ORIGINAL ARTICLE

Developing persuasive systems for marketing: the interplay of persuasion techniques, customer traits and persuasive message design

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Abstract

This paper presents a comprehensive review of persuasion techniques and their applications in the context of designing persuasive communication systems for marketing purposes. The study provides a condensed taxonomy of techniques and offers examples to guide the development of effective persuasive messages. Furthermore, the paper explores how attitudes, personality traits, and emotions can be leveraged as input data in predictive models, including machine learning approaches. The study's findings offer valuable insights for the design and implementation of persuasive communication systems across diverse contexts, including marketing and advertising, public health campaigns, and political messaging. This paper has the potential to serve as a valuable resource for both researchers and practitioners seeking to enhance their understanding of the science of persuasion, as it synthesizes existing literature and provides practical examples. In this way, the paper contributes to the field of persuasion research and practice, serving as a valuable tool for those seeking to expedite and deepen their knowledge of persuasive communication.

Keywords Influence · Propaganda · Digital marketing · Attitudes · Rhetorical devices · Cognitive bias · Persuasion techniques · Decision-making

1 Introduction

The study of persuasion and propaganda has a long history dating back to the World War I and II, during which governments and organizations recognized the power of communication in influencing public opinion and behavior (LaBrecque, 2008).

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As a result, researchers began examining the effects of propaganda on attitudes and beliefs, which led to the renaming of the field to "persuasion and attitudes research" (Jowett and O'Donnell, 2018, pp. 122–54). Attitudes, which refer to a person's positive or negative evaluation of an object, person or idea, are central to the study of persuasion (O'Keefe, 2015, p. 4).

Today, research on persuasion is a complex and interdisciplinary field that incorporates insights from various academic disciplines, such as economics, marketing, psychology, communication studies, information systems and artificial intelligence. The volume of literature and the numerous theories and models in the field pose challenges for researchers, which can be addressed through systematic reviews or quantitative content analysis. The objective of this paper is to conduct a comprehensive review of the existing literature on persuasion techniques and their potential application in the context of modern online advertising and persuasion. The focus of the review is to identify the most useful insights from the literature for individuals interested in tailoring messages in the digital age.

To achieve this, a concise and organized taxonomy of persuasion techniques will be presented, accompanied by relevant examples, to facilitate the design of effective persuasive messages in online advertising and persuasion efforts. Additionally, the role of language in persuasion and the potential to leverage customer attitudes to enhance message effectiveness is explored. The paper also offers a concise summary of key concepts and theories in persuasion, making it a valuable resource for interdisciplinary and trans-disciplinary researchers. The concept of persuasion techniques is explained, various types of messages that use embedded persuasion are discussed, and the implementation of these persuasive strategies is elaborated upon. The practical guidance provided in this paper is valuable to interdisciplinary researchers, including marketing executives, developers, data scientists and designers who may use persuasive techniques in applications such as online apps, digital advertising, recommendation systems, chatbots and e-commerce platforms.

The subsequent sections of this paper are organized as follows: Sect. 2 presents the methodology employed for conducting the literature review. Section 3 provides a comprehensive overview of strategies for designing persuasive messages in the context of marketing, including the classification and description of a wide range of persuasion techniques. Section 4 delves into the principles underlying psychological influence and discusses relevant psychological theories of persuasion. Section 5 focuses on the application of persuasion techniques within a data science framework. Section 6 highlights the main insights gleaned from the paper, while Sect. 7 offers concluding remarks.

1.1 Motivation and objectives

The abundance of literature in the field of persuasion research poses a significant challenge. There are many different theories and models that have been developed, each with its own set of concepts, variables and empirical findings. While this is a positive development, as it helps to build a comprehensive understanding of the topic, it can also create challenges for researchers who may struggle to navigate the

literature, to stay current with the latest developments and to identify new areas of inquiry.

To address this issue, some studies have proposed conducting systematic reviews or quantitative content analysis. However, most of these studies tend to focus on exploring or applying specific persuasive techniques or methods in particular contexts—such as promoting healthy behaviors for well-being, political marketing, etc. (Jenkin et al., 2014; Kalla & Broockman, 2018; Kraak et al., 2017; Matthews et al., 2016; Orji & Moffatt, 2018; Tikka & Oinas-Kukkonen, 2019).

Moreover, the convergence of persuasion research with computer science and artificial intelligence has become a prominent research area. Often, social science studies in this domain typically presume that all readers possess a background understanding of the persuasion process, which can pose difficulties for non-social science researchers (Jacobucci & Grimm, 2020; Michie et al., 2017). Clear and concise explanations are needed to help these researchers understand persuasion principles and benefit from the integration of computer science and AI in persuasion research. A shared understanding of the persuasion process and the system requirements can facilitate communication and collaboration among stakeholders, including designers, developers, users and others. This can help ensure that everyone is on the same page and working towards a common goal.

The central objective of this paper is to address an existing gap in the literature by providing a comprehensive review targeted at system designers, computer scientists and data scientists who seek to understand persuasion and the underlying psychological mechanisms of persuasion techniques. Specifically, this paper reviews the literature on persuasion techniques and their potential application in the modern context of online advertising and persuasion. To facilitate the design of effective persuasive messages, we present a condensed taxonomy of techniques, accompanied by relevant examples. We integrate the findings from psychological research on reasoning with theories of critical thinking to propose a taxonomy of cognitive errors from a persuasive perspective. This taxonomy serves as a framework that system designers and other practitioners can use to better understand and utilize various persuasion techniques in their work. The role of language in persuasion is explored, along with the examination of how customer attitudes can enhance the effectiveness of persuasive messages.

Furthermore, this paper provides a concise overview of key concepts and theories in persuasion, making it a valuable resource for those seeking to better understand this interdisciplinary field. This may be especially useful for early career researchers or those without a social science background as it provides a comprehensive overview of various persuasion techniques and the underlying psychological processes involved. Relevant concepts and theories are outlined with recommendations for further reading. For coverage, our literature review has been limited to certain literature according to the purpose of the paper (i.e., to provide practical guidance for interdisciplinary researchers who do not have a specific background in the fields of social science, linguistics, psychology or persuasion).

Our overarching goal is to explain the concept of persuasion techniques, discuss various types of messages that utilize persuasion and elaborate on the implementation of these persuasive strategies—such that researchers might bring these related

elements together into a cohesive and effective persuasion system. From our perspective, marketing executives, developers, data scientists and designers could leverage persuasive techniques in applications such as online apps, digital advertising, recommendation systems, chatbots and e-commerce platforms—which can benefit from integrating persuasive research and techniques into their systems. To achieve this goal, we defined the following research questions to guide the review process.

The central research question of this paper is:

RQ1. How can persuasive communication systems be tailored for marketing purposes to enhance their impact?

Designing a persuasive system that effectively influences people's attitudes requires a clear understanding of specific behaviors or actions that the persuasive system is trying to encourage or discourage. This will help in determining which persuasion techniques and strategies are most likely to be effective. Therefore, understanding the process and context within which a system will be used can assist designers in identifying the key needs of users and designing a system that effectively meets those needs leading to a more usable, efficient and effective system. Hence, we explored the following secondary research questions:

RQ2. What are the fundamental components of the persuasion process, and how do these components contribute to achieving the intended persuasive outcomes?

RQ3. How do the different components of the persuasion process relate to each other, and what are the underlying relationships between these components?

RQ4. What are the factors that contribute to a person's susceptibility to various persuasion techniques, and how do these factors influence the effectiveness of these techniques?

RQ5. How can persuasion techniques be implemented from a data science perspective?

1.2 Background: principles of persuasion for digital marketing

Terms such as persuasion, influence, rhetoric, sales techniques and cognitive biases all relate to the study of how people are influenced to change their attitudes, beliefs or behaviours. This area of study falls under the umbrella of social psychology which is concerned with understanding how individuals interact with others and how social forces shape our thoughts, feelings and behaviours (Taillard, 2000). In the context of marketing, these conceptualizations are relevant because they help marketers understand how to persuade consumers to buy their products or services (Sharma, 1999).

By understanding the principles of persuasion and influence, marketers can design effective advertising campaigns, develop persuasive messaging and use sales techniques that are more likely to result in a positive response from consumers (Akgun et al., 2017). For example, marketers might use rhetorical techniques such as emotional appeals or framing their messages in a particular way to persuade consumers to buy their products (Stiff & Mongeau, 2016). They might also use sales techniques such as scarcity or social proof to create a sense of urgency or to convince consumers that their product is popular and desirable (Cialdini, 2007, p. 237).

Overall, the study of persuasion and influence is important for marketing because it helps marketers understand how to effectively communicate with consumers and influence their decisions in a way that benefits their business. For example, digital marketing allows customer engagement through social media, email and other digital channels. Crucially, it contributes to personalization by using machine learning methods to leverage demographical and behavioural data that its easily accessible in online settings.

Machine learning plays a crucial role in digital marketing since its algorithms are used to optimize the selection and placement of ads in front of users (Truong, 2022). This is also known as ad targeting. Machine learning models can be used to analyze user behaviour and preferences to identify the audiences most likely to be interested in a particular product or service. These models can then be used to target ads to these audiences, increasing the chances of engagement and conversion. One important application of machine learning optimization in digital marketing is in predicting the likelihood that a user will click on an ad. Ad click-through rate (CTR) prediction models can be trained on historical data to learn the patterns that are most likely to lead to user engagement with ads. These models can then be used to predict the probability that a given user will click on a particular ad and to adjust the selection and placement of ads in real time to maximize engagement. This gives businesses the opportunity to showcase their products and services on a more personalized level (Truong, 2022).

As customers are increasingly spending more time online searching for information related to products and services, businesses have also adapted to cater to the online users. However, this does not necessarily mean that they have effectively optimized their sales strategies and customer engagement efforts (Kaptein, 2015b, pp. 14–16). A classical marketing strategy has been the use of attention-grabbing messages. These messages typically possess embedded persuasion techniques which are used to enhance advertising effectiveness (Braca & Dondio, 2023). This practice of using persuasion techniques for influence is not new; What is new is the implementation and use of persuasive techniques to influence and persuade consumers while online (Kaptein, 2015b, p. 14).

Persuasive messages have been used to connect with customers and increase the generation of conversions, clicks and purchases—driving revenue and growth for sellers and advertisers (Kaptein, 2018; Kaptein & Parvinen, 2015; Parvinen et al., 2015). These persuasive messages are delivered through channels such as emails, search engines, chatbots, social media platforms (like Facebook, Instagram and Tik-Tok) and others. The goal is to target customers by finding the best match between ads and a given customer. To this end, researchers from academia and industry blended computational methodologies from a myriad of fields such as information retrieval, machine learning, statistical modelling and computational propaganda (Dave & Varma, 2014).

