analysis revealed that only one factor had an eigenvalue greater than 1, meeting the criterion for retention. The Scree Plot also indicated a single dominant factor, as the inflection point of the derivative occurred after the first factor (see figure C1). While the total variance explained by this single factor was 42.8%, falling below the typical reference range of 70% to 90%, it is crucial to interpret these results within the context of theory.

Figure C1

Scree Plot of NCS-6



Considering the consistency between the initial eigenvalues, the scree plot, and theoretical expectations, we concluded that the measure demonstrated validity in capturing the one-dimensional nature of the NC construct.

The following tables will display the items for both the original NCS-6 version and the adapted Portuguese version.

Table C8

Original and Adapted Version of NCS-6.

Items	Original Version (English)	Adapted Version (Portuguese)
1	I would prefer complex to simple problems.	Prefiro problemas complexos aos simples.
2	I like to have the responsibility of handling a situation that requires a lot of thinking.	Gosto de ter a responsabilidade de lidar com situações em que é preciso pensar muito.
3	Thinking is not my idea of fun. (R)	Pensar não me diverte. (R)
4	I would rather do something that requires little thought than something that is sure to challenge my thinking abilities. (R)	Prefiro fazer algo que não me obrigue a pensar, em vez de algo que desafie a minha capacidade de pensar. (R)
5	I really enjoy a task that involves coming up with new solutions to problems.	Gosto muito de uma tarefa que envolva a descoberta de soluções novas para problemas
6	I would prefer a task that is intellectual, difficult, and important to one that is somewhat important but does not require much thought.	Gosto muito de uma tarefa que envolva a descoberta de soluções novas para problemas

Appendix D – Task Instructions

Figure D1

First Page of the Questionnaire Presenting the Two Studies

Solicito a sua participação para dois estudos que estou a conduzir no âmbito da minha tese de mestrado em Psicologia Social e das Organizações.

O primeiro estudo é relativo a características individuais e requer o preenchimento de dois breves questionários (aproximadamente 3 minutos).

No segundo estudo serão apresentados alguns anúncios de novas aplicações para o telemóvel e feitas questões relativamente às suas preferências (cerca de 5 minutos).

Para participar, deverá dominar a língua portuguesa e ter uma idade compreendida entre os 18 e os 30 anos.

O anonimato das suas respostas será garantido.

Ao prosseguir, estará a declarar que concordou com as indicações acima referidas e que aceita colaborar voluntariamente nas presentes investigações. Porém, poderá anular a sua participação a qualquer momento, abandonando o questionário.

Qualquer dúvida poderá remeter para o e-mail: 26710@alunos.ispa.pt

Obrigado pela sua participação!

Figure D2

Instructions for the Demographic Questions

ESTUDO 1

Peço-lhe que responda às seguintes questões para efeitos de caracterização da amostra do estudo.

Figure D3

Instructions for BFI-10

Peço-lhe agora que leia cuidadosamente cada uma das 10 afirmações abaixo e assinale a opção (entre 1 "Discordo Fortemente" e 5 "Concordo Fortemente") que melhor o(a) caracteriza.
Não existem respostas certas ou erradas, assinale a sua opinião da forma mais sincera possível.

Vejo-me como alguém que..

Figure D4

Instructions for the NCS-6

Seguidamente apresento-lhe um conjunto de 6 afirmações que podem ou não aplicar-se a si. Indique o quanto cada uma destas seguintes afirmações é uma característica sua, numa escala entre **1 (Nada como eu) a 5 (Totalmente como eu).**

Figure D5

Conclusion of the First Study and Introduction of the Second Study

Obrigado pela sua participação no estudo 1!

Hoje em dia existem aplicações para o telemóvel com diferentes finalidades.
De seguida, irão ser apresentados anúncios relativos a 4 novas aplicações que serão lançadas no mercado.

Avançar para o Estudo 2

Figure D6

Instructions for the Second Study (followed by the first set of the ads)

ESTUDO 2

Peço-lhe que observe o conjunto de 4 anúncios que se segue (por questões legais, os logotipos, nomes e conteúdo dos anúncios, foram ligeiramente alterados).

Nota: cada anúncio será apresentado por um período mínimo de 10 segundos, depois aparecerá uma seta azul abaixo do anúncio, onde poderá clicar quando quiser passar ao próximo.

