

A Comprehensive Theoretical Framework of Attention Hijacking Effect Theory

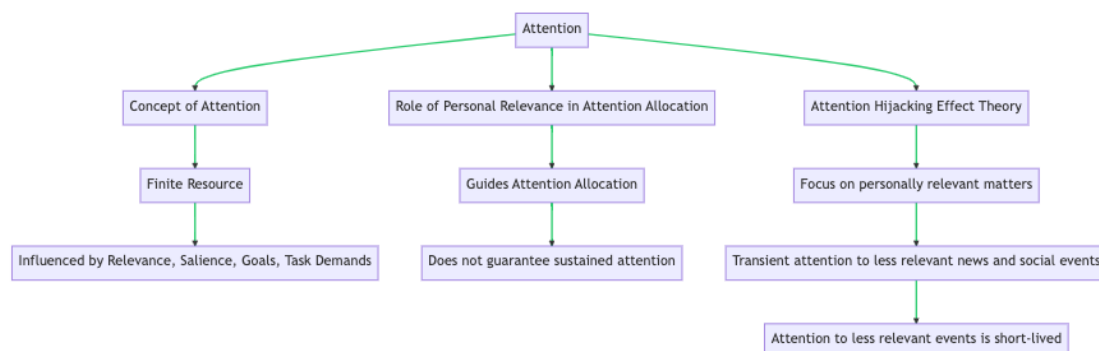
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Abstract

This paper analyzes the Attention Hijacking Effect (AHE) Theory, a novel psychological construct that elucidates the allocation of limited attentional resources in an information saturated society. The AHE posits that individuals primarily concentrate on subjects pertinent to their work, life, and interests, maintaining sustained attention over time. However, transient attention is often allocated to news and trending social events due to their minimal relevance to daily life. The theory underscores the significance of relevance in attention allocation, aligning with the concept of selective attention. The paper further identifies gaps in the current understanding of AHE, proposing future research directions, including the investigation of AHE dynamics and the development of attention allocation measurement tools. The practical implications of AHE, such as informing the design of information delivery systems and educational materials, are also discussed. This comprehensive theoretical framework provides a foundation for understanding attention allocation amidst information overload.

Key words: Attention Hijacking Effect, Attention allocation, Social media, Attention duration



Introduction

The Attention Hijacking Effect Theory (AHE) is a psychological construct that explains how individuals allocate their limited attentional resources when faced with an abundance of information. This theory posits that people typically focus on matters closely related to their work, life, and interests, and maintain attention on these subjects over time. However, information such as news and trending social events, despite their ability to temporarily capture attention, often receive fleeting attention due to their minimal relevance to daily life (Towne, 2023).

Understanding the allocation of attention is crucial in an era characterized by information overload. The human attention span is a finite resource, and how it is distributed can significantly impact various aspects of life, including productivity, decision-making, and overall well-being (Kane et al., 2001). In the context of media multitasking and information overload, the AHE theory provides a framework for understanding why certain information attracts our attention and why some information, despite its prominence, is quickly forgotten.

The AHE theory suggests that news and trending social events can temporarily hijack people's attention. However, due to their minimal relevance to daily life, the attention given to these events is often short-lived (Boyce, 2014). This phenomenon is particularly evident in the digital age, where the constant influx of information can lead to a state of continuous partial attention, where individuals are perpetually in a state of alertness to scan for relevant information (Rogers & Monsell, 1995).

The theory also highlights the importance of relevance in attention allocation. People are more likely to maintain attention on news or social events that are closely related to their daily lives. This aspect of the theory aligns with the concept of selective attention, which suggests that individuals are more likely to focus on information that is relevant to their current goals or interests (Awh et al., 2012).

The Attention Hijacking Effect Theory provides a comprehensive framework for understanding how individuals allocate their attention in the face of information overload. It underscores the importance of relevance in attention allocation and highlights the transient nature of attention given to less relevant information.

Literature Review

The Concept of Attention

The concept of attention is a complex cognitive process that has been a subject of interest for psychologists, cognitive scientists, and researchers across various fields for centuries. It has been defined and studied in various ways, with different theories and models proposed to explain its mechanisms and influences (Nasiri et al., 2023; Kaldas, 2022).

Historically, attention was viewed as a spotlight that illuminates certain aspects of our environment while leaving others in the dark (James, 2007). This metaphor has been influential in shaping our understanding of attention. However, this perspective has been challenged and expanded upon over the years, leading to a more nuanced understanding of attention.

Attention is now widely recognized as a finite resource that is allocated to various cognitive tasks (Kahneman, 1973). This perspective is supported by empirical evidence demonstrating that our ability to process information decreases as the number of tasks we are engaged in increases (Pashler, 1994). This limitation in attentional resources is thought to be a result of the limited capacity of our cognitive system, which can only process a certain amount of information at any given time (Broadbent, 2013).

The allocation of attention is influenced by a variety of factors. One of the most significant factors is the relevance of the information to the individual. According to the AHE, individuals tend to allocate their attention to information that is closely related to their work, life, and interests, and they tend to maintain their attention on these topics. In addition, the allocation of attention is also influenced by the salience of the information, with more salient information receiving more attention (Itti & Koch, 2001). Other factors that influence attention allocation include the individual's goals and expectations, the demands of the task, and the individual's cognitive and perceptual abilities (Egeth & Yantis, 1997; Meyerhoff, Schwan, and Huff, 2014).

Attention can be directed towards specific spatial locations or emotional images, providing insights into individual personality traits (Snowden et al., 2023). This selective attention is a process that is controlled by goal-directed and stimulus-driven mechanisms (Corbetta & Shulman, 2002), and can be influenced by perceptual load (Lavie, 1995). The effects of abrupt visual onsets on selective attention have also been studied (Yantis & Jonides, 1984).

