

Investigating consumer visual memory of 360-degree and standard video advertisements: A social information-processing theory perspective

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**Investigating consumer visual memory of
360-degree and standard video advertisements: A social
information-processing theory perspective**

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BSc in Business Management (First Class Honours), MBA in International
Business, Graduate Diploma of Business Research

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“If we knew what it was, we were doing, it would not be called research,
would it?” - **Albert Einstein**

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Abstract

In the modern era, marketers focus more on digital channels, although online marketing efforts are considered a popular topic (Lynch, 2015). The 360-degree video technology is not a completely new nor a completely old concept as it recently has gained attention (in year 2017) by joining the list of standard video formats (Feng, 2018; Feng, Xie, & Lou, 2019). In 2017, around 86% of businesses had used 360-degree videos as part of their respective marketing campaigns (Feng, Xie, & Lou, 2019). The purpose of this study is to investigate the differential effects of 360-degree and standard video advertisements on consumer visual memory under single and multiple viewing conditions. This study addresses two main research questions, “How do the effects of 360-degree video advertisements on visual memory differ from the effects of standard video advertisements?” and “How do the effects of 360-degree video advertisements on visual memory differ from the effects of standard video advertisements, after repeated viewing?” using two studies. Study 1 addresses the first research question and study 2 addresses the second research question.

The data were collected using experimental surveys and interviews with 40 participants and were analysed using a qualitative thematic approach via NVivo QSR software. This study explores consumer visual memory using the theoretical constructs of a theory of social information processing by Wyer (2003)—a social psychology theory that focuses on several aspects in the social cognition stages (Wyer, 2003). The four theoretical constructs of the ‘workspace’ unit were used, which are comprehender, encoder, inference maker and response selector to explore consumer visual memory. In the single viewing condition, a total of 10 main themes are identified under the four categories of visual comprehension, encoding, inference making and response selection. These are colour detection, facial expressions, visuals on locations, visuals on objects, visuals on people, visuals on actions, multi-cultural symbols, behavioural engagement, visuals on product details and visuals on brand details. In the repeated viewing condition, a total of 11 main themes are identified under the four categories of visual comprehension, encoding, inference making and response selection. These are colour detection, facial expressions, plot or storytelling, visuals on locations, visuals on objects, visuals on people, visuals on actions, emotional engagement, behavioural engagement, visuals on product details and product benefits.

The findings of this study are as follows. From a theoretical perspective, the application of a social psychology theory for the advertising sector enables us to gather more insights about the social cognition stages of the human mindset, such as information retrieval, judgement, decision making, goal stimulation, and short- and long-term memory (Wyer, 2003). This study not only explores consumer visual memory of 360-degree video advertisements and standard video advertisements, but also contributes to the theory of social information processing by Wyer (2003) by being among the first few comparative study. From a practical perspective, findings of this study provide a solid foundation for advertising firms or agencies, marketers, and salespeople on how to arrange visuals in standard and 360-degree video advertisements in a way that appeals to consumer visual memory, by considering the four categories of comprehender, encoder, inference maker and response selector in visual working memory.

Keywords: 360-degree videos, standard videos, qualitative thematic analysis, visual memory, social information processing, social psychology, advertising

Statement of Originality

This work has not previously been submitted for a degree or diploma in any university. To the best of my knowledge and belief, this thesis contains no material previously published or written by another person except, where due reference is made in the thesis itself.

.....

Signature

Nirma Sadamali Jayawardena

Date: 19th of April 2022

Publications Resulting from this Dissertation

Jayawardena, N. S., Ross, M., Quach, S., Behl, A., & Gupta, M., Lang D (2021). Effective online engagement strategies through gamification: A systematic literature review and a future research agenda. *Journal of Global Information Management*. 30(5), 1-25. [ABDC- A]

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Chapter 1: Introduction

“There is something about video marketing that helps it stay apart from the other online marketing tactics. When done correctly, all you need is one video marketing campaign to build up highly targeted traffic for a long time”—*Carey Lowe*

1.0 Background of the Study

In 2020, it was reported that 92% of marketers predicted ‘videos’ as an important marketing strategy (Chaffey, 2020). The marketing industry is continuously changing due to technological innovations and the dynamic business environment (Chaffey, 2020). The flexibility of the online media has led to a wide range of advertising format choices for advertisers, such as static images (e.g., GIF and JPG formats), video formats (e.g., 3D vs 360-degree video formats) comprising interactive features (Spalding et al., 2009). Viewing online videos has become increasingly common (Chaffey, 2020). The largest individual site for online videos is ‘YouTube’ which has 10 billion views (Thomas et al., 2015). The evolutionary advancements in technology such as 360-degree video technology, augmented reality and virtual reality, mixed reality, artificial intelligence, blockchain technology, high-definition video (HD), Dolby surround sound, and 3D have become an innovative approach in the marketing field (Hills-Duty, 2018). In the modern era, marketers focus more on digital channels, but interest in online marketing efforts is a popular topic (Lynch, 2015).

360-degree videos are considered as immersive or spherical videos, in which the video records a view in every direction (Hills-Duty, 2018). These photo shoots are accomplished by using an omnidirectional camera or a collection of cameras (Hills-Duty, 2018). During playback in normal flat display, the viewer has control of the viewing direction, such as a panoramic view (Fisher, 2019; Habig, 2016). One of the special features of the 360-degree video is that it allows the user to enter a totally immersive, three-dimensional (3D) experience anywhere in the world by simply using a smart phone and a virtual reality headset or by using other tools designed to view 360-degree video content (Yoganathan et al., 2018). In 2017, around 86% of businesses had used 360-degree videos as part of their respective marketing campaigns (Lynch, 2015).

