



SCHOOL OF  
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MANAGEMENT

# In the Spotlight or Blending In

Navigating Product Placement Interaction Levels in VR Gaming

by

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# Abstract

The objective of this study is to explore differences between prominent and subtle product placement (PP) interaction levels on consumer cognitive, behavioral and affective outcomes within virtual reality (VR) gaming context. Leveraging a quantitative approach, the study employs a between group experimental design to investigate the influence of in-game advertising (IGA) interactivity on advertisement recall, product valuation, willingness to consider the brand, interest in the brand, and brand favorability. This research draws into theories such as Stimulus-Organism-Response, experiential marketing, vicarious touch, and dialogic engagement to explore the topic. 74 participants from diverse cultural backgrounds, with a significant proportion new to VR technology, participated in the experiments. Findings indicate that advertisement recall was significantly better among people who experienced prominent PP. Interactivity of PP did not have significantly different effects on product valuation, willingness to consider the brand, interest in the brand and brand favorability. Post-experiment interviews with the participants, while not the main part of the study, revealed some interesting insights on PP within VR gaming context. The study contributes to the understanding of VR gaming as an emerging marketing channel and underscores the importance of tailored advertising strategies for VR gaming environments.

**Keywords:** Virtual Reality, In-Game Advertising, Product Placement, Advertisement Recall, Experiential Marketing, Persuasion Knowledge, Interactivity

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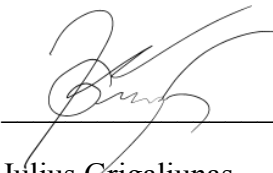
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What it stands for	Abbreviation
Virtual Reality	VR
Product Placement	PP
In-Game Ads	IGA
Virtual Environment	VE
Head Mounted Display	HMD

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# 1. Intro

Advertisement practices in marketing have immensely evolved with the development of diverse media channels such as the Internet. As advertisers get more creative to find new ways and new media channels to reach consumers, rapidly developing technologies such as Virtual Reality (VR) attracts the interest of marketers as an innovative marketing tool (Lee & Faber, 2007; Lupinek et al., 2021; De Gauquier et al., 2018). Among this innovation and technological advancement, the integration of advertising into VR gaming environments has gathered increasing attention from marketers and researchers. In recent years, the VR gaming industry has undergone rapid growth, gaining notable popularity in the entertainment landscape. With projections indicating continued expansion, VR gaming represents not only a significant revenue stream but also a unique platform for immersive experiences (Alsop, 2024b). Unlike traditional media, VR gaming offers users immersive experiences where they actively engage with virtual environments and products, potentially influencing real-world behaviors (Hsu et al., 2024). Within this virtual realm, users do not just passively consume content. They actively participate, shaping their experiences through gameplay and exploration. Leveraging interactions with advertising in VR, users have provided positive feedback such as positive customer experience, signaling promising opportunities for marketers (Dieter et al., 2023). Gaming remains a significant revenue driver in the VR industry, accounting for over 30% of total revenue in 2022, with advancements such as eye-tracking technology further propelling growth (Grand View Research, 2022).

By seamlessly embedding branded content within virtual experiences, advertisers can engage users on a visceral level, potentially influencing their perceptions and behaviors (Berki & István, 2018). Product placement (PP), in particular, has emerged as a promising strategy for brands seeking to connect with consumers in new ways (Dieter et al., 2023). However, despite the sector's rapid expansion, empirical research examining the impact of different interaction types on user responses to PP and subsequent consumer perception and behavior remains scarce.

## 1.1. Background

Technological advancements, such as high-speed internet, improved display resolutions, AI, mobile technologies, and enhanced computing power (Rauschnabel et al., 2022), have led to a significant shift in consumer habits toward digital experiences. Although VR technology has been around for over 60 years, its widespread adoption by consumers has surged in the past decade, largely due to technological progress and increased affordability (Song et al., 2020). Recent years have marked a rapid digital transformation, with VR playing a crucial role in bridging the gap between reality and virtual realms, offering immersive experiences for consumers (Paul et al., 2024).



VR can be defined differently depending on the context and its components. However, this paper draws upon insights from various sources including Wedel et al. (2020) and Gutiérrez et al. (2008) to establish a comprehensive understanding. According to Gutiérrez et al. (2008), VR is described as a computer-generated 3D virtual environment (VE) that enables users to explore and interact within it. An essential aspect of VR is the user's ability to engage with the VE (Gutiérrez et al., 2008). In simpler terms, VR users are immersed in a simulated reality where they can move around and interact with various elements. VR experiences can be delivered through different hardware, including head-mounted displays (HMD), cubic immersive spaces (CAVE), large screens, mobile devices, and computers (Wedel et al. 2020). Different types of hardware define various immersiveness levels, breaking down VR definition into several types - non-immersive, semi-immersive, and fully immersive (Gutiérrez et al., 2008). This study focuses on fully immersive VR experiences delivered through HMD hardware in order to achieve the highest level of psychological “presence”.

Paul et al. (2024) underscore the significance of these new technologies in shaping digital customer experiences and driving digital transformation across various industries. With advancements in computing power, VR applications have expanded to encompass a wide range of sectors, including entertainment, gaming, healthcare, construction, retail, and education (Alsop, 2024a). VR technology enables simulation and creates diverse scenario experiences, helping to mitigate risks and improve training effectiveness (Syamimi et al., 2020). For instance, flight simulation training for pilots using VR offers a realistic training environment, allowing pilots to acquire and enhance their skills without risking the safety of passengers, crew, and pilots themselves (Cross et al., 2023).

In the realm of marketing, VR is gaining traction as a powerful tool for creating immersive digital experiences for consumers (De Gauquier et al., 2018). Its widespread adoption across industries underscores its growing importance. For instance, in retail, Pleyers & Poncin (2020) demonstrate how VR can enhance consumer's product knowledge, attitudes towards brands, and purchase intentions by offering virtual product experiences. Similarly, in tourism, Lee & Oh (2007) highlight the use of interactive media, such as virtual tours, to relieve anxiety among travelers, leading to better-informed decisions and more satisfying vacations (Cheong, 1995; Hobson & Williams, 1995).

Another evidence of the growing importance of VR is the projected growth of the Extended Reality market to \$100.77 billion by 2026 and VR's significant share in the B2C market to be \$28.84 billion in 2026 (Alsop, 2023a; Alsop, 2023b ). However, research attention on VR advertising remains limited. This is surprising considering the expected growth of the VR advertising market to \$182.79 million by 2027, indicating a 9.66% increase between 2023 and 2027 (Alsop, 2024c). This growth is mainly stimulated by the most recent developments in the market: Metaverse, affordable HMD such as Meta Quest series and Pico 3, and the latest extended reality headset developed by Apple - Vision Pro (Roose, 2024; Hogarty, 2024).

## 1.2. Purpose of the research

It is evident that the development of VR technology not only benefits users by providing them with new entertainment experiences but also creates new opportunities for marketers. As VR has an advantage of immersiveness over other types of media, non-intrusive advertisements that seamlessly blend in the environment without breaking the immersion, like product placement (PP), is the key.

Although most previous research has focused on PP applications in 360° videos, 2D, and 3D video games, technological settings, such as VR video games utilizing HMD, have not been extensively explored (Pavlič et al., 2021). This study contributes to this less-explored category by offering a new experimental methodology. For instance, Dieter et al. (2023) used different scenes to evaluate separate groups, which may limit the comparison of user engagement between 2D advertisements and immersive IGA. On the contrary, Roettl & Terlutter (2018) conducted a study using a uniform game version with integrated PP across different gaming mediums (2D, 3D, VR) without exploring different types of interaction with PP.

By altering only the interactivity of the PP and keeping the VE constant for all participants, this study aims to understand the contextual and experiential nature of marketing in VR. Specifically focusing on the dynamics between low-involvement PP and consumer behaviors within the VR gaming landscape. This research seeks to uncover the underlying mechanisms that contribute to the impact of such marketing strategies on real-world consumer response by answering the following research question: how do different interaction levels with PP in VR gaming affect the consumer's response?

## 2. Literature review

### 2.1. Immersive VR

Based on the definition of virtual reality by Wedel et al. (2020) and Gutiérrez et al. (2008), VR technologies immerse users in a 3D computer-generated environment in which they can navigate and interact. Gutiérrez et al. (2008) deepen the definition of VR as the authors emphasize the physical “immersion” and psychological “presence” aspects of the technology.

The physical “immersion” refers to the “ability of the experience to isolate the user from the real world” and can be defined on 3 different levels: (1) “fully immersive system”, (2)

“semi-immersive”, (3) “non-immersive systems” (Gutiérrez et al., 2008). Wedel et al. (2020) adds to the previous definition that physical “immersion” is the result of the technological features the system can carry. In their article, the authors expose that the better the technological features are at replicating the sense of viewing, hearing, and touching, the higher the user will be immersed in the VE. These technological features include the sound system of the device, the FOV (field of view), the resolution capacities of the display, and the haptic functions of the interface (Wedel et al., 2020).

- (1) In a fully immersive system, the objective is to completely isolate the user from reality to add to the effectiveness and believability of the experience (Gutiérrez et al., 2008). The system can offer a real-time response by using hardware, such as HMD and controllers, to replicate head and hand movements, which allows it to point and manipulate objects in the VE (Gutiérrez et al., 2008; Xi & Hamari, 2021). The first fully immersive interface academic research was only around 2015 (Alcañíz et al., 2019). Alcañíz et al. (2019) even define this advancement of VR technologies as pioneering in its usage of HMD, 3D navigation, and interactions in virtual experience marketing. Following Wedel et al. (2020)’s definition of “immersion”, in a fully immersive VE the technological features interacting with the different senses will be highly developed.
- (2) Semi-immersive VR systems, referred to as lower immersive capacity by Alcañíz et al. (2019), are composed mainly of screens instead of HMD. A good example of semi-immersive systems are CAVE systems (Gutiérrez et al., 2008), which is a cubic immersive space where the interface is projected and the user can interact with it via a controller or hand movements without being totally cut from reality (Wedel et al., 2020).
- (3) Non-immersive systems, also called desktop-based VR systems, are of lower cost as well as easier to install and use, which leads to higher popularity for this kind of system (Gutiérrez et al., 2008). They are usually associated with video games (Gutiérrez et al., 2008) which are displayed through computer screens and interacted with in a non-natural way through traditional input devices, such as mouse and keyboard (Alcañíz et al., 2019). Therefore, the technological abilities of the setup are minimal (Wedel et al., 2020), such as a simple display configuration and low haptic features.

As for the “presence”, Gutiérrez et al. (2008) define it as subjective and refers to the user's consciousness to be part of the VE. This construct is widely used to account for the positive impact of VR on customer experience (Tussyadiah et al., 2018). Pleyers & Poncin, (2020) provide evidence that by increasing the sense of “presence”, VR improves consumer experiences. This means that by creating a fully immersive system with a high-quality VE, it is possible to facilitate the “immersion” of the user, increasing its feeling of “presence”, and consequently improving its overall customer experience (Gutiérrez et al., 2008).

In their article, Lupinek et al. (2021) suggest that the sense of "presence" in a VE is significantly influenced by the congruence of its elements. The authors explain that the greater the congruence among the VE's elements, the easier it is for players to retain information encountered during gameplay, including potential advertisements within the VE. This harmony is achieved through the alignment of various game elements, such as aesthetics and graphic design, which impact the perceived congruence by the player. Additionally, even factors like motion sickness experienced during VR simulations can affect this feeling of "presence" (Lupinek et al., 2021). Ultimately, creating a harmonious and interactive VE directly enhances the players' sense of "presence". Furthermore, Dwivedi et al. (2022) argue that the sense of "presence" is considered as one of the drivers for advertisement efficiency in a VR setting. The feeling of "presence" is determinant in the way users feel connected to the product and the way they process the advertising message (Kim et al., 2017). Thus, if a VE element is perceived as intrusive in the environment, the overall experience can seem less cohesive and damage the user's sense of "presence", leading to a minimal effect of the advertising message on the user (Tussyadiah et al., 2018).

VR offers numerous benefits, not only through its physical immersion but also its interactive capabilities. According to Wedel et al. (2020), immersion in VR is characterized by its ability to engage the senses, with haptic technology playing a significant role. Research has shown that tactile interaction with products increases purchase intentions (Liu et al., 2018), facilitating both product assessment and purchasing processes (Grohmann et al., 2007; McCabe & Nowlis, 2003; Peck and Childers, 2003). In a virtual setting, the presentation of graspable objects and the ability to interact with them can have positive effects by fostering mental imagery (Krishna et al., 2016; Luangrath et al., 2022; Zhang et al., 2024). Luangrath et al. (2022) validated this notion by demonstrating that the effect of touch translates to the virtual world. When users observe a virtual hand interacting with a digital product, they psychologically consider it as their own, thereby increasing the perceived value of the product. This phenomenon, termed the "vicarious haptic effect," underscores the psychological ownership of the product being touched, consequently enhancing its valuation. The research conducted by Luangrath et al. (2022) highlights the importance of meaningful touch throughout the digital customer experience and emphasizes the influence of interactivity in VEs on the sense of "presence."

## 2.2. VR Marketing

Mainly used in the retail, hospitality, and tourism industries, VR marketing practices are evolving. Enabled by the decrease of the cost barriers for VR hardware for the mass market, the ability to access this technology becomes easier (De Gauquier et al., 2018). Despite the VR marketing practices yet to be widely adopted, multiple brands have already used VR experiences for marketing purposes. For example, in the past, Volvo has used Google Cardboard VR to enable customers to virtually test drive their cars and try different interior design configurations (Digiday, 2014). Marriott International hotel chains created a

multi-sensory travel experience where users can virtually travel to their destination and experience the environment by being immersed in the scenery with sounds and feelings of the breeze and the sun (Marriott International, 2015). Many other brands used VR such as Boursin, Adidas, or even retailer brands such as IKEA that used this technology to virtually conceptualize showrooms to visualize their catalog (De Gauquier et al., 2018).

Additionally, Luangrath et al. (2022) expose that digital media developments are shaping the shift from real to virtual shopping and consumption experiences. This, in turn, leads to increasing demand for “visualization” of products that will keep on evolving in the near future (Pavlič et al., 2021). Wan et al. (2007) affirm, for specific services or products, the impact of virtual advertising has seen more effectiveness than brochure advertising s, and other two-dimensional advertising showcasing the growing importance of VR advertising. However, there is a distinction to be made between 3D advertising and VR advertising. 3D advertising is defined by De Gauquier et al. (2018) as the limited possibility to interact with certain products through pointing and clicking, like enlarging and rotating the products. Contrary to other 3D advertisements, VR advertising is more than a mouse-click, users can view and experience the product thanks to the interactivity and immersive characteristics of VR (De Gauquier et al., 2018). VR advertising pushes the boundaries by giving a richer experience than 3D advertising, allowing advertisers to be more creative with advertisements as they are not limited to space and time constraints anymore (Serrano et al., 2016; De Gauquier et al., 2018). The ability of VR to vividly display brand experiences becomes an opportunity for managers to be able to bring life to their brand but also contributes to a better positive brand attitude and higher purchase intentions (De Gauquier et al., 2018).

The increased importance of product visualization, interactivity, and new media technologies calls for the development of interactive marketing in digital marketing and advertising practices (Pavlič et al., 2021). Pavlič et al. (2021) refer to interactive marketing as “customer participation in controlling and modifying the mediated environment”. Meaning that the audience can interact with the media content in their environment by controlling or modifying the content itself. Thus, interactive marketing participated in the shift of brands from real to VE (Pavlič et al., 2021) where product interactions using VR technology can be leveraged to benefit marketing campaigns to drive engagement and increase conversion rates (Dieter et al., 2023). Dwivedi et al. (2022) argue that in the case of immersive content, the virtual interactions with the VE, products, or people can create a sense of “now” that leads to better positive advertising outcomes as the content seems more likely to be enjoyable and engaging.

Advertising is a fundamental element of marketing communications, designed to persuade consumers and shape their behaviors through various stimuli that evoke specific responses or attitudes (Nichifor, 2014). Nichifor (2014) describes this process as the reaction mechanism. A useful framework for understanding and explaining the impact of advertising on consumers is the Stimulus-Organism-Response (S-O-R) theory coined by Mehrabian & Russell (1974). It suggests that the exposure to environmental cues, in VE, can influence the cognitive and emotional state of consumers, which in turn leads to a response from the consumer (Pleyers

& Poncin, 2020). This theory is widely used to explain consumer's response to virtual stimuli and is a useful framework to explore factors influencing consumer behavior in a VR context (Kim et al., 2018; Pleyers & Poncin, 2020).

Zhang et al. (2024) explains that consumer behavior varies based on their level of involvement with the product. Product involvement refers to consumers' interest and motivation for the product and its perceived value (Zhang et al., 2024; Zaichkowsky, 1994). High-involvement products require a rigorous cognitive process involving evaluation of risks, values, and quality, while low-involvement products entail less cognitive effort due to lower perceived risks, values, and significance (Zhang et al., 2024). In their research on VR retailing environments, Zhang et al. (2024) found that differences in product involvement influenced how consumers formed mental imagery of the product, thereby impacting their behavior. However, there is limited research on the advertising potential for low-involvement products in the VR context as a whole. It is essential to recognize the low-involvement product marketing opportunities that VR offers due to their reduced demands for cognitive resources in the consumer decision-making process (Zhang et al., 2024; Lee & Faber, 2007). Wedel et al. (2020) underscore the efficacy of employing such technologies to enrich consumer experiences throughout the entire customer journey, spanning from awareness and evaluation to decision-making, trial, repurchase, consumption, and post-consumption evaluations. As the VR technologies allow consumers to visualize products and create concrete mental imagery (Pavlič et al., 2021; Zhang et al., 2024), the utilization of VR technologies to influence consumer behavior in the earliest stage of their consumer journey (pre-purchase stage) becomes of interest for the marketers (Wedel et al., 2020).