The concept of attention extends beyond humans and has been applied in computer vision (Guo et al., 2021) and robotics (Ghosh et al., 2022). Models such as the coarse-to-fine attention tree (CAT) have been developed for semantic change detection (Wei et al., 2023). Other models, such as the large-kernel attention model, have been used for 3D medical image segmentation (Li et al., 2023). These models often draw from computational models of visual attention (Itti & Koch, 2001), and some even propose that attention is all you need (Vaswani et al., 2017).

In the field of psychology, attention problems have been linked to educational level and externalizing behaviour in adolescence and early adulthood (Schmengler et al., 2023). Attention deficit hyperactivity disorder (ADHD), a common attention-related disorder, is now being screened among preschool children (Younis et al., 2023). Barkley (1997) proposed a unifying theory of ADHD, linking it to issues with behavioral inhibition, sustained attention, and executive functions.

In the medical field, attention mechanisms have been applied in the prediction of medical codes from clinical notes, with the joint learning attention networks and denoising mechanism (JLAN) showing promising results (Li et al., 2021). The triggers of self-focused

attention have been explored using ecological momentary assessment studies (Nanamori et al., 2023; Csikszentmihalyi & Larson, 2014).

The study of attention has made significant strides over the past decades, and it continues to be a vibrant area of research. The AHE theory provides a comprehensive framework for understanding how attention is allocated in the face of information overload and is supported by empirical research such as the study by Crowe et al. (2019) on goal-directed unequal attention allocation. This body of research underscores the multifaceted nature of attention and its significance in various domains, from cognitive science and psychology to computer vision and robotics (Carrasco, 2011).

Types of Attention

Adaptive attention, which is the ability to adjust focus based on changing circumstances or requirements, has been found to be particularly relevant in the field of speech separation (Wang et al., 2023). This aligns with the concept of selective attention, which is the process of focusing on a particular object in the environment while ignoring irrelevant information (Desimone & Duncan, 1995; Eriksen & Eriksen, 1974).

Endogenous attention, another type of attention, is internally driven and involves the voluntary direction of focus towards a specific stimulus (Cochrane, 2023). This is similar to the concept of goal-directed attention, which is the ability to maintain attention on a task in the face of distraction or competing demands (Corbetta & Shulman, 2002).

Visual attention, a type of exogenous attention, can be influenced by various factors (Yang et al., 2023; Kwak et al., 2023). This is consistent with the research on selective visual attention, which involves the ability to focus on one source of sensory input while simultaneously ignoring other distractors (Desimone & Duncan, 1995; Theeuwes, 1992).

Attention mechanisms are also used in adversarial settings and in the field of deep learning to enhance the performance of neural networks (Ni et al., 2022; Gu et al., 2022; Klomp et al., 2023; Cultrera et al., 2023). This is in line with the work of Vaswani et al. (2017), who proposed the transformer model, a type of neural network architecture that uses attention mechanisms to improve performance.

The role of attention mechanisms in neural question answering systems has been investigated (Shen et al., 2022). This is related to the concept of attention in cognitive psychology, which involves the ability to focus on specific stimuli or locations in the environment (James, 2007; Posner & Petersen, 1990).

The Development of Theoretical Studies on Attention

The evolution of theoretical studies on attention has been a multifaceted journey, with research spanning from the cognitive to the computational realms. Attention, as a cognitive process, has been explored through various lenses, each contributing to a more comprehensive understanding of its nature and function.

Early studies on attention, such as those by James (2007), focused on its role in human interaction with the environment, highlighting the psychological significance of these

experiences. This line of inquiry has expanded to include the study of attention in everyday activities, such as the role of foot cues in eliciting covert orienting of attention (Dalmaso, 2023; Eriksen & Eriksen, 1974).

In the realm of cognitive neuroscience, research has delved into the electrophysiological underpinnings of attention, revealing insights into dysfunctional inhibitory control in adults with attention-deficit/hyperactivity disorder (Papp et al., 2023; Tipper, 1985). The interactive functional biases of manual, language, and attention systems have also been explored, shedding light on the complex interplay between these cognitive domains (Serrien & O'Regan, 2022; Rizzolatti et al., 1987).

The advent of computational models has further enriched our understanding of attention. For instance, attention-based spatial-temporal multi-graph convolutional networks have been used for casualty prediction of terrorist attacks (Hou et al., 2023), while attention-based random forest models have been employed for reaction yield prediction (Chen et al., 2023). These models underscore the potential of attention mechanisms in enhancing computational efficiency and accuracy (Vaswani et al., 2017).

The application of attention mechanisms in neural networks has also been a significant area of development. A modified attention-steered encoder-decoder architecture has been proposed for predicting the response of shock wave-loaded plates, demonstrating the versatility of attention mechanisms in various computational contexts (Tandale & Stoffel, 2023; Itti & Koch, 2001).

In the field of visual attention, research has been inspired by human visual attention mechanisms, leading to the development of point-and-line stereo visual odometry for environments with unevenly distributed features (Wang et al., 2023; Wolfe, 1994). Moreover, the dynamic guidance of visual attention across space through the statistical learning of spatiotemporal regularities has been investigated (Xu et al., 2022; Theeuwes, 1992).

Despite these advancements, the nature of attention remains elusive, leading some researchers to question the utility of "attention" as a unitary construct (Hommel et al., 2019). This ongoing debate underscores the complexity of attention and the need for continued theoretical development (Chun et al., 2011).

In conclusion, the theoretical studies on attention have evolved significantly over the years, with research spanning various domains and employing diverse methodologies. As our understanding of attention continues to deepen, so too will the sophistication of our theoretical models and their applications (Nasiri et al., 2023; Corbetta & Shulman, 2002).

The Development of Empirical Studies on Attention

Empirical studies on attention have undergone substantial development in recent years. Attention, as James (2007) described, is the ability to focus on specific stimuli or activities over a certain period of time. Recent research has reinforced and expanded this concept, illustrating the importance of attention across diverse fields and contexts.

Bautista, Maradei, and Pedraza (2023) utilized this principle in the realm of extended reality, investigating strategies to attenuate visual attention changes, thereby emphasizing the

importance of attention in learning and training contexts. This research aligns with Anderson's (2013) value-driven mechanism of attentional selection, which suggests that individuals prioritize information that is perceived as valuable (Anderson, 2013).