Furthermore, 360-degree video formats can reveal the stories more interactively as more audience engagement is possible (Fisher, 2019; Habig, 2016). One major reason for 360-degree videos proving to be an effective storytelling tool is the ability to provide the full picture and full context of what is going on around a scene (Fisher, 2019; Habig, 2016). For example, Google, partnering with Columbia Sportswear created a marketing campaign around two U.S. Olympic skiers enjoying an epic season in Chile using both a 360-degree video advertisement and a standard video advertisement to determine whether spherical video advertisements drive more viewer engagement than standard video advertisements (Habig, 2016). Even though the 360-degree video advertisement had a lower retention rate than the standard advertisement, it had a higher click-through rate, meaning that viewers were more interested in checking out the full-length version of the video (Habig, 2016). This experiment proved that 360-degree videos have more user engagement than standard videos. The 360-degree technology encourages viewers to get involved in the action by controlling their perspective with a simple tilt angle of a smartphone or through their mouse pointing device (Habig, 2016).

In 2016, Lipton Tea company released a new advertisement with two different video versions (viz., 360-degree and standard) when launching Magnificent Matcha, which is a variety of green tea (Shoot, 2016). Both video versions took the viewer on a sensual journey inside a cup of tea. The 360-degree viewing experiences were designed to primarily run-on YouTube with or without different viewing tools, and this advertisement reported over 3.4 million viewers (Shoot, 2016). The application of different video versions could be a useful technique for brands to advertise their products—this represents a major contribution to the marketing sector. Similarly, Graham (2016) declared 360-degree videos to be the next biggest achievement in technology. While providing 360-degree video versions is not a new concept, it has not been applied in advertising sector until only recently (Habig, 2016).

In general, most researchers who worked on 360-degree videos focused on 360-degree video viewing tools (Choi et al., 2018; Lee & Faber, 2007; Luo et al., 2016; Rauschnabel et al., 2015; Saiheng, 2018; Speicher et al., 2018; Tse et al., 2017) and the 360-degree video viewing experience (Animesh et al., 2011; Barnes, 2016; Bessa et al., 2016; Brautović et al., 2017; Broeck et al., 2017; Flavián et al., 2019; Mohd Adnan et al., 2020; Obrist et al., 2013; Passmore et al., 2016; Shin, 2018). Previous research that focused on 360-degree videos has found a positive relationship between 360-degree video technology and viewing experience, based on

different viewing devices. When considering the marketing literature, 360-degree videos have contributed to brand placement (Roettl & Terlutter, 2018), advertisement characteristics (de Boer et al., 2010; Spielmann & Orth, 2020; Feng, 2018; Feng, Xie, & Lou, 2019), consumer attitudes (Yaoyuneyong, Foster, Johnson, & Johnson, 2016; Yoon, Kim, & Sun, 2018). Brand memory (Terlutter, Diehl, Koinig, & Waiguny, 2013; Yim, Abdourazakou, Sauer, & Park, 2018) is another aspect that has received research attention; however, the effect of 360-degree video advertisements on consumer visual memory context is ambiguous.

Over two decades ago, Rossiter, (1976) identified that consumer research had largely ignored product relevant information stored in visual memory. Twenty years later, Zaltman (1997) echoed this concern by reminding scholars that most marketing research tools are verb-centric and need to be enriched with techniques that accommodate non-verbal expressions of perception and learning as all these stimuli reach the brain through visual systems. However, Park et al. (2015) recently identified that a combination of topics such as visual merchandising, social cognition, visual memory, and repeated viewing of visual memory remains relatively unexplored in advertising, as it needs to combine with social psychology. Consumer visual memory plays a significant role in advertising (Bleize & Antheunis, 2019) by encoding, storing, and retrieving information related to products and services (further justified in chapter 2—literature review), hence the investigation of the visual memory component remains largely unexplored (Habig, 2016). The 360-degree or 3D video advertisements directly affect the consumer visual memory due to higher eye movement aspect. Studies have shown that eye movements are closely associated with cognitive processes such as attention, memory, and decision making (Xu et al., 2020; Zhu et al., 2018; Park et al., 2015). It is not only true that eye movements reflect certain aspects of brain function, revealing information about feelings and desires to others, but also, they can be actively involved with the content (Xu et al., 2020; Zhu et al., 2018).

Therefore, this dissertation responds to this existing research gap, by combining social psychology with advertising research. Further, this study investigates the consumer visual memory role of 360-degree and standard video advertisements by using Wyer's (2003) social psychology theory of social information processing. The next section discusses the research objective and research questions as follows.

1.1 Research objectives and Research Questions

As mentioned in the previous discussion, consumer visual memory of 360-degree video advertisements is an emerging concept that lacks attention from marketing researchers. The following research objectives are considered worthy of investigation and subsequently, guide the research process that summarises this study.