Figure D7

Instruction for the Second Study (followed by the second set of the ads)

Habitualmente é necessário testar vários anúncios para as mesmas aplicações. Irá agora observar um novo conjunto de 4 anúncios referentes às aplicações que foram apresentadas anteriormente.

Nota: poderá passar ao próximo anúncio ao fim de 10 segundos, clicando na seta azul que surgirá abaixo do anúncio.

Figure D8

Instructions for Attitudes Assessment

Gostaria de saber a opinião com que ficou relativamente à app *TripPlanner* (app de planeamento de viagens). Utilize as seguintes escalas de respostas para responder à questão abaixo.

Como considera a aplicação *TripPlanner*?

Figure D9

Instructions for Attitude Certainty Assessment.

Responda às duas seguintes questões utilizando uma escala de 7 pontos, em que 1 = Nada e 7 = Totalmente.

Figure D10

Instructions for Behavioral Intentions Assessment.

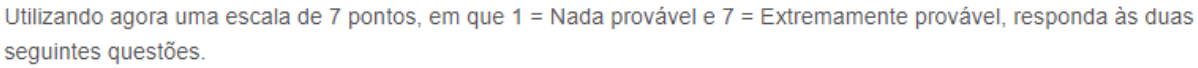


Figure D11

Instructions for Recall Task

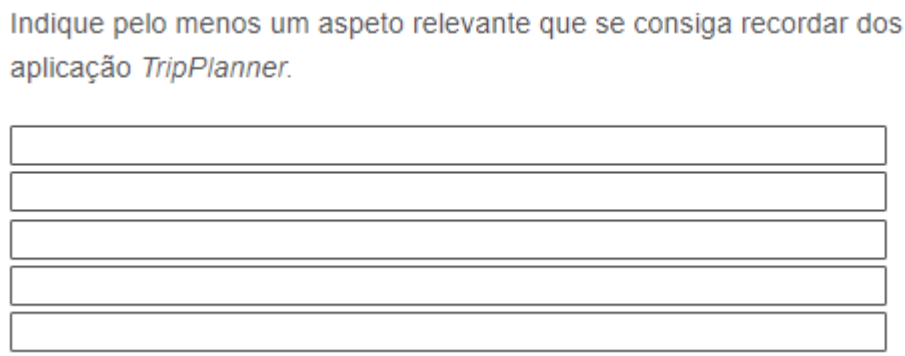


Figure D12

Control Check

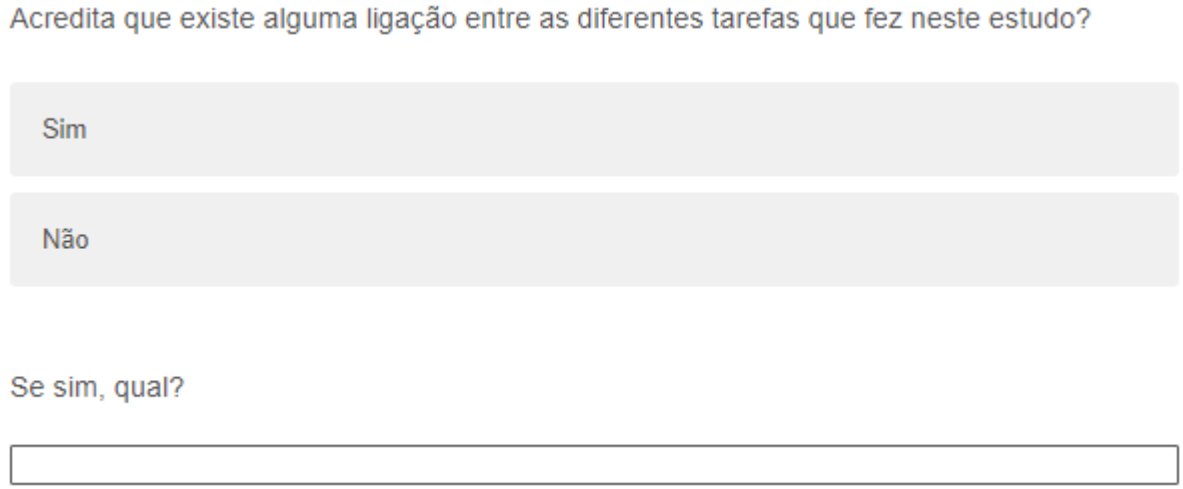
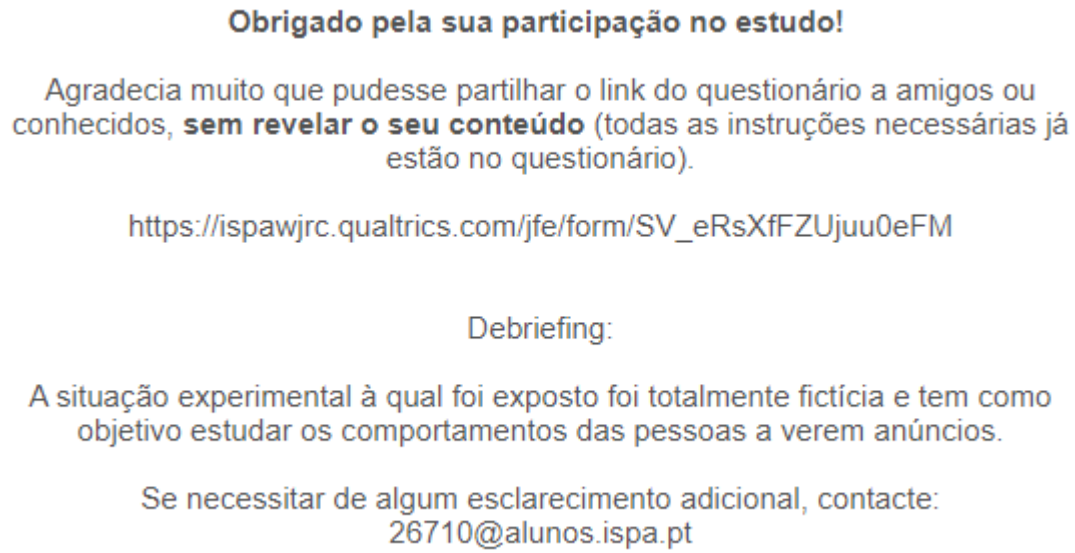


Figure D13

Thanking Message and Debriefing



Appendix E – Tables and Figures from Statistical Analyses Performed

Table E1

Sample Descriptive Statistics of Age

	Age
N	161
Missing	0
Mean	25.1
Median	25.0
Standard deviation	2.88
Minimum	18.0
Maximum	30.0

Table E2

Sample Frequencies of Gender

Gender	Counts	% of Total	Cumulative %
Masculine	68	42.2 %	42.2 %
Feminine	91	56.5 %	98.8 %
Other	1	0.6 %	99.4 %
Prefer not to say	1	0.6 %	100.0 %

Table E3

Sample Frequencies of Educational Background

Education	Counts	% of Total	Cumulative %
High-school	32	19.9 %	19.9 %
Bachelor	77	47.8 %	67.7 %
Master	51	31.7 %	99.4 %
Ph.D	1	0.6 %	100.0 %