In the field of bioinformatics, attention models have been effectively employed. For instance, Choi and Chae (2023) developed a breast cancer subtype classification framework based on multi-omics attention neural networks, demonstrating the utilization of attentional principles in this discipline. This aligns with Posner and Petersen's (1990) conceptualization of the human brain's attention system and its potential applications across different domains.

The psychological implications of attention have also been intensely studied. Hargitai et al. (2023) found that attention-deficit hyperactivity disorder traits are a more significant predictor of internalising problems than autistic traits. This research accentuates the role of attention in psychological disorders, resonating with Chun and Turk-Browne's (2007) exploration of the interactions between attention and memory and their impact on various psychological processes.

Moreover, attention is not merely a predictor of psychological issues, but also a potential tool for mental health interventions. This was illustrated by Ito, Watanabe, and Osawa (2023) who examined the association between mindful attention awareness and posttraumatic stress disorder-like symptoms, suggesting the therapeutic potential of attention in mental health. This aligns with Gilbert and Shallice's (2002) research on task switching and its impact on cognitive flexibility, which plays a crucial role in psychological well-being.

The importance of attention extends to educational contexts, as highlighted by Luo et al. (2023) who studied the impact of different combinations of physical activity and natural environment videos on children's attention levels. This builds upon prior research by Desimone and Duncan (1995) who explored the neural mechanisms of selective visual attention, which can have crucial implications for educational practices.

The role of attention has been found to influence emotional processing, as Mitchell (2023) discussed the relationship between emotion and attention, giving a philosophical perspective on the subject. This echoes the findings of Posner and Dehaene (1994) who proposed that attentional networks are central to the regulation of emotion and cognitive processes.

A call for increased attention to human interaction with the divine, the sacred, and the deceased has been made by Plante et al. (2023), which accentuates the importance of attention in the field of psychology. The importance of rest and rejuvenation on attention was proposed by Riedl et al. (2023), who suggested live-streaming activity and relaxation breaks to promote break recovery, mood, and attention in office settings. This can be tied back to the principles of sustained attention (Sarter, Givens, & Bruno, 2001).

The role of attention also extends into the realm of interpersonal relationships. Schoellbauer, Tement, and Korunka (2023) examined the adverse consequences of both negative and positive work rumination on attention to the partner. This emphasis on the role of attention in relationships aligns with Carrasco's (2011) extensive review of visual attention over the past 25 years, which also explored social implications.

Lastly, from the lens of cognitive processing, Skulmowski (2023) found that realistic details impact learners independently of split-attention effects, suggesting the influence of attention on cognitive processing. This finding is supported by Treisman and Gelade's (1980) feature-integration theory of attention and Baddeley's (1992) work on the interaction between attention and working memory. Furthermore, attention's role in cognitive processing aligns with Itti and Koch's (2001) computational modeling of visual attention and Knudsen's (2007) research on the fundamental components of attention.

In addition, Driver's (2001) selective review of attention research over the past century, Rueda et al.'s (2005) work on the maturation and genetic influences on the development of executive attention, Bundesen's (1990) theory of visual attention, Corbetta and Shulman's (2002) research on goal-directed and stimulus-driven attention control, and Lavie's (2005) discussion on selective attention under load all reinforce the significant strides taken in empirical studies on attention.

Attention Studies in the Field of Neuroscience

The evolution of empirical studies on attention has witnessed substantial advancements in recent years, enriched by a multidisciplinary approach spanning diverse fields of research. In this domain, it's vital to acknowledge the pivotal work by Posner and Dehaene (1994) which provides a comprehensive examination of the attention system in the human brain.

Strategies to mitigate visual attention changes in extended reality environments were explored by Bautista, Maradei, and Pedraza (2023), reflecting the sentiments expressed by Duncan (2006), who earlier underlined the critical role of attention mechanisms within the brain. Choi and Chae (2023) took attention research into the realm of bioinformatics, developing a breast cancer subtype classification framework based on multi-omics attention neural networks. This innovative application of attention dovetails with the idea of Egeth and Yantis (1997), who highlighted the importance of control, representation, and time course in visual attention.

Ito, Watanabe, and Osawa (2023) examined the association between mindful attention awareness and posttraumatic stress disorder-like symptoms, suggesting the therapeutic potential of attention in mental health. Their findings align with the research of Tipper (2001), who considered negative priming to potentially reflect inhibitory mechanisms in attention processes.

Luo et al. (2023) and Mitchell (2023) probed the significance of attention in educational and emotional contexts, respectively. Their studies are reinforced by the extensive body of literature on attention mechanisms, including Posner, Snyder, and Davidson's (1980) work on attention and the detection of signals and Chica, Bartolomeo, and Lupiáñez's (2013) insights on endogenous and exogenous spatial attention systems.

Moreover, Riedl et al. (2023) proposed live-streaming activity and relaxation breaks as a method to promote break recovery, mood, and attention in office settings. Their initiative resonates with the neurobiological evidence provided by Serences and Yantis (2007) and Mangun (1995), who detailed the neural mechanisms of visual selective attention.

Schoellbauer, Tement, and Korunka (2023) underscored the importance of attention in interpersonal relationships, while Skulmowski (2023) proposed its crucial role in cognitive processing. The conceptual development of attention by these researchers dovetails with Anderson, Laurent, and Yantis' (2011) study on value-driven attentional capture and the broader attention framework discussed by Corbetta, Patel, and Shulman (2008).

Plante et al. (2023) called for increased attention by psychologists to human interaction with the divine, the sacred, and the deceased, reflecting the evolving sphere of attention research. This aligns with Ungerleider and S. K. A. L. G 's (2000) work that delved into the mechanisms of visual attention in the human cortex, and the exploration by Ruff and Driver (2006) of attentional preparation for a lateralized visual distractor.