Research objective 01:

To explore the differential effect of 360-degree versus standard video advertisements on visual memory under single viewing conditions

Research objective 02:

To explore the differential effect of 360-degree versus standard video advertisements on visual memory after repeated viewing conditions

The main scope of this study is to explore the consumer visual memory of 360-degree video advertisements and standard video advertisements using the four theoretical assumptions of the ‘workspace’ unit (visual memory) presented in Wyer’s (2003) theory of social information processing by using a qualitative thematic approach. These two research questions will be addressed through study 1 and study 2 respectively and explained in detail in chapter 3’s methodology section. Study 1 addresses the first research objective and study 2 addresses the second research objective through exploring the consumer visual memory of 360-degree versus standard video advertisements, thus leading to the formation of the two research questions:

Research Question 01:

RQ1: What is the differential effect of 360-degree versus standard video advertisements on visual memory under single viewing conditions?

Research Question 02:

RQ2: What is the differential effect of 360-degree versus standard video advertisements on visual memory under repeated viewing conditions?

Chapter 2 further justifies the research gap of this study by integrating the key literature focusing on consumer visual memory and 360-degree video advertising. Chapter 3 further justifies the selected research methodology and development of the experimental interview questions based on the themes identified through the literature. Chapter 4 and chapter 5 present the results of the qualitative thematic analysis of study 1 and study 2 respectively.

1.2 Definitions and Terms

As this study combines advertising with social psychology, there are several technical terms in Wyer's (2003) theory of social information processing that need to be defined. Table 1.2 presents definitions and meanings to facilitate the understanding of the technical terms in this theory.

Table 1.1: Definitions and terms of the theory

Technical term	Meaning
Input information	<i>Input information</i> is the raw data which is initially encoded to semantic concepts by the comprehender. These semantic concepts will be stored and retrieved from permanent storage.
Sensory store	The <i>sensory store</i> initially stores the information, which is captured by the five senses, namely sight, smell, taste, touch, and hearing.
Comprehender	The <i>comprehender</i> is an initial comprehension device that interprets input information in terms of general verb, noun, and adjective concepts.
Workspace	This unit is a temporary store unit and consists of four sections. The first section of the ' <i>workspace</i> ' unit stores information that has recently been transmitted to it by the 'comprehender'. The second section of the ' <i>workspace</i> ' unit stores information acquired by the processing unit of the 'encoder'. The third section of the ' <i>workspace</i> ' stores information acquired by the processing unit of the 'inference maker'. The fourth section of the ' <i>workspace</i> ' stores information acquired by the processing unit of the 'response selector'.
Executor	The activation of these latter units (workspace, permanent storage, goal specification box, encoder, inference maker and response selector) is governed by an <i>executor</i> , which directs the flow of information between processing units and storage units. In doing so, it takes instructions from a goal schema that specifies the sequence of operations to be performed and the type of information required.

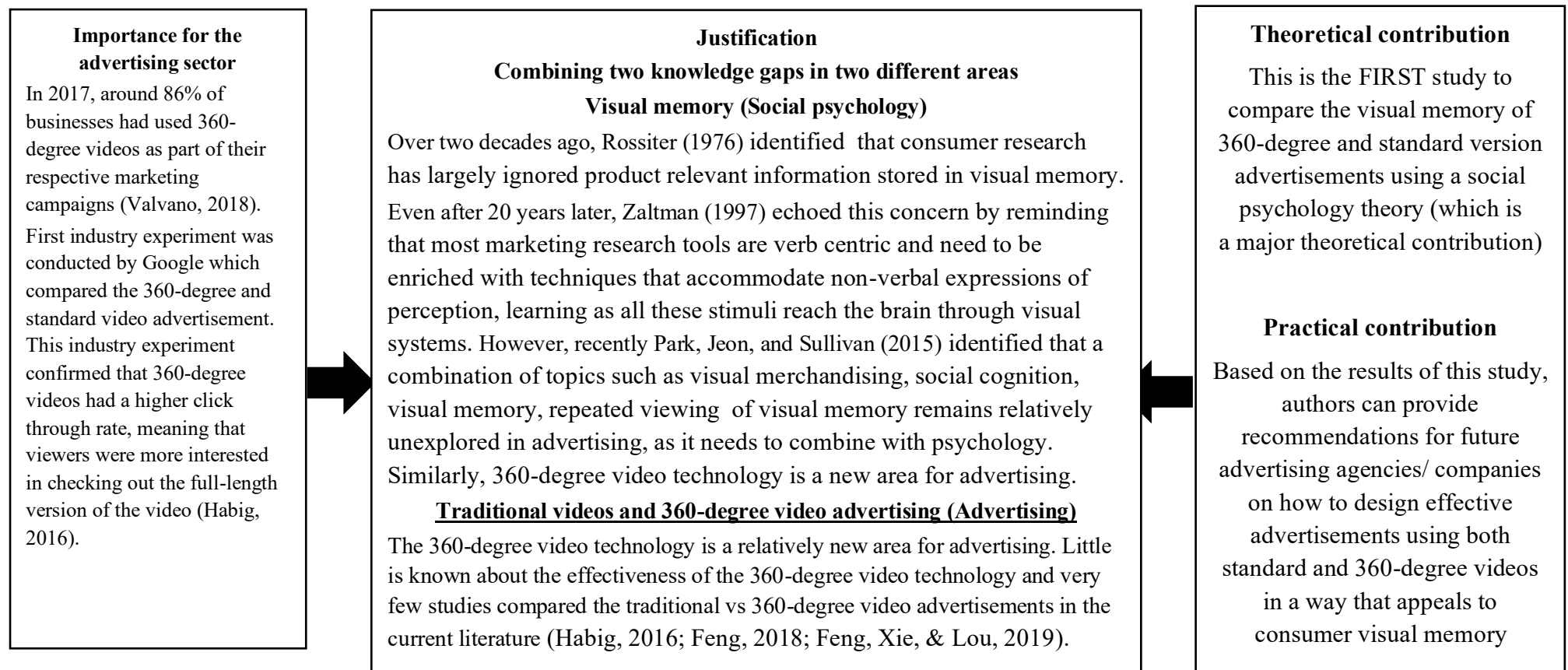
Permanent storage unit	<i>Permanent storage unit</i> is the long-term memory. This unit is assumed as a storage and retrieval unit of information flowing from the processing units and storage units mentioned in the theory.
Goal specification box	The executor retrieves a relevant goal schema from Permanent Storage and deposits it in the <i>goal specification box</i> . This unit is a temporary repository of goal schemas or sequences of cognitive steps that are involved in the pursuit of an objective.
Encoder/organizer	<i>The encoder or organizer</i> is considered as a processing unit in this theoretical model. It processes high-order interpretations of information and forms mental representations consisting of several features.
Inference maker	The <i>inference maker</i> processing unit combines the implications of information to form a subjective judgement.
Response selector	The <i>response selector</i> processing unit transforms subjective inferences into an overt or meaningful response.