Organizations have benefited from computational advertising and its integration with persuasion research. This mixture has enabled companies to connect with customers, improve brand awareness and ultimately influence online customers' attitudes (Dave & Varma, 2014). Most people do not make purchase decisions during advertisement exposure but rather through their memory of the information

presented in the advertisement (Tellis & Ambler, 2007). Therefore, when persuading customers online, advertising needs to be memorable. Additionally, modern internet consumers often seek instant gratification, possess a short attention span and are constantly dealing with information overload (Subramanian, 2018). One way to take advantage of these realities is by personalizing persuasion (Alslaity & Tran, 2021; Dijkstra, 2008; Pangbourne et al., 2020).

Lastly, technological advances have made possible to reach a broader audience, and the big data revolution opened a window into consumers psychology. This combination of technology and abundance of data allows marketers to enhance their persuasive messages by targeting customers based on psychological characteristics such as personality traits, desires, attitudes, belief systems and motivation (Galli, 2022; Sánchez-Corcuera et al., 2020; Zarouali et al., 2020). Studies have shown that this coalescence potentially maximizes conversion rates and ultimately gives value to business and consumers (Matz & Netzer, 2017). Given rich enough data, persuasive models could predict the optimal persuasion technique to use from a customer's profile (Braca & Dondio, 2023) highlighting the importance of leveraging persuasive strategies informed by comprehensive data analysis and customer profiling in contemporary marketing practices.

2 Methodology

Following Snyder's (2019) framework, this journal article utilizes a comprehensive synthesis of empirical and theoretical literature to undertake an in-depth investigation into the process of persuasion. Broome et al. (1993) assert that the integrative review method serves as a critical evaluation tool with the potential to re-conceptualize the existing knowledge base in the field under study. This aligns with Snyder's (2019) argument that the primary objective of an integrative review is to systematically survey and synthesize diverse perspectives, aiming to create new theoretical models, rather than attempting to exhaustively review all literature ever published on the given topic.

The integrative review commenced with an extensive literature search conducted through various sources including university library books and web-based engines such as Google Search and Google Scholar. Initially, a limited number of books were searched to identify related concepts which were further explored through reference chasing and citation tracking (i.e., snowballing) to uncover additional relevant publications. To ensure the inclusion of high-quality academic sources, the search was extended to reputable databases including Scopus, ProQuest, SpringerOpen, IEEE Xplore and EBSCO. Search strategies were formulated using relevant phrases and text words, and bibliographic searching was performed by scrutinizing reference lists of articles.

The screening process involved independent review of the titles and abstracts of the search results and other sources. Studies that potentially met the inclusion criteria were further assessed for eligibility based on their full text by the two authors of the paper. The search terms used for title, subject and keyword searches were categorized into two sets: (a) persuasive techniques and (b) persuasion, persuasive

language, influence, beliefs, attitudes, intentions, behaviors, rhetoric and advertisement. The search terms were cross-referenced to identify all possible combinations of search terms. The details of the search process, including the number of studies and query search strategies used at each stage of the screening process, are provided in the supplementary information.

Data collection was conducted rigorously to ensure a comprehensive review of the multidisciplinary literature on persuasion. The Scopus database was primarily utilized between 2019 and 2023 to identify articles published between 1968 and 2023 that met the predefined inclusion and exclusion criteria. The search was limited to several fields including Social Sciences, Psychology, Arts and Humanities, Computer Science, Mathematics, Engineering, Business, Decision Sciences and Neuroscience or Medicine.

The inclusion criteria for this review were restricted to articles that were peer-reviewed and published in academic journals or peer-reviewed reports from international scientific conferences. Additionally, the selected studies had to measure at least one outcome related to beliefs, attitudes, emotions, persuasion or behaviors, and be relevant to the design features of propaganda—as outlined in the supplementary material. Studies focusing on other forms of persuasion such as visual prompts or graphic design were excluded from the review. It should be noted that while a rigorous search methodology was employed, the vastness of the research field and the limitations of the search strategy may have resulted in some relevant studies or resources being overlooked. Nevertheless, the sources that were identified are considered to provide a comprehensive and representative overview of the current research on the components of persuasion and their underlying relationships. For more in-depth information, please refer to the supplementary material, which includes a flowchart (Figure S3) that illustrates the study selection process.

3 Strategies for crafting persuasive messages, structure, and language style

This section surveys relevant research relating to persuasive techniques and the effects of message variations using linguistic strategies. We focus mainly on techniques for which the empirical evidence is more extensive.

Persuasion has been described as the style and delivery that empowers words and ideas, targeting decision making and compliance inducement (Asemah & Edegoh, 2013; Crittenden & Crittenden, 2022; Rimer & Kreuter, 2006; Shahid et al., 2017; Usunier & Shaner, 2002). All messages intended to shape, reinforce, or change the responses of another, or others, can be considered persuasive (Roloff & Miller, 1980). According to the literature, language style and variation as a persuasive strategy could affect the receiver's attitude and judgement of a speaker and their comprehension and recall (O'Keefe, 2015, p. 214).

Language style refers to the way that people use language to convey meaning beyond the literal meaning of their words. It includes a variety of features, such as word choice, sentence structure, tone of voice and nonverbal cues, that can help to convey additional meaning or nuance in communication (Blankenship &

Craig, 2011). According to Blankenship, who cites Holtgraves and Lasky (1999, p. 195), the term "linguistic style" can be defined as a collection of pragmatic features that serve to alter the intended assertion conveyed within a message. These pragmatic features may encompass a wide range of elements including but not limited to politeness markers, modal verbs and intonation patterns (Holtgraves & Bonnefon, 1999). Through their inclusion, these features can impart additional meanings or nuances to an utterance beyond its literal interpretation. For example, imagine someone says, "Could you pass me the salt?" The use of the modal verb "could" makes this a polite request rather than a direct command. Similarly, imagine someone says, "That's an interesting idea," with a rising intonation at the end of the sentence. The rising intonation signals that the speaker is unsure or sceptical about the idea, even though the words themselves are neutral (Wurmbrand, 1999).

Linguistic style represents a crucial component of persuasive communication, which can facilitate the expression of delicate meanings and nuances within messages. Mastery of these features can therefore prove pivotal for effective communication, particularly in settings where cross-cultural or multilingual contexts are involved (Shen, 2023; Panina & Kroumova, 2015).

According to Dillard and Pfau (2002a, p. 371), the linguistic style of persuasive messages is contingent upon their argumentative features: style, structure and content. This approach may require the incorporation of semantic variations, syntax and stylistic elements (Musté et al., 2015). As outlined by Vasiloaia (2009), advertising language often utilizes techniques similar to those employed in poetic texts. The utilization of mnemonic devices, including rhyme, rhythm, alliteration and assonance provides a significant advantage due to their mnemotechnical effect. This effect ensures that the recipient of the advertisement retains the information more effectively and can retrieve it at the appropriate time.

Moving forward, the design of persuasive messages may even necessitate breaking the rules of English language grammar. Teodorescu (2015) states that the design of successful persuasive statements "can be achieved by breaking the conventions of language usage, and making use of wrong spelling, neologisms, puns, rhymes and semantic deviations, amongst others".

Persuasion techniques have been the object of research for a long time and there is evidence that they are a useful way to deflect careful and conscious thinking (Dove, 2020, p. 55). Persuasive techniques are a collection of linguistic features that can alter the intended core statement without necessarily changing the content of information delivered in the message (Holtgraves & Lasky, 1999). From consideration of the many techniques that have been documented, it appears that there is considerable redundancy in the definition of these techniques, leading to confusing and overlapping terminology. Additionally, many forms of persuasion techniques contribute to each other making it difficult to differentiate between them. To address this problem we classify, define, and describe a range of these techniques by function and target outcome. Figure 1 outlines a taxonomy of persuasion techniques from which authors believe researchers and practitioners could potentially benefit and develop a systematic research agenda to undertake larger research questions.
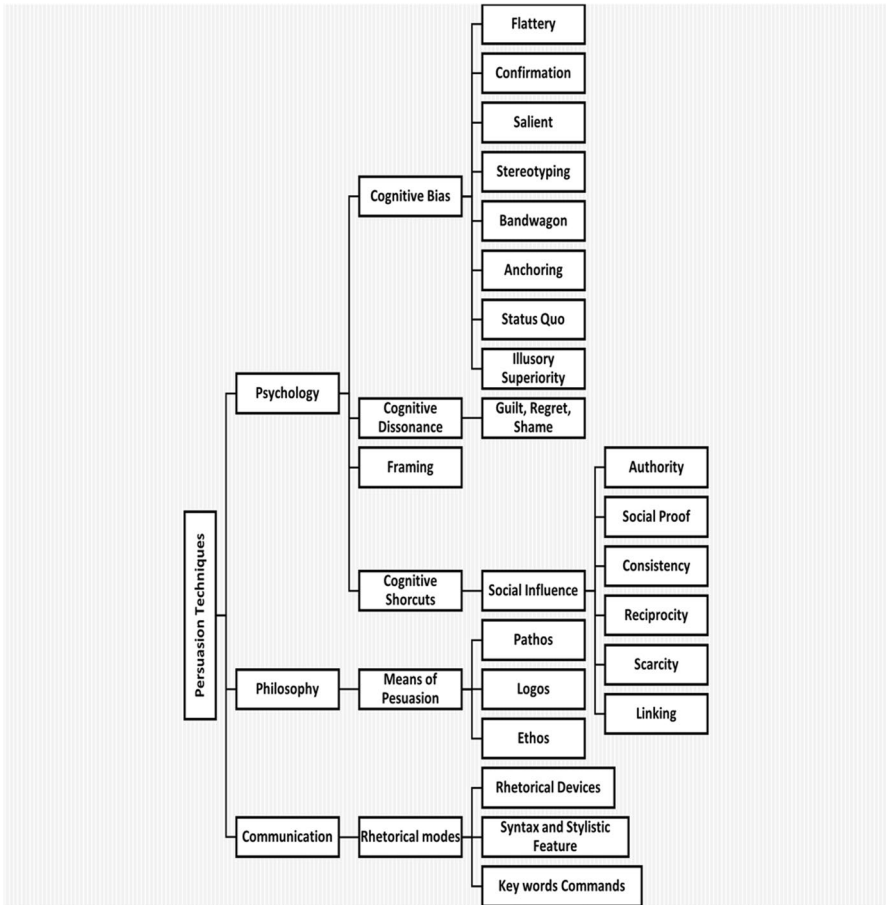
Fig. 1 Persuasion technique classification for 4 main categories relating to the line of persuasion research. *Group 1* Psychology—cognitive-based techniques. *Group 2* Philosophy—Aristotle's means of persuasion. *Group 3* Communication—Rhetorical Modes which refer to manipulation of semantics and syntax in language-based communication

3.1 Taxonomy of persuasion techniques

This study utilizes a multidisciplinary approach that integrates theoretical perspectives from psychology, critical thinking theories and Aristotle's rhetoric, while also drawing on relevant literature from marketing research and sociology. Through a comprehensive review of studies conducted by cognitive psychologists, we have identified a diverse range of cognitive errors that highlight the effective utilization of cognitive biases as a means of persuasion in various domains including propaganda, digital marketing and other persuasive contexts.