Attention Studies in the Field of Education

Attention, as a cognitive process, is of critical importance in the field of education, influencing learning outcomes across a diverse array of educational settings (Posner & Rothbart, 2014). Over the past two decades, a burgeoning body of research has elucidated the intricacies of attention dynamics in both physical and digital learning environments.

Studies on attention in digital learning environments indicate that attention mechanisms can enhance interactive learning experiences (Zhong et al., 2023). Such interactive learning experiences are further influenced by the interplay of attention and emotion (Makita et al., 2023), underscoring the psychological dimensions of learning. The deployment of attention-based neural networks offers promising results for predicting student learning outcomes, suggesting that leveraging attention-based models can enhance learning outcomes (Fu et al., 2023).

Attention also plays a significant role in shaping individual responses to the broader learning environment. Selective attention and engagement can mediate the impact of visual cues and instructor presence during online lessons, highlighting the need to consider individual differences in attention when designing online learning environments (King et al., 2023). Moreover, the application of attention mechanisms in the restoration of ancient Chinese texts illustrates the potential of these mechanisms in enhancing the learning experience in historical and cultural education (Wenjun et al., 2023).

Despite the ubiquity of digital technology, the educational sphere is still grappling with challenges such as distraction due to mobile phone usage (Kuznekoff & Titsworth, 2013) and task-switching induced by text messages (Rosen et al., 2011). Therefore, research into strategies to reduce attention changes is invaluable. For example, Bautista et al. (2023) explored how to decrease visual attention changes in extended reality environments to minimize cognitive overload, thereby enhancing the learning experience.

Understanding the neuroscience of attention has been crucial in these developments. It has been found that sustained attention involves the interplay of top-down and bottom-up control processes (Sarter et al., 2001), and that attention involves both external and internal aspects (Chun et al., 2011). Research on attention networks in the brain has also revealed that these networks develop throughout childhood (Rueda et al., 2004), and are affected by a

variety of factors, including executive functions (Diamond, 2013) and cognitive load (Sweller et al., 2011).

Attention Studies in the Field of Cognitive Psychology

Attention also plays a critical role in the diverse realms of cognitive psychology. The impact of attention on an array of psychological phenomena has been the subject of extensive recent studies, affording deeper insights into how attention helps to shape our perceptions, emotions, and actions (Posner & Petersen, 1990).

Mindfulness meditation, an exercise fostering concentrated attention, has been found to exert influence on memory processes. Bitton, Chatburn, and Immink (2023) have shown that both focused attention and open monitoring mindfulness meditation states can influence the formation of true and false memories. This discovery suggests that memory accuracy could be modulated by attentional states, which carries significant implications for areas such as eyewitness testimony and memory-centric decision making.

Concurrently, attention training programs have demonstrated promising outcomes in ameliorating cognitive biases and diminishing anxiety symptoms (James, 2007; Broadbent, 2013). Blanco et al. (2023) documented that Online Contingent Attention Training (OCAT) resulted in transfer effects to cognitive biases, rumination, and anxiety symptoms. This underscores the potential of attention training as a therapeutic instrument in mental health interventions, especially when considered in conjunction with the theories of selective attention and cognitive load (Cherry, 1953; Deutsch & Deutsch, 1963; Lavie, 2005).

Attention bias, a propensity to pay more heed to certain types of information, has been associated with anxiety (Eriksen & Hoffman, 1973; Carrasco, 2011). Bocanegra et al. (2023) discovered an interaction between attention bias and anxiety in relation to sociocultural variables in rural Latinx youth [3]. This suggests that cultural context can modulate the relationship between attention and anxiety, contributing to our understanding of the role of selective attention in various social settings (Johnston & Dark, 1986; Chun & Wolfe, 2005).

Further, parent training has been shown to influence attention-related behaviors in mothers bringing up children with attention-deficit/hyperactivity disorder (ADHD). Makita et al. (2023) found that parent training led to neural and behavioral changes in emotion recognition in these mothers. This underlines the role of attention in social-emotional processing and parent-child interactions, echoing the views of attention and self-regulation theories (Rueda, Posner, & Rothbart, 2005).

Divided attention, where attention is shared between multiple tasks, can influence metacognition and responsible remembering (Jonides, 1981; Jin et al., 2002). Murphy and Castel (2022) have demonstrated that divided attention can impair metacognitive accuracy and responsible remembering, highlighting the importance of focused attention in memory-related tasks.

In adults with ADHD, Papp et al. (2023) found evidence for reduced NoGo anteriorization, a neurophysiological marker of inhibitory control, suggesting dysfunctional inhibitory control in this population. This finding sheds light on the role of attention in

inhibitory control, a core aspect of executive functioning (Corbetta, Patel, & Shulman, 2008; Ungerleider and S. K. A. L. G, 2000).

Spatial attention to emotional images has been linked to psychopathic personality traits (Mangun & Hillyard, 1988; Tipper, 1985) [46,44]. Snowden et al. (2023) found that individuals with psychopathic traits displayed distinct patterns of spatial attention to emotional images. This suggests that attentional processes can be influenced by personality traits, contributing to individual differences in emotional processing.

Statistical learning, the capacity to discern patterns in the environment, can dynamically guide visual attention across space. Xu, Theeuwes, and Los (2022) demonstrated that learning of spatiotemporal regularities can influence attention allocation, providing insights into the interaction between attention and learning. This aligns with previous research indicating that attentional processes can be directed by both top-down and bottom-up signals (Yantis & Jonides, 1984; Awh, Belopolsky, & Theeuwes, 2012)

Lastly, attention mechanisms have been applied to real-time facial expression recognition systems, hinting at the broad potential of attention research. Zhong et al. (2023) developed a system based on YOLOv5 and attention mechanisms capable of real-time recognition of teachers' facial expressions. This highlights the application of attention mechanisms in the advancement of artificial intelligence systems, and more broadly, in our everyday perceptual experiences (Rensink, O'Regan, & Clark, 1997; Theeuwes, 2010)

In conclusion, attention plays a crucial role in various psychological phenomena, from memory and learning to emotion recognition and social interactions. Future research should continue to explore the multifaceted nature of attention, elucidating further its role in personality and social psychology. This endeavor will surely benefit from integrating the breadth of understanding encapsulated in attention studies.