The theory of social information processing by Wyer (2003) is used to investigate the central focus of this thesis, which is to explore the differential effects of the consumer visual memory component on 360-degree versus standard video advertisements, under single and multiple viewing conditions. The next section discusses the research justification and contribution.

1.3 Research Justification and contributions

As described in the previous discussion, research on human memory combining with advertising is necessary. Additionally, there are several practical and theoretical implications which highlights the importance, justification, and contribution for this study. As such Figure 1.1 provides an overview of the following discussion.

Figure 1.1: Importance, justification, and contribution of the study



1.3.1 Importance of the study

The global video marketing consumption is increasing (Thomas et al., 2015). ‘YouTube’, which is the first and largest site for online videos attracts over 10 billion views (Thomas et al., 2015). According to the Statista database in year 2021, global video marketing volume statistics reported that 82% of Twitter users watch video content on Twitter or YouTube which is almost one-third of total internet users. Globally, the majority of people watch more than an hour of Facebook or YouTube videos a week (Lister, 2019), pointing to more than 500 million hours of video viewing time on YouTube each day (Lister, 2019). Since it is becoming increasingly common to view online videos, it is also becoming a new trend in how people across the world spend their free time (Lister, 2019).

Marketers can use this fact to further promote their products by considering the different types or versions of videos, which will engage more with users, to sell their products (Lister, 2019). The evolutionary advancements in video technology such as television, social media platforms, 3D, 2D and 4D videos, virtual reality and 360-degree video platforms have become an innovative approach to be used in the marketing field (Lister, 2019). These various innovative digital channels could explore new opportunities for audience engagement and revenue generation (Mabrook & Singer, 2019). Therefore, contemporary researchers have investigated the ability of 360-degree videos as a new kind of medium that gives the viewers a sense of real engagement as they perceive the action from all angles and directions (Feng, Xie, & Lou, 2019). The majority of professional and amateur filmmakers are actively adopting this new medium for transformative storytelling (Broeck et al., 2017). The first industry experiment which compared 360-degree and standard video versions was conducted by Google and it confirmed that 360-degree videos had a higher click-through rate, meaning that viewers were more interested in watching the full-length version of the video (Habig, 2016). Despite this phenomenal progress in 360-degree video creation, current understanding on 360-degree and standard video version- related comparisons is limited (Feng, Xie, & Lou, 2019). This further illustrates the need for and importance of research in this area.

1.3.2 Justification of the study

As mentioned earlier, in general, most marketing research tools are verb-centric and need to be enriched with techniques that accommodate non-verbal expressions of perception and learning as all these stimuli reach the brain through visual systems (Habig, 2016; Park et al., 2015; Feng, 2018; Feng, Xie, & Lou, 2019). As identified by Park et al. (2015), advertising research topics such as visual merchandising, social cognition, visual memory, and repeated viewing of visual memory remain relatively unexplored, as they need to combine with psychology. Similarly, little is known about the effectiveness of 360-degree video technology and very few studies have compared the traditional vs 360-degree video advertisement formats in the current literature (Habig, 2016; Speicher et al., 2018; Feng, 2018; Feng, Xie, & Lou, 2019). Therefore, this study combines these two knowledge gaps by integrating the two different fields of advertising and social psychology. This will be the **first comparative study** to be conducted on these two video versions through the lens of a social psychology theory. Repetition of viewing videos appears to influence people's understanding and use of the video content. According to some researchers, repeated viewing of television programs facilitates children's comprehension and understanding (Skouteris et al., 2007). According to Huston and Wright (1983), repeat viewing makes initially incomprehensible stimuli gradually understandable, increasing level of engagement and ability to interpret information among people. When considering the 2D and 3D videos, repeated exposure was found to affect the visual comprehension memory due to higher number of eye movements (Li et al., 2016; Cockburn & McKenzie, 2002). The rationale is further justified in the literature review section (chapter 2).