The existing academic literature on cognitive biases expounds on the non-random nature of these errors, highlighting their systematic and predictable patterns. Walton

(2010) provides a comprehensive explanation of how fallacious arguments can be misleading, appearing more persuasive than their actual merit. For instance, the fallacy of appeal to authority is often associated with the argument from expert opinion. As discussed by Walton (2010) fallacious arguments may gain apparent strength from their alignment with heuristics that are commonly employed in everyday reasoning such as the basic structure of a parascheme. A parascheme is a representation of the structure of a heuristic, which is a fast and instinctive form of inference that swiftly jumps to a conclusion and is frequently utilized in decision-making (Walton, 2010). However, it is important to note that heuristics are expedient shortcuts typically used in situations with limited data and time, and as such, they can be precarious and lead to erroneous conclusions.

Furthermore, it is noteworthy that persuasive techniques often exploit these cognitive errors in reasoning, although this aspect has not been extensively explored in the literature, with a few exceptions (see Walton, 2010; Battersby & Bailin, 2013). Battersby and Bailin (2013) emphasized the assessment of fallacies in critical thinking based on their fallacious nature. However, it is crucial to acknowledge that fallacies go beyond being mere ordinary errors in reasoning; they possess a persuasive quality. The allure of these fallacious inferences lies in the presence of underlying cognitive biases that influence and impact our cognitive processes. It is important that the identification of reasoning errors has predominantly relied on philosophical studies of arguments, rather than empirical research (Battersby & Bailin, 2013).

In this study, we propose a taxonomy of cognitive errors with a focus on how persuasive techniques are specifically designed to exploit these errors in reasoning, shedding light on how the understanding of cognitive biases can inform marketing strategies and tactics. Moreover, it is important to note that existing categorizations of persuasive techniques often focus on specific use cases such as sales or health education messages. In contrast, our taxonomy delves deeper into the root causes of these cognitive biases and provides insights into why they are persuasive by considering the underlying mechanisms of cognitive biases and their persuasive potential.

This paper introduces a taxonomy that encompasses a broad spectrum of persuasive techniques, including explicit and implicit methods. The taxonomy is structured into categories and sub-categories based on underlying psychological and rhetorical principles, and includes illustrative examples of techniques within each category, as well as their potential applications in real-world contexts. To address issues related to terminology, the taxonomy's structure employs groupings of categories and hierarchical levels. Furthermore, the paper proposes a blueprint for constructing persuasive messages that incorporates persuasive cues, customized to the specific persuasive strategy employed, as illustrated in Fig. 1.

As indicated previously, persuasion and influence are broad research topics that encompass a range of techniques and strategies. There is abundant literature addressing concepts such as persuasion, influence, rhetoric, sales techniques, influence techniques, persuasion techniques, persuasive frameworks and other related terms that serve a range of cognitive and research objectives. This may lead to ambiguity, overlapping use of terminology or confusion regarding the target use of a persuasive technique within cognitive frameworks.

For example, Rhetoric is a related concept that refers to the art of persuasive communication. The study of rhetoric seeks to understand how language can be used to influence audiences and achieve specific goals, such as winning an argument or persuading people to take a particular course of action (Cockcroft et al., 2013, p. 207). Sales techniques are a specific application of persuasion and influence that focus on convincing people to buy products or services. The study of sales techniques can help to identify effective strategies for marketing and selling products, as well as understanding consumer behaviour (Zanna et al., 2014, p. 165).

Other relevant frameworks, such as social influence theory (Dillard & Pfau, 2002, p. 529), cognitive dissonance theory theory (Dillard & Pfau, 2002, p. 99), and the elaboration likelihood model theory (Dillard & Pfau, 2002, p. 155), seek to explain how persuasion and influence work at the psychological level. These frameworks aim to help to identify the underlying cognitive and emotional processes that drive persuasion and provide insights into how to design more effective persuasive messages.

In the subsequent sections, we will provide an in-depth explanation,of the taxonomy (as shown in Fig. 1) by presenting an inventory of cognitive errors from the perspective of the persuasive target. In this context, the term 'target' corresponds to the recipient or audience of a persuasive message or communication and represents the individuals or groups that a persuader aims to influence or convince through the application of persuasive techniques.

Within the context of this study, the persuasive target perspective involves examining how cognitive errors impact the persuadability or susceptibility of individuals or groups to persuasion. This entails comprehending how cognitive biases can be strategically employed in persuasive techniques to effectively influence or persuade the intended target audience.

Furthermore, we will delineate a categorization of persuasive techniques that are grounded in these cognitive errors. The distinctive contribution of our approach lies in its emphasis on understanding the persuasive power of cognitive biases, rather than solely elucidating their nature. By offering a fresh perspective on categorizing cognitive errors based on their impact on persuasion, we shed light on how persuasive techniques are intentionally crafted to capitalize on these biases. Finally, we will discuss the potential implications of our findings for marketing research.

In the following sections, we will expound upon the taxonomy (Fig. 1) by providing a comprehensive list of cognitive errors from a persuasive target perspective. Additionally, we will delineate a categorization of persuasive techniques that are based on these cognitive errors.

3.1.1 Psychology: cognitive bias

Cognitive bias is a well-studied phenomenon in psychology that can be used in persuasive technology to influence users' decisions and behaviour (Abdullahi et al., 2019; Breves, 2021; Chiu et al., 2020; Lee, 2008; Russo & Chaxel, 2010; Wiafe et al., 2014). Persuasive technology refers to technology designed to persuade users to take a particular action or to adopt a particular attitude or behaviour (Fogg, 1998). One common use of cognitive bias in persuasive technology is to leverage the

availability heuristic, which is the tendency of people to make judgments based on the examples that come to mind most easily (Eisenman, 1993).

For example, an online retailer might highlight positive reviews of a product or emphasize how many other people have purchased it to make it seem more popular and desirable. The slogans and advertising of lottery tickets often use these cognitive biases to influence consumer behavior and by repeating certain messages to increase their salience and influence individuals' perceptions. For example, lottery advertising often emphasizes the large sums of money that can be won, making it seem like winning is more likely than it actually is (Griffiths & Wood, 2001).

Another way to use cognitive bias in persuasive technology is through social proof, which is the tendency of people to conform to the behaviour of others in similar situations. Social proof can be leveraged by displaying messages that indicate how many other people have performed a desired behaviour or by providing testimonials from other users who have successfully adopted the desired behaviour (Cialdini, 2007). Persuasive technology can also leverage cognitive biases such as the framing effect, which is the tendency of people to respond differently to information depending on how it is presented. For example, a fitness app might frame the benefits of exercising as "preventing disease" or "improving longevity" depending on the user's age and health concerns (Carfora et al., 2022; Weeks et al., 2022).

The following part of this paper moves on to describe in greater detail some of the main highly effective persuasion techniques that are commonly found in marketing and persuasive communication research. These techniques target people's fundamental needs such as love, self-esteem, self-actualization, and include feelings relating to reward, punishment, and others psychological manifestations. In social psychology, attitudes are defined as global evaluations that influence thought and action e.g., enjoying the taste of chocolate ice-cream or more complex matters, such as endorsing the values of a particular political party (Bem, 1970). The concept of attitude can be defined as the "position or stance of the mind" (Ajzen & Fishbein, 1977) and pertains to the assessments and evaluations that individuals hold towards objects, people, or issues. Attitudes are considered fundamental expressions of approval or validation, indicating their fundamental role in shaping human behavior and decision-making. Cognitive bias is often a result of intrinsic attitudes and beliefs that occur outside of peoples' conscious awareness and control (Battersby & Bailin, 2013). In psychology, this is also known as unconscious bias or implicit bias. Tetlock (2000) stated that ''people are too quick to draw conclusions about others, too slow to change our minds, excessively confident in our predictions, and prone to give too much weight to irrelevant cues (such as sunk costs) and too little weight to relevant ones (such as opportunity costs)''. Substantial research has been conducted concerning errors of thinking and judgement. As a result, many types of cognitive bias have been identified. Spillane and Wade (2020) outlines some of the common biases that are observed in text news and headlines such as Bandwagon, Anchoring Effect, Stereotyping, among others. In this paper we focus on biased thinking that is commonly leveraged in marketing communications such as framing techniques, flattery and illusion of superiority (also known as bias blind spots) (Spillane & Wade, 2020). For a review of cognitive bias see (Kahneman & Tversky, 2013; Priest, 2019).

3.1.2 Psychology: framing techniques

Framing techniques have been a major topic of research in the psychology of economic decisions (Tversky & Kahneman, 1989). Framing is also known as gain–loss messaging and is widely used for delivering messages in political marketing and health communication. This is evident in health communication where the main focus of persuasive messaging is to convince people to adopt healthier lifestyles and to encourage behaviours that can prevent disease or detect illness at an early stage (Rimer & Kreuter, 2006). The framing technique works by emphasizing the benefits that might be associated with adopting a healthy behaviour versus the cost of not adopting that particular behaviour (Toll et al., 2008). An example of message framing was observed during the COVID-19 pandemic where health authorities and media presented both the benefits and risks of vaccination—highlighting the challenges of communicating public health recommendations. Penning and Symons (2021) propose that ethical persuasion has proven to be the most effective approach in promoting COVID-19 vaccination.

In the domain of political marketing, the framing technique has focused on voters' support for political candidates by fitting messages to a particular audience, arguing in favor of a political position that members of a political group would not normally support in terms of moral concerns (Feinberg & Willer, 2019). Political campaigners' endeavor to convince people that a particular candidate is the right one and to induce a vote from them. Framing in political advertisement is expected to present a candidate's position on certain issues and to enhance familiarity, in an effort to persuade voters to support the candidate (Boeynaems et al., 2021). Ethically speaking, persuasion in politics involves the idea that candidates can espouse opinions that are contrary to their historically held beliefs on the presumption that voters can decide between truths and falsehoods. This type of persuasion illustrates the best and worst of liberal democracy (Held, 1996).

The framing technique uses message variation based on message structure and format. This mostly utilizes gain–loss variation by emphasizing emotions and threat appeals such as fear, arousal, and guilt. Studies suggest that negative-framed environmental and financial savings messaging significantly increased emotional arousal (Shin et al., 2017). Some examples of framing usage include: "*If you wear sunscreen, you'll have attractive skin when you're older*'' and *"Smoking causes fatal lung cancer"*.