What Gap Will the AHE Theory Fill in the Existing Literature?

The AHE, while being a novel concept, has the potential to fill a significant gap in our understanding of attention, especially attention allocation amidst information overload. This theory provides a novel framework that elucidates how individuals navigate their limited attentional resources, particularly in the context of news and societal events.

Firstly, the AHE theory accentuates the role of novelty and relevance in attention allocation. This aligns with existing theories, such as the Limited Capacity Model of Motivated Mediated Message Processing (LC4MP), but offers a more nuanced understanding of how these factors operate in the context of news and societal events. This could enrich our understanding of the dynamics of attention allocation in real-world scenarios.

Secondly, the AHE theory introduces the concept of transient attention given to less relevant news and societal events. This perspective could enhance our comprehension of how individuals prioritize information when confronted with an abundance of stimuli, a topic that is also explored in the existing literature.

Thirdly, the AHE theory proposes a rapid forgetting mechanism for news and societal events that bear minimal relevance to individuals' daily lives. This aspect of the theory could

provide valuable insights into the role of working memory in attention and forgetting, complementing the existing literature on this topic.

Lastly, the AHE theory suggests that news or societal events closely related to individuals' daily lives receive prolonged attention. This proposition could contribute to our understanding of how personal relevance influences attention allocation and memory encoding, topics that are also discussed in the existing literature.

In conclusion, the AHE theory could fill a significant gap in the literature by providing a more comprehensive understanding of the dynamic nature of attention, particularly in the context of news and societal events. It offers insights into how attention is influenced by the novelty, relevance, and personal significance of information, thereby complementing and extending the existing literature, which primarily focuses on the cognitive processes and neural mechanisms of attention.

The Role of Personal Relevance in Attention Allocation

The concept of personal relevance has a significant role in the allocation of attention. The theoretical background of personal relevance in attention allocation can be traced back to early cognitive and social psychology theories. According to these theories, individuals are more likely to pay attention to information that is personally relevant because it has implications for their self-concept or personal goals (Fiske & Taylor, 2013).

Empirical studies have provided substantial evidence supporting the role of personal relevance in attention allocation. For instance, research has shown that individuals are more likely to remember information that is personally relevant (Symons & Johnson, 1997). This is consistent with the self-reference effect, which suggests that encoding information in relation to the self-enhances memory recall (Rogers, Kuiper, & Kirker, 1999).

In the context of the Attention Hijacking Effect Theory, personal relevance plays a crucial role in determining what information captures an individual's attention amidst information overload. The theory posits that individuals are more likely to pay attention to information that is personally relevant, such as information related to their work, life, hobbies, or interests. This is because such information is likely to have implications for their personal goals or self-concept.

However, it is important to note that while personal relevance can guide attention allocation, it does not guarantee sustained attention. For example, news and social events can temporarily hijack an individual's attention due to their novelty or emotional impact, but if they are not highly personally relevant, the attention they receive is often short-lived (Kahneman, 1973). This is the Attention Hijacking Effect Theory's assertion that attention to news and social events that are not personally relevant is often fleeting.

Personal relevance plays a critical role in attention allocation. It serves as a guiding principle that helps individuals navigate the information-rich environment and allocate their limited attention resources effectively. However, the role of personal relevance in attention allocation is complex and multifaceted, and further research is needed to fully understand its mechanisms and implications.

The Attention Hijacking Effect Theory: An In-depth Examination

The AHE provides a comprehensive framework for understanding how individuals allocate their limited attentional resources amidst an overload of information. This theory posits that individuals typically focus on matters that are personally relevant, such as work, life, hobbies, and interests, and maintain their attention on these matters over time. However, information such as news and societal events can temporarily hijack people's attention, but due to their often minimal relevance to individuals' daily lives, the attention given to these events is usually short-lived (Lang, 2000).

A detailed examination of the AHE theory reveals that information such as news and societal events can temporarily hijack people's attention due to their novelty and potential relevance to individuals' lives. This phenomenon is supported by the LC4MP, which suggests that the allocation of cognitive resources to process media content is influenced by the novelty and relevance of the information (Lang, 2006). In the context of information such as news and societal events, the novelty and potential relevance can draw individuals' attention away from their usual focus of attention, resulting in a temporary attention hijack (Lang, 2000; Parry et al., 2019).

However, the AHE theory also posits that the attention given to less relevant information from news and societal events is short-term in nature. This is because individuals have a limited capacity for processing information, and when faced with an overload of information, they tend to prioritize information that is personally relevant and discard less relevant information (Lang, 2000). This phenomenon is supported by the findings of a study by Symons and Johnson (1997), which showed that individuals are more likely to remember information that is personally relevant and forget information that is less relevant.

Furthermore, the AHE theory suggests that individuals rapidly forget information from news and societal events that are not closely related to their daily lives. This rapid forgetting is a result of the limited capacity of individuals' working memory, which can only hold a certain amount of information at a time. When new information comes in, old information that is not actively maintained in working memory is displaced and forgotten (Baddeley, 2003). This phenomenon is supported by the findings of a study by Parry et al. (2019), which showed that individuals quickly forget news stories that are not personally relevant.

Lastly, the AHE theory posits that information such as news or societal events that are closely related to individuals' daily lives receive prolonged attention. This is because these

events are personally relevant and therefore more likely to be encoded into long-term memory, allowing individuals to maintain their attention on these events over time (Craik & Lockhart, 1972).

The Psychology of Forgetting in the Context of the AHE

Overview of forgetting theories

Forgetting, a critical component of human memory, has been extensively studied, leading to the proposal of numerous theories to explain its mechanisms (Schacter, 1999; Norman, 1982). The Decay Theory, as first articulated by Ebbinghaus (1885), suggests that information in memory decays over time unless it is actively rehearsed. This idea aligns with the AHE theory's assertion that rapid forgetting occurs of information not closely tied to daily life, such as news and societal events (Towne, 2023).