### 2.3. Gaming advertising

The recent developments in VR technology have profoundly transformed the advertising landscape (Kitsopoulou & Lappas, 2023). Given VR technology is predominantly used for entertainment, with VR games being the preferred choice, researchers started paying more attention to the topic (Lupinek et al., 2021). As consumers become more immersed in virtual environments, advertisers have recognized the potential of VR platforms for in-game advertising (Lupinek et al., 2021).

Video games have been recognized and studied as powerful marketing tools for a long time (Clavio et al., 2009). This form of entertainment has emerged as a popular leisure activity for millions across various age demographics (Belchior et al., 2012). Consequently, video games have become compelling platforms for delivering persuasive advertisement messages (de la Hera Conde-Pumpido, 2019). This development has encouraged marketers to explore the potential opportunities of advertising within video games. The Interactive Advertising Bureau (2014) categorizes game advertising into three distinct types:

1. **Around Game Ads:** A form of game advertising that entails sponsorship of display units within the game, where display or digital video ads are presented during loading screens or can appear during natural breaks in gameplay (e.g. pop-up ads in mobile games to earn extra points).
2. **In-Game Ads (IGA):** These are advertisements that are seamlessly integrated into the game environment (e.g. sidecourt banners showcasing real-life advertisements in sports games).
3. **Custom Branded Games (also known as advergames):** These are games specifically designed to promote a brand and usually developed by the brand itself as part of a marketing campaign (e.g. games created by brands where brand symbolism and lore are all over the game).

Each of these advertising types offers unique opportunities for marketers to engage with their target audience in the gaming environment (Advertising Bureau, 2014). However, IGA and advergames were explored as the same subject and are still sometimes mistakenly used as synonymous terms for any video games that contain advertising (Ghosh et al., 2022). However, a clear distinction exists. IGA refers to the inclusion of products or brands in games that are primarily designed to entertain players and not primarily for marketing purposes (Terlutter & Capella, 2013). This is in contrast to a distinct category of games known as advergames. Advergames, while variably defined, are often described as interactive computer games specifically designed to deliver promotional marketing messages to consumers (Winkler & Buckner, 2006; Cauberghe & De Pelsmacker, 2010; Nelson & Waiguny, 2012). A study by Winkler & Buckner (2006) suggests that individuals engaging with advergames exhibit a significant openness to embedded advertising content and strong brand recall. However, more recent research indicates that advergames, simpler by nature, are more effective when targeting children, while IGA would be more suitable for adults (Ghosh et al., 2022). Therefore, this paper will exclusively focus on IGA, given that the area of interest is VR marketing and the average HMD VR user is an adult.

The efficiency of IGA hinges on various characteristics of how consumers perceive and respond to the advertisement, whether positively or negatively. Anubha & Jain (2022) propose that an individual's favorable attitude towards an advertisement leads to positive engagement, while a negative attitude can deter interaction. Therefore, for an advertisement to influence consumer response, it must be accepted and acknowledged by the consumer. Acceptability of the advertisement is determined by both the legitimacy of the brand's presence within the game and the perceived intrusiveness of the advertisement (De Pelsmacher et al., 2019; Lupinek et al., 2021). De Pelsmacher et al. (2019) refer to the legitimacy of the brand's presence as ad congruity. Their research indicates that congruence between the advertisement and the VE results in greater consumer brand acceptance within IGA. This is because strategically placing products within the narrative context significantly enhances consumers' susceptibility to persuasion efforts (De Pelsmacher et al., 2019; Friestad & Wright, 1994; Wang & Chen, 2019). However, consumer acceptance of the advertisement

can be challenged due to potential skepticism regarding its intrusiveness (De Pelsmacker et al., 2019). Aggressively persuasive advertisements can lead to negative reactions toward the brand, as outlined by the persuasion knowledge model by Friestad & Wright (1994). This model proposes that consumers actively analyze and interpret both the persuasive message and its sender, ultimately forming an attitude towards an advertisement and the brand (Wang & Chen, 2019).

Additionally, Lupinek et al. (2021) emphasize that telepresence (feeling of "presence") and interactivity also significantly influence consumers' attitudes toward the brand presented in the IGA. More precisely, increased interactivity enhances the feeling of "presence". Therefore, for an IGA to be effective, it should enhance gameplay (high congruity) through low intrusiveness and high interactivity of the advertisement. These factors contribute to increased telepresence, thereby influencing the consumer's response to the IGA. Thus, all these factors are integral components of IGA, see Figure 1.

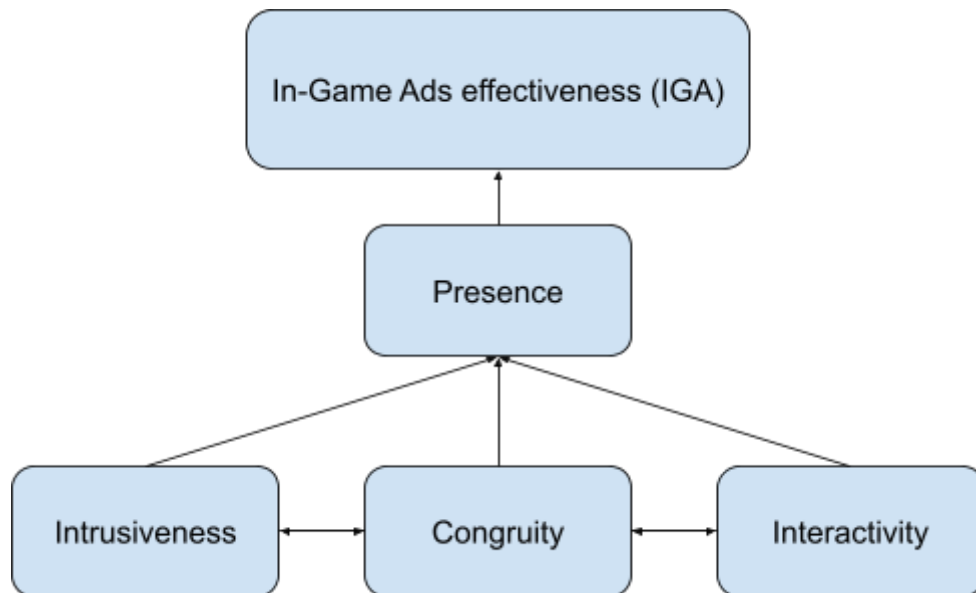


Figure 1: Adapted from literature Lupinek et al. (2021)

However, research indicates that gamers exhibit a phenomenon known as "selective focus". The limited capacity model of attention created by Lee & Faber, (2007) explains that a player's cognitive resources as well as attention to the environment are expected to be reduced. Due to reduced cognitive resources, they prioritize attention toward the primary task of gameplay rather than secondary elements such as props or IGA (Lupinek et al., 2021).

## 2.4. Product Placement

As marketing communication strategies become increasingly prevalent and consumers are overwhelmed with advertisements, a heightened level of skepticism and negative perceptions towards advertising has been observed (Ferreira & Barbosa, 2017). With the increasing



prevalence of persuasive marketing, particularly through promotions and advertisements, consumers have become more knowledgeable about the tactics employed by marketers (Friestad & Wright, 1994). Over time, consumers have learned to recognize when, why, and how they are being influenced (Friestad & Wright, 1994). It suggests that the more obvious the persuasion attempt, the less likely the targeted audience is to be influenced by the advertisement.

Consequently, practitioners should prioritize the creation of content that is less intrusive and more engaging, specifically tailored to user experiences, needs, and interests (Çelik et al., 2022). This approach can potentially mitigate consumer skepticism and foster a more positive perception of advertising. That is particularly evident in the context of Around Game Ads where players consider pop-up ads to be intrusive and only have a more positive perception of this type of advertising when ads are personalized, entertaining, and offer in-game rewards (Hussain et al., 2022). Therefore, this study disregards Around Game Ads as a research subject and focuses on more immersive advertising techniques like IGA.

The rise in PP within video games is closely tied to the concept of IGA; in the realm of video game advertising, one often cannot exist without the other (Pavlič et al., 2021). According to Pavlič et al., (2021), the PP definition can be defined as an intentional inclusion of a branded product or branded element to the media content and paid by the brand (Chen & Haley, 2014). This advertisement type can be seamlessly integrated into a game environment without being intrusive as it is considered to be an indirect and disguised advertising practice (Chan, 2012; Russell, 1998; Pavlič et al., 2021). Thus, the use of more immersive PP tactics, like IGA, can be seen as a potential solution to the advertising overstimulation of the consumer. Although users frequently notice branded elements, it does not compromise the effectiveness of the advertisement (Chernikova & Branco, 2019). Furthermore, PP that are given prominent visibility lead to an increased level of recall and recognition (Schneider & Cornwell 2005; Cauberghe & De Pelsmacker 2010; Terlutter & Capella, 2013).

Previous studies show that the outcomes of PP can be influenced by different types of integration into the content and have psychological and behavioral effects on consumers (Pavlič et al., 2021; Chang et al. 2010). Firstly, the cognition effect encompasses how advertisements influence consumer psychology, including PP awareness and brand recall (Pavlič et al., 2021; Chang et al., 2010). Secondly, the behavioral effect focuses on consumer actions, such as purchasing intentions and brand consideration (Pavlič et al., 2021). Finally, the affective effect pertains to the emotional responses evoked by PP, with indicators like brand interest and acceptability (Pavlič et al., 2021).

Chang et al. (2010) argue that the way a brand and its product integrate into the games greatly influences the overall effects of the in-game PP. There are three distinct levels of brand immersion in games that were proposed to differentiate PP (Winkler & Buckner, 2006):

1. **Demonstrative integration** allows players to engage with products within the immersive context of a gaming environment, allowing them to interact with product

features, resulting in a high level of brand immersion (Winkler & Buckner, 2006). This type of game requires players to actively engage with and learn about the product features to progress in the game (Huang & Dinu, 2010) (e.g. cooking game where players use branded kitchen appliances demonstrating how these items would be used in real world, acting as a tutorial as well as IGA).

2. **Illustrative integration** represents the second-highest tier of brand integration within gaming, where the product becomes an integral part of the gameplay experience (Winkler & Buckner, 2006) (e.g. skateboarding game where players use branded skateboards to do tricks making the item an integral part of the gameplay).
3. **Associative integration** is regarded as the most basic level of integration (Yang & Roskos-Ewoldsen, 2007), where the product or brand is associated with a specific lifestyle or activity depicted in the game, often through the display of the company's logo or product in the background scenery (Winkler & Buckner, 2006) (e.g. a football game where banners in a stadium display brand logo).

While these categories provide a systematic approach towards IGA by classifying immersion levels, it is not recommended to adhere to these guidelines rigidly. The categories are not necessarily mutually exclusive, as multiple strategies can effectively coexist within a single game (Svahn, 2005). However, a study that dives deeper into the cognitive function of players exposed to IGA, conducted by Huang & Dinu (2010), revealed that while there was no significant difference in brand recall between the highest and average levels of brand immersion, both levels (Demonstrative integration and Illustrative integration) outperformed the lowest level (Associative integration). This implies that providing players with control over the product can enhance brand activation and recall, as opposed to mere background branding (Huang & Dinu, 2010). Lee et al. (2013) argue that brand interactivity can enhance positive brand perception as it strengthens the relationship between the brand and the consumer, and can also positively influence purchase intention if the advertisement is interactive.

While a significant portion of research focuses on brand interactivity in flat-screen computer games, Roettl & Terlutter (2018) explored how different types of gaming mediums (2D, 3D, and VR) impact players and their experiences with IGA. The authors found that players' perception of "presence" was highest in VR and lowest in 2D playthroughs, while memory for the brand was strongest in 2D experiences and weakest in VR. This supports the findings of Winkler & Buckner (2006), who argued that straightforward and uncomplicated gameplay allows users to focus on advertising subconsciously linking to the limited capacity model of attention (Lee & Faber, 2007). However, the research by Roettl & Terlutter (2018) has limitations, as the game concept was standardized across platforms, neglecting each format's unique strengths, such as 2D ease of use, 3D graphical advancement, and VR immersion capabilities, thereby introducing potential errors in the findings.

Another research conducted by Dieter et al. (2023) has addressed the subject of IGA, with a specific emphasis on VR, given the recent significant advancements in VR advertising in the gaming industry. The study explored user sentiment and engagement with different types of advertisements within VR and discovered that immersive in-game experiences led to increased interaction and heightened levels of immersion compared to conventional 2D banner advertisements. Participants devoted considerably more time to engaging with immersive ads as well as preferred them as opposed to viewing 2D billboards, with engagement levels being approximately 12.66 times higher, which proves that immersive ads are a more effective advertising technique (Dieter et al., 2023).

### 3. Theoretical framework

With the growing importance of interactive marketing, interactivity plays an increasing part in the efficiency and development of new VR advertisement practices, especially in the VR gaming industry (Pavlič et al., 2021; De Gauquier et al., 2018; Lupinek et al., 2021). Moreover, virtual touch and interactivity, the center of VR technologies, allow users to immerse themselves in a simulation (Wedel et al. 2020; Gutiérrez et al. 2008). It proves to be efficient in developing a sense of “presence” (Roettl & Terlutter, 2018), which in turn facilitates the processing of the advertisement (Kim et al., 2017; Tussyadiah et al., 2018).

According to the Stimuli-Organism-Response theory by Mehrabian & Russell (1974), exposing players to IGA as a stimulus should trigger a reaction mechanism that creates a positive or negative response from the consumer (Nichifor, 2014). Previous research has identified various consumer responses to PP, including research on reaction mechanisms responses, categorizing them into cognitive, behavioral, and affective responses (Balasubramanian et al., 2006; Pavlič et al., 2021; Nichifor, 2014). Building on this premise and incorporating theories such as dialogic engagement and vicarious touch, interacting with a PP in a virtual environment should enhance the consumer's response to the IGA (Wang & Chen, 2019; Luangrath et al., 2022; Pleyers & Poncin, 2020).

For readability and comprehensiveness, we're adopting the terms 'prominent placement' for high immersion and interactivity IGA, and 'subtle placement' for low immersion and interactivity IGA, as defined by Pavlič et al. (2021).

#### 3.1. Cognitive response

The theory of dialogic engagement suggests that the higher the interactivity and dynamism the PP has, the better the consumer will respond to it (Wang & Chen, 2019). Wang & Chen's (2019) study on dialogic engagement found that high interactivity in the VR video setting

significantly enhances consumers' brand recall, which serves as an indicator of advertisement recall. Although their study focused on VR video content, it is expected that IGA in VR gaming experiences will produce similar effects on consumer advertising recollection. Findings such as Huang & Dinu (2010) support the previous statement by stating that players' ability to interact and control a product increases brand activation and recall. Combined with the principles of experiential marketing theory (Davey et al., 2023), it is expected that IGA may influence cognitive response, leading to enhanced advertisement recall.

Experiential marketing is characterized by the creation of memorable real-life encounters that aim to engage audiences through immersive brand experiences. By fostering emotional engagement and positive brand memories, experiential marketing, using high immersion levels of VR technologies, enhances brand advertisement performance and cultivates customer loyalty by creating a mental image in their memory (Davey et al., 2023).

Further supporting this assumption is the limited capacity model of attention, which explains that during gameplay, players' cognitive resources and attention to their environment are expected to be reduced (Lee & Faber, 2007; Lupinek et al., 2021). These arguments suggest that the prominent and interactive PP will have more effect on the advertisement recall (Lee & Faber, 2007; Lupinek et al., 2021). The anticipation of these results is supported by the study from Gupta & Lord (1998) who found that prominent PP in films had better results on advertisement recall than subtle PP or other types of advertising. Even though the type of media is different, the effect is expected to be the same:

H1: Prominent PP in VR gaming settings has a bigger effect on **advertisement recall** among users than subtle PP.

According to Luangrath et al. (2022)'s findings, the value attributed to the product by a consumer is directly linked to psychological ownership. Central to psychological ownership is the sense of control, like physically touching a product (Luangrath et al., 2022). Studies have shown that consumers with the ability to interact with a product in a VE tend to have a more positive view of it compared to scenarios where no interaction is possible (Luangrath et al., 2022). Thus, the theory of vicarious touch exposed by Luangrath et al. (2022) implies that IGA of an interactive nature may influence the cognitive behavior of consumers leading to increased willingness to pay.

However, it is worth noting that in the Luangrath et al. (2022) study, the product was a central part of the experience. Results for similar experiments exploring IGA in a VR gaming context may differ as the primary participants' focus would be on game tasks rather than on the IGA itself (Lupinek et al., 2021). This raises the question of whether interacting with a branded product in this context will influence how the product is valued by the consumer. Therefore, further research is needed to explore these dynamics in a VR gaming context:

H2: Prominent PP in VR gaming settings has a higher influence on the consumer's **perceived value of the product** than the subtle PP.

## 3.2. Behavioral response

Previous studies found VR to be effective in shaping behavioral responses to virtual stimuli (Tussyadiah et al. 2018). Behavioral responses are often associated with consumer behavioral intentions, as they reflect an individual's inclination to engage in future actions (Ajzen, 1991). This includes the willingness to consider a brand, indicating a predisposition to purchase from a particular brand (also referred to as purchase intention) (Pleyers & Poncin, 2020). Brand consideration is an important indicator of consumer behavior in the pre-purchase stage of their purchasing decision (Wedel et al., 2020).