1.3.3 Contribution

There are two main contributions of this study. From a theoretical perspective, the application of a social psychology theory for the advertising sector enables the gathering of additional insights into the social cognition stages of a human mindset, such as information retrieval, judgement, decision making, goal stimulation and, short- and long-term memory. By comparing the visual memory of two different video formats, this study contributes to the theory of social information processing by Wyer (2003), by being the first comparative study. From a practical perspective, findings of this study provide a solid foundation for future advertising companies, agents, and marketers on how to design effective advertisements by elaborating the visual arrangement strategies for advertising designers through considering four

aspects: visual comprehension, visual encoder, visual-based inference maker and visual-based response selector.

The first research question is, “What are the differential effects on consumer visual memory for 360-degree and standard video advertisements under single viewing conditions? ”. Study 1 addresses this research problem. A total of 10 main themes were identified under the four categories of visual comprehension, encoding, inference making and response selection. These are colour detection, facial expressions, visuals on locations, visuals on objects, visuals on people, visuals on actions, multi-cultural symbols, behavioural engagement, visuals on product details and visuals on brand details. The second research question is, “What are the differential effects on consumer visual memory for 360-degree and standard video advertisements under repeated viewing conditions?” and is addressed in Study 2. A total of 11 main themes were identified under the four categories of visual comprehension, encoding, inference making and response selection. These are colour detection, facial expressions, plot or storytelling, visuals on locations, visuals on objects, visuals on people, visuals on actions, emotional engagement , behavioural engagement, visuals on product details and product benefits. Therefore, the key outcome variable of visual memory under the four main categories of comprehension, encoder, inference maker and response selector help advertising designers to arrange visuals in the advertisements of 360-degree and standard video versions in a way that appeals to visual memory.

1.4 Research Method

This study used experimental approach and the instrument involved in each experiment is a survey questionnaire and semi-structured interviews. The first research question which is (RQ1: How do the effects of 360-degree video advertisements on visual memory differ from the effects of standard video advertisements?) will be addressed in study 1, whereas the second research question of (RQ2: How do the effects of 360-degree video advertisements on visual memory differ from the effects of standard video advertisements, after repeated viewing?) will be addressed in study 2. The studies are qualitative with an open-ended survey questionnaire and semi-structured interviews of two groups (that receive different stimuli for 360-degree and standard video advertisements). The qualitative results will be compared to identify the

differences in themes for consumer visual memory for 360-degree and standard video advertisements.

This study intends to collect data from youths (age group of 20-40 years) due to their high adoptability of new technology (Goldberg et al., 2019; Sharma & Bhuyan, 2020). A total of 40 participants will be recruited for this study using the snowball sampling method. Age and gender will be controlled by making each group comparative in terms of age and gender. For example, participants will be divided into two groups, Group A and Group B, each comprising 20 people (10 females and 10 males). Due to the limited number of 360-degree video advertisements on YouTube that have associated standard versions, of the available eight video advertisements (Lipton Magnificent Matcha, Columbia Sportswear, Mercedes-Benz, Nescafé, BMW, Expedia, and Infiniti) the Lipton Matcha advertisement was selected. This advertisement promoted a new tea product and had a higher number of visuals than the other video advertisements, such as Columbia Sportswear, Nescafé, Expedia.com, BMW, Mercedes-Benz, Expedia, and Infiniti which fell under the definition of visual memory investigation in this study (e.g., human visual memory activation is higher for novel scenes than repeated scenes due to the activation of hippocampal regions in the brain (Köhler et al., 2002)).

Consequently, study 1 addressed the first research question after participants viewed the video advertisement (either 360-degree version or standard version) once, and study 2 addressed the second research question after participants viewed the video advertisement (either 360-degree version or standard version) for a second time. The survey questionnaire and semi-structured interviews were analysed using NVivo software to compare the differences in themes for consumer visual memory for 360-degree versus standard video advertisements. The thematic analysis was conducted in two stages. In the first stage, the thematic analysis of the single viewing was assessed. In the second stage, the thematic analysis of multiple viewing was assessed. The selected methodology of this study is further justified in the methodology section (chapter 3). The summary of the methodology is presented in Table 1.3.

Table 1.2: Summary of the research methodology

Different elements	Study 1	Study 2
Research Question	RQ1: What is the differential effect of 360-degree versus standard video advertisements on visual memory under single viewing conditions?	RQ2: What is the differential effect of 360-degree versus standard video advertisements on visual memory under repeated viewing conditions?
Research method	Qualitative method involving semi-structured interviews and surveys of two groups (who received different stimuli for 360-degree and standard video advertisements)	Qualitative method involving semi-structured interviews and surveys of two groups (who received different stimuli for 360-degree and standard video advertisements)
Research Gap	Limited research has focused on consumer visual memory of 360-degree and standard video advertisements under multiple viewing conditions	Limited research has focused on consumer visual memory of 360-degree and standard video advertisements under multiple viewing conditions
Data analysis	The qualitative results will be compared to identify the differences in themes using NVivo software.	The qualitative results will be compared to identify the differences in themes using NVivo software.
Viewing time	Single viewing	Multiple viewing (second viewing)

The next section discusses the thesis outline as follows.

1.5 Thesis Outline

This section presents the overall structure of the thesis with a summary of each research component. This dissertation has a six-chapter format.