Alternatively, the Interference Theory proposes that forgetting arises due to interference from other information, either previously learned (proactive interference) or learned subsequently (retroactive interference) (Anderson & Neely, 1996; Wixted & Carpenter, 2007). This theory can be related to the AHE theory in the context of information overload. Here, the abundance of new information could interfere with the retention of previously attended information (Towne, 2023).

Application of forgetting theories to AHE

The Decay Theory can be applied directly to the AHE theory. In the context of AHE, information not closely related to an individual's daily life, such as news and social events, is not actively rehearsed and thus decays over time, leading to rapid forgetting (Towne, 2023; Bjork & Bjork, 1992). The Interference Theory can also be applied to AHE, where the constant influx of new information, particularly in today's digital age, interferes with the retention of previously attended information, leading to forgetting (Anderson & Neely, 1996; Wixted & Carpenter, 2007).

Empirical evidence supporting the AHE's claim on rapid forgetting

Empirical evidence supporting the AHE's claim on rapid forgetting can be found in studies examining the trajectory of forgetting. For instance, Müller and Pilzecker (1900) observed a "forgetting curve", indicating that the likelihood of forgetting increases over time, especially if the information is not rehearsed. This supports the AHE theory's assertion of rapid forgetting of information not closely related to daily life (Towne, 2023).

Moreover, research by Roediger and Karpicke (2006) supports the test-enhanced learning theory, indicating that retrieval practice or testing improves long-term retention, which underscores the importance of active rehearsal in mitigating forgetting. Levy and

Anderson (2002) further emphasize inhibitory processes' role in controlling memory retrieval, suggesting the existence of mechanisms that actively suppress irrelevant or competing information, thereby facilitating the forgetting process.

The AHE theory dovetails well with these traditional views on forgetting, positioning attention allocation amidst the information overload typical of the digital age. In essence, news and societal events, despite their momentary novelty and potential relevance, fail to secure long-term attention due to their often marginal relevance to individuals' everyday lives, leading to rapid forgetting. Empirical evidence aligns with this theory, as studies demonstrate that information unrelated to one's daily life decays quickly unless it's frequently rehearsed (Roediger & Karpicke, 2006; Ebbinghaus, 2013).

The Potential Implications of AHE in Social Media

AHE and Echo Chamber

Social media platforms are heavily reliant on content recommendation algorithms, which curate and deliver personalized content based on user interests. This idea, central to the Attention Hijacking Effect (AHE) theory, is aimed at capturing and retaining user attention. Pariser (2011) introduced the concept of a "Filter Bubble," wherein these algorithms expose users solely to information that aligns with their pre-existing beliefs and preferences. However, such personalized content curation could potentially limit the diversity of information users encounter, leading to echo chambers and societal polarization (Nguyen, 2020).

These echo chambers and polarized societies result from the selective presentation of news by these algorithms, which can inadvertently shape users' perceptions and beliefs (Allcott & Gentzkow, 2017; Sunstein, 2018). Researchers argue that this selection reduces exposure to ideologically diverse news on social media platforms (Bakshy, Messing, and Adamic, 2015; Flaxman, Goel, and Rao, 2016). This effectively encapsulates users within self-constructed realities, leading to ideological polarization (Spohr, 2017).

The danger of this trend becomes evident in the context of misinformation spread. Certain studies highlight how these algorithms can accelerate the dissemination of false information, often amplified within these echo chambers (Del Vicario et al., 2016; Schmidt et al., 2018). Concurrently, practices such as 'link farming' manipulate these algorithms to promote specific content, thus further narrowing users' information scope.

However, opinions diverge on the severity and extent of these filter bubbles and echo chambers. Some argue that despite potential risks, users are still exposed to diverse information (Zuiderveen Borgesius et al., 2016; Lerman and Hogg, 2010). Most agree, though, on the need for increased scrutiny of these algorithms, with suggestions ranging from

breaking the filter bubble (Bozdag and van den Hoven, 2015) to improving algorithmic transparency and media literacy.

The aforementioned discussion centers on the issue of curated content, but another aspect of AHE in social media pertains to the constant influx of new information. The modern digital environment is characterized by a rapid flow of news and information, with novelty playing a crucial role in maintaining user engagement. This incessant generation of novel content creates an attentional cycle marked by transience (Towne, 2023), which can lead to cognitive overload and challenges in comprehending and retaining information (Lang, 2006; Baddeley, 2003).

Interestingly, this continuous renewal of information fits within the Limited Capacity Model of Motivated Mediated Message Processing (LC4MP), which proposes that the allocation of cognitive resources for processing media content is influenced by the novelty and relevance of the information (Lang, 2006). However, attention towards less relevant or personally insignificant news tends to be ephemeral due to individuals' limited capacity to process information.

The AHE theory suggests rapid forgetfulness of news and societal events that aren't strongly connected to individuals' daily lives. This can be explained by the constraints of working memory, which can only retain a certain amount of information (Baddeley, 2003). Information not encoded into long-term memory due to lack of personal relevance is likely to be forgotten swiftly when replaced by new content. Conversely, news or events with strong ties to individuals' daily lives receive prolonged attention and are remembered over time due to their personal relevance (Craik & Lockhart, 1972).

Attention Management on Digital Platforms

Digital platforms employ several strategies to captivate their users, effectively embodying the principles of the Attention Hijacking Effect (AHE) theory (Towne, 2023). A crucial tactic involves the delivery of fresh, bite-sized content that easily piques users' interest (Alhabash & Ma, 2017). However, such short-lived novelty often caters to our fleeting attention spans (Davenport & Beck, 2001; Lang, 2000), which the platforms like TikTok leverage, keeping users continuously engaged.

Platforms strategize around the LC4MP model, presenting novel, relevant, and often ephemeral content (Lang, 2006). As a result, users focus temporarily on novel information but ultimately prioritize personally relevant content (Lang, 2000; Towne, 2023). This aligns with findings that memory retains personally pertinent information longer (Symons & Johnson, 1997), highlighting the cognitive challenges of retaining information from short-form content platforms like TikTok.