While Wang & Chen (2019) found that VE control impacted brand consideration, their study on dialogic engagement in VR video revealed no significant effect on this specific consumer behavior. However, in the context of VR, Salem (2023) identified perceptual “presence”, behavioral interactivity, and technological embodiment as influential factors for purchase intentions.

Purchase intention is often linked to willingness to consider the brand as it indicates a possible future choice of a certain brand/product (Luangrath et al., 2022). Moreover, given that VR can encapsulate elements of high “presence”, congruity, low intrusiveness, interactive gameplay, and technological immersion, it is worth exploring how IGA in the VR gaming context influences consumers' willingness to consider based on interaction levels (Salem, 2023; Pavlič et al., 2021; Wang & Chen, 2019; Pleyers & Poncin, 2020). Based on these insights, the following hypothesis is proposed:

H3: Increased interactivity with PP in VR gaming environments positively influences consumers' **willingness to consider the brand**.

## 3.3. Affective response

Other important indicators of consumer affective response are interest in the brand and brand favorability (Wedel et al., 2020; ). It is worth exploring these variables in VR gaming settings as this novel media channel could provide the ability for marketers to create and foster interest and favorability in brands by consumers (De Gauquier et al., 2018; Wang & Chen, 2019).

The persuasion knowledge model developed by Friestad & Wright (1994) may explain the possible effects on brand interest and favorability when different PP interaction levels are introduced. When individuals notice an attempt at persuasion, they develop what is known as

persuasion knowledge (Matthes & Naderer, 2015). This leads to the activation of a coping mechanism - they begin to analyze and interpret the advertisement and the goals of persuasion to maintain control over the outcomes (Friestad & Wright, 1994). According to the vividness effect, attention is more readily captured by prominent PP (Homer, 2009). In other words, players become aware of the presence of the PP. While beneficial for aiding advertisement recall, it could also negatively impact the brand as the advertisement appears to be out of place, thus becoming a more noticeable persuasion attempt (Russel, 2002; Matthes & Naderer, 2015).

Although Wang & Chen (2019) and Matthes & Naderer (2015) found that different levels of PP interaction in VR video content did not significantly affect customers' brand interest or favorability, it is important to investigate whether this holds true for both prominent and subtle PP within the context of VR gaming. Findings may show differences between subtle and prominent PP in the VR gaming context as increased interactivity and immersion in VR gaming might lead to enhanced effects on customer affective response (Lupinek et al., 2021). These observations form the basis for the development of the fourth and fifth hypotheses:

H4: Prominent PP within VR gaming environments negatively affects **consumer interest in the brand** compared to subtle PP.

H5: Subtle PP within the VR gaming setting is associated with a higher **brand favorability** compared to prominent PP.

Ultimately, the study intends to compare different interactivity conditions of IGA within a gaming environment. IGA with high interaction capabilities in a VR gaming context is expected to have a more significant influence on advertisement recall, product valuation, and willingness to consider the brand compared to static advertising subtly integrated into the VE (referred to as associative integration in previous studies), which offer lower interaction levels. On the other hand, subtle PP is expected to affect consumer interest in the brand and brand favorability in a more positive way than prominent PP. Building on this premise, Figure 2 presents the theoretical model constructed for this research.

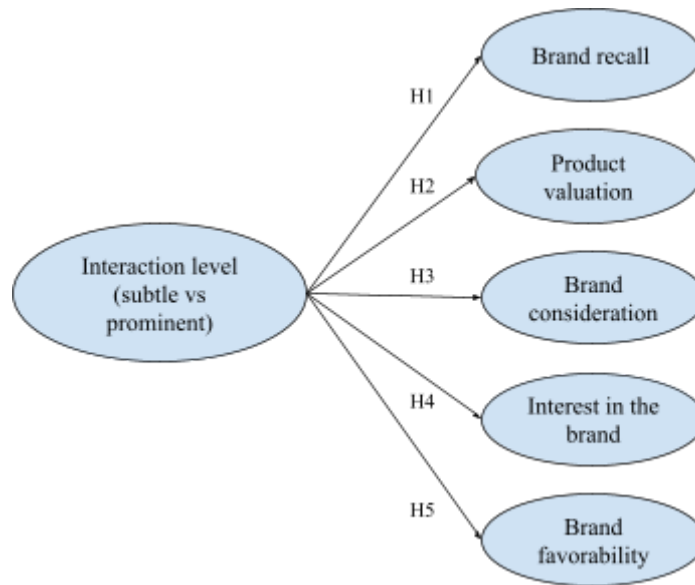


Figure 2: Theoretical model for relationships between the level of interaction and immersion of a PP and different aspect of the customer response

## 4. Methodology

### 4.1. Research philosophy

Before any academic or business research, it is essential to understand the underlying philosophy to mitigate potential misunderstandings and clarify the role of research methods (Easterby-Smith et al., 2021). It provides a framework and structure for the research allowing for the evaluation of effective methodologies and those prone to failure (Easterby-Smith et al., 2021).

#### 4.1.1. Ontology

To comprehend the direction of the study, the initial step in defining the research philosophy involves selecting an ontology. Ontology, in its simplest terms, refers to the assumptions and meanings about the nature of existence (Easterby-Smith et al., 2021). Philosophers choose between two positions: realism and relativism (Easterby-Smith et al., 2021).

Realism is a stance that speaks of the physical and social worlds existing independently and are not interconnected by observations between them, thereby revealing a single truth

(Easterby-Smith et al., 2021). This study adopts a realism approach as it explores the effects on users' psychological and behavioral outcomes to obtain clear, observable results. The premise is that modifying gamers' levels of interaction within VR gaming environments may influence the effectiveness of PP for low-involvement products. This highlights a single truth that can be objectively observed (Easterby-Smith et al., 2021).

#### 4.1.2. Epistemology

Another crucial component of research philosophy is epistemology. While ontology focuses on theories about the nature of reality and its existence, epistemology delves into the process of knowledge acquisition (Easterby-Smith et al., 2021).

As epistemology aligns with ontology, and in this context realist ontology is paired with positivism (Easterby-Smith et al., 2021). This emphasizes the importance of empirical evidence in uncovering universal and generalizable truths through objective data collection methods and statistical analysis (Easterby-Smith et al., 2021). In line with positivist epistemology, this research seeks to explore the effectiveness of PP and examine the behavior of gamers based on varying levels of interactivity. This is achieved by conducting experiments and collecting objective data to either confirm or disprove measured properties, thereby establishing generalizable knowledge (Easterby-Smith et al., 2021).

### 4.2. Research approach

This research adheres to a deductive approach. The deductive approach, favored by positivists, follows a different logic - the analysis of existing theories leads to the development of hypotheses, which are then explored through observations (Burns & Burns, 2008). These observations allow for the confirmation or rejection of the explored assumptions (Burns & Burns, 2008).

Hypotheses were formulated after analyzing existing theories applicable to PP in a VR gaming context. An experiment, followed by a questionnaire, was conducted to either confirm or reject the formulated hypotheses and establish a generalizable truth about the subject.

### 4.3. Research strategy

In light of the chosen philosophy of this study and its deductive research approach, this study employs a quantitative research strategy. Quantitative scientific research methods are utilized to establish generalizable knowledge through controlled experimentation (Burns & Burns, 2008). A key distinguishing factor for quantitative data is its expression in numeric values

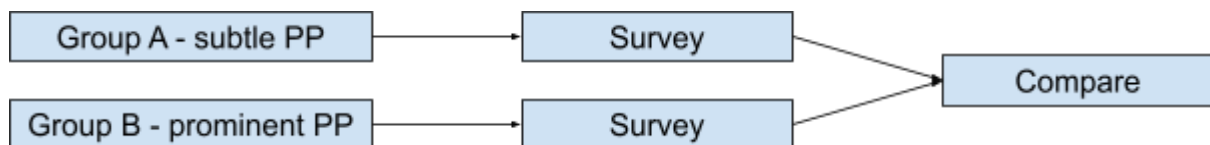


while encompassing large data sets and allowing for control over the research process (Easterby-Smith et al., 2021; Burns & Burns, 2008).

This approach is often implemented by conducting surveys and experiments as it offers valuable aspects for any business research, such as objectivity, generalizability, and reliability (Burns & Burns, 2008). It involves the collection of structured data that can be quantified and subsequently used to test hypotheses or explore relationships between variables (Burns & Burns, 2008). This is precisely the approach this research is adopting, as it enables us to confirm or reject selected hypotheses, explore causation, and discover a single generalizable truth.

#### 4.4. Research design

To assess the cause and effect of different levels of interaction on cognitive, behavioral, and affective outcomes, the planned methodological approach will involve employing a between-group experimental design with proportional random assignment to different interaction levels (i.e. prominent vs subtle) (Burns & Burns, 2008). Followed by a survey, to capture and measure the dynamics in consumer response comprehensively. Both groups will experience the same VE, with the only difference being one branded element within the environment. One group will be exposed to a prominent version of the branded content, while the other will encounter a subtle version. Figure 3 will provide a more detailed illustration of the design.



*Figure 3: Proportional independent group design (Burns & Burns, 2008)*

As the objective is to collect data from both independent groups, one version of a survey is going to be conducted. Both groups will complete the same survey to collect data, with identical questions for both. The only difference between the two groups in the survey is the images that were used to explore ad recall (Figure 6 & 7). This is to evaluate the exactitude of the advertisement recall from the VE they experienced, the term ad recognition is employed for this measure. At the end of the survey, both groups are going to be studied and compared with each other.

To ensure the most reliable results, it's crucial to proportionate participants, creating two independent groups (Burns & Burns, 2008). Therefore, an equal number of participants was used in both groups.

## 4.5. Experiment

### 4.5.1. Development

Taking the inspiration from Luangrath et al. (2022) and Dieter et al. (2023) research methods, this experiment follows the same idea in which participants are subjected to different interaction levels in a VE. One of the objectives of this research method is to build a close-to-reality context in which the participants might find themselves while playing VR games. This means that, while exploring a version of a game and having to perform in-game tasks, participants are unknowingly subjected to a low-involvement PP during the gameplay.

To create a VR project, external developer, Aaron Berlow, was recruited as the authors of this paper lacked the expertise to create a necessary VE for the experiment. After contacting Aaron through a Discord Channel, he skillfully crafted a short VR experience, using the Unity game engine for Meta Oculus Quest 2 HMD. The successful outcome of the project can be attributed to the project management skills of both parties, including effective teamwork, clear communication via the Discord messaging platform, and combined project development and timeline management. The flow of the experiment can be found in the Appendix A.

### 4.5.2. Gameplay

As a result, the VR experiment is structured as an escape room style experience called "Family Treasure". Participants' goal is simple: to find the family jewels hidden within the room by completing a series of tasks. After completion of in-game tasks, participants eventually discover the hidden treasure. The VE of the game can be found in the Appendix B.

There are two versions of the game. In one version, a static 2D ad for the brand Duracell is displayed on the wall, representing the **subtle** PP (see Figure 4). In the other version, participants encounter an interactive branded battery box as a part of the gameplay, known as the **prominent** PP (see Figure 5). In this version, finding the branded batteries is essential to progress in the game. Participants were unaware that branded content had been incorporated into the environment making them unbiased in this research. Both of the PP were inspired by real-life designs used by Duracell.



Figure 4: Subtle PP in-game



Figure 5: Prominent PP in-game

With the help of the developer, the VE was designed to encompass all the necessary criteria for an effective IGA. The environment is highly interactive, with minimal intrusion from both versions of the IGA, and the congruity of the VE is carefully maintained. All of these criteria allow participants to have the highest achievable feeling of “presence” for such a short VR experience. The VE immerses participants in a virtual basement, complete with various decorations: a safe, a fireplace, posters, targets, a desk, and other elements. On the desk, participants find a paper note with instructions, a remote, a frame, and a key hidden behind the frame. Here's how participants are expected to proceed:

1. **Read the paper note:** Participants are presented with clues and hints as well as the main goal to understand the tasks required to complete the game.
2. **Find the key:** They must locate a key hidden behind the picture frame on the desk and use it to unlock a drawer.
3. **Retrieve batteries:** Inside the unlocked drawer, players discover a box of batteries and a single battery. Depending on the game version, participants will see either a branded or a generic box and the battery.
4. **Insert the battery into the remote:** A remote control found on the desk does not have a battery and therefore, does not work. Participants must insert the battery into the remote and interact with it to progress further.
5. **Enter the code:** Interacting with the remote reveals a code on a TV screen located in front of the player. This code must be entered on the keypad to open the safe to unlock it. The code is randomized for each participant to prevent avoidance of completing the tasks.
6. **Retrieve the gun:** Players then find a handgun in the safe. They must pick up the gun, load it, and use it to shoot four targets located on a wall beside the TV and a fireplace.

7. **Find the jewels:** Successfully hitting the target with the handgun causes the back wall of the fireplace to open, revealing family jewels. A Congratulatory message is displayed on the TV screen notifying of game completion.

The choice to use a real brand is justified by the need for the highest level of realism to achieve representative results (Wang & Chen, 2019). As exposed previously, the higher realism within the game environment (congruity), leads to a heightened feeling of “presence” in the VE (De Pelsmacker et al., 2019). Consequently, the design of the experiment aimed to replicate this congruity and feeling of “presence” parameters by using a real brand (Duracell). Duracell was selected for this experiment as it is a widely recognized brand associated with low-involvement products that place significant emphasis on its marketing campaigns (Krambs, 2024; Tesser, 2018; YouGov, 2023). This suggests a possibility for a brand like Duracell to explore similar advertising strategies in the future.

A seated VR experience was chosen due to concerns that motion sickness, commonly experienced during VR gaming, could diminish the feeling of “presence” in the game (Lupinek et al., 2021). This could result in a less enjoyable experiment and potentially reduce the noticeable effects of the advertisements (Kim et al., 2017; Tussyadiah et al., 2018). The experiment has therefore a limited amount of movements to reduce the motion sickness probability.

To streamline logistical organization, a scheduling tool was implemented that allowed participants to book a 15 minute time slot. Upon arrival, participants received a preliminary explanation of the VE they were about to experience without unveiling the aim of the research or the specific elements present in the game. A brief explanation of the controls and setting up the experience followed. Interventions were allowed only when participants encountered difficulties during gameplay. Specifically, refraining from mentioning the poster or the batteries. However, assistance was provided if needed to help participants accomplish their tasks, recognizing that many had limited or no prior experience with VR or gaming.

#### 4.5.3. Survey

After the completion of the VR experience, participants were surveyed with a goal of measuring how IGA affected their decision making process. The survey itself allowed us to reflect on the outcomes of the PP on consumer cognitive, behavioral, and affective outcomes. This survey was administered on the site directly after the experiment. The estimated time for each experiment, including a brief introduction of the game, instructions for VR controls, the gaming experience, and the survey was 15 minutes for each participant. However, the actual duration of the experiment varied depending on how quickly participants completed all the in-game tasks. Conducting the experiment in person and administering the survey at the same location provided opportunities to gain a deeper understanding of the participants' views.

#### 4.5.4. Post-experiment

Once the experiment was finished and the survey submitted, participants were explained the full scope of research after completion of the experiment. Although not mandatory, a number of participants were eager to share their opinions on the experiment itself as well as thoughts on VR technology, IGA, and PP. These post-experiment interviews were conducted in a flexible discussion style which allowed participants to open up and dive deeper into the topic. While these interviews are not a substantial part of the methodology, they provided interesting insights and better comprehension of participants' behavior, thus bringing attention to them.

### 4.6. Sampling

#### 4.6.1. Target population

This study delves into VR marketing within a gaming context. Consequently, it's crucial to identify the target population that could be most impacted by VR IGA. For this study, the target demographic was chosen to be the 18-34 age group. This group represents the largest segment of VR owners, tying with the 35-54 age group, with both groups accounting for 47% of all VR headset owners each (National Research Group, 2022).

The 18-34 age group was selected, while the 35-54 age group was excluded due to the higher percentage of video gamers among the younger generations (Hadji-Vasiljev, 2024). Individuals under the age of 18 were not included in this study to avoid the requirement for guardian consent. This study considers the 18-34 group to be the most representative customer segment targeted by IGA.

Another reason for choosing participants aged between 18 and 34 is that individuals in this age bracket are typically more tech-savvy and can quickly adapt to new technology. Moreover, the majority of individuals within this age group hold positive views towards VR (Touchstone Research, 2016).

#### 4.6.2. Sample method

This study uses snowballing otherwise known as the referral sample method. It is a non-probability sampling method that selects elements in some non-random way (Burns & Burns, 2008). The selected snowball sampling method uses the initial participants to provide contacts and expand the sample size. Moreover, this sampling technique is one of the most beneficial techniques because most potential users of VR technology are often exposed

through recommendations by acquaintances and therefore simulates real-life scenarios (National Research Group, 2022).

Probability sampling that uses random participant selection was not used due to time and resource restrictions, despite its advantages. Furthermore, the experiment was conducted on personal equipment. The use of non-probability sampling allowed the control of selecting participants that were trustworthy to protect the equipment.

The initial group of participants was reached through connections with the authors as well as cold approaches in person or via social media. Participants were then asked to refer their friends and other acquaintances who would be interested in participating after completing the experiment. This allowed an expansion of the sample size without limitations reaching a dead-end while still being relatively randomized.

### 4.6.3. Sample Size

The sample size should be sufficiently large to accurately represent the selected population. According to the main principle of the Central Limit Theorem, as the sample size increases, its average converges towards the population's mean (Burns & Burns, 2008). A larger sample size also enhances the statistical power, thereby increasing the likelihood of identifying relationships between the items under investigation (Burns & Burns, 2008). Higher statistical power also reduces the chances of committing false positive (Type I) or false negative errors (Type II) (Christley, 2010).