3.1.3 Psychology: flattery

This technique is defined as "communicating positive things about another person without regard to that person`s true qualities or abilities" (Fogg & Nass, 1997). Research suggests that flattery can induce a positive influence on the target`s judgment of the flatterer (Chan & Sengupta, 2010).

Persuadees (receivers) tend to believe the content of flattering messages. They may believe that flatterers speak the truth even when they know the flatterer is being insincere. People tend to feel good when others flatter them (Berscheid & Hatfield,

1969). Substantial behavioural science research shows that when computers use random statements to flatter people, they can achieve a positive effect (Willcox, 2020). Flattery has been linked to a sense of entitlement and deservingness and may relate to people with narcissistic attitudes. They may have an inflated idea of themselves and a need for praise, admiration or validation (Credo et al., 2016; Twenge & Campbell, 2009). Examples of phrases containing flattery cues are: "*A person of your intelligence deserves much better than this*" and "*Because you are worthy, …*".

3.1.4 Psychology: illusory superiority

This is a cognitive bias which begins when people see themselves as being superior to the average person along various dimensions such as intelligence, cognitive ability, and possession of desirable traits. Zell et al. (2020) defined illusion of superiority as the tendency for people to perceive themselves as superior compared with their average peer. Researchers also suggested that this effect is more pronounced when examining personality traits than abilities and is associated with higher self-esteem. An example of illusory superiority is that 95% of drivers consider themselves to be better than the rest (Pietroni & Hughes, 2016). Illusion of superiority is sometimes called the "Lake Wobegon effect"—this term comes from Garrison Keillors' fictional town in which "the women are strong, the men are good-looking, and all the children are above average" (Pinker, 2011; Van Damme et al., 2017). Young (2016, p. 27) argues that while the use of pattern words (See Sect. 3.4.7) which elicit the superiority bias, may sound facile and adulating, they can be an effective path to influence and persuasion. Ruvio et al. (2020) argued that in marketing communication an effective strategy is the use of words that trigger consumers' arrogance and sense of superiority in the consumption domain (Danciu et al., 2014). These include phrases like: "*You made a good choice!"* and *"I've noticed that you are quite intelligent, so I'm sure you agree with my idea"*.

3.1.5 Psychology: cognitive dissonance theory

Cognitive dissonance occurs when two cognitions are in dissonance relation (i.e., a person's beliefs or actions contradict each other). In psychology literature, cognitions are defined as any belief, opinion or attitude about people, objects, issues, or oneself (O'Keefe, 2015). An illustration of a case of cognitive dissonance is when a person believes that smoking reduces anxiety and makes one appear sophisticated, while also believing that smoking causes cancer and is expensive. Cognitive dissonance plays a role in decisions and evaluations, and can occur in many areas of life e.g., a person may place value on being environmentally responsible but also drive a car that is not environmentally friendly (O'Keefe, 2015). Cognitive dissonance is also observed in online shopping, particularly when the purchase decision was impulsive. People in general tend to believe that they make good choices. For example, when people are disappointed with a purchase, this can conflict with previously existing beliefs about their decision-making abilities (Sharma, 2014).

In order to reduce this dissonance between belief and behaviour, the persuader might attempt to influence by targeting the conflicting beliefs (the contradiction) i.e., the dissonance attitudes. Studies provide evidence that positive and negative emotions are a key driver of this dissonant behaviour—also known in the literature as induced compliance (O'Keefe, 2015). A persuader could appeal to emotions such as *guilt* (Ghingold, 1981), *regret* (Brehm & Wicklund, 1970) and *hypocrisy* (Kim & Ryoo, 2021). Research indicates that to minimize cognitive dissonances, supportive beliefs that outweigh the dissonant belief or behaviour (e.g., the belief that smoking makes one appear sophisticated) may increase the importance of the conflicting belief (e.g., smoking causes cancer). For example, cognitive dissonances could potentially be mitigated by using the technique hypocrisy induction i.e., by highlighting when people have previously acted inconsistently with their attitudes (Allyn & Festinger, 1961). Examples of phrases employing hypocrisy induction include: *"Practice what you preach!"* and "Have *you thought about your list of excuses?— all those good reasons that stand in your way to success"*.

3.2 Psychology: cognitive shortcuts and Cialdini's principles of persuasion

Studies have shown that modern internet consumers tend to look for instant gratification, have a propensity for a short attention span and are often dealing with information overload. As a result, people are relying more on cognitive shortcuts to make decisions and navigate online environments more efficiently (Cheng et al., 2010; Kulviwat et al., 2004; Song et al., 2004; Sundar et al., 2007). Cognitive shortcuts are the automatic thought patterns that people use to make the decision-making process more efficient (Bogetz et al., 2021). Such cognitive shortcuts, or heuristics, allow us to skip steps and save mental energy (Vaughn & Linder, 2018). This process is also known as a cognitive schema, which is a framework that our brains use to "help us organize and interpret information" (Falzer, 2004). When people feel mentally fatigued (e.g., at the low-end of their circadian cycle), they are more likely to take cognitive shortcuts rather than study and evaluate information (Battersby & Bailin, 2013; Goel et al., 2013).

Robert Cialdini (2007, p. 273) in his publication on the psychology of persuasion, suggested that as the complexity and diversity of stimuli in our daily lives continue to increase, our reliance on mental shortcuts will correspondingly intensify. Cialdini organizes his findings of influence around six core principles that affect these decision-making short cuts, particularly in relation to purchasing and consumption decisions. These are *Reciprocity*, *Commitment*, *Social Proof*, *Liking*, *Authority*, and *Scarcity*. Cialdini`s principles of persuasion are considered cognitive shortcuts that are especially needed when individuals have neither the inclination or wherewithal to engage in more mindful message processing (Simons & Jones, 2011).

3.2.1 Reciprocity

Reciprocity is also known as reciprocal exchange, where actors perform individual acts that benefit others, without negotiation and without knowing whether the other will reciprocate (Molm, 2010). There is a sense of obligation that goes with this rule. The rule of reciprocation says that we should try to repay, in kind, what another person has provided us – "Favors must be returned in kind"(Cialdini, 2007, p. 17). This technique has shown to be effective in getting people to buy products and services that they would otherwise not buy, thus avoiding the social pressure produced by having accepted a gift or a `free' service. For example, in the food and beverage industry, food marketers offer free food sampling to their potential customer. When the customer tastes the food, they may feel obligated to purchase the product. Otherwise, people may tend to feel guilty about not purchasing the product (Mustapha & Shamsudin, 2020). Special key words associated with reciprocity are: '*Free*', '*Freebie*', '*Bonus'*.

   To cultivate a sense of obligation among individuals and encouraging them to reciprocate by undertaking a desired action, persuasive messages may emphasize the value of the product or service being promoted, while also highlighting the effort and resources that went into its creation. This approach is often utilized in reciprocity-based advertisements, such as "*Get your free workout at our health spa*" and "*Watch TV and movies anytime—avail of our free month offer*!". These examples are representative of the type of persuasive messaging that aims to create a feeling of indebtedness among potential customers, leading them to engage with the product or service in question.

3.2.2 Commitment

Good personal consistency is highly valued, while inconsistency is commonly thought to be an undesirable personality trait (Cialdini, 2007, p. 57). Human value systems can drive commitment, in that they can prompt us to comply with requests that are consistent with those values (Dillard & Pfau, 2002, p. 524). Psychologists have long understood the importance of consistency for humans, with individuals often feeling a desire to appear to be consistent. Consistency may also be one of the reasons that some people resist changing their attitudes or resist changing in general, given that they showed consistency to earlier commitments or behaviour (Chaiken et al., 1995).

   Appealing to commitment is a persuasive tactic designed to induce commitment and make persuadees feel obliged to act in a certain manner—they work by establishing an earlier commitment that targets the desired behaviour. These tactics are known as reciprocal concessions and a number of examples exist. *The foot-in-the-door* tactic works by obtaining an initial compliance, which is then followed up by another request for a larger related favor (Mowen & Cialdini, 1980). *The lowball* involves obtaining commitment to an action and then increasing the cost of performing the action (Cialdini, 2007, p. 99). *The bait-and-switch* tactic aims to lure purchasers in with the promise of a specific quality or price of a product before substituting the goods or services with lower quality or pricier items—making individuals

satisfied with the alternative to a disappointment (Kenechukwu et al., 2013). *The labelling technique* assigns a label to a person that is consistent with the behaviour that the persuader wants that person to adopt. An example of this could involve a teacher addressing a student as such: "*You look to me like the kind of boy or [girl] who understands how important it is to write correctly*" (Dillard & Pfau, 2002, p. 528).

3.2.3 Social proof

Social proof as a persuasive technique involves presenting information about the behaviour of others to a persuadee, in the hope that they will adopt similar behaviour. The social proof technique basically uses others as an example of the behaviour you are trying to elicit, and the perceptions of social pressure for performance of the behaviour. People are framed to adopt a position to agree with the persuader because it appeals to their desire to belong to the group or plays on their fears of being "left out" or regarded as an outsider (Dillard & Pfau, 2002, p. 529). Other related concepts which may be of interest to those who want to learn more about social proof includes: (a) group pressure (mental and psychological dependency of a person upon an existing set of beliefs and norms of a particular group (Umar, 2021); (b) conformity (where people adopt certain behaviours to 'fit in' and belong to a group (Umar, 2021); (c) herding behaviour (primal trait in animals linked to their survival—each animal rushes towards the center of the herd. This behavioural trait is also innate in human social behaviour (Umar, 2021)); (d) social validation (when individuals observe a group manifesting a belief or behaviour, they are more likely to believe and behave similarly (Dillard & Pfau, 2002, p. 531); (e) crowd psychology (phenomenon that occurs when an individual in a crowd is consciously submerged in the collective crowd mindset. This is often characterized by impulsive, unanimous, emotional, and intellectually weak behaviour (Le Bon, 2002); (f) information cascade/Mass Psychology (which occurs when individuals take decisions based on observation of others without regard to his own private information. One significant difference between herd behaviour and information cascade is that in information cascade the information is centralized, while for the other it is chaotic (as seen in sport events, strikes, demonstrations and riots) (Durlauf & Blume, 2016).

According to Nietzsche, people become herd animals when lacking any individual will and living by group instincts in the herd society. Individuality, originality, and freedom of thought may even be perceived as offensive—producing feelings of guilt. Nietzsche referred to conformist people as ''a smaller, almost ridiculous type, a herd animal, something eager to please, sickly and mediocre'' (Beyond Good and Evil) (Nietzsche, 2013). Many examples of the use of social proof can be found in social media platforms such as Facebook (Hilverda et al., 2018). It has been shown previously that people tend to follow the crowd, and humans have a tendency to run because others are running (Fiske & Taylor, 1991). "Well, they're doing it…" or "That's how other people do it" are typical examples of phrases used to justify an extensive array of human actions, from the way we protect the environment to the way we engage in exchange. People may mirror their friends' actions such as the restaurants they visit, or which TV shows they watch. It is not uncommon to see

phrases utilizing social proof in marketing. For example: *"McDonald's has served billions of satisfied customers!"* and "*In a recent survey, 8 out of 10 people said they would buy this product*".