A crucial consideration, however, is the diminished depth of engagement with rapidly changing content (Craik & Lockhart, 1972; Parry et al., 2021). Although the brevity and pace of information presented cater to our transient attention, they may compromise thorough engagement and recollection of the material.

Diverting Attention in the Media Landscape

The AHE theory extends beyond digital platforms to broader media landscapes where "attention diversion" tactics, especially during significant political events, can guide public focus and narrative (Entman, 1993; McCombs & Shaw, 1972). Media outlets tactically shift attention away from less favorable topics, manipulating narratives aligned with LC4MP – focusing on novelty and relevance to command attention temporarily (Lang, 2000; Lang, 2006).

However, such tactics also capitalize on our cognitive processing limits, leading to an information overload that often results in a lack of transparency (Miller, 1956; Baddeley, 2003). Compounding this, selective exposure algorithms create filter bubbles (Pariser, 2011), which can distort reality and spread misinformation (Tandoc Jr et al., 2018), amplifying the ethical concerns surrounding attention diversion tactics.

Potential Real-world Applications of AHE

Implications of AHE for News Media and Advertising

The AHE theory suggests that news outlets may strategically present information to temporarily hijack the attention of the public (Kaplan & Haenlein, 2016). This can be achieved by focusing on sensational or controversial topics that, while also relevant to the daily lives of individuals, are capable of capturing their attention for longer periods. This phenomenon is supported by the Limited Capacity Model of Motivated Mediated Message Processing (LC4MP), which posits that the allocation of cognitive resources to process media content is influenced by the novelty and relevance of the information (Lang, 2000; Lang, 2006). However, due to the limited capacity of individuals' working memory, old information that is not actively maintained is displaced and forgotten when new information comes in (Baddeley, 2003). This suggests that the attention given to less relevant news is short-lived, a concept supported by a study by Parry et al. (2021), which showed that individuals quickly forget news stories that are not personally relevant.

Applications in Marketing Strategies

In the context of marketing strategies, the AHE theory can provide insights into how consumers allocate their attention amidst a plethora of information (Towne, 2023). Understanding the principles of AHE can enable marketers to design strategies that effectively capture and sustain the attention of potential consumers. For instance, marketers could focus on creating content that is personally relevant to the target audience, thereby increasing the likelihood of sustained attention and engagement (Pieters & Wedel, 2004). This approach is supported by the findings of Symons and Johnson (1997), who demonstrated that individuals are more likely to remember information that is personally relevant.

Policy-making Considerations under the Lens of AHE

The AHE theory can also inform policy-making by highlighting the importance of personal relevance in capturing and sustaining public attention (Towne, 2023). Policymakers could leverage this understanding to ensure that policy information is presented in a way that is personally relevant to the public, thereby increasing the likelihood of sustained attention and engagement. Furthermore, the AHE theory could inform strategies for public communication and engagement, particularly in contexts characterized by information overload (Palm et al., 2023). This approach aligns with the findings of Craik and Lockhart (1972), who suggested that information closely related to individuals' daily lives is more likely to be encoded into long-term memory, allowing individuals to maintain their attention on these events over time.

Empirical Support of AHE

The AHE theory explains how individuals strategically allocate their limited attentional resources in an environment saturated with information. This theory emphasizes that individuals primarily attend to matters of personal relevance, such as work, hobbies, interests, or daily life. However, according to the AHE theory, information such as news or societal occurrences can briefly divert this attention due to their novelty and potential relevance, even if their relevance to individuals' everyday lives is often minor (Lang, 2000; Anderson, 2016).

Underpinning the AHE theory is the Limited Capacity Model of Motivated Mediated Message Processing (LC4MP). This model suggests that the allocation of cognitive resources towards media content processing is steered by novelty and relevance (Lang, 2006; Bundesen, 1990). This indicates that attention can be temporarily diverted from typical focal points by potentially relevant novel information, such as news or societal events.

However, as the AHE theory posits, attention directed towards less relevant stimuli is short-lived. This ephemeral nature of attention is due primarily to individuals' limited capacity for processing information (Desimone & Duncan, 1995). Therefore, when overwhelmed with an influx of information, individuals tend to prioritize personally relevant data while disregarding less pertinent content (Lang, 2000). Symons and Johnson's study (1997) supports this claim, demonstrating that individuals are more likely to remember personally relevant information and forget less relevant content.

The concept of selective forgetting can be attributed to the constraints of working memory (Baddeley, 2003). Given that working memory can only hold a finite amount of information, when new information is introduced, older information, unless actively maintained, is displaced and forgotten (Rensink, O'Regan, & Clark, 1997). Empirical evidence provided by Parry et al. (2021) supports this claim, showing that individuals quickly forget news stories lacking personal relevance.

Yet, the AHE theory also maintains that attention to news or societal events closely related to individuals' daily lives persists over time (Yantis, 2000). This sustained attention is largely due to the personal relevance of these events, making them more likely to be encoded into long-term memory, thereby enabling individuals to maintain their attention over extended

periods (Craik & Lockhart, 1972; Awh, Belopolsky, & Theeuwes, 2012). The study by Towne and Zhang (2023) lends further empirical support by analyzing Google search index in four countries and finds news which has higher daily familiarity tends to receive longer attention.

Challenges and Counterarguments to AHE

While the AHE theory provides a comprehensive framework for understanding attention allocation amidst information overload, it is not without its challenges. One of the primary challenges of AHE is its potential oversimplification of the complex nature of attention. The theory posits that individuals primarily focus on matters closely related to their daily lives, with news and social events only temporarily hijacking their attention due to their lesser relevance. However, this perspective may not fully account for the myriad factors that influence attention allocation, including individual differences, cultural context, and the influence of technology.

For instance, the theory's emphasis on the fleeting nature of attention towards news and social events may be challenged by the rise of social media, which has fundamentally altered the way individuals consume and engage with news. Social media platforms, with their algorithms designed to maximize user engagement, can perpetuate a cycle of attention towards certain topics, potentially extending the duration of attention hijacking.