As Burns & Burns (2008) share in their book, the Central Limit Theorem suggests that a sample size should comprise at least 30 units. Taking into account both the recommended number and the arguments favoring a large sample size, this study aims to engage 70 participants in the experiment. This number significantly exceeds the minimum, thereby enabling a higher statistical power and facilitating the discovery of effects where they exist.

## 4.7. Data collection method

Following the experiment, it's crucial to understand the attitudes of participants towards the explored subject. The concept of attitude consists of three components - belief, affective, and behavioral (Burns & Burns, 2008). These components facilitate the exploration of potential customer behavior and maximize the productive potential of businesses (Burns & Burns, 2008). In academic research and the business world, attitudes are often measured by structured questionnaires and surveys, which are a part of quantitative research methods (Burns & Burns, 2008). However, it's important to consider potential discrepancies, as attitude measurements are self-reported and could pose issues with validity and credibility (Burns & Burns, 2008).

Upon completion of the experiment, data on participants' attitudes was gathered by asking them to complete a digital survey on the site of the experiment. As previously discussed, the selected population is tech-savvy, thus, it is advisable to conduct the survey digitally (Easterby-Smith et al., 2021). This also facilitates easier tracking of participants' responses and standardization of responses, thereby enhancing reliability (Burns & Burns, 2008). Another reason for opting for a digital survey is that it allows control over the survey flow, with the ability to skip certain parts, customize the process, and limit the ability to change answers (Burns & Burns, 2008), which can impact the final results.

Having a well-designed survey is crucial (Burns & Burns, 2008). The survey for this study was conducted immediately after the experiment, providing an opportunity for participants to receive explanations for the questions. However, to minimize confusion, it's important to formulate simple and straightforward questions (Burns & Burns, 2008). Burns & Burns (2008) suggest that a survey should begin with an introductory message that explains to participants how to answer the questions

For this study, Qualtrics XM was chosen as a survey platform. The decision to use Qualtrics XM is based on several key factors. Firstly, it offers an intuitive and user-friendly web-based platform for collecting responses. The platform also boasts a rich set of features, such as the ability to add graphical content and introduce display logic that allows for the presentation of custom questions or information based on previous answers.

#### 4.7.1. Questionnaire design

In the process of designing the questionnaire, guidelines provided by Burns & Burns (2008) were closely followed. The survey began with an introduction that clearly explained the purpose of the research, as well as provided instructions and an estimated time for completion, as suggested by Burns & Burns (2008). This section introduced participants to the researchers behind this study and presented them with the primary objective of the questionnaire. Participants were assured that all their responses would remain confidential and were encouraged to answer truthfully. This approach was adopted to convey respect to the participants, ensuring they felt valued and secure (Burns & Burns, 2008). This leads to more honest responses and motivates them to assist the researchers (Van Quaquebeke et al., 2022; James & Busher, 2015).

The following section introduced control questions. Participants were asked about their demographics (Burns & Burns, 2008) - their country of origin, gender, and age - to confirm that the participants belonged to the selected 18-34 age group (Bryman & Bell, 2011). To gain a better understanding of the participants, they were also asked to share their level of experience with video games and VR technology.

The subsequent section of the survey explored whether participants had noticed branded PP during the experiment. Responses to this question were monitored, and only those who could recall the Duracell advertisement and its context were allowed to select an answer indicating

advertisement recall. Those who responded affirmatively proceeded with an additional question asking them to identify the branded PP shown from three images with minor differences, to assess advertisement recall in more depth (see figures 6 & 7). Others were asked to repeat the experiment, this time with full awareness of the presence of a PP, before continuing with the survey. All participants then proceeded with the remaining questions that explored the effects of PP in VR video game context on product valuation, consideration, interest, and favorability. To prevent careless response behavior, an attention check in the form of a multiple-choice question was added. Participants were considered to have passed the test if they chose the answer they were instructed to select. Otherwise, the entry was recognized as careless and was not used for this study.

In designing the survey, it was taken into account that some scholars advise against using multimedia and graphics solely for aesthetic reasons, as it may negatively impact respondents' attention span (Bărbulescu & Cernat, 2012; Van Quaquebeke et al., 2022). Images were used only when they served the purpose of inquiring about the advertisement recall and showing what product should be evaluated.

#### 4.7.2. Pretest

A pretest was conducted prior to the experiments and data collection. As Burns & Burns (2008) explain in their book, survey pretests are essential for testing the formulation of questions to prevent the use of unintelligible language that could potentially confuse participants. Test subjects in the pretest phase should closely mirror the target population (Burns & Burns, 2008). Therefore, individuals in the 18-34 age group of various genders and nationalities were selected for this study's pretest.

The pretest adhered to the same procedures as the actual experiment and survey. Participants were asked to complete the game without any guidance to achieve the final goal. It was discovered that the clues provided in the note during gameplay were overly challenging. Moreover, the pretest subjects did not have a clear idea about the final goal and any additional tasks they needed to perform, which consequently prolonged the time required to complete the experiment. As a result, the text in the note was revised to provide more hints and clarify the final goal. Another area where participants encountered difficulties was aiming with a gun in VR, as they were not experienced in VE. Thus, a decision was made to add aim assist in the form of a laser pointer.

Subsequently, they were required to complete a survey featuring graphical imagery of the experiment version they were undertaking. Afterward, participants were asked to share all their comments and concerns. This stage of the pretest revealed that the survey images testing prominent PP advertisement memory were too similar. Thus, in one of the options the Duracell bunny was relocated from the right to the left side of the depicted box. The question about product valuation was changed to clarify the understanding as participants found it confusing at first.



It was crucial to gather feedback on both the experiment and the questionnaire. This enabled the estimation of the required timeframe for each experiment, as well as the evaluation of whether the experience had any flaws that could impact the research, and the assessment of the level of understanding for the questions. Adjustments were made based on the feedback, and another pretest was subsequently conducted to determine whether the adjustments enhanced the overall quality of the experiment and questionnaire design. There was no need for changes after the repeated pretest as changes have improved the overall experience of the experiment.

## 4.8. Variable measurements and scaling

The research employs a questionnaire as the primary measurement method, which participants will complete after experiencing the VE created for the study. This questionnaire consists of multiple closed-ended questions and one open-ended question. Except for the Brand Recall and Product Valuation constructs, all other questions are measured using a Likert scale. Each question on the Likert scale represents an individual item, and by combining multiple items, a construct can be effectively measured.

Given that this study aims to investigate unobservable phenomena, the use of latent dependent variables is essential. Using multiple items for each construct offers a broader illustration and reduces the risk of a latent variable being represented by a single item (Bryman & Bell, 2011). However, the construct of Product Valuation is measured using a single-item question, as this question adequately represents the construct in its entirety.

### 4.8.1. Independent variable

The core concept of this paper centers on the interaction and immersion levels of PP in a VR gaming experience (IGA). The research seeks to explore the impact of those levels on real-world consumer responses.

The independent variable in this experimental study is the in-game PP (IGA), which is categorized into two conditions. The first condition, termed "prominent," involves a high level of interaction with the IGA, exemplified by the interactable branded batteries integrated into the gameplay. In contrast, the "subtle" condition features a low level of interaction with the IGA, represented by a static 2D ad poster displayed on a wall within the game. This subtle placement does not affect gameplay and does not obstruct the player's field of view, as the 2D poster blends into the overall game ambiance. On the contrary, the prominent condition is fully integrated into the environment and gameplay, requiring players to interact with it to progress and complete the final game tasks.

## 4.8.2. Dependent variables

Dependent variables are referred to as the outcomes of the independent variable (Easterby-Smith et al., 2021). As exposed previously, it was believed that PP has different effects on the consumer, which can be categorized into cognitive effects (brand recall, product valuation), behavioral effects (brand consideration), and affective effects (interest, favorability). All of these effects are influenced by the two conditions of the independent variable in different ways.

### *Advertisement Recall*

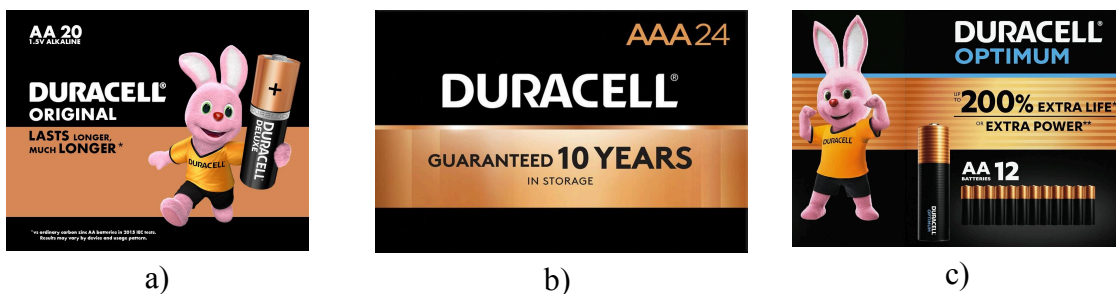
Items related to Advertisement Recall are composed of binary and multiple choice questions, and establish this dependent variable as categorical (see Table 1).

*Table 1: Ad recall items*

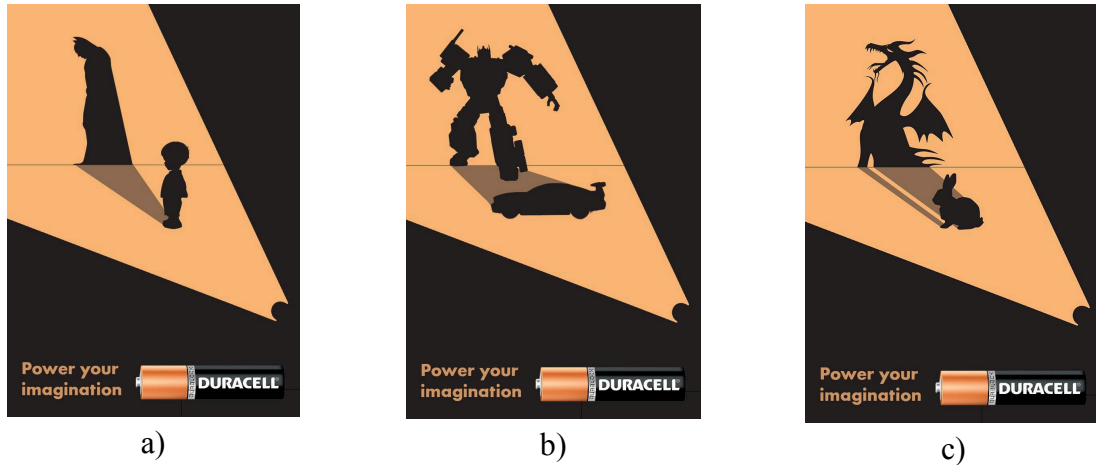
Items	
<b>Ad Recall</b>	
Have you noticed any brands or advertisements during your experience in the VR game?	Binary (Y/N)
Which branded product placement did you see when you played the game? Choose one, that you believe you saw:	Multiple choice with pictures
<i>Note: If participant responds "No" to the first item, the experiment restarts</i>	

The first component of the variable is a binary question designed to make sure whether participants recall encountering a PP during the experience. Although Roettl & Terlutter (2018) and Dahl et al. (2003) used open questions to explore ad recall in their studies, this research opted for a different approach to facilitate the analysis of the data.

Multiple studies have used before in their experiment the idea of proposing multiple images to assess the degree of the Advertisement Recall accuracy, called ad recognition. Adapted from Dahl et al. (2003) study, this item asked the participants to indicate the correct poster they were exposed to during their gameplay. Thus, this second item is a multiple choice question with pictures established to deepen the understanding of how much the participants actually recall from the PP (Figure 6 & 7).



*Figures 6 a,b,c: Images presented to evaluate the actual ad recall of the participant for the prominent PP (image a) is the correct one)*



Figures 7 a,b,c: Images presented to evaluate the actual ad recall of the participant for the subtle PP (image c) is the correct one)

If a participant indicates no recollection of encountering a PP, the experiment is repeated, with the participant’s full awareness of the PP. This ensures participants can proceed with subsequent questions while maintaining the study's validity. Participants were considered to have ad recall when they selected the right advertisement displayed in the gameplay. If they chose the wrong one, then their ad recall is considered partial as they remember seeing an ad but not recognizing it.

### Product Valuation

Product Valuation serves as a single-item construct aimed at determining the value consumers associate with each of the IGA conditions (Table 2). Derived from the research of Luangrath et al. (2022), who examined how virtual touch in a retail setting impacts consumer willingness to pay, this study adopts a similar focus. However, instead of employing a price scale with a slider, an open question format was used to obtain participants' opinions without scale influence. Participants are prompted to indicate a price for a specific Duracell product featured in the survey (Figure 8), revealing their perceived value.

Even if participants are unsure of the actual price, this approach allows them to express the price they are willing to pay for the given brand and product. Additionally, incorporating a real Amazon<sup>2</sup> product image enables comparison with its actual retail price.

Table 2: Product valuation item

Items
<b>Product valuation</b>
How much would you pay for this product in SEK? (number) - Duracell Plus Power Type AA Alkaline Batteries, Pack of 4 Open question
<i>Note: single-item construct</i>

<sup>2</sup> <https://www.amazon.se/-en/Duracell-Plus-Power-Alkaline-Batteries/dp/B004W7D4ZU/> [Accessed 4 May, 2024]



Figure 8: Amazon product displayed in the survey for Product Valuation question

### ***Willingness to consider the brand***

Based on a Likert scale from 1 to 5, with 1 being “Strongly disagree” and 5 being “Strongly agree”, willingness to consider the brand is a dependent variable aimed to uncover the overall purchase intention of the consumer (Table 3). Derived from Wang & Chen's (2019) work on dialogic engagement of PP in VR video content, this multiple-item construct is applied as Wang & Chen (2019) did in their study. As they are studying the same dependent variable in a different VR context, it is relevant to keep the items as similar as possible. The Likert scale used for this construct will allow us to gauge the extent to which participants are open to considering the brand presented in the VR experience, providing insights into their potential purchasing behavior.

Table 3: Willingness to consider the brand items

Items	
<b>Willingness to consider the brand</b>	
The product placement of this brand would make me more likely to use the brand.	SD D N A SA
The product placement of this brand would make me more likely to consider the brand the next time when I buy.	SD D N A SA
I would be more likely to buy the brand as a result of the product placement.	SD D N A SA

*Note: the items are measured on a 5-point likert scale*

### ***Interest in the brand***

Also derived from Wang & Chen's (2019) study, interest in the brand represents the construct in which the consumer develops a general interest in a brand or product after being exposed to an advertisement, potentially indicating a sensitivity to future exposure to the brand. These Likert scale items range from 1 to 5, with "Strongly disagree" corresponding to 1 and "Strongly agree" to 5 (see Table 4). Utilizing these items, the construct is believed to be effectively measured, as Wang & Chen (2019) used the same scale in their research on PP in a VR video content setting.

Table 4: Interest in the brand items

Items	
<b>Interest in the brand</b>	
This product placement would make me more likely to notice the brand on other occasions	SD D N A SA
This product placement would make me more likely to pay attention to the brand's advertising	SD D N A SA
This product placement would make me more likely to remember the brand's promotion	SD D N A SA

*Note: the items are measured on a 5-point likert scale*

### Brand favorability

Wang & Chen (2019) examined brand favorability as a consequence of engagement with PP in a VR video context. Utilizing a Likert scale ranging from 1 to 5, with 1 representing "strongly disagree" and 5 indicating "strongly agree," brand favorability aims to explore the extent to which the consumer may be influenced following exposure to PP (see Table 5). This multi-item construct, consistent with Wang & Chen's (2019) methodology, is employed to construct a comprehensive understanding of this variable.

Table 5: Brand favorability items

Items	
<b>Brand favorability</b>	
This product placement makes me feel more favorable toward the brand	SD D N A SA
This product placement would improve my perception of the brand	SD D N A SA
This product placement would make me like the brand more	SD D N A SA

*Note: the items are measured on a 5-point likert scale*

## 4.9. Validity and reliability

When conducting any research, it is essential to match the standards of validity and reliability. These standards ensure that the research is seen as legitimate and recognized by the academic community for its quality (Easterby-Smith et al., 2021). Validity assesses how accurately the research represents the topic under study and whether it addresses the research questions without any biases (Sallis et al., 2021). Meanwhile, reliability examines the consistency of the research and the extent to which the results accurately reflect reality (Sallis et al., 2021). This implies that with repeated measurements, the obtained results should closely align with those from previous studies.

The importance of validity and reliability in any research cannot be overstated, as they help to avoid random and systematic errors. Measures with a random error do not have any pattern and are, as the name suggests, distributed randomly which in turn makes these measures neither reliable nor valid (Sallis et al., 2021). On the other hand, systematic errors are influenced by specific factors that create patterns in measurements. This can negatively impact research, as the repetition of measurements introduces bias (Sallis et al., 2021). While measurements with a systematic error are highly reliable, they are not valid (Sallis et al., 2021).

This research employed specific techniques to prevent random and systematic errors. To improve both validity and reliability, the research followed the guidelines provided by Burns

& Burns (2008) and Easterby-Smith et al. (2021). Validity was established by employing a snowball sampling method, which increased the random selection of participants, thereby better representing the population under investigation. The control question regarding age served as an entrance criterion to exclude respondents who did not belong to the target population. And, an attention check, adopted from the study by Luangrath et al. (2021), ensured that participants thoroughly read and contemplated the questions.

Reliability in this study was ensured by providing each participant with the same VR experience and maintaining a consistent structure throughout the experiment. A detailed description of the experiment flow, provided above, can be used for future research. The questionnaire's questions were adopted from existing literature in a similar field to prevent reliability issues. The exact questions used in the survey can also be found above.