3.2.4 Liking

The liking technique elicits an individual's innate desire to agree with others who share their values or resemble them. Liking has proved to be a powerful technique that can be used to motivate individuals to comply with another person's request, by emphasizing similarity. Liking as a persuasion technique is based on research of attitude similarity (Alvarez & Jaffe, 2004) attitude alignment, interpersonal dynamics (Reid et al., 2013) and inter-group contact (Słowiński et al., 2016) Dillard and Pfau (2002, p. 532) posit that individuals tend to trust those who share similarities with them. Additionally, people are more likely to agree or say "yes" to those they have a liking for and this affinity is often shaped by perceived similarities with others. Furnham (1996) claimed that liking and similarity can affect the decision making process and judgment of whose lives are saved in medical settings. His experiment consisted of a rank being assigned to a waiting list of patients who were suffering from kidney disorders. The rank related to the perception of who deserved to be treated next. Results showed that those with control of the waiting list tended to choose patients whose political party preference matched their own. Another experimental study investigated how interpersonal similarity plays an important role in the development of romantic relationships and can be used to predict initial romantic interest and long-term relationship stability (Ireland et al., 2011). In addition, studies have demonstrated that both similarity and language style matching can serve as valuable indicators of social dynamics and can effectively predict changes in relevant social psychological factors (Bell, 1984). For instance, using words and phrases such as "*Us*", "*Our*", "*like you*", "*I am like you…*", "*We both believe in protecting the environment for future generations*" or "*Just like you, we value honesty and transparency in our business practices*". This language strategy can create a perception of shared identity and foster a sense of relatability, potentially influencing individuals' attitudes and behaviors in a positive manner.

3.2.5 Authority

This technique is based on the concepts of credentials, credibility and history. It attributes greater weight to the opinion of an authority figure, suggesting their views to be more credible. This technique is considered a form of social influence (Cialdini, 2007). Appealing to authority is also considered a social cognitive bias which may be defined as having a strong belief that the information provided by an expert with recognized authority is correct (Hinnosaar & Hinnosaar, 2012). Research has shown that respect for authority is a universally instinctive trait in human psychology (Haidt et al., 2009). Studies suggest that authority bias can be quantified, as a greater respect for authority positively correlates with the tendency to accept information endorsed by authoritative sources (Graham et al., 2009). Studies have found

that some people are prone to comply with the directives of an authority, even in the face of evidence suggesting that it would be a mistake to do so (Modic & Lea, 2013). An example of this automatic but irrational willingness to comply are the Milgram conformity experiments, which examined the impact of the obedience paradigm in modern society on the psychology of individuals (Milgram et al., 1992). Legitimate authorities are extremely influential sources. A notable example in the literature of irrational compliance relating to a legitimate authority is the effect called *Captainitis* (Foushee, 1984). This demonstrates that when the captain maintains an authoritarian leadership style, the flight crew tends to disregard errors made by the captain, potentially allowing actions that they are supposed to monitor and prevent. Given the effectiveness of this technique, consumers and audiences are frequently faced with authority-based endorsements such as: "*This toothpaste has been recommended by dentists*", "*Professor Doherty's extensive research on the matter leaves little doubt*".

3.2.6 Scarcity

The idea of scarcity is an intrinsic aspect of human life and is a fundamental precondition of economic behaviour. Researchers in consumer marketing and psychology (Aggarwal et al., 2011; Jang et al., 2015) showed that people find resources that are dwindling more valuable, while people seem to be more motivated by the idea of losing than gaining something.

Lynn (1991) explained that scarcity boost the value (or desirability) of anything that can be possessed, is useful to its possessor and is transferable from one person to another. This effect relates to the commodity theory which deals with the psychological effects of potential loss (Brock, 1968). Items that are difficult to obtain are more desirable than those that require little effort (Lynn, 1991).

The perception of scarcity can drive people to increase their desire for a product or service (Cialdini, 2007, p. 237). If people are induced to believe an offer is only available for a limited time, they may be driven to act on it with more urgency (Aguirre-Rodriguez, 2013; Mou & Shin, 2018). The scarcity principle firstly appeals to an individual's desire for what is rare, scarce, or decreasing in availability, even if this scarcity is only perceived (Lynn, 1991). Secondly, scarcity lures individuals based on an unrelenting desire to preserve their freedom of choice. Accordingly, whenever individuals feel that freedom is threatened or limited, they react by wanting to retain the freedom as well as the goods or services associated with them—effectively triggering a response of increased desire (Brehm, 1966).

Persuasive messages that use scarcity as the main persuasive technique can be designed to place emphasis on the potential negative consequences of not taking action, such as by highlighting the risks of waiting too long or missing out on a limited time offer. This can create a sense of urgency and scarcity by framing the opportunity as something that is fleeting and that must be acted upon quickly. Alternatively, the persuader may emphasize the novel or exclusive nature of a product or service, such as by highlighting its rarity or uniqueness. This can create a sense of scarcity and desirability among individuals, prompting them to take immediate action in order to obtain the product or service before it is no longer available.

Examples of phrases that employ the principle of scarcity, for example to persuade consumers, are: "*Limited time offer/limited release/limit of one per customer*" and "*Great offers today, which will be gone tomorrow*".

3.3 Philosophy: persuasion techniques

Ancient Greek philosophers and rhetoricians identified factors that make an argument persuasive: *logos*—the structure of the argument and the quality; *ethos*—referring to the speaker's character and *pathos*—the appeal to the emotions, values, beliefs and personality of the message recipient. These are also known as means of persuasion or modes of proof (McCormack, 2014). Aristotle's means of persuasion (also known as *common places* or *topics*) drove peoples' interpretation of concepts such as good and evil, useful or dangerous, states of the mind and personal characteristics (McCormack, 2014).

Regarding, ethos, pathos and logos—in order to be in command of Aristotle's three modes of proof, an advocate must be able to reason logically, to understand human character and goodness in their various forms and to understand the emotions—that is, to name them and describe them, to know their causes and the way in which they are excited" (Burke, 1969). Aristotle's rhetoric is still relevant today and is utilized across a broad range of applications. Semantic types based on Aristotelian modes of persuasion are very common in advertising and online forums. From a linguistic perspective, advertising research has shown that successful adverts are those that catch the attention and arouse curiosity by appealing to *Logos*, *Ethos* and *Pathos* (Burke, 2008; Stern, 1990).

3.3.1 Persuasive techniques based on rational arguments (logos)

This technique is present when truth is established by the speech (Braet, 1992). The speaker frames the message using keywords that emphasize features such as facts, evidence, experts and common sense (Aronson et al., 1963). The following are some examples of these features: "*Veterinarians suggest that German shepherd dogs are a perfect match for people with active lifestyles*" and "*It is a matter of common sense that people deserve to be treated equally*".

3.3.2 Persuasive techniques based on moral arguments (ethos)

Regarding ethos, the persuasive message relies on the "source" of the message rather than the message itself (Choi et al., 2005). Persuasion takes place when the speech is delivered in such a manner as to render the orator worthy of trust. Messages are generally framed so that they accentuate elements such as trustworthiness, respect, titles, awards, accomplishments, humanitarian work, authority and empathy (Carey, 1996). Some examples of this style are: "*As a doctor, I am qualified to advise you.*" and "*As a celebrity, I endorse this product*".

3.3.3 Persuasive techniques based on emotional involvement (pathos)

This technique is related to the situation where the speaker induces emotions in the audience. Stories and metaphors are key elements in language, relating to feelings such as pity, happiness and anger (Carey, 1996). Examples of phrases appealing to pathos which demonstrate the use of emotive content are: "*Open a Coke, open happiness*" and "*Donating blood is one of the most personal and generous ways to help others*".

3.4 Persuasion techniques: rhetorical modes of communication

A rhetorical device is a tool that can be used to arouse emotion and persuade individuals for various purposes including to inform, to entertain or for enhancing style. Rhetorical devices affect the audience by inducing an emotional response, evoking powerful imagery or by leveraging expert opinion. It subtly guides the receiver's attitude in ways often not possible with a direct approach (Burke, 1969). This type of language includes pragmatics, which involves making inferences about the speaker's meaning without logical implication. For example: "*The hungry python caught the mouse*" pragmatically implies "*The hungry python ate the mouse*" but does not logically imply it (Brewer, 1977).

Persuaders choose their language carefully to enhance meaning and increase impact on the audience/reader. Persuaders widely use rhetorical devices in political discourse, propaganda and advertising. The rhetorical tools, particularly rhetorical devices, can be identified by analyzing word choices and lexical and semantic variations. The use of rhetorical devices is considered critical in the persuasion attempt (Tom & Eves, 2012). Popular rhetorical devices employed in the field of rhetoric are described below.

3.4.1 Hypophora

This is a figure of speech in which the speaker poses a question and then answers the question The grammatical structure often involves placing a question at the beginning, with the question subsequently being answered (McGuire, 2000). The value of this rhetorical device is that well-timed use can be employed to introduce or direct thoughts and ideas that persuadees (receivers) might already have on their minds and for which they are seeking answers (McGuigan, 2011). Examples of the hypophora technique follow: "*When will you be satisfied? We can never be satisfied as long as the Negro is the victim of the unspeakable horrors of police brutality*" (Martin Luther King Jr.).

and "*What kind of peace do I mean? What kind of peace do we seek? Not a Pax Americana enforced on the world by American weapons of war*" (John F. Kennedy).

3.4.2 Rhetorical question (the socratic method)

The use of this device enables the receiver to think, query and conclude with the speaker. It is used for effect, emphasis, or provocation, or for drawing a conclusion statement from the facts at hand. It stimulates critical thinking and encourages drawing out ideas and underlying presuppositions (Harris et al., 1997). Examples include: "*If we lose the ability to perceive our faults, what is the good of living on?*" (Marcus Aurelius) and "*Who doesn't want success*?".

Further examples of rhetorical questions being used in advertising are: "*Are you tired of constantly feeling thirsty*? *Do you want a refreshing drink that satisfies your thirst? Then try our new all-natural fruit juice today!*" In this example, the rhetorical questions are designed to engage the audience and prompt them to consider their own experiences and desires, leading them to the conclusion that the advertised fruit juice can provide the solution to their problem. Another example of the use of this technique online is "*Ready to take your first step towards success*? *Click the link below to start your journey today!*".