Chapter One–Introduction

Chapter one introduces the background of the research by showing the importance of 360-degree video advertising and consumer visual memory research. This chapter further elaborates

the rationale, research objectives, justification, contribution, and importance of the study and concludes by providing an outline on the structure of the thesis.

Chapter Two–Literature Review

Chapter two reviews the literature examining various scholarly articles mainly in the four areas of studies which focused on the characteristics of 360-degree video advertisements, effects of 360-degree video advertisements, 360-degree video viewing devices and 360-degree video advertising, considering social cognition stages. Further, this chapter presents the importance of consumer visual memory research and the applicability of the social psychology theory of social information processing as proposed by Wyer (2003).

Chapter Three–Methodology

Chapter three illustrates the appropriate philosophical assumptions underpinning the research approach, and justification of the research method including the sampling procedure, data collection and development of the research questions based on the themes identified through the literature. This section also includes the strategy of inquiry which restates the research objectives and research questions and the justification of the appropriate research paradigm and the qualitative research method. This chapter presents the formation of interview questions based on the text-based cluster analysis obtained from the Vos-Viewer software. Finally, the ethical considerations and conclusion are provided at the end of this chapter.

Chapter Four–Results of Experiment 1

Chapter four commences by providing an overview of experiment 1, followed by a discussion regarding the equipment used for this experiment, and then presents the results of experiment 1, separately based on female and male responses. Consequently, this section addresses research question one (RQ1– How do the effects of 360-degree video advertisements on visual memory differ from the effects of standard video advertisements?) through a detailed qualitative analysis conducted using NVivo software.

Chapter Five—Results of Experiment 2

Chapter five explains the qualitative findings of experiment 2. This chapter commences by providing an overview of experiment 2, followed by an overview of the experiment design and results of experiment 2 concerning female and male participants. Therefore, this section addresses research question two (RQ2- How do the effects of 360-degree video advertisements on visual memory differ from the effects of standard video advertisements, after repeated viewing?) through a detailed qualitative analysis conducted using NVivo software.

Chapter Six – Discussion and Conclusion

Chapter six explains the results of the two experiments in terms of the four visual arrangement strategies as illustrated in the theory of social information processing by Wyer (2003). These four segments comprise comprehender, encoder, inference maker and response selector. This section demonstrates how advertising companies, marketing agents, and sales agents can develop effective advertisements using standard and 360-degree video versions in a way that appeals to consumer visual memory. This section also includes implications for theory and practice, limitations of the study and recommendations for future researchers. The final segment of this thesis contains appendices and references.

1.6 Conclusion

This chapter outlines the context, significance, research objectives, research questions and contribution of the study. The concluding sections of the chapter present the thesis outline of the study. This study contributes important findings to current research by exploring the role of visual memory in 360-degree video advertisements and traditional video advertisements through the lens of a social psychology theory. This study can be considered as the first study to compare the consumer visual memory of 360-degree and standard version advertisements using the theory of social information processing by Wyer (2003). Chapter Two will present the relevant literature pertaining to the 360-degree video advertising and consumer visual memory literature.

Chapter 2: Literature Review

“Psychology explores human nature, the soul, and why people behave the way they do.
Advertising explores the art of influencing human behaviour to make certain purchase
decisions” - *Leah Dekrey*

2.1 Background of advertising

The evolution of advertising has experienced some major milestones over the years as it had to adopt and change to suit new mediums and audiences constantly (Gallegos, 2020; Habig, 2016; Quick, 2020). As a result, it became more personalised with the times (Quick, 2020). The single medium that has had the biggest impact on the history of advertising and advertising personalisation is the internet (Beard, 2017; Frederick, 1925; Pincas & Loiseau, 2008). When considering the history of advertising, before the 15th century, three major forms of advertisement existed during the pre-printing period namely, trademarks (moon or stars), town criers and sign boards (Gallegos, 2018). Sears was the first company to focus more on personalisation by advertising through direct mail (Quick, 2020). The advent of newspapers and magazines in the 16th and 17th centuries changed the method of advertising delivery by becoming more personalised through delivering the message directly to people's doorsteps (Stephens, 2007).

In the beginning of the 19th century, early print advertisements were used mainly to promote books and newspapers, which became increasingly affordable with advances in the printing press (Gallegos, 2018). After the 19th century, advertising personalisation began to take off even more (Quick, 2020). In 21st century, several websites, including the search engine Google, started a change in online advertising by emphasizing contextually relevant ads based on an individual's browsing interests (Kumar, 2014). As a result of the development of technology, traditional marketplaces of shops, village fairs, and shopping centres changed to virtual marketing places such as eBay and Amazon (Dinner, Heerde, & Neslin, 2014). Mobile advertising also became popular during this period, as mobile phones came into existence.

Digital advertising replaced the billboards and television ads with web banner ads and YouTube skippable video ads (Dangerfield, 2018). While most areas of business have been

affected by the popularity of social media, the advertising world has been especially impacted. According to the data of Digital Information World of 2018, YouTube, Facebook, and Instagram became the most popular platforms on which consumers spend more time (Ahmad, 2018). Advertisers were able to reach much larger audiences enabling them to increase brand awareness and customer engagement through such social media platforms (Ahmad, 2018). This major milestone changed the traditional advertising method of offline advertising such as outdoor advertising, print media, television and radio (Dinner et al., 2014; Pfeiffer & Zinnbauer, 2010) to online advertising with more personalisation on the internet, such as social media and search engine marketing (Hanekom & Scriven, 2002).