Moreover, the AHE theory's focus on the individual's immediate relevance may overlook the broader societal and cultural factors that shape attention. For example, societal norms and cultural values can significantly influence what individuals deem relevant and worthy of their attention. The theory's individual-centric perspective may therefore limit its applicability across diverse cultural contexts.

Despite these challenges, there are counterarguments and rebuttals in defense of AHE. The theory's emphasis on the individual's immediate relevance is not necessarily a limitation but rather a reflection of the inherent subjectivity of attention. While societal and cultural factors undoubtedly influence attention, the theory underscores the individual's agency in attention allocation, which is a crucial aspect often overlooked in broader societal analyses.

Furthermore, while technology, particularly social media, has indeed transformed the information landscape, the core premise of AHE remains relevant. Despite the bombardment of information and potential attention hijackers, individuals still tend to focus on matters closely related to their daily lives. The temporary nature of attention hijacking by news and social events, as posited by AHE, is not negated but rather amplified in the digital age, where the rapid turnover of information further shortens the duration of attention towards any single topic.

In conclusion, while the AHE theory may not fully encapsulate the complexity of attention in the modern information age, it provides a valuable framework for understanding the dynamics of attention allocation amidst information overload. Its critiques serve not as dismissals of the theory but rather as avenues for further exploration and refinement.

Limitations and Future Directions in AHE Research

While the Attention Hijacking Effect (AHE) theory provides a comprehensive theoretical framework for understanding how individuals allocate their attention amidst information overload, there are several limitations in our current understanding of AHE that warrant further exploration.

Firstly, the AHE theory primarily focuses on the temporary shift of attention towards news and social events, but it does not fully account for the role of individual differences in attention allocation. For instance, the study by Paridon et al. (2010) suggests that gender may influence how individuals respond to different types of content in multitasking situations, which could have implications for the AHE theory. Additionally, a study by Sörqvist, Marsh, and Nössl (2013) found that individual differences in working memory capacity can affect attention allocation in multitasking environments. Future research could explore how individual characteristics, such as gender, age, or cognitive abilities, might moderate the effects of AHE.

Secondly, the AHE theory assumes that news and social events are less relevant to individuals' daily lives, and therefore, their attention towards these events is short-lived. However, this may not always be the case. Some news or social events may have significant implications for individuals' lives, leading to sustained attention over time. Future research could examine the conditions under which news and social events might lead to longer-lasting attention shifts.

Thirdly, the AHE theory does not fully consider the role of the media environment in attention allocation. The media environment has become increasingly complex and fragmented, with individuals often engaging in media multitasking. This raises questions about how media multitasking might interact with AHE. For instance, Paridon et al. (2010) found that media multitasking can negatively affect brand attitude formation, suggesting that media multitasking could potentially influence the dynamics of AHE. A study by Wiradhany and Nieuwenstein (2017) also found that media multitasking can lead to increased cognitive load and decreased performance on primary tasks, which could have implications for attention allocation in the context of information overload. The role of media multitasking is a compelling area for future research.

Moreover, the AHE theory could benefit from incorporating more nuanced measures of attention. The study by Paridon et al. (2010) utilized a novel digital assessment battery, Adaptive Cognitive Evaluation Classroom (ACE-C), which included tasks designed to measure various aspects of executive functions such as attention, working memory, and multitasking. Future research could consider using such comprehensive measures of attention to provide a more detailed understanding of the dynamics of AHE.

Lastly, the AHE theory could be expanded to consider the implications of AHE for academic performance. A study by Gallen et al. (2023) found that sustained attention abilities significantly contributed to performance on tests of targeted academic abilities, suggesting that AHE might have implications for academic performance. A study by Sörqvist, Marsh, and Nössl (2013) also found that working memory capacity can predict academic performance, further suggesting a potential link between attention allocation and academic outcomes. Future research could explore this potential link between AHE and academic performance, which could provide valuable insights for educational practices.

Statement

During the preparation of this work the author used ChatGPT in order to cite literature, proofread, draw a diagram and improve the language clarity and structure of this report. After using this tool/service, the author reviewed and edited the content as needed and takes full responsibility for the content of the publication.

Conclusion

In conclusion, the Attention Hijacking Effect (AHE) theory offers an in-depth and valuable understanding of the mechanics of attention allocation amid an overwhelming flux of information. Align with the Limited Capacity Model of Motivated Mediated Message Processing (LC4MP), the AHE theory underscores the potency of personal relevance and novelty in steering attention, both within and outside individuals' main focal points. Empirical evidence consistently supports these premises, elucidating how people retain personally relevant data and transiently allocate attention to less relevant yet novel stimuli.

The AHE theory is not without its critics, who contend that it potentially oversimplifies the intricate dynamics of attention and may not fully accommodate diverse influencing factors like individual differences, cultural context, and technological impact. However, such challenges can be seen as opportunities for further refining and developing the theory, rather than negating its value. The AHE theory's focus on personal relevance highlights the subjectivity of attention, an important perspective that is often overlooked in more broad societal analyses. Additionally, while technology has indeed reshaped the information landscape, the essence of the AHE theory remains applicable and potentially more pertinent in the digital era.

The research to date, while robust, exhibits certain limitations and opens up intriguing avenues for future exploration. The role of individual differences in attention allocation, long-lasting attention shifts prompted by certain news or social events, the impact of media multitasking, more nuanced measures of attention, and the implications of the AHE theory for academic performance are all promising areas of investigation. Each of these potential

research paths holds the promise to enrich and expand our understanding of the AHE theory and its applicability to various domains.

In summary, the AHE theory stands as a pivotal framework for understanding attention dynamics in the contemporary information-saturated society. It offers insightful explanations for our cognitive behavior, prompts stimulating debates, and encourages further empirical inquiries, thereby making an indelible contribution to the field of cognitive and media psychology.

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*The underlined literature, in the author's belief, is from the field of personality and social psychology

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