3.4.3 Epistrophe

This is the repetition of the same word or group of words at the end of phrases or sentences. Epistrophe is an excellent way to emphasize an idea and communicate urgency or emotion. It increases the expressiveness of the speech and creates rhythm and memorability and can reflect strong emotions ranging from anger to joy (Harris et al., 1997). The psychological effect of this device works by giving the impression of certainty in an idea. It encourages recipients to adopt a concept and provokes emotional and psychological attitudes in the audience (Katrandjiev et al., 2016). For example, a company might use epistrophe by repeatedly emphasizing the benefits of a product at the end of each sentence in a marketing message. Examples of epistrophe usage are: "*Yes, we can, to opportunity and prosperity. Yes, we can heal this nation. Yes, we can repair this world. Yes, we can!*" (Obama). *Reduce, reuse, recycle.*","*We have the power to make a difference, to create a cleaner, healthier planet, to protect the Earth for future generations.*"

3.4.4 Anaphora

The rhetorical device anaphora is a commonly used rhetorical device in advertising and it can be used in various ways to enhance the effectiveness of marketing messages. Anaphora is the repetition of a word or phrase at the beginning of successive clauses or sentences and it is often used to create a memorable and persuasive message. The same word/phrase is repeated initially in two successive sentences. Anaphora is contextually dependent, referring to some noun/phrase that has already been introduced into the discourse (Harris et al., 1997).

An example of the usage of anaphora is the famous slogan "*Just Do It. Just Do It. Just Do It*". In this example, "*Just Do It*" is repeated to create a sense of urgency and encourage viewers to take action and purchase Nike products.

Other examples of this include: "*Here's where the fun starts, here we go shopping*" and "*Always irresistible, always in vogue*".

3.4.5 Antanagoge

This is a rhetorical device in which a criticism and a compliment are jointly used to deflect or balance a counteraccusation or recrimination e.g., a negative connotation with a positive outlook. The literature on rhetoric defines antanagoge as the contradiction of a negative comment with a positive one. The goal is to reduce the impact or significance of the negative point (Cui & Zhao, 2014). For example, a company might use antanagoge to acknowledge a product's high price while also emphasizing its high quality. AI-powered content creation tools could be programmed to use antanagoge by analyzing the content of the message and identifying opportunities to use this device to make the message more persuasive. An example of this device was used by Hillary Clinton to persuade the electorate in one of her campaign speeches: "*We have seen that our nation is more deeply divided than we thought. But I still believe in America, and I always will*" (Taping et al., 2017). Other examples include "*When life gives you lemons, make lemonade*'' and *"Those in favor of a lockdown acknowledge that it will cause economic hardship but recognize that we will save lives and ultimately control the pandemic".*

3.4.6 Repetition

Semantic rhetorical repetition is a rhetorical technique that utilizes an eye-catching keyword or key-phrase in text or speech that could capture a readers' or listeners' attention. It includes repeating sounds, words, expressions, clauses and even sentences in a definite succession to deliver emphasis (McQuarrie & Mick, 1996). This effect is also known in the field of cognitive psychology as priming. Priming can be defined as an indirect memory impact in which exposure to one stimulus influences a response to another stimulus and, according to Tulving (1982), priming can be used to alter the way people think. The use of repetition can help the audience to see patterns and to become more familiar with key ideas or words. People typically like things that are familiar to them and restating ideas through repetition can help to cement an idea (McGuigan, 2011). A famous example of repetition can be found in one of Martin Luther King's speeches, when he repeated *"I have a dream…"* sixteen times (King, 1999). Semantic rhetorical repetition is also used as a strategy in other rhetorical devices such as anaphora (beginning words), epistrophe (ending words), epanalepsis (beginning and ending) and anadiplosis (ending and beginning) (Chetia, 2015). AI-powered content creation tools could also be programmed to use repetition by analyzing the structure of the message and identifying opportunities to repeat key words or phrases. Examples of repetition are: "*It`s a simple choice, a simple plan, a simple solution.*" and "*He keeps going and going and going.*" (Energizer Batteries Tagline).

3.4.7 Awareness patterns

This technique is also known as key words, loaded words or awareness words. Usually, this technique is applied in combination with other techniques to persuade the audience. The goal of the technique is to employ words that help to bypass resistance, increase responsiveness, embed ideas and suggestions and effortlessly deliver and plan presuppositions and assumptions. Typical awareness pattern words include key words such as: *"notice", "see", "realize", "aware", "experience", "discover", "consider", "contemplate", "think about", "what if", "imagine", "how about" and "if you could have"* (Crespo-Fernández, 2013; Young, 2017). These words are known as "trigger words" or "power words" in propaganda and are designed to elicit a specific response from the audience.(Young, 2016, p. 178).

For example, the word *"discover"* is often used in propaganda to create a sense of excitement and curiosity about a new idea or product. Advertisements may use phrases such as *"discover the secret to perfect skin"* or *"discover the hidden benefits of our product"* to encourage consumers to try the product or service. Another common word is "*notice*" which is often used in propaganda to draw attention to a particular message or idea. Advertisements may use phrases such as "*notice how our product stands out from the competition*" or "*notice the difference in quality with our product*" to emphasize the unique features of their product and encourage consumers to choose their brand. Overall, the use of trigger words in propaganda can be a powerful tool for influencing individuals' attitudes. By creating awareness patterns that evoke specific emotions and responses, propagandists can effectively shape public opinion and promote their desired message or idea. These might be used in a sentence as follows: "*As you become aware…*", "*I invite you to notice …*" and "*You will realize quickly, that …*".

4 Psychological influence

In this section, we provide an overview of the key concepts related to psychological influence, attitudes, beliefs and emotions. By understanding these concepts, we can gain insights into how persuasive techniques are used in various contexts and their potential impact on individuals and society.

4.1 Attitudes

Attitudes are mechanisms that influence peoples' choices and decisions, they are relevant in a myriad of cases including the products people buy, buttons clicked online, likes/dislikes, policies being endorsed, people and trends being followed and political candidate support (Jayawardhena, 2004). According to Wong and Cappell (2009), an attitude can be defined "as the degree to which one has a favorable or unfavorable evaluation of a behaviour (e.g., compliance with a tobacco-free policy improves health). Researchers argue that there exist factors that moderate or influence the relationship between attitude and behaviour.

These factors include personality traits, values, beliefs and the attractiveness of a presented message, and are believed to exert influence on individuals' attitudes and decisions. O'keefe (2015b, pp. 4–5) asserts that attitudes are enduring evaluations that have the power to influence behavior, making them a prime target for persuasion. Therefore, it is crucial to thoroughly assess the factors that impact attitudes, such as their influence on behavior, cognition, and beliefs about ideas. This is essential for the systematic study of computational persuasion, including the development and modeling of persuasive online solutions, such as statistical and machine learning-based predictive models.

According to O'Keefe (2015b, pp. 10–14) attitudes are influenced by values, belief factors and personality traits, which in turn shape the choices individuals make. The persuasiveness of a message depends greatly on how well it aligns with the receiver's values, as people's preferences and priorities may vary.

Personality traits, on the other hand, refer to enduring patterns of thoughts, feelings and behaviours that are relatively stable across time and situations (McCrae & John, 1992). The Big Five taxonomy of personality traits which includes five broad dimensions (openness to experience, conscientiousness, extraversion, agreeableness and neuroticism) is the most consistently favored by personality psychologists (Hirsh et al., 2009). Personality researchers argue that a person's level of each of the Big Five traits can predict various life outcomes such as job satisfaction, academic achievement and even longevity (Mar et al., 2006; Peterson et al., 2002; Xu & Peterson, 2017).

For instance, individuals who score high on the trait of conscientiousness, characterized by being organized, responsible and diligent, have been found to have longer lifespans (Roberts et al., 2009). Contrastingly, individuals who score high on neuroticism, characterized by emotional instability and negative affectivity, have been found to have shorter lifespans (Lahey, 2009).

The understanding of the relationship between personality and attitudes can aid designers in creating persuasive messages and technologies tailored to specific personality types. This can enhance the effectiveness of persuasive communication. O'Keefe (2015, p. 5) recommends that successful persuasion is achieved through the observation and measurement of variables such as attitudes and values, in addition to the evaluation of the persuasive message's impact. When contemplating attitudes, the specific data pertaining to attitudes becomes indispensable for designers of persuasive systems as it can provide insights into individuals' preferences, beliefs and values—thus enabling the creation of more personalized and effective persuasive messages and technologies. Incorporating attitudes data into the design process can increase the likelihood of achieving the intended goals of persuasive systems.

4.2 Emotions

Emotions are a fundamental aspect of human behavior and play a crucial role in the process of psychological influence. Emotions can be both positive and negative and

can be evoked through various persuasive techniques such as fear appeals, humor and empathy (Berenbaum & Boden, 2014).

Emotion can influence belief change and formation—previous analysis has indicated that emotions can influence and alter a person's process of forming an opinion, the evaluation of ideas and decision-making (Rolls, 2013). Emotions can be defined as states elicited by rewarding and punishing stimuli (Bechara, 2004).

There is evidence that decision-making is sensitive to emotion—emotion and reasoning are part of the psychological process through which individuals draw inferences from information (Blanchette, 2013). Lerner et al. (2015) claimed that "emotions constitute potent, pervasive, predictable, sometimes harmful and sometimes beneficial drivers of decision making". For example, market research has shown that e-shopping is strongly and positively associated with emotions of pleasure, satisfaction and feelings of well-being (Sabatini et al., 2011). Increasing attention to emotion will increase the likelihood of successfully influencing a person's beliefs (Lerner & Keltner, 2000). Berenbaum and Boden (2014) recommend researchers test further the impact of emotions on beliefs and on behaviour change.

Data related to emotional states can be used to design persuasive systems that are better suited to individual users. For example, by analyzing user emotions, persuasive systems can tailor their messages and techniques to elicit the desired emotional responses. This approach can significantly improve the effectiveness of persuasive systems as users are more likely to respond positively to messages that align with their emotional states. There are several ways in which emotional state data of users and customers can be collected online. For example, emotions can be inferred from user behavior, such as clickstream data, mouse movements or facial expressions captured by webcams (Ahn et al., 2008; Waterson, 2002). Social media platforms also offer a wealth of emotional data, as users often express their emotions in their posts, comments and reactions (Tang et al., 2011; Volkova et al., 2015). Another source of emotion-related data can be obtained from wearable devices such as smartwatches or fitness trackers that can collect biometric data such as heart rate or skin conductance and which can be used to infer emotional states (Long et al., 2022).