2.2 Overview of Digital video advertising

Due to the rapid usage of the internet around the world, delivery of video content surged to an extraordinary level (Mei, Hua, Yang, & Li, 2007). Videos are common in the web browsing experience as advertisers can use it to quickly engage with their target market by offering the required content of the target market (Chaitanya, 2018). For example, video interventions resulted in significant changes in the targeted health behaviours such as breast self-examination (Albert, Buchsbaum, & Li, 2007); and self-care in patients with heart failure and HIV treatments (Carey, Coury-Doniger, Senn, Venable, & Urban, 2008). Moreover, when considering the education sector, videos are a common platform used to facilitate learning (Carpenter et al., 2015; Chan, Mak, & Law, 2009; Gregory et al., 2017; Winkler et al., 2017).

In the marketing field, recent developments in digital video advertising challenged the dominance of traditional advertising media such as newspaper, radio and television (eMarketer, 2015). According to eMarketer (2015), online video advertising represents more than one-quarter of total global advertising spending. This further illustrates that modern companies are shifting their marketing strategies online, due to relatively poor efficiency of traditional marketing channels (Pescher, Reichhart, & Spann, 2014) and higher levels of technology usage among consumers (Krawford, 2011).

The two most popular types of video advertising tools are television advertisements and online video advertisements (Lindsay, 2019). The traditional video advertising method of television ads reaches a larger audience than local newspapers and radio stations within a short period of time (Kaid & Holtz-Bacha, 2006). It reaches viewers when they are the most attentive and

conveys the message with sight, sound, and motion, which provides instant credibility to the business, product or service (Kaid & Holtz-Bacha, 2006). Although the internet has captured more attention nowadays, the traditional marketing method of television advertising is still in use (Gallegos, 2020).

Online video advertisements are videos created by experts from an agency or even produced by an in-house team to promote a product using a traditional video format (Nicky, 2018). This type of video advertisements is very common and engages target customers to a digital level (Nicky, 2018). For example, advertising agencies can create a short video and post it on social media platforms such as YouTube, Facebook, Hulu, blogs or in mobile friendly websites (Nicky, 2018).

One of the most significant current discussions in digital video advertising platforms is the use of 2D, 3D or 4D video advertising platforms (Gallegos, 2020). 2D video advertisements focus on creating a character, storyboards, and backgrounds in two-dimensional environments (Chen, Hulyalkar, Kellerman, & Klebanov, 2014). Similarly, 3D video advertisements add 3-dimensional, interactive layers to a regular 2D advertisement (Mustakallio, Autio, & Zahra, 2002) and 4D uses video as a base and layers on interactivity to add personalization to the advertisements (Casas, 2020; Casas, Volino, Collomosse, & Hilton, 2014). Further, a considerable amount of literature has been published on the effectiveness of 2D video advertising (Terlutter, Diehl, Koinig, & Waiguny, 2016); 3D video advertising (Berki, 2018; Heath, 2017; Lau & Lee, 2016; Mongkolprasit & Arunrangsiwed, 2016; Roetl & Terlutter, 2018; Terlutter et al., 2016); 4D video advertising (Terlutter et al., 2016); and also, of consumer buying behaviour. When considering the differences between Augmented Reality (AR), Virtual Reality (VR) and 360-degree videos, in AR, digital elements are added to a live-view by using the camera on a smartphone while a VR experience replaces a real-life environment with a simulated one (Habig, 2016). VR videos are interactive, whereas 360-degree videos are immersive. In 360-degree videos, the timeline is in the hands of the audience. Virtual reality allows you to choose what you want to see more freely than 360-degree videos (Habig, 2016). In addition, VR and AR videos are bringing physical and virtual objects to a new level of integration (Flavián et al., 2019). However, the boundaries between these new realities, technologies and experiences have not yet been clearly established by researchers and practitioners (Flavián et al., 2019). In VR video advertising, the user can experience a specific

environment using software that creates real images that simulate the user's location. For example, some of the studies which identified the effectiveness of VR advertising comprise: Barnes, (2016); Griffin et al., (2017); Grudzewski et al., (2018); Kerrebroeck et al., (2017); Scatena et al., (2016); and Tussyadiah et al., (2018).

In AR video advertising allows marketers to create a certain emotional connection with customers (Gleb, 2020). For example, AR advertisements are interactive, and consumers can not only see but also can interact with the virtual environment (Gleb, 2020). Recent studies which identified the effectiveness of AR advertising are as follows; Çeltek, (2015); Choi et al., (2016); İlhan & Çeltek, (2016); Jamali et al., (2015); Javornik, (2016); Scholz & Smith, (2016); Yang & Mueller, (2019); and Yaoyuneyong et al., (2016). Evolutionary advancements in technology such as television, mobile phones, social media platforms, 3D, 2D and 4D videos, VR and AR platforms have become an innovative approach to be used in the marketing field (Fisher, 2019; Habig, 2016). These various innovative digital channels could explore new opportunities for audience engagement and revenue generation (Mabrook & Singer, 2019). Recently, researchers have shown more interest in 360-degree video advertisements (Fisher, 2019; Habig, 2016). While 360-degree videos are not a new concept, so far there has been very little discussion about 360-degree video advertising (Habig, 2016).