Figure E1

*Output from Power Analysis used to Determine Sample Size (from G*Power)*

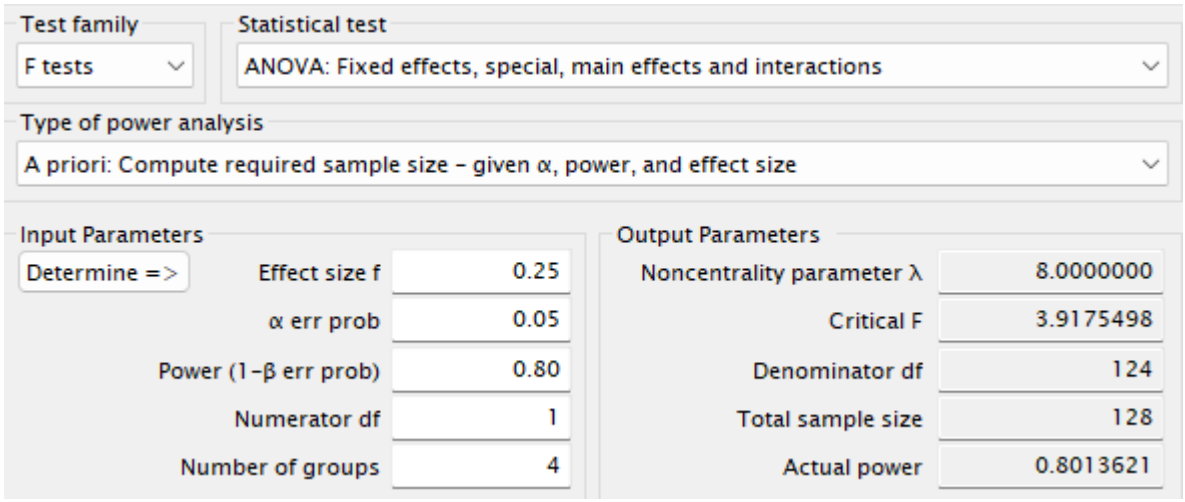


Table E4

ANOVA Analyzes of Attitudes

	SS	df	F	p	η^2p
Model	19.771	7	1.571	0.148	0.067
Matching	4.489	1	2.496	0.116	0.016
Consistency	2.635	1	1.465	0.228	0.009
NeedCog	2.509	1	1.395	0.239	0.009
Matching ✻ Consistency	0.743	1	0.413	0.521	0.003
Matching ✻ NeedCog	3.496	1	1.944	0.165	0.013
Consistency ✻ NeedCog	2.028	1	1.128	0.290	0.007
Matching ✻ Consistency ✻ NeedCog	4.714	1	2.622	0.107	0.017
Residuals	275.114	153			
Total	294.885	160			

Table E5

ANOVA Analyzes of Attitudes under Consistent Conditions

	SS	**df**	**F**	**p**	**η²p**
Model	0.8914	3	0.15801	0.924	0.006
Matching	0.8009	1	0.42595	0.516	0.006
NeedCog	0.0127	1	0.00676	0.935	0.000
Matching ✻ NeedCog	0.0451	1	0.02401	0.877	0.000
Residuals	144.7886	77			
Total	145.6800	80			

Table E6

ANOVA Analyzes of Attitude Certainty

	SS	df	F	p	η^2p
Model	33.088	7	1.971	0.062	0.083
Matching	0.621	1	0.259	0.612	0.002
Consistency	0.351	1	0.146	0.703	0.001
NeedCog	4.653	1	1.940	0.166	0.013
Matching ✻ Consistency	2.007	1	0.837	0.362	0.005
Matching ✻ NeedCog	3.329	1	1.388	0.241	0.009
Consistency ✻ NeedCog	5.521	1	2.302	0.131	0.015
Matching ✻ Consistency ✻ NeedCog	16.787	1	7.000	0.009	0.044
Residuals	366.951	153			
Total	400.039	160			

Table E7

ANOVA Analyzes of Behavioral Intentions

	SS	df	F	p	η^2p
Model	260.96	3	83.00	< .001	0.613
Attitudes	130.78	1	124.79	< .001	0.443
Certainty	12.14	1	11.59	< .001	0.069
Attitudes ✻ Certainty	8.33	1	7.95	0.005	0.048
Residuals	164.53	157			
Total	425.49	160			

Table E8

ANOVA Analyzes of Attitudes under Inconsistent Conditions

	SS	df	F	p	η^2p
Model	16.22	3	3.15	0.030	0.111
Matching	4.67	1	2.72	0.103	0.035
NeedCog	4.55	1	2.65	0.107	0.034
Matching ✻ NeedCog	8.22	1	4.79	0.032	0.059
Residuals	130.33	76			
Total	146.54	79			

Table E9

ANOVA Analyzes of Attitude Certainty under Inconsistent Conditions

	SS	df	F	p	η^2p
Model	29.86	3	4.76	0.004	0.158
Matching	2.16	1	1.04	0.312	0.013
NeedCog	10.22	1	4.89	0.030	0.060
Matching ✻ NeedCog	17.64	1	8.45	0.005	0.100
Residuals	158.78	76			
Total	188.64	79			

Table E10

ANOVA analyzes of Behavioral Intentions under Inconsistent Conditions

	SS	df	F	p	η^2p
Model	20.571	3	2.962	0.037	0.105
Matching	6.112	1	2.640	0.108	0.034
NeedCog	0.300	1	0.130	0.720	0.002
Matching ✻ NeedCog	14.342	1	6.196	0.015	0.075
Residuals	175.916	76			
Total	196.487	79			