4.3 Beliefs

The concept of behavioural beliefs was studied by Ajzen (1991), where author presented the theory of planned behaviour and stated that persuasion as a process has shown to be dependent on context, peoples' beliefs and values. Persuaders can be successful when eliciting specific salient beliefs (attitudes towards the behaviour). Ajzen (1991) suggests that persuaders should identify salient beliefs in the target population before performing the persuasion attempt. Results of a further study (Ajzen, 2002) gave evidence that people have certain levels of internal and external locus of control (inclination to attribute events to themselves or to the outside world). According to Avtgis (1998), people who score higher on external locus of control tend to be more easily persuaded, socially influenced and conforming, than those who score as internal in locus of control.

In a marketing context Kaptein et al. (2009) provided an example of assessing salient beliefs and susceptibility to persuasion. The authors suggested persuasive system designers elicit salient beliefs as part of their data collection plan. Different techniques have been devised for assessing emotions and belief. Two measures can serve as useful examples—Semantic Differential (SD) (Osgood et al., 1975) and the Dysfunctional Attitude Scale (DAS) (Weissman & Beck, 1978). SD is a method used for quantifying subjective assessments of the connotative meaning of concepts, events, ideas, motivations, emotions and attitudes. For example, this questionnaire is frequently used in experimental studies of semantic priming (Hahn & Heit, 2001) and advertising framing effects (Chang, 2008). On the other hand, the DAS assesses dysfunctional beliefs and cognitive vulnerability, while also providing an indicator of the psychological strengths of an individual based on their own system of beliefs (Burns, 1981).

4.4 Decision-making styles

The Elaboration Likelihood Model (ELM) (Petty & Cacioppo, 1986) is a process-oriented framework that was the first attempt to integrate persuasive communication literature on source, message, receiver and the effect of context. Message elaboration is the degree to which a person thinks about a message consciously. The ELM assumes that when people are approached with persuasive communications, the motivation and ability of message elaboration would determine whether a person engages in either the *central or peripheral route*.

The aim of the ELM is to interpret how an individual can process certain messages. When the individual is motivated and able to evaluate critically the arguments contained within a message, the individual is likely to take the *central route* to persuasion. This route to persuasion works best when the target of persuasion, or the audience, is willing to engage in processing of the information. For example, personal computer advertisements often appeal to this route of persuasion by providing selected information—assuming their audience wants to systematically compare features and prices (Myers & Smith, 2012).

By contrast, the *peripheral route* is associated with less thoughtful processing. If motivation or ability is low, an individual is less likely to engage in the evaluation and analysis of the message (Petty & Cacioppo, 1986). The *peripheral route* to persuasion works by eliciting cues that trigger automatic acceptance, thus avoiding much thinking (Myers & Smith, 2012). An example of this is soft-drink advertising—this type of advertisement tends to provoke the *peripheral route*, by merely associating their product with glamour, pleasure and good moods (Myers & Smith, 2012).

The ELM suggests that the strength of the argument does not matter if the motivation and/or ability to think carefully is low. Instead of focusing on the facts and a product's quality, the *peripheral route* relies on a person associating something with positive characteristics such as positive emotions or celebrity endorsement. Cacioppo et al., (1984) used a questionnaire to show that differences exist in people's responses to persuasive messages. They measured predilection for the *central/*

peripheral route to persuasion as high or low—high scores indicated preference for the *central route*, whereas low scores implied inclination for the peripheral route of information processing (Cacioppo et al., 1984).

Within the literature, there are several terms and theories that represent the same concepts, which are used to describe the manner in which people deal with tasks and information. For example, the same theory that underlies ELM is also identified by the term "*Need for cognition*". "High need for cognition" is understood as the *central route* while "low need for cognition" refers to the *peripheral route* (Cacioppo et al., 1984). Furthermore, there are additional versions of this theory outlined in the literature by other researchers. Kahneman (2011, p. 22) labelled the *peripheral* and *central routes* as System 1 and System 2 respectively.

Information processing of messages in System 1 (*peripheral*) occurs in an automatic and fast fashion, while in System 2 (*central*) processing is slow, controlled and requires concentration. Other terms include Type 1 which refers to cognitive biases (*peripheral*) and Type 2 which describes analytical and rational thinking (*central*) (Korteling et al., 2018; Stanovich et al., 2011). Hamilton et al. (2016) proposed a questionnaire to test and measure decision making styles i.e., low thinking (peripheral) or high thinking (central) processing. Persuasion can take place through one of two paths, but other researchers proposed that people tend to use a combination of both thinking processes, namely: *central/system 2/type 2 and peripheral/system 1/ type 1*—leading to a mixture of decision-making styles that is not mutually exclusive and is influenced by the situation people find themselves in (Dove, 2020, p. 47).

To summarize, the central route is about the facts and quality of the argument—people make decisions using this route when they have the time to focus, categorize, compare and filter data. Comparatively, the peripheral route is the process of decision-making based on the attractiveness of the proposition and a person's current emotional state. Examples of messages appealing to both paths of persuasion are as follows: central route—"*Obama's economic plan seems like a sensible approach. So, I'll vote for him*" and peripheral route—"*Obama seem like a nice guy! I'm going to vote for him*".

5 Persuasion techniques using data science and the ELM model

In order to implement persuasion techniques from a data science perspective, the ELM theory of persuasion can be used as a guide. The following steps can be taken to design a persuasive communication system under an ML approach: (1) Identify the relevant variables, (2) Data collection, (3) Data analysis, (4) Develop a persuasion strategy and (5) Test the strategy.

1. The initial step in implementing persuasion techniques from a data science perspective is to identify the key variables that may influence the target audience's attitudes and behavior. These variables may encompass demographic, psychographic and behavioral factors, as well as contextual variables like time, location and social influence. To identify the relevant variables in the context of the ELM theory of persuasion, it is suggested to consider the message characteristics, user

profile encompassing attitudes, personality traits, emotions, beliefs, demographic information and the channel chosen for delivering the message. For example, in designing an ML-based persuasion system, Braca and Dondio (2023) collected personality, attitudinal and demographic data. This study may serve as a helpful guide in developing such systems.

2. The second step in implementing persuasion techniques using data science involves data collection on the identified variables. This data can be obtained from diverse sources such as surveys, experiments or online behavior tracking tools. The collected data can be analyzed to identify correlations and connections between variables, and further used to build predictive models to forecast the target audience's attitudes and behavior. The analysis of the collected data can contribute to the development of user models under an ML approach.

3. During the third step of applying data science to persuasion engineering, data analysis is carried out to identify patterns and relationships between variables. This is accomplished through the use of statistical techniques such as regression analysis or ML algorithms, such as clustering, regression and classification. By analyzing the data, researchers can uncover insights and develop predictive models for the target audience's attitudes and behavior. These methods are essential for making informed decisions when developing a persuasive communication system and can provide valuable insights into how to design effective messages and tailor them to the needs of different individuals or groups.

4. In the fourth step of implementing persuasion techniques from a data science perspective, a persuasive strategy must be developed based on the analysis conducted in the previous step. The analysis identifies the key variables that influence attitudes and behaviors of the target audience. For example, the analysis may show that appealing to the illusion of superiority can be an effective factor in persuading certain individuals. In this case, personality traits such as extroversion and agreeableness can be important predictors of the message. Messages such as "*Be the best version of yourself*" or "*You are unstoppable*" can reinforce the belief that one is superior to others. Extraverted individuals tend to be more confident and outgoing, while less agreeable individuals may be more focused on their own needs and desires rather than considering the perspectives of others (Campbell et al., 2002). Alternatively, if a group of people or individual seems to be prone to authority bias, a persuasion strategy can be developed using the Captainitis bias. This can be achieved by establishing expertise and authority experience and by using assertive language in the message while avoiding any uncertain or ambiguous expressions (Milgram et al., 1992, p. 119).

5. The final step in the process is to develop a communication strategy that leverages the insights gained from the data analysis. Such a strategy can include a variety of persuasion techniques such as social proof, authority and scarcity. The effectiveness of the strategy can be assessed through experiments like A/B testing and randomized controlled trials (Avtgis, 1998; de Carolis & Mazzotta, 2017; Ciocarlan et al., 2019; Dodoo & Padovano, 2020; Hirsh et al., 2012; Josekutty Thomas et al., 2017).The results can be used to refine and optimize the strategy. Braca and Dondio (2023) proposed a prototype that employs ML techniques to predict and evaluate persuasive strategies utilizing separate training and test data

sets to estimate the level of influence of different techniques. Thus, the last phase of the persuasion process involves not only creating a communication plan but also subjecting it to rigorous empirical testing and refinement based on evidence. Overall, by applying the ELM theory of persuasion and following the above steps, it is possible to design persuasive models that effectively leverage data science techniques to influence attitudes and behavior. This approach has the potential to significantly improve the effectiveness of persuasive communication systems, particularly in today's digital age where vast amounts of data are available for analysis.

While developing persuasive models using data science, it is crucial to be mindful of the ethical implications of such practices (Jobin et al., 2019). To create effective persuasive models, one can follow the steps mentioned above, including identifying relevant variables, collecting data, analyzing it and developing a persuasive strategy. However, it is important to consider the ethical implications of targeting individuals based on their psychographic profiles, as it may infringe on their privacy and influence their behaviors. Therefore, when creating persuasive models, one should take steps to ensure that they are not crossing ethical boundaries. This may include being transparent about data collection and usage, obtaining consent from individuals and avoiding the use of manipulative tactics (Donath, 2021; Jobin et al., 2019; Lo Piano, 2020).

There are some concerns around the ethics of using psychographic profiling for advertising purposes and some argue that it can be manipulative and infringe on privacy rights (Stock et al., 2016). It is well known that online marketers often collect data on users for advertising purposes through various methods such as cookies, website trackers and social media monitoring. This data can include demographic information, browsing and search history, location data and other information that can help create user profiles. Online marketers often attempt to understand user personality via psychographic profiling. This involves collecting data on a user's behaviour, interests, attitudes and preferences in order to make inferences about their personality traits. This information is then used to create targeted advertising campaigns that are more likely to resonate with the user (Chouaki et al., 2022; Shah et al., 2020). It is important for users to be aware of the data that is being collected about people and to understand how it is being used (Cooper et al., 2022).

The use of AI to leverage cognitive biases for influence and persuasion is a growing concern in the field of AI ethics. If an AI system is designed to intentionally manipulate users by leveraging cognitive biases, it can be seen as unethical and potentially harmful. For example, an AI system that uses the availability heuristic to display certain news articles or social media posts that reinforce a certain political viewpoint could be seen as shaping users' opinions and potentially leading to polarization and division (Spohr, 2017). Similarly, an AI system that uses social proof to encourage users to endorse a certain political candidate or idea could be seen as underhanded and potentially harmful to democratic processes (Bertrand et al., 2022). Furthermore, the use of logging to keep users engaged for longer periods of time can also be problematic if it is done in a way that prioritizes engagement over user well-being. If an AI system is designed to keep users engaged even when

they are experiencing negative emotions or behaviors, it could be seen as prioritizing profit over user welfare (Bhargava & Velasquez, 2021; Petticrew et al., 2020; Waldman, 2020).