2.3 What is 360-degree Video Advertising?

Standard video advertisements are online videos created by experts from an agency or even done by an in-house team to promote a product using traditional video formats (LaMarco, 2018). The 360-degree videos are considered as immersive or spherical videos with video recording consisting of views in every direction that are recorded simultaneously (Yoganathan et al., 2018). These photo shoots are conducted by using an omnidirectional camera or a collection of cameras. During playback on a normal flat display, the viewer has control of the viewing direction similar to a panorama (Fisher, 2019; Habig, 2016). The 360-degree video formats can express the stories more interactively and with higher audience engagement (Wurmser, 2019). Another key feature of 360-degree videos is the ability to deepen engagement with audiences (Fisher, 2019; Habig, 2016). One major reason that 360-degree videos have proven to be an effective storytelling tool is their ability to provide the complete

context of the image, that is, what is going on around the scene (Wurmser, 2019). Consumers are eager to experience 360-degree video advertisements even when created by brands, owing to their inherent fun and excitement (IAB, 2018). The 360-degree video versions can be viewed using different tools or options such as Head-Mounted Displays (HMDs), High-definition videos (HD), Virtual Reality Goggles, and Magic Leap or they can also be viewed on screens without using these tools (Fisher, 2019; Habig, 2016).

By joining the list of standard video formats, 360-degree videos began to gain attention in 2017. In that year, around 86% of businesses had used 360-degree videos as part of their respective marketing campaigns (Valvano, 2018). Some of the best uses of 360-degree videos include travel and car advertising. For example, the 360-degree video advertising campaign of Mercedes-Benz recorded a 34% increase in customer advertisement recall based on the reports of the Proprietors' Association of America (Devrix, 2020). Several car manufacturers, such as BMW, Hyundai, and Mercedes-Benz have adopted 360-degree videos to highlight their latest vehicles by allowing the viewer to engage in a simulated ride (Devrix, 2020). The travelling company of Expedia Group (an American online travel shopping company for small business travel) enabled viewers to explore the forests, cliffs, and ocean of Australia via a panoramic experience (Huang, 2017). The other examples of major brands that have used 360-degree video advertisements are Columbia Sportswear, Coca-Cola and Nescafé (Valvano, 2018). It was reported that Coca Cola achieved a 36 percent higher view-through rate for their first 360-degree video advertisement (Fisher, 2019; Habig, 2016).

Video advertisements using the 360-degree format are important for the marketing sector in various ways. Firstly, research conducted by Google proved that 360-degree videos contribute a five times higher click-through rate, and more repeated views (because viewers can have a different experience each time they watch) than a standard video (Helm, 2020). Secondly, Watson (2017) found that organisations are now investigating the effectiveness of 360-degree video versions due to high audience engagement and revenue generation. Further, the success of 360-degree video advertisements is being driven by achieving 29% more views than the same videos using a traditional video format (Feng, 2018). Forer (2018) found that these videos have a higher click-through rate compared to standard videos. As a result, brands across different industries are experiencing significant success via their use of 360-degree video advertising. A research report for 'Business Insider' investigating how virtual reality,

augmented reality and 360-degree videos are shaping the future of content creation also revealed that, “the global virtual reality market is forecast to grow at a nearly 81% compound annual growth rate from 2016 to 2024, according to Global Market Insights” (Cisse, 2017).

It has been noted by Rossiter et al. (2001) that consumer memory research has largely ignored product-relevant information stored in visual memory. Additionally, they emphasized the need to supplement current marketing research tools with techniques that accommodate non-verbal expressions of perception and learning since all these stimuli are received by the brain through the visual systems (Xu et al., 2020; Zhu et al., 2018; Park et al., 2015). In advertising, topics such as visual merchandising, social cognition, visual memory, and repeated viewing of visual memory remain relatively unexplored. 360-degree or 3D video advertisements directly affect consumer visual memory. Studies have shown that eye movements are closely associated with cognitive processes such as attention, memory, and decision making (Xu et al., 2020; Zhu et al., 2018; Park et al., 2015). It is not only true that eye movements reflect certain aspects of brain function, revealing information about feelings and desires to others, but also, they can be actively involved with understanding the information presented by the advertisement (Xu et al., 2020; Zhu et al., 2018).

2.4 Categorisation of the existing literature on 360-degree videos and consumer visual memory

Based on the foregoing discussion, several gaps were identified in 360-degree video advertising from the marketing perspective. The existing literature on 360-degree videos and consumer visual memory can be divided into four types: studies which focused on the characteristics of 360-degree advertisements, effects of 360-degree video advertisements, 360-degree video viewing devices and 360-degree video advertising considering social cognition stages. Figure 2.1 further explains the literature categorisation of this study.

Figure 2. 1: A summary of existing literature on 360-degree videos and consumer visual memory

Summary of the existing literature on 360-degree videos and consumer visual memory			
Studies on 360-degree video advertisement characteristics	Studies on effects of 360-degree video advertisements	Studies on 360-degree video viewing devices	Studies on 360-degree video advertising research at different social cognition stages
Mabrook and Singer (2019); Feng (2018); Feng et al. (2019); Habig (2016); Ausin-Azofra et al. (2021); Shi (2017); Kerrebroeck et al. (2017); Boer et al. (2010); Bassbouss, Steglich, and Fritzsche (2019); Shin (