## 4.10. Ethical considerations

This study placed a high priority on ethical considerations to ensure the welfare and rights of the participants. Participants were invited to participate in the study of their own free will. They were under no obligation to participate and could withdraw at any time without any consequences. Participants were also informed that their gameplay would be monitored to provide assistance if needed and asked for their consent before proceeding. They were fully briefed about what to expect in the experiment.

Participants were assured that all of their responses would remain confidential and anonymity maintained. No personal data was collected in compliance with the General Data Protection Regulation (GDPR) according to the European Union requirements (Intersoft Consulting, 2018). Furthermore, while providing personal information such as country of origin or gender, participants were given the option not to share this information. This was done to respect their privacy and personal boundaries.

As engaging with VR can induce motion sickness, participants were informed of this potential risk. They were asked to notify us immediately if they felt uncomfortable at any point during the experiment. Fortunately, no participant reported any discomfort.

By following these ethical guidelines, the study respected the rights and welfare of the participants, while also ensuring the integrity and validity of the research findings.

# 5. Result

## 5.1. Data screening and preparation

The study initially included 74 participants, but 3 participants failed the attention check and one other was outside the age range, resulting in a total of 70 valid observations. The age discrepancy was likely due to the snowball sampling method used, which, while effective in recruiting participants, lacked control over participant demographics.

To prepare the data for analysis, the collected data was exported from Qualtrics XM in a CSV format, and imported in Excel to proceed with the data cleaning process. During this process, participants who failed the attention check and were outside the specified age range were removed. Additionally, the Likert-scale responses were modified from text to numerical scores as follows:

- Strongly disagree = 1
- Somewhat disagree = 2
- Neither agree nor disagree = 3
- Somewhat agree = 4
- Strongly agree = 5

Exporting the questionnaire from Qualtrics XM disrupted the naming of the images for the second item of the Ad Recall construct exploring the ad recognition. This required manual correction using a search-and-replace formula to fix the image names by their position in the question, ensuring accurate identification of participant responses. To facilitate the assessment of the ad recognition, a binary system was established indicating complete Ad Recall with 'Yes' or 'No'. A complete Ad Recall ('Yes') is required:

- A 'Yes' response to noticing any brands or advertisements during the VR game.
- Correct identification of the branded PP in the game.

After the adjustments, the final dataset was imported into Jamovi for further analysis. A few additional changes were made, such as renaming grouping conditions from 'Left' to 'Prominent' and 'Right' to 'Subtle' for clearer categorization. The attention check variable (column) was also removed since all remaining observations had passed this check.

## 5.2. Sample

In total, the 70 observations were divided into two groups based on the type of PP the participants were exposed to. Group A was formed of 35 participants who were exposed to the subtle PP, and Group B was formed of 35 participants who were exposed to the prominent PP.

Those 70 observations were distributed relatively equally between males (36) and females (34). Within the groups, Group A was composed of 18 females and 17 males, and Group B was composed of 16 females and 19 males (Table 6).

*Table 6: Gender Distribution of the Sample*

	Subtle (group A)	Prominent (group B)	Total
Female	18	16	34
Male	17	19	36
Total	35	35	70

*Source: Jamovi*

In summary, the overall sample had a balanced gender distribution, with a slight female predominance in Group A and male predominance in Group B. The breakdown of participants across the two conditions ensures a representative analysis of the effects of subtle versus prominent PP on consumer responses.

The dataset was composed of 70 participants from a diverse array of countries, reflecting significant cultural diversity. The single largest group of participants were from Sweden with 16 representatives, 23% of the total sample. This was followed by French and American participants with 5 individuals each. Other nationalities included 4 Germans, and 3 participants each from Croatia, Peru, Slovenia, and the Netherlands. Additionally, there were participants from Argentina (2), Brazil (2), China (2), Colombia (2), Greece (2), Poland (2), Turkey (2), the Philippines (1), Portugal (1), Spain (1), Romania (1), Vietnam (1), Lithuania (1), Iceland (1), Hungary (1), Belgium (1), Albania (1), Czechia (1), Mexico (1), Switzerland (1), and Syria (1), each contributing to the cultural diversity of the study (Table 7).



Table 7: Nationality Distribution of the Sample

Number of participants	Country of origin
16	Sweden
5	France, the USA
4	Germany
3	Croatia, Peru, Slovenia, the Netherlands
2	Argentina, Brazil, China, Colombia, Greece, Poland, Turkey
1	Albania, Belgium, Czechia, Hungary, Iceland, Lithuania, Mexico, the Philippines, Portugal, Romania, Spain, Switzerland, Syria, Vietnam

Source: Jamovi

Concerning the age distribution, participants were ranging from 19 (4 observations) to 34 years old (2 observations). The average age of the participants is 24.47 years old (Figure 9) with 24 year old participants being the most frequent observation (18 observations). The 22-24 year old participants were the most represented with a total of 45 observations, which represents 50% of the sample. Looking at the repartition in the groups, the distribution is not significantly different. For Group A (subtle) the average age is 24.89, while for Group B (prominent) it is 24.06, suggesting equally distributed groups.

Descriptives		Descriptives		
	Age		Version	Age
N	70	N	Prominent	35
Missing	0		Subtle	35
Mean	24.47	Missing	Prominent	0
Median	24.00		Subtle	0
Standard deviation	3.48	Mean	Prominent	24.06
Minimum	19		Subtle	24.89
Maximum	34	Median	Prominent	24
			Subtle	24
		Standard deviation	Prominent	2.96
			Subtle	3.92
		Minimum	Prominent	19
			Subtle	19
		Maximum	Prominent	34
			Subtle	34

Figure 9: Age Distribution of the Sample and by PP Version

Source: Jamovi

In order to examine participants' prior experiences in VR, they were asked to answer the following question: "Prior to this experience, how familiar were you with using virtual reality (VR) technology?". This question revealed that the majority of the participants never used VR before (39%) or had a limited experience with VR technologies (39%) (Figure 10). Only

two people (3%) answered that they are very experienced with VR technologies, which provides evidence for the limited access of VR technologies to the mass market. Additionally, 14 participants shared that they had some experience in VR technologies, which represents 20% of the sample.

VR Experience	Counts	% of Total	Cumulative %
I am very experienced with VR technology	2	3%	3%
I have limited experience with VR technology	27	39%	41%
I have never used VR technology before	27	39%	80%
I have some experience with VR technology	14	20%	100%

*Figure 10: Prior Experience with VR Technologies of the Participants*  
*Source: Jamovi*

A similar question was asked about the prior experience with gaming in general. This question (“Before this gaming session, how would you describe your level of experience with gaming in general?”) aided with comprehension of participants' familiarity with video games. Participants had a limited (30%) or moderate (31%) experience with gaming. Meaning that participants have occasionally played video games before (Figure 11). Moreover, 16 participants indicated that they were highly experienced gamers (23%). However, 11 of the participants noted that they were completely new to gaming (16%).

Gaming Experience	Counts	% of Total	Cumulative %
I am a highly experienced gamer	16	23%	23%
I am completely new to gaming	11	16%	39%
I have limited experience with gaming	21	30%	69%
I have moderate experience with gaming	22	31%	100%

*Figure 11: Prior Gaming Experience of the Participants*  
*Source: Jamovi*

### 5.3. Advertisement recall

The first hypothesis (**H1**) examines the relationship between the interaction level with PP (subtle vs. prominent) and participants' recall of these advertisements within the VR game. **H1** anticipates a significant difference in the ability to notice and recall PP based on their interactivity levels. The expectation is that prominent PP, being more visually and contextually integrated into the gameplay, will be more recognized and recalled by participants. To analyze the implications of this variable across the two distinct game

versions, a two-step approach was chosen. Firstly, overall IGA recall was analyzed. Afterwards, the participant’s memory for advertising details was explored.

The Chi-Square Test of Independence was employed for both parts of the analysis. It explores relations between two categorical variables. This test will help to determine whether there is a statistically significant difference between the type of PP and the participants' ability to notice and remember the placements, thereby providing insights into the effectiveness of different PP strategies in virtual gaming environments.

**First step: Ad Recall**

To evaluate the relationship between the level of immersion for PP (subtle vs. prominent) and the participants' advertisement recall in the VR game, a Chi-Square Test of Independence was conducted. Participants were divided into two groups based on the version of the game they played: one with subtle PP and the other with prominent PP. After completing the game, participants were asked if they recalled any advertisements or brands within the VE. In Group A (subtle PP) only 11 participants recalled seeing an advertisement. In Group B (prominent PP) 29 out of 35 participants noticed a branded item. The observed frequencies of responses are presented in Table 8.

*Table 8: Observed Frequencies of Ad Recall by PP Version*

	No	Yes	Total
Subtle PP	24	11	35
Prominent PP	6	29	35
Total	30	40	70

*Source: Jamovi*

The expected frequencies, assuming the null hypothesis is true and no relationship between the type of PP and advertising recall, are shown in Table 9.

*Table 9: Expected Frequencies of Ad Recall by PP Version*

	No	Yes	Total
Subtle PP	15	20	35

Prominent PP	15	20	35
Total	30	40	70

*Source: Jamovi*

## Step 2: Ad Recognition

It is important to explore advertisement recognition as well, considering it a crucial factor in understanding the effectiveness of PP. Participants who noticed the PP during the VR experience were asked to identify the specific graphical representation of the IGA they observed by choosing one of three options (Figures 6 & 7). In Group A, out of 11 participants who noticed the PP, only 2 identified the poster correctly, while the remaining 9 selected one of the two incorrect options. In Group B, 21 participants accurately identified the branded box, while 8 selected the incorrect box image containing a bunny. Notably, none of the participants chose the image of the box graphic without the Duracell bunny. The detailed results are presented in Table 10:

*Table 10: Observed Frequencies of accurate Ad Recognition by PP Version*

	Wrong	Correct	Total
Subtle PP	9	2	11
Prominent PP	8	21	29
Total	17	23	40

*Source: Jamovi*

The expected results, assuming no effect of interaction level on advertisement recognition, are presented in Table 11:

*Table 11: Expected Frequencies of Accurate Ad Recognition by PP Version*

	Wrong	Correct	Total
Subtle PP	4.67	6.33	11
Prominent PP	12.32	16.68	29

Total	17	23	40
-------	----	----	----

Source: Jamovi

### Chi-Square Test of Independence

The Chi-Square statistic for the first part of the test was calculated using the observed and expected frequencies ( $\chi^2 = 18.9$ ). The degrees of freedom (df) for this test with 2 rows and 2 columns were determined to be 1.

The significance level for this test was chosen to be 5% ( $\alpha = 0.05$ ). Considering the fact that  $df = 1$ ,  $\alpha = 0.05$ , and according to the chi-square table, the critical cutoff value is 3.84. Since the calculated Chi-Square value (18.9) is much greater than the critical value (3.84), the null hypothesis was rejected, and concluded that there is a significant difference between the variables (Table 12):

Table 12: Chi-Square Results of Ad Recall

	Value	df	p
$\chi^2$	18.90	1	<.001
N	70		

Source: Jamovi

The results indicate a significant association between the interaction level of PP and ad recall ( $\chi^2(1, N = 70) = 18.9, p < .001$ ). **H1** was confirmed as participants were significantly more likely to notice the PP in the prominent version of the game compared to the subtle version (Table 8).

The Chi-Square statistic and the degrees of freedom (df) for the second part of the test were found to be 9.60 ( $\chi^2 = 9.60$ ) and 1 ( $df = 1$ ) since a 2x2 matrix was used again. The significance level was set at 5% ( $\alpha = 0.05$ ), resulting in a critical value of 3.84, which is smaller than the calculated Chi-Square statistic ( $\chi^2 = 9.60$ ), indicating a significant difference (Table 13).

Table 13: Chi-Square Results of Accurate Ad Recognition

	Value	df	p
$\chi^2$	9.60	1	.002
N	40		

Source: Jamovi

The results indicate a significant difference in advertisement recognition depending on the interaction level of PP ( $\chi^2(1, N = 40) = 18.9, p = .002$ ). Participants from group B (prominent PP) demonstrated better recognition of PP, thereby only strengthening **H1**.

## 5.4. Product Valuation

The second hypothesis (**H2**) aims to explore whether gamers who experience a more prominent IGA integrated into gameplay mechanics perceive the advertised product as more valuable than those who experience a subtle PP. It is expected that participants from Group B, who were exposed to the prominent PP, will perceive Duracell batteries to be more valuable than those from Group A due to the influence of vicarious touch. The perception of value was measured by comparing the price participants were willing to pay for a 4-pack of AA Duracell batteries (Figure 8). To examine the valuation variable, an independent sample t-test was conducted.

### Descriptives

There was an equal number of participants in both groups (35 in each group), but there were differences in responses between Group A ( $M = 71.94, SD = 73.76$ ), and Group B ( $M = 51.48, SD = 29.11$ ). Additional descriptives such as mode, median, and extreme values are presented in Figure 12.

Descriptives								
	Version	N	Mean	Median	Mode	SD	Minimum	Maximum
WTP	Prominent	35	51.48	45.00	40.00	29.11	10.00	150.00
	Subtle	35	71.94	50.00	50.00	73.76	20.00	400.00

Figure 12: Descriptive Analysis for Product Valuation by PP Version

Source: Jamovi

Such large differences in standard deviation between the groups, while medians are relatively similar, call for further investigation of the extreme values. After examining the histograms (Figure 13) and box plots (Figure 14), it became evident that two outliers in Group A could significantly impact the results for **H2**. Paying 300 SEK and 400 SEK for a 4-pack of AA batteries is considerably higher than the actual price of 60-80 SEK (Amazon, 2024<sup>3</sup>). Therefore, these extreme values were excluded from the analysis of the valuation variable.

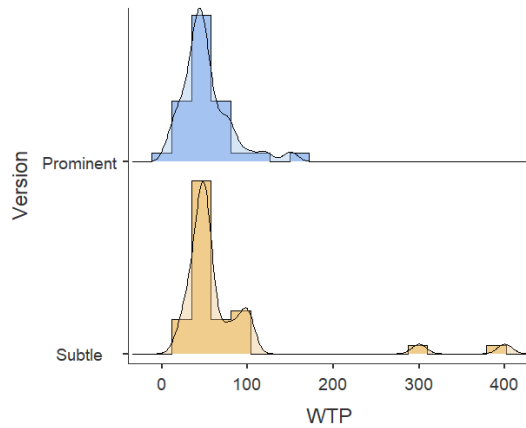


Figure 13: Histograms for Product Valuation outliers  
Source: Jamovi

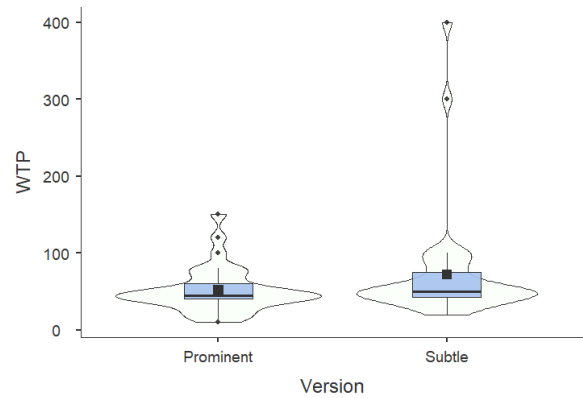
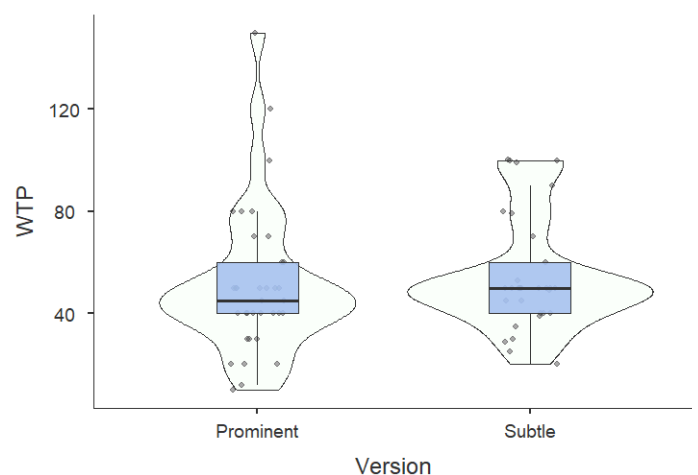
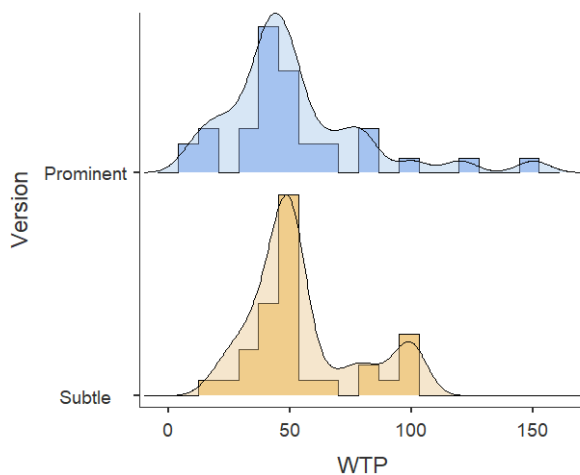


Figure 14: Box plots for Product Valuation outliers  
Source: Jamovi

After excluding the two extreme values affecting the dataset, the mean and standard deviation for Group A decreased to  $M = 55.09$ ,  $SD = 22.33$ . Changes in distribution can be seen in Figure 15 and Figure 16:



<sup>3</sup> <https://www.amazon.se/-/en/Duracell-Plus-Power-Alkaline-Batteries/dp/B004W7D4ZU/> [Accessed 4 May, 2024]

Figure 15: Histograms for Product Valuation corrected  
Source: Jamovi

Figure 16: Box plots for Product Valuation corrected  
Source: Jamovi

### Assumption checks

Before conducting the independent samples t-test to compare the valuation of batteries between the two groups (subtle vs. prominent), several assumptions were checked to ensure the validity of the test results.

The normality of the valuation scores for both groups was assessed using the Shapiro-Wilk, Kolmogorov-Smirnov, and Anderson-Darling tests. The results are as follows (Figure 17):

Tests of Normality			
		statistic	p
Value	Shapiro-Wilk	0.89	< .001
	Kolmogorov-Smirnov	0.24	< .001
	Anderson-Darling	2.64	< .001

Figure 17: Normality test for Product Valuation  
Source: Jamovi

Since all of the p-values for both groups are less than .001, the null hypothesis that the data are normally distributed was rejected, indicating that the normality assumption is violated. However, this is a common challenge in research and does not necessarily negatively impact the reliability of the study. Most importantly, visual inspection of histograms (Figure 15) did not show any discrepancies.

The homogeneity of variances was tested using Levene's Test for Equality of Variances ( $F(1, 66) = 0.55, p = .461$ ). Since the p-value is greater than .05, it was confirmed that the variances are equal and that the assumption of homogeneity of variances is met.

### Independent samples t-test

The Student's t-test was conducted to compare the valuation of batteries between the subtle and prominent PP groups (Figure 18). Group A (subtle PP) < Group B (prominent PP) setting was considered for this test. Considering the significance level of 5% ( $\alpha = 0.05$ ), Student's independent t-test revealed no significant difference for the valuation of a 4-pack AA Duracell batteries between Group A ( $N = 33, M = 55.09, SD = 22.33; t(66) = -0.57, p = .285$ ) and Group B ( $N = 35, M = 51.48, SD = 29.11$ ). Therefore, **H2** is rejected, suggesting there is no significant difference in product valuation depending on PP interactivity levels.



Independent Samples T-Test								
		Statistic	df	p	Mean difference	SE difference	Effect Size	
WTP	Student's t	-0.57	66.00	0.715	-3.61	6.32	Cohen's d	-0.14
	Welch's t	-0.58	63.43	0.717	-3.61	6.27	Cohen's d	-0.14

Note.  $H_a: \mu_{\text{Prominent}} > \mu_{\text{Subtle}}$

Figure 18: Student's t-test results for Product Valuation  
Source: Jamovi

## 5.5. Willingness to consider

The third hypothesis (**H3**) revolves around the willingness of consumers to consider the brand for future purchases. Prominent PP has immersive integration into gameplay and interactive features contrasting subtle PP that merely serves as a static advertisement in the game background. Therefore, this research anticipates more positive behavioral responses among participants exposed to prominent PP than subtle PP. To analyze the implications of this response across two distinct groups, the independent samples t-test analysis strategy was employed.

### Reliability analysis

This multiple-item construct is deemed reliable as it showed satisfactory results, indicating good internal consistency among the measured variables. The mean score for the measured construct was 3.32, with a standard deviation of 0.86. The reliability coefficients, Cronbach's alpha ( $\alpha = 0.82$ ) and McDonald's omega ( $\omega = 0.82$ ), further supported the robustness of the measurement instrument, exceeding the generally accepted threshold of 0.70 for reliability coefficients. This means that after calculating and checking the scale statistics, under 20% of the Willingness to consider scale is error variance (Figure 19).

Scale Reliability Statistics				
	Mean	SD	Cronbach's $\alpha$	McDonald's $\omega$
scale	3.32	0.86	0.82	0.82

[3]

Item Reliability Statistics				
	Mean	SD	If item dropped	
			Cronbach's $\alpha$	McDonald's $\omega$
W1	3.14	1.00	0.70	0.70
W2	3.57	0.97	0.83	0.83
W3	3.24	1.04	0.70	0.70

Figure 19: Reliability Analysis for Willingness to Consider the Brand  
Source: Jamovi

After examining the independent items, it was observed that by dropping the second item (W2), corresponding to the question “The PP of this brand would make me more likely to consider the brand the next time when I buy,” the statistical scale increased slightly (M = 3.57; SD = 0.97; Cronbach's  $\alpha$  = 0.83; McDonald's  $\omega$  = 0.83). However, the increase was not substantial enough to consider the removal of W2 from the construct.

### Descriptive

The analysis revealed that participants exposed to the prominent PP reported a slightly different mean score (M = 3.35, SD = 0.84) compared to those exposed to the subtle version (M = 3.29; SD = 0.89) (Figure 20). Additionally, the prominent PP had a median score of 3.67, while the subtle version had a median score of 3.33.

Group Descriptives						
	Group	N	Mean	Median	SD	SE
Willingness	Prominent	35	3.35	3.67	0.84	0.14
	Subtle	35	3.29	3.33	0.89	0.15

Figure 20: Descriptive Table for the Willingness to Consider the Brand  
Source: Jamovi

Furthermore, the given maximum score by a single participant in Group B was 5, while 4.33 was the maximum score in Group A (Appendix C).

### Assumption checks

Before proceeding with data analysis, it is essential to confirm adherence to the fundamental statistical assumptions necessary for independent samples t-test analysis (Figure 21). These include normality and homogeneity checks. Normality tests, namely the Shapiro-Wilk, Kolmogorov-Smirnov, and Anderson-Darling tests show that the normality assumptions are not met with significant values for the dependent variable.

Tests of Normality			
		statistic	p
Willingness	Shapiro-Wilk	0.90	<.001
	Kolmogorov-Smirnov	0.20	0.007
	Anderson-Darling	2.80	<.001

Note. Additional results provided by moretests

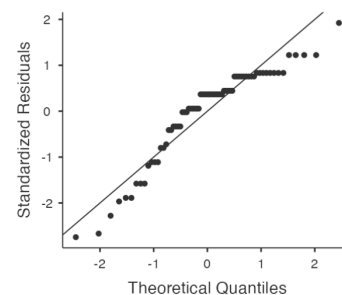


Figure 21: Normality Check for the Willingness to Consider the Brand  
Source: Jamovi

However, after visual inspection (Figure 22), no discrepancies were found. Thus, the construct is assumed to be normally distributed allowing to proceed with the rest of the analysis.

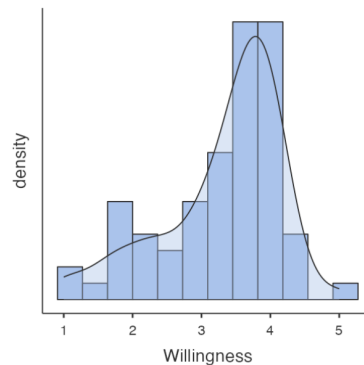


Figure 22: Histogram plot for the Willingness to Consider the Brand  
Source: Jamovi

Furthermore, the equality of variances between the two experimental conditions was assessed using Levene’s Test. The results revealed no violation of the assumption of homogeneity of variances for willingness to consider ( $p < .706$ ). Therefore, the conclusion was made that the requirement of equal variances across groups was met (Figure 23)

Homogeneity of Variances Tests					
		F	df	df2	p
Willingness	Levene's	0.14	1	68	0.706
	Variance ratio	0.88	34	34	0.718

Note. Additional results provided by moretests

Figure 23: Homogeneity Check for the Willingness to Consider the Brand  
Source: Jamovi

### Independent samples t-test

Independent samples t-test followed Group B (prominent) > Group A (subtle) settings. Assuming  $\alpha = 0.05$ , the Student’s independent t-test revealed that willingness to consider the brand is not significantly higher after exposure to a prominent PP ( $M = 3.35$ ,  $SD = 0.84$ ;  $t(68) = 0.32$ ;  $p < 0.374$ );  $d = 0.08$ ) than after exposure to a subtle PP ( $M = 3.29$ ;  $SD = 0.89$ ) as anticipated (Figure 24). Thus, **H3** can be rejected.

Independent Samples T-Test								
		Statistic	df	p	Mean difference	SE difference	Effect Size	
Willingness	Student's t	0.32	68.00	0.374	0.07	0.21	Cohen's d	0.08
	Welch's t	0.32	67.74	0.374	0.07	0.21	Cohen's d	0.08

Note.  $H_a: \mu_{\text{Prominent}} > \mu_{\text{Subtle}}$

Figure 24: Student’s t-test Results for Willingness to Consider the Brand  
Source: Jamovi

## 5.6. Interest in the brand

As interest in the brand is an important indicator for pre-purchase consumer behavior, investigating this affective response represents an opportunity to delve into its relationship with PP interactivity in the VR game. This fourth hypothesis (**H4**) anticipated that exposure to a subtle PP, with no interactive features and low integration in the gameplay, would have a higher effect on the interest in the brand. To analyze the implications of this response across both groups of participants, the independent samples t-test analysis strategy was employed.

### Reliability analysis

This construct is represented by three different items. Although the multiple-item construct's reliability analysis resulted in a moderate internal level for the Cronbach's alpha ( $\alpha = 0.64$ ) and the McDonald's omega ( $\omega = 0.66$ ), suggesting almost satisfactory reliability levels for the construct under investigation. This means that after calculating and checking the scale statistics, 34% of the interest in the brand scale is error variance. Thus, close to the threshold of 0.70, all three items were deemed to be necessary for satisfactory reliability of the construct (Figure 25).

Scale Reliability Statistics				
	Mean	SD	Cronbach's $\alpha$	McDonald's $\omega$
scale	3.82	0.69	0.64	0.66

[3]

Item Reliability Statistics				
	Mean	SD	If item dropped	
			Cronbach's $\alpha$	McDonald's $\omega$
11	3.90	0.82	0.44	0.44
12	3.66	0.95	0.60	0.60
13	3.91	0.93	0.59	0.59

*Figure 25: Reliability Analysis for Interest in the Brand*  
*Source: Jamovi*

### Descriptive

Upon analysis, participants exposed to the prominent PP demonstrated slightly different results ( $M = 3.86$ ,  $SD = 0.70$ ) in their interest in the brand, in comparison to those who experienced the subtle version ( $M = 3.79$ ,  $SD = 0.68$ ). Delving deeper into the data, the median reveals equal scores for both groups (Figure 26).

Group Descriptives						
	Group	N	Mean	Median	SD	SE
Interest	Prominent	35	3.86	4.00	0.70	0.12
	Subtle	35	3.79	4.00	0.68	0.11

Figure 26: Descriptive Analysis for the Interest in the Brand  
Source: Jamovi

Additionally, the maximum score given to the prominent condition was 5, while for the subtle condition, it was 4.67. The minimum score recorded for the prominent condition was 2.33, whereas for the subtle condition, it was 2 (Appendix C).

### Assumption checks

It is imperative to assess compliance with fundamental statistical assumptions, essential for conducting the independent samples t-test. These include checks for normality and homogeneity. The normality of the collected data was assessed using the Shapiro-Wilk, Kolmogorov-Smirnov, and Anderson-Darling tests, all of which resulted in very close to significance values, indicating that normality assumptions are met but need to be carefully treated and visually checked (Figure 27).

Tests of Normality			
		statistic	p
Interest	Shapiro-Wilk	0.94	0.003
	Kolmogorov-Smirnov	0.18	0.026
	Anderson-Darling	1.38	0.001

Note. Additional results provided by moretests

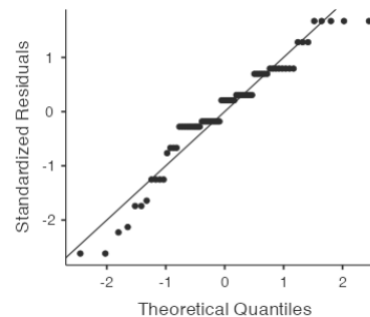


Figure 27: Normality Check for Interest in the Brand  
Source: Jamovi

According to Figure 28, the distribution for this dependent variable is visually normal. Thus, it can be assumed that the construct is normally distributed.

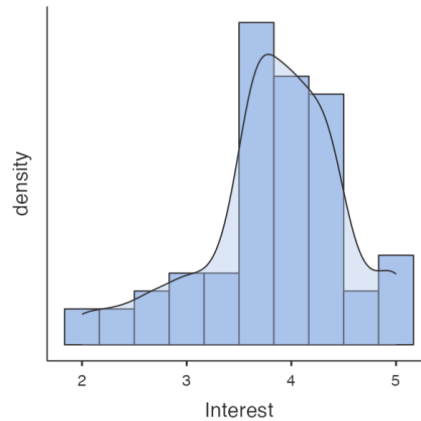


Figure 28: Histogram plot for the Interest in the Brand  
Source: Jamovi

Additionally, the equality of variances was evaluated across the two experimental conditions using Levene’s Test. The findings revealed no violation of the assumption of homogeneity of variances for interest in the brand ( $p < .6019$ ) (Figure 29). Thus, it can be concluded that the prerequisite of equal variances across groups was met.

Homogeneity of Variances Tests					
		F	df	df2	p
Interest	Levene's	0.25	1	68	0.619
	Variance ratio	1.07	34	34	0.836

Note. Additional results provided by moretests

Figure 29: Homogeneity Check for Interest in the Brand  
Source: Jamovi

### Independent samples t-test

Transitioning to the independent samples t-test, the comparison between Group B (prominent IGA) and Group A (subtle IGA) reveals no significant variance in interest in the brand for Group B < Group A. Assuming  $\alpha = 0.05$ , results obtained from the Student's independent t-test indicate that exposure to a subtle PP does not result in a statistically significant increase in interest in the brand ( $M = 3.79$ ;  $SD = 0.68$ ;  $t(68) = 0.40$ ;  $p < 0.656$ ;  $d = 0.10$ ) compared to exposure to prominent PP ( $M = 3.86$ ,  $SD = 0.70$ ) (Figure 30). **H4** is rejected due to no significance.

Independent Samples T-Test								
		Statistic	df	p	Mean difference	SE difference	Effect Size	
Interest	Student's t	0.40	68.00	0.656	0.07	0.16	Cohen's d	0.10
	Welch's t	0.40	67.91	0.656	0.07	0.16	Cohen's d	0.10

Note.  $H_a: \mu_{\text{Prominent}} < \mu_{\text{Subtle}}$

Figure 30: Student's t-test Results for Interest in the Brand  
Source: Jamovi

## 5.7. Brand favorability

Brand favorability plays a pivotal role in predicting consumer pre-purchase behavior. The fifth hypothesis (H5) anticipates that exposing consumers to an interactive and congruent IGA within a VR game will induce a lower response compared to a subtle IGA. Consequently, consumers exposed to the prominent version of the game are expected to exhibit less favorable affective responses towards the advertised brand. To assess the significance of these responses across both groups, the independent samples t-test analysis approach is employed.

### Reliability analysis

To evaluate the internal consistency of the construct, both Cronbach's alpha and McDonald's omega coefficients were calculated. Results indicate that the items are consistently measuring the construct of brand favorability and that less than 23% of the scale is error variance (Cronbach's  $\alpha = 0.87$ ; McDonald's  $\omega = 0.88$ ) (Figure 31). Given the high reliability coefficients, the construct effectively captures the underlying dimensions of brand favorability, ensuring that the observed scores are a reliable representation of the participants' affective responses.

Scale Reliability Statistics				
	Mean	SD	Cronbach's $\alpha$	McDonald's $\omega$
scale	3.30	0.87	0.87	0.88

[3]

Item Reliability Statistics				
	Mean	SD	If item dropped	
			Cronbach's $\alpha$	McDonald's $\omega$
F1	3.27	0.93	0.78	0.78
F2	3.46	1.00	0.87	0.87
F3	3.17	0.99	0.82	0.83

Figure 31: Reliability Analysis for Brand Favorability  
Source: Jamovi

### Descriptive

After looking at the descriptive analysis, the subtle PP condition (M = 3.36; SD = 0.85) indicated a slightly different mean than the prominent PP condition (M = 3.24; SD = 0.90). The median score for the prominent PP condition was 3, compared to 3.67 for the subtle PP condition. Additionally, the standard deviation for the prominent PP condition was 0.90, while for the subtle PP, it was 0.85 (Figure 32).

Group Descriptives						
	Group	N	Mean	Median	SD	SE
Favorability	Prominent	35	3.24	3.00	0.90	0.15
	Subtle	35	3.36	3.67	0.85	0.14

Figure 32: Descriptive Analysis for the Brand Favorability  
Source: Jamovi

Both conditions had participants who rated the brand at the extremes, with minimum scores of 1 out of 5 in both groups. The maximum score for the prominent PP condition was 5, while for the subtle PP condition, it was 4.67 (Appendix C).

### Assumption checks

In order to ensure the fundamental statistical assumptions required for conducting the independent samples t-test are met, normality and homogeneity assumptions checks are carried out. The normality of the data was evaluated using the Shapiro-Wilk, Kolmogorov-Smirnov, and Anderson-Darling tests, all of which produced non-significant results. These outcomes indicate that the normality assumption for the brand favorability dependent variable is satisfied (Figure 33).

Tests of Normality			
		statistic	p
Favorability	Shapiro-Wilk	0.96	0.018
	Kolmogorov-Smirnov	0.12	0.229
	Anderson-Darling	0.90	0.021

Note. Additional results provided by moretests

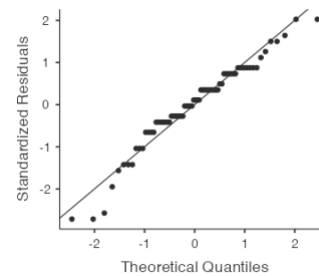


Figure 33: Normality Check for Brand Favorability  
Source: Jamovi

Furthermore, the equality of variances between the two experimental conditions was assessed using Levene's Test. The results indicated no violation of the homogeneity of variances assumption for the brand favorability construct ( $p < .361$ ). Therefore, it can be concluded that the requirement of equal variances across groups was satisfied (Figure 34).

Homogeneity of Variances Tests					
		F	df	df2	p
Favorability	Levene's	0.84	1	68	0.361
	Variance ratio	1.13	34	34	0.726

Note. Additional results provided by moretests



Figure 34: Homogeneity Check for Brand Favorability  
Source: Jamovi

### Independent samples t-test

Proceeding to the independent sample t-test, the comparison between Group B (prominent) and Group A (subtle) suggests no significant disparity in brand favorability. Thus, to validate or reject **H5**, the independent sample t-test was carried out with the following condition: Group B < Group A. Assuming  $\alpha = 0.05$ , findings from the Student's independent t-test indicate that brand favorability does not exhibit a significant increase following exposure to a subtle IGA (M = 3.36, SD = 0.85;  $t(68) = -0.59$ ;  $p < 0.278$ ;  $d = -0.14$ ) compared to exposure to a prominent IGA (M = 3.24; SD = 0.90) (Figure 35). Through these results, **H5** is rejected.

Independent Samples T-Test		Statistic	df	p	Mean difference	SE difference	Effect Size
Favorability	Student's t	-0.59	68.00	0.278	-0.12	0.21	Cohen's d
	Welch's t	-0.59	67.75	0.278	-0.12	0.21	Cohen's d

Note.  $H_a: \mu_{\text{Prominent}} < \mu_{\text{Subtle}}$

Figure 35: Student's t-test Results for Brand Favorability  
Source: Jamovi

## 5.8. Post-experiment interviews

Upon discussing in an informal and unstructured way with the participants at the end of their experiment, some of the insights were considered worth noting. Several participants from Group A (subtle PP) suggested that having such a PP as a poster in a game was a “good idea” and could possibly be an effective strategy. On the other hand, participants who played the game with prominent PP were more hostile towards the IGA. Some of them even mentioned that they “did not like the PP” which was reflected in the survey. Interestingly, none of the participants from the group exposed to the subtle PP version had a similar mindset during interviews after the experiment.

However, several participants from Group B, while having negative feelings towards the prominent PP, agreed that this type of advertisement has created a mental image in their memory. They contemplated whether an initial negative response would change as time passed. One participant even believed a positive effect on ad recall outweighs any potential negative effects prominent PP might have at the beginning.

Meanwhile, participants from Group A, who experienced subtle PP, had some suggestions on strategies for IGA that blend with the environment. The majority of them suggested that PP should be placed in a location that is the most visible during the gameplay to attract more attention. Interestingly, some participants from Group A did notice two decoration posters that were placed on a wall in front of them, while the Duracell poster on a wall to the left was

ignored. Out of the two decoration posters, the one on the right was named and recognized more often than the left one, even though both of them depicted graphical images of world-wide known literature pieces. A couple of participants shared that this was caused by the poster appearing in the field of view while directing their look from the safe on the right side to the TV screen in front to check the code, and then back to the safe.

The majority of participants from Group B who recalled seeing PP, shared their hesitation in choosing between two images featuring the Duracell bunny. In contrast, participants from Group A predominantly noted that they did not focus on the specific image but rather on the battery in the poster. Interestingly, both elements, the design of the bunny and the battery, are well-known elements of the brand identity of Duracell.

Conversations with the participants, after the experiment was done, have also revealed that consumers often do not know nor care about the value of low-involvement products such as batteries. The majority of participants claimed that they are willing to pay what is asked when they need the product. Several participants also stated that for such a low-involvement product as batteries, they are not prepared to pay a price premium for a well-known and trusted brand, opting for the cheapest option when in need.

## 6. Discussion

This research aimed to examine how varying levels of PP interactivity in VR gaming influence consumer responses to the IGA. The findings generally indicated that higher interactivity levels have a positive impact on advertisement recall while no significant difference was found for other explored variables. This chapter aims to analyze the study's results in the context of existing literature.

### 6.1. Cognitive outcomes

#### **Ad recall**

Following the experimentation and subsequent analysis of the results, it became clear that prominent PP outperformed subtle PP in terms of advertisement recall and recognition within the VR gaming setting. These results confirm the first hypothesis (**H1**), which predicted that participants playing a VR game version with prominent PP would have a higher ad recall rate than those who played a version with subtle PP.

These findings reflect arguments in the literature that suggest a player's ability to interact with and control a product enhances brand activation and recall (Huang & Dinu, 2010). The findings of this research also align with those of Wang & Chen (2019) who conducted a study on dialogic engagement in the VR video setting. In their study, the authors found that a higher

level of interactivity positively influences brand and ad recall. This can be explained by the experiential marketing theory, which states that memorable and immersive advertising experiences positively impact the saliency of the brand in the minds of customers (Davey et al., 2023).

This research delved deeper into advertisement recognition and examined whether participants who recalled seeing PP also recognized the advertisements displayed during the experience. It was found that the prominent PP was more recognizable than the subtle one displayed in the background. This could be explained by the experiential marketing theory (Davey et al., 2023). Additionally, conversations with participants suggested another possible reason. Prominent PP, when integrated into the gameplay for a low-involvement product, is unexpected and could be perceived as incongruent. Prior research found that this has a positive effect on brand memory and ad recall (Lee & Faber, 2013; Lupinek et al., 2022). However, it should be treated with caution as this could have negative effects in other areas as it stands out from the environment (Homer, 2009). According to Russel (2002), subtle PP could be considered more congruent than prominent PP. Therefore, when asked to recall the details, they are not remembered very well because they blend seamlessly with the environment.

Another factor contributing to lower ad recall rates in the game version featuring subtle PP could be that gamers often prioritize primary tasks. As players concentrate on the task at hand, their cognitive resources as well as attention to the environment are expected to be reduced, as suggested by the limited capacity model of attention (Lee & Faber, 2007). This could potentially explain the lower ad recall rates observed in versions of the game with subtle PP. Lupinek et al. (2022) also support this argument, emphasizing the role of cognitive resource allocation in influencing players' attention to IGA. On the other hand, in the prominent game version, participants were required to interact with a PP to complete one of the tasks. This forced engagement with the branded virtual product aided memorization of the advertisement details.

### **Product Valuation**

In terms of the product valuation variable, the findings of this study did not align with the expectations set by the literature review. According to **H2**, it was anticipated that participants who played a version with interactive PP would be willing to pay a higher amount for an advertised product than those who merely observed a branded poster. There has been evidence that individuals who have an opportunity to touch an item experience an increased sense of psychological ownership, which in turn, increases the value of the item (Peck et al., 2013). Interestingly, Krishna et al. (2016) suggest that this effect is experienced even if the item is not physically touched, but merely imagined to be touched. VR should theoretically amplify this effect via vicarious touch, which has been found to positively impact participants' willingness to pay for virtually touched objects (Luangrath et al., 2022). However, the research did not find a significant difference, which contradicts the suggestions from the literature.

This could be attributed to the fact that some participants perceived prominent PP as an intrusive type of advertisement. The observations shared by some participants in post-experiment interviews support the findings of Homer (2009). When customers notice such advertisements, they understand that they are being targeted, and their persuasion knowledge is activated (Matthes & Naderer, 2015). In response to the persuasion attempt, some participants may attempt to resist and deliberately choose a lower amount they are willing to pay (Homer, 2009, Matthes & Naderer, 2015).

Another reason for no significant difference in product valuation between groups may be the product itself. Batteries are low-involvement products and there is a limit of how much customers are willing to pay for such items compared to other types of goods (Zhang et al., 2024). Thereby, price differences are not that drastic when comparing the explored groups. Furthermore, post-experiment interviews showed that the majority of consumers typically show little concern for the value of low-involvement products and are frequently prepared to pay whatever is necessary when an item is needed.

## 6.2. Behavioral and Affective Outcomes

Both categories of outcomes, behavioral and affective, will be discussed together because they exhibit similar results and share the same underlying reasoning.

This study aimed to investigate the impact of PP interactivity within VR gaming environments on consumer responses, specifically focusing on willingness to consider the brand, interest in the brand, and brand favorability. Despite the theoretical foundations and previous research suggesting potential influences, the findings revealed no significant effects, leading to the rejection of hypotheses **H3**, **H4**, and **H5**.

Prior studies indicated that VR can shape consumer responses to virtual stimuli (Tussyadiah et al., 2018) and influence behavioral and affective outcomes such as willingness to consider a brand, interest in the brand, and brand favorability (Ajzen, 1991; Wedel et al., 2020). This research anticipated that the immersive and interactive nature of VR IGA would enhance consumer behavioral and affective responses for future purchasing decisions.

The theory of vicarious touch suggests that VR interactive abilities, through virtual touch and manipulation, provide a more profound exposure to virtual stimuli, potentially influencing the consumer's ability to process the information present in the advertisement, leading to a response to a PP (Pleyers & Poncin, 2020; Luangrath et al., 2022; Wang & Chen, 2019; Kim et al., 2018; Kim et al., 2017).

However, discussions with participants revealed that many perceived the prominent PP as intrusive. Since the prominent PP used in this study was an obligatory part of the gameplay, users could not avoid interacting with it. This aligns with previous studies suggesting that overly prominent PP may be perceived as intrusive and irritating, negatively impacting

behavioral and affective outcomes (Pavlič et al., 2021; Wang & Chen, 2019; Russell, 2002; Van Reijmersdal et al., 2012).

The results showed no significant difference in the explored variables between the prominent and subtle PP. These results can be interpreted through the persuasion knowledge model of Friestad & Wright (1994). PP is often distinguished from other advertising strategies due to its subtle and indirect nature (Chan, 2012; Russell, 1998; Pavlič et al., 2021). However, when the PP is too obvious, consumers may react by activating coping mechanisms to counteract the persuasion attempt (Matthes & Naderer, 2015). These findings align with Wang & Chen's (2019) study, which also found no significant effects of dialogic engagement level with PP in VR video content on these variables. This suggests that highly immersive and interactive IGA neither enhances nor diminishes the behavioral and affective responses of consumers when exposed to virtual stimuli.

Additionally, the results for the behavioral and affective outcomes studied in this paper can also be attributed to the use of a low-involvement product in the experiment (Duracell battery). Low-involvement products require less intensity in the decision-making process of the consumer as they often represent less risk, value, and significance (Zhang et al., 2024). Therefore, the lack of significant results for the consumer's consideration, interest, and favorability in the brand can be explained by the involvement with the product being too low.

Therefore, while interacting with a PP can enhance ad recall, its prominence can make the persuasion attempt too obvious. This was reflected in the post-experiment interviews. However, while these results were observed immediately after exposure to the prominent PP, it is possible that the long-term negative effects on consumer behavioral and affective responses could dissipate over time. This could lead to better consideration, interest, and favorability of the brand in the future as initial resistance may fade in time.

## 7. Conclusion

In conclusion, **H1**, looking into ad recall, was supported while the rest of the hypotheses regarding the impact of interactivity of PP in VR games on product valuation, willingness to consider, interest, and favorability towards brands were rejected. This research aimed to contribute to both academic knowledge and practical applications in advertising, gaming, and consumer behavior by examining links between unexplored interaction possibilities with PP in VR gaming and consumer behavior for low-involvement products.

## 7.1. Theoretical implications

This research provides empirical evidence and theoretical explanations for how IGA, specifically its interactivity, affects consumer responses to virtual stimuli in VR gaming. The findings offer several theoretical implications for the field of VR advertising, demonstrating that highly interactive PP improves ad recall compared to non-interactive PP. However, there are no significant differences between both interaction levels of PP on behavioral and affective responses for low-involvement products.

Contributing to the fields of experiential marketing and interactive marketing, this study underscores the importance of interactivity in creating short-term cognitive responses from consumers (Davey et al., 2023; Pavlič et al., 2021). The findings of this research demonstrate that increased levels of experiential marketing, such as engaging with a product in a VR environment, significantly enhance recall compared to merely observing the product. This suggests that while experiential marketing is beneficial, enhancing the interactive experience can further amplify its impact on advertisement recall. Aligned with the limited capacity model of attention (Lee & Faber, 2007), this research suggests that gamers' focus on primary tasks reduces attention to subtle ad placements.

Additionally, it contributes to the dialogic engagement theory by replicating the findings of Wang & Chen (2019) within the context of VR gaming. Providing evidence that the level of dialogic engagement and prominence of the PP does not affect the behavioral and affective outcomes, including willingness to consider, interest in the brand, and brand favorability.

This research also examines the vicarious touch theory (Luangrath et al., 2022), which suggests that interacting with items in virtual experiences should enhance consumer responses (Pleyers & Poncin, 2020). However, the findings of the research indicate that the context of interaction and the type of product involved are crucial. While Luangrath et al. (2022) found increased product valuation in retail settings upon interaction with virtual products, this effect was not observed in the VR video game setting. Furthermore, the use of a low-involvement product in this study suggests that the effectiveness of VR advertising may significantly depend on the product's involvement level (Zhang et al., 2024).

Building on the congruity framework (Lupinek et al., 2021), this research provides evidence that the congruity between PP and VE is crucial in VR advertising. Participants' perception of prominent PP as intrusive and incongruent supports the persuasion knowledge model (Friestad & Wright, 1994), by aligning with research by Homer (2009) and Matthes & Naderer (2015). Consequently proving that intrusive and incongruent ads can trigger resistance and negatively influence behavioral and affective responses.

## 7.2. Managerial implications

The insights derived from the findings offer valuable implications for managers considering PP strategies in the VR gaming context. The findings indicate that prominent PP is more likely to be noticed by players, as this type of IGA stands out and is integral to the gameplay. Managers aiming for higher visibility and immediate brand recognition should consider using prominent PP. This strategy ensures that the IGA captures the player's attention, which can be crucial for advertisement recall and recognition. However, managers must also be cautious of the potential for negative reactions. Even though this research did not examine the negative outcomes of prominent PP, some participants in post-experiment interviews noted they felt that this type of advertising was intrusive, which in turn could harm brand perception (Homer 2009). Thus, the key is to balance visibility and subtlety to avoid irritating players.

Subtle PP, on the other hand, blends seamlessly into the game environment, making it less likely to be noticed because these placements are easily overlooked. Therefore, they might not be effective in games where players are highly task-focused (Lee & Faber, 2013; Lupinek et al., 2022). However, this approach is less intrusive and may be better suited for maintaining a positive consumer response. Subtle PP could be more effective in longer, exploratory games where players spend more time interacting with the environment, giving them more chances to notice IGA. Managers should tailor subtle placements to fit the game's context, ensuring they do not disrupt the immersive experience while still achieving some level of brand visibility. This can be achieved by strategically placing them in locations where players most frequently direct their view.

The research found that there is no significant difference between subtle and prominent PP effects on participants' perceived value of the product, behavioral, and affective responses. This might be caused due to the use of the low-involvement product in the research as consumers are less involved with products such as batteries. Managers should carefully assess whether the cost and complexity of integrating IGA for low-involvement products into VR games justify the potential return on investment.

The findings suggest that it is advisable to use IGA that closely resembles real-life products for prominent PP. This study showed that players are more likely to recognize and remember PP when they encounter it later in purchasing opportunities. This approach leverages the familiarity of real-life products to enhance brand recall. In contrast, it is not as important to replicate real-life ads for subtle PP since the details are often forgotten. Instead, it would be reasonable to adapt subtle PP to fit seamlessly into the gaming environment, avoiding any perception of incongruity.

In summary, managers considering PP in VR gaming should prioritize prominent placements for creating strong brand memories and achieving higher visibility. This approach can offer a competitive advantage in terms of brand recognition and ad recall. Alternatively, subtle PP could be a way to reach customers without being perceived as intrusive, although it runs the

risk of not being noticed. This approach might be more suitable for games that emphasize exploration and environmental interactions. Regardless of the approach, managers should carefully evaluate their strategies, especially for low-involvement products, to ensure the effectiveness of their advertisements.

## 8. Limitations

This study highlights several limitations that may have influenced the findings. Participants' pre-existing attitudes towards the Duracell brand may influence their responses in the study. Considering that Duracell is widely recognized as a leading battery brand, some participants may have already established attitudes toward the brand. However, the low-involvement nature of the product might render prior attitudes towards the brand relatively neutral. Since batteries are typically seen as utilitarian items rather than hedonic products, participants may not have strong preconceptions that significantly bias their responses.

Additionally, participants spent a relatively short time (5-7 minutes) in the VR experience, which could potentially reduce the impact of the IGA on their responses. Given the brief exposure to the VE, participants may not have had sufficient time to fully engage with the IGA or form strong impressions about the advertised product. This limitation raises questions about the extent to which the IGA influenced subsequent outcomes of the participants.

Given the status of VR gaming as a relatively novel technology, coupled with the fact that a significant portion of participants had limited or no prior experience with VR, it's important to acknowledge the excitement participants may have experienced during the gameplay. This heightened focus on the immersive gaming experience itself might have overshadowed their attention to specific environmental cues, such as IGA. Consequently, participants may have responded to the survey with less consideration for these cues, potentially influencing their feedback.

## 9. Future research

Although this research provides valuable findings for the unexplored area of PP interactivity within the VR gaming context, VR marketing could benefit from further research to uncover its full potential.

As mentioned in the result part, participants shared their thoughts on how initial negative responses could lose importance in the future. It calls for further research to study how the consumer response to IGA in the VR gaming setting changes consumers' cognitive, behavioral, and affective outcomes over time. This could be achieved by reevaluating



outcomes on different dates. This type of research would provide marketers with new knowledge on behavior and attitude shifts of consumers who experienced PP over the long term.

This study focused on a low-involvement product by a well-known brand - Duracell batteries. Future research could explore PP of different interaction levels involving multiple brands in one experience. For example, an experiment could involve several brands of different involvement levels as well as different interactivity levels with the PP. Exploration of which brands were recalled and in which context would help to understand what type of products benefit the most from PP within the VR gaming context.

Future studies could also investigate the behavior of gamers and their impulses after playing a VR game with PP. This could provide valuable insights into the immediate impact of IGA on consumers. It could be accomplished by showcasing a variety of PP in VE and observing the behavior of participants after the game. Due to the immersive nature of VR and the sense of embodiment, PP of branded food items could be a great fit for such an experiment. According to Guy et al. (2023) interactions with food items in VR can create food cravings. VR marketing would benefit from research exploring if cravings are transferred to branded products as well. An exploration could be conducted to examine whether participants have a stronger preference for the showcased product.

Finally, interviews with the participants after the experimentation provided us with interesting insights into how they perceived PP in the VR gaming context. Individuals also have different experiences and their own perspectives on this subject (Burns & Burns, 2008). While this research was quantitative, future studies could employ qualitative methods for a similar experiment design to gain deeper insights into gamers' experiences and perceptions of PP. This could involve in-depth interviews, focus groups, and observations.

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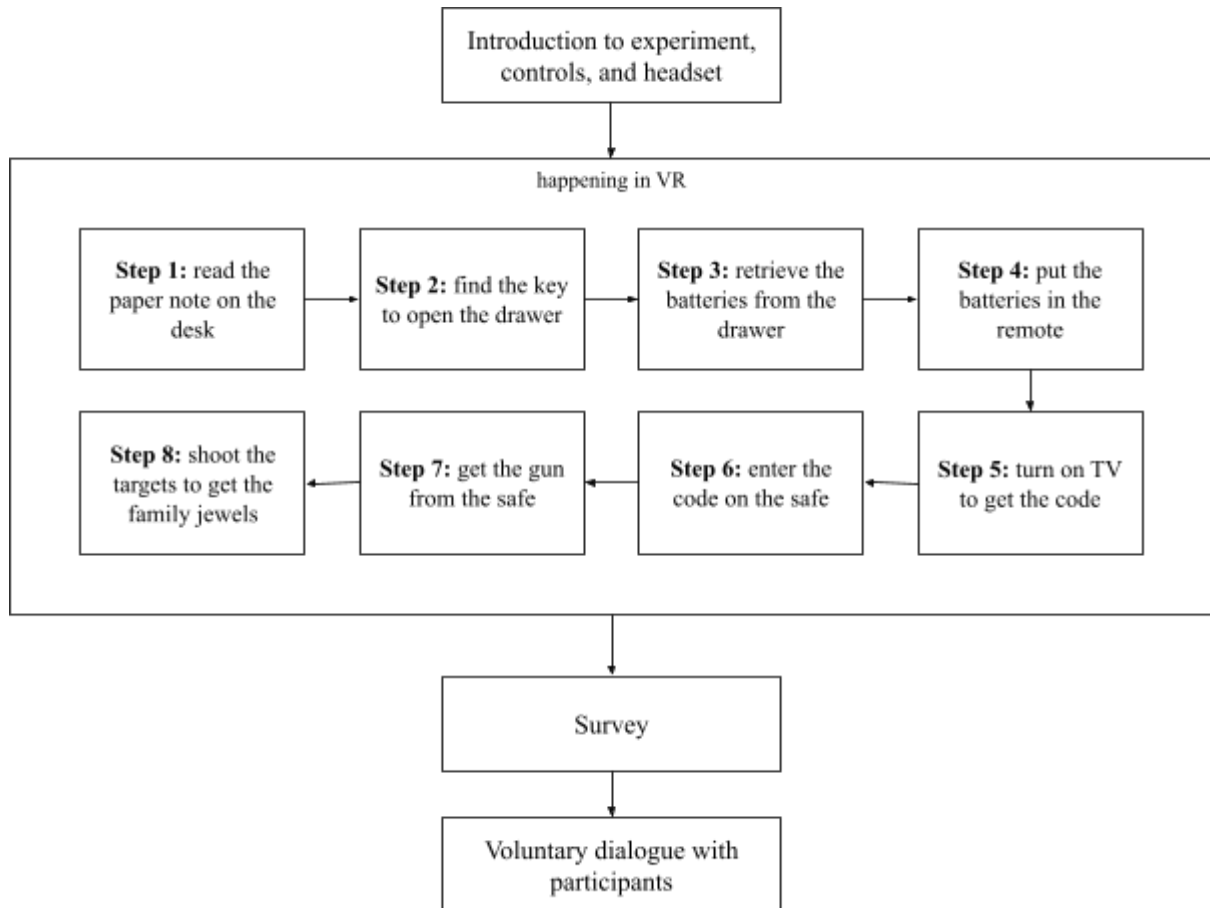
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# Appendix A

Flow of the global experiment



# Appendix B

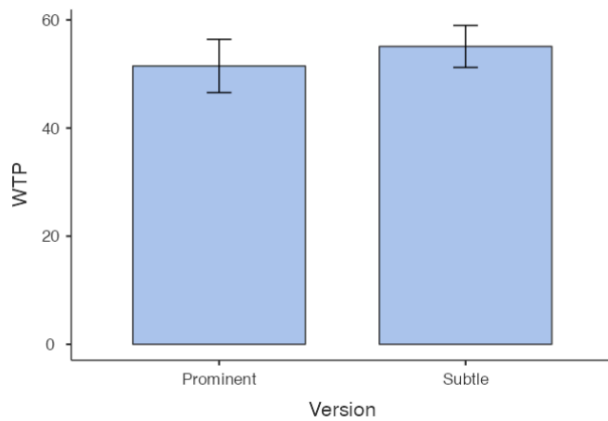
VE of the game experiment (prominent PP version)



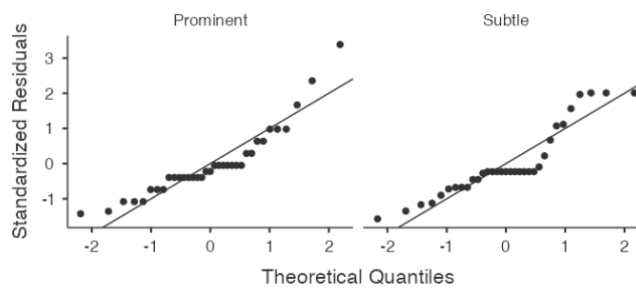
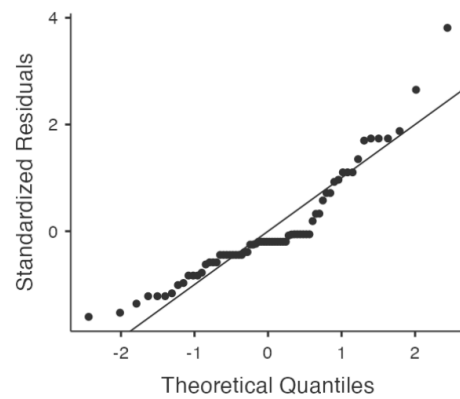
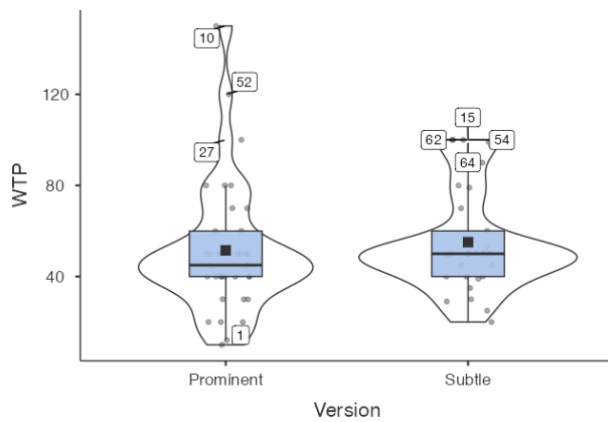
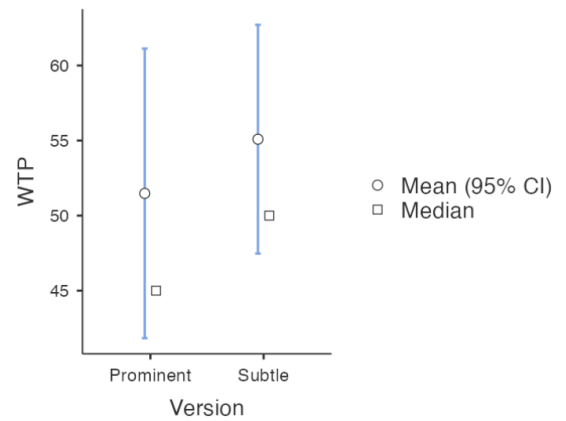
# Appendix C

Product valuation, Willingness to consider the brand, Interest in the brand and brand Favorability dependent variables plots from Jamovi

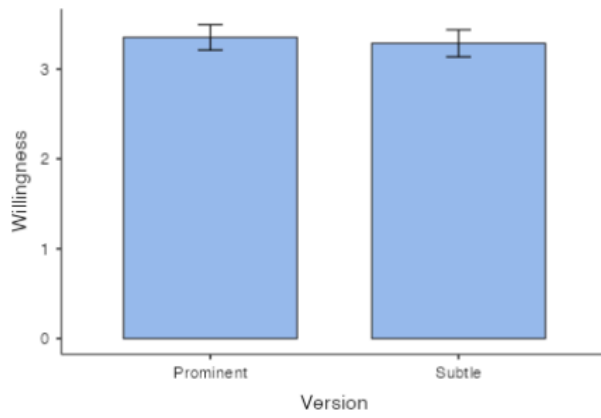
WTP



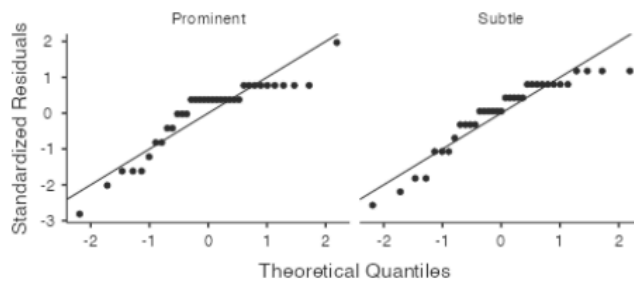
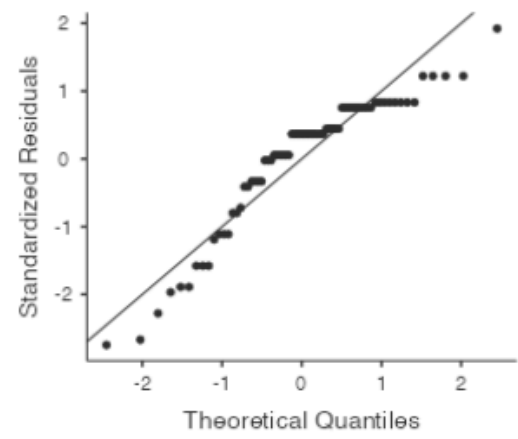
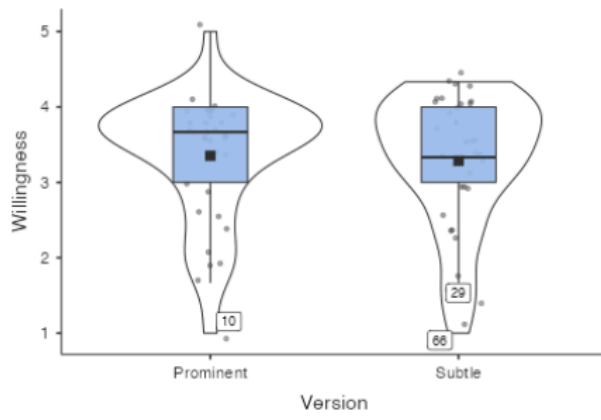
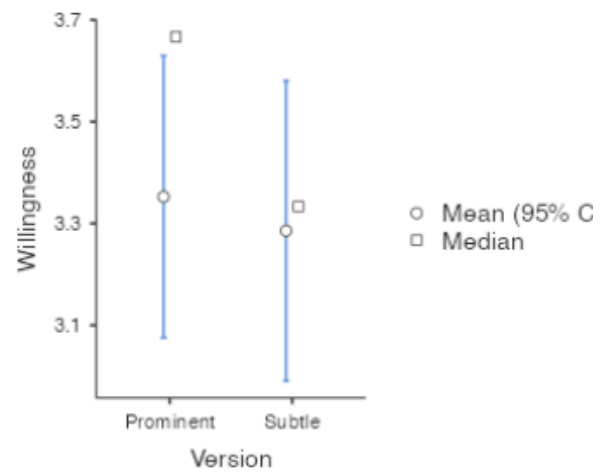
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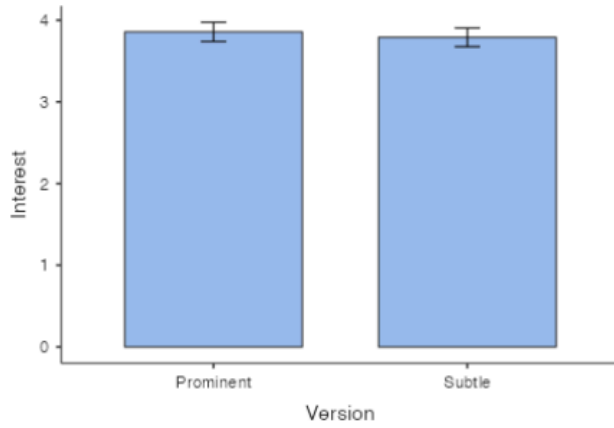
Willingness



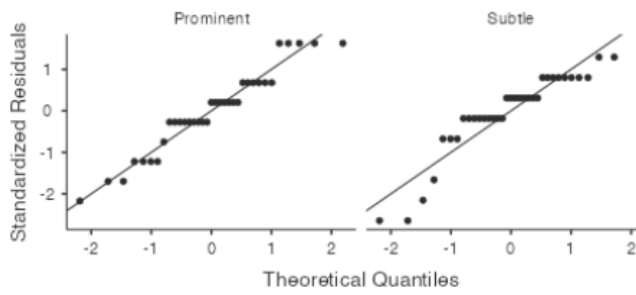
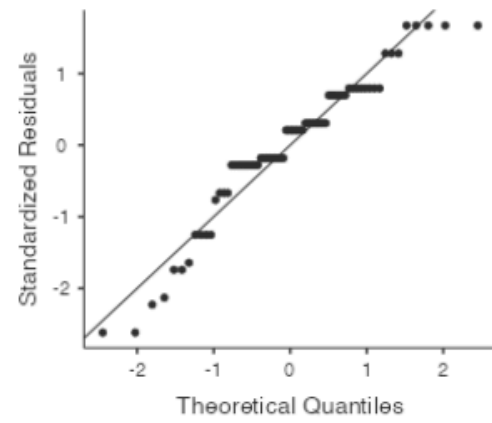
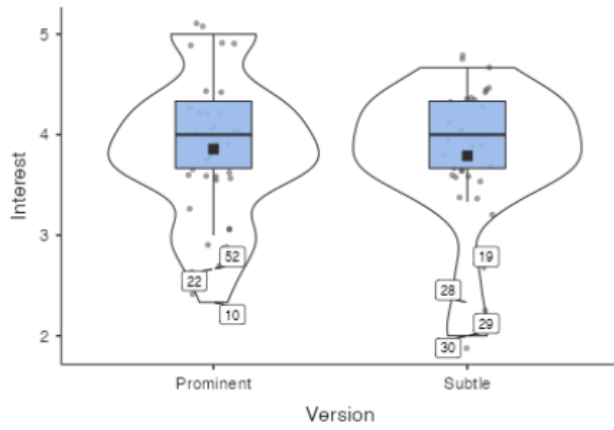
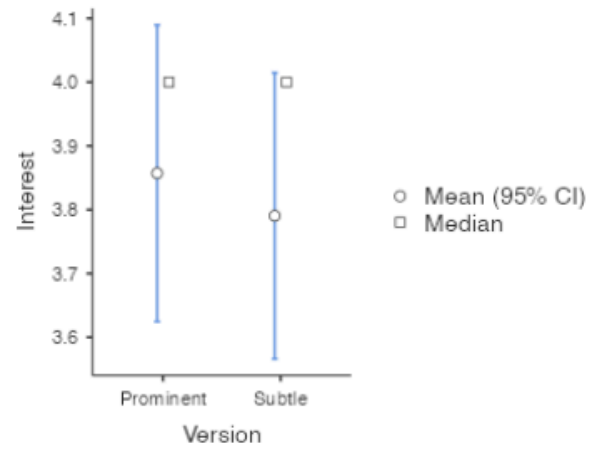
Willingness



Interest

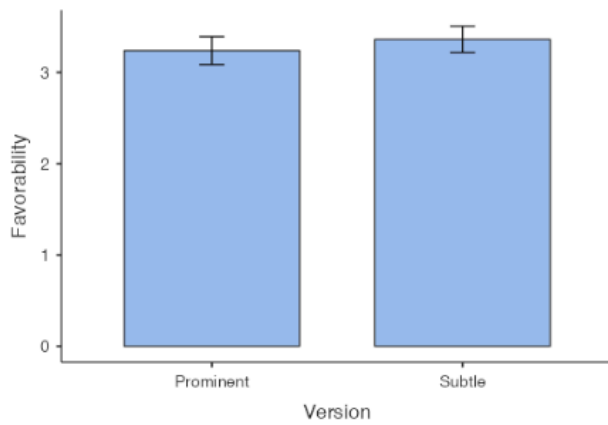


Interest





Favorability



Favorability