Therefore, it is important for designers of AI systems to consider the potential consequences of their designs and to ensure that they are not intentionally manipulating users or prioritizing engagement over user health. AI systems should be designed with ethical principles in mind, including transparency, accountability and respect for user autonomy.

6 Discussion and main findings

The purpose of this study was to synthesize and integrate the extant corpus of research pertaining to the process of persuasion, with the aim of obtaining a comprehensive understanding of the intricacies and mechanisms underlying the process of being persuaded. Specifically, our aim is to provide a comprehensive resource that can assist in understanding the design and application of persuasive messages to influence attitudes and behaviors. To achieve this goal, we organized and presented a variety of persuasion theories, techniques and frameworks in a clear and concise manner. Our main findings are outlined below:

1. Persuasive messages should be tailored to the audience, taking into account their characteristics, values, beliefs and attitudes. This implies that values, beliefs and attitudes can be predictors of persuasion techniques (Braca & Dondio, 2023). It is important to note that attitudes and personality traits are not the same thing, although they are related. Attitudes can be positive or negative and can vary in intensity and strength. They can also be shaped by a range of factors, including personal experiences, social norms and cultural values (Dillard & Pfau, 2002, p. 42). By tailoring messaging to specific personality traits, marketers and persuasion researchers alike may be able to increase the effectiveness of their communications and build stronger connections with their audience. For example, if attitudes toward a particular political candidate are generally negative, persuasive messages may focus on highlighting the candidate's positive attributes or casting the opposing candidate in a negative light (Sahly et al., 2019).

Researchers suggest a deep connection between the Big Five personality traits and cognitive biases (Ahmad, 2020). For example, individuals who score high on the personality trait of openness to experience tend to be less susceptible to certain cognitive biases, such as the confirmation bias and the sunk cost fallacy. This may be because open individuals are more willing to consider new information and to revise their beliefs accordingly (Ronayne et al., 2021). Similarly, individuals who score high on the personality trait of conscientiousness tend to be less susceptible to other cognitive biases such as the framing effect and the availability heuristic (Gamliel et al., 2014). This may be because conscientious individuals are more systematic and analytical in their decision-making processes and less likely to be swayed by factors that are not directly relevant to the decision at hand (Toet et al., 2016). There is a tendency for neurotic people to be prone to the gambler's fallacy which is the mistaken belief that past events can influence future outcomes in a random process.

Lottery advertising leverages this cognitive bias by often highlighting recent big winners or the odds of winning, which can create the impression that playing is more likely to result in a win (Griffiths & Wood, 2001). It is important to note, however, that these links between personality traits and cognitive biases are not always consistent across studies and that other factors such as cultural background and education level may also play a role in determining susceptibility to cognitive biases (Ahmad, 2020).

2. The theory of systems I and II, as well as the ELM, can help explain how cognitive biases influence our perceptions and behaviours, including our susceptibility to persuasion techniques (Dove, 2020, p. 45). People can be susceptible to propaganda that targets our peripheral route or shortcuts of information processing, particularly when we are not motivated or able to engage in deep processing of the message's content. This is because propaganda often appeals to emotions, biases and other peripheral cues rather than logical arguments. The ELM theory suggests that an individual's level of involvement or motivation to process information can influence the effectiveness of persuasive messages (Joyal-Desmarais et al., 2022). When individuals are highly involved, they are more likely to engage in systematic processing, carefully evaluating the content of the message. However, when individuals have low involvement, they may rely on peripheral cues such as the source of the message or the emotional appeal to make decisions (Kitchen et al., 2014).

In online advertising, marketers may use persuasive techniques such as social proof, scarcity or authority to encourage individuals to make a purchase or take a specific action. These techniques can be particularly effective in influencing individuals who rely on System 1 thinking, as they may be more susceptible to heuristics and shortcuts (Muscanell et al., 2014).

3. Cognitive biases can also play a role in how individuals process and respond to persuasive messages in online marketing. For example, individuals may be influenced by the availability bias which refers to the tendency to overestimate the likelihood of events that are more easily recalled (Tversky & Kahneman, 1973). The slogans of lottery tickets often use these cognitive biases to influence consumer behaviour by repeating certain messages to increase their salience and influence an individual's perceptions. For example, lottery advertising often emphasizes the large sums of money that can be won, making it seem like winning is more likely than it actually is (Griffiths & Wood, 2001). Battersby and Bailin (2013) argue that cognitive biases possess a strong persuasive influence due to their origin in natural inferential tendencies as postulated by the two systems theory. These cognitive processes are typically the initial approach that individuals employ when faced with cognitive challenges, due to their quick and effortless nature.

4. Individuals have certain expectations about the language that will be used in persuasive messages based on their previous experiences and social norms. These language expectations can affect how individuals process persuasive messages and influence their attitudes and behaviour. This is known as Language Expectancy Theory (LET) (For a review see (Dillard & Pfau, 2002, p. 117)). LET is related to the ELM theoretical frameworks that emphasize the role of the message recipient's cognitive processing in message reception and persuasion. Specifically, if the message content is consistent with the recipient's language expectations, it will be processed

more efficiently and effectively. In contrast, if the message content is inconsistent with the recipient's language expectations, it may be processed less effectively or even rejected altogether. Both LET and ELM highlight the importance of the message recipient's cognitive processing in message reception and persuasion. Specifically, LET focuses on the role of language expectations in cognitive processing, whereas ELM emphasizes the importance of central versus peripheral processing in persuasion (Dillard & Pfau, 2002, p. 126).

5. Persuasive language style refers to the language patterns and techniques that are used to influence a person's attitudes or behaviours. These language patterns may include the use of emotional appeals, rhetorical questions, repetition, appeals to authority or social norms. There is evidence to suggest that an individual's personality traits can influence their use of persuasive language style. For example, individuals high in extraversion may be more likely to use persuasive language style that is assertive and confident, whereas individuals high in agreeableness may be more likely to use language that is polite and accommodating (Hirsh & Peterson, 2009). Furthermore, studies have found that matching the language style of the message with the language style of the recipient can also increase the effectiveness of persuasive messages. This is because individuals are more likely to process and respond positively to messages that use language patterns that are familiar and comfortable to them (Gao et al., 2017; Ireland et al., 2011).

Research has also shown that the use of linguistic styles can play a critical role in the persuasive process with the potential to increase the effectiveness of persuasive messages e.g., using language that is aligned with the message recipient's cognitive processing style (central or peripheral). For example, using more complex and detailed language may be more effective when trying to persuade individuals high in need for cognition (who are more likely to engage in central processing). On the other hand, when attempting to persuade individuals with a high need for closure (peripheral route) (Evans et al., 2017), the use of emotionally charged language may be more effective. Emotionally loaded language has the ability to capture their attention and trigger a strong emotional response, potentially influencing their attitudes and behaviors. This is due to the tendency of individuals with a high need for closure to rely on heuristics or peripheral cues such as emotional appeals to swiftly form judgments or make decisions. (Lee, 2008; Pennebaker et al., 2003; Munaro et al., 2021).

7 Conclusions

Human attention is the new monetizable commodity and persuasive message design can target this phenomenon. As noted previously, studies have shown that online consumers strive for instant gratification, possess a shorter attention span and are constantly dealing with information overload. This lack of attention and deep thinking presents an opportunity to marketers to adapt, review and refine the methods currently being used to attract and hold consumers' attention (Dwivedi et al., 2021).

Our study presents a taxonomy of persuasive techniques that aims to facilitate the selection and consideration of suitable strategies for designing persuasive

communication systems. Considering that there is overlap in the definition of persuasion techniques, the taxonomy organizes them into categories and levels. The taxonomy encompasses powerful persuasive strategies such as Aristotle's means of persuasion, rhetorical devices and cognitive shortcuts. Furthermore, our study provides explanations and illustrative examples to assist researchers and practitioners in tailoring their own persuasive messages and developing data-driven models of persuasive communication. The taxonomy serves as a valuable tool for designing effective persuasive communication and promoting a better understanding of the principles underlying persuasive communication.

Given that ML is revolutionizing many scientific fields, we believe that the blending of persuasive marketing and artificial intelligence offers valuable possibilities and opportunities for leveraging data-driven marketing platforms. The underlying assumption is that the relationship between people's attributes and the effect of different persuasion techniques (messages characteristics) can be discovered—ML models can be designed to potentially learn this intricate relationship. While technically challenging, it should be possible to automatically identify persuasive strategies and adapt these to a given user, thus potentially increasing compliance with a behavioural request.

Regarding limitations of this approach, it could be argued that, as observed in the social sciences, findings and results in persuasion research are prone to population biases which at the broadest level exist in the acts of collecting, analyzing and reporting data. Particular attention should be given to the confounding effects of other variables. This refers to the many internal and external factors that can potentially over- or underestimate the outcome of a persuasion effect. To mitigate these confounding effects, it may be helpful to deploy pilot work that elicits and measures receivers' beliefs (Ajzen, 2002). Another potential pitfall is misleading self-reporting assessments (Stephens-Davidowitz, 2018). Furthermore, practitioners should consider that most findings on persuasion research are not necessarily applicable across countries, cultures and backgrounds (Morris et al., 2001). Lastly, empirical research provides considerable evidence that persuasion and its effect on behaviour change requires long-term studies.

We briefly summarized the most frequently used strategies within persuasive communication and discussed the main behavioural theories and persuasive frameworks. Much persuasion research considers factors such as source and message characteristics and the consumers' attitudes and behaviours—factors that can be incorporated into analytical and predictive models. As such, we have discussed some of the most relevant personality and belief system-based variables and shown that these can be collected, for example, via explicit surveys or as part of online user profile data. A wide range of persuasion techniques and the effects of message variation using linguistic strategies are also discussed.

Although this work is primarily intended as an academic resource, it may also be of interest to cognitive psychologists, marketers, software designers, data scientists and those seeking to expand their theoretical understanding and form a foundation for research in persuasive communication. Finally, the ability to persuade and influence people can provide a mechanism to deliver a multitude of benefits ranging health, education and psychology amongst others. Potential commercial applications

are online marketing, chat bots, advertising platforms and recommender systems. We hope that this paper will facilitate a better understanding of the design and implementation of persuasion communication models as researchers aim to develop their own novel persuasive systems.

In conclusion, our study contributes to the understanding of persuasive communication, propaganda, attitudes and machine learning. Leveraging machine learning to analyze user data can enhance the effectiveness of persuasive communication but requires responsible use and consideration of ethical implications. Future research can build on our findings to further advance the field of persuasive communication and promote responsible use of user data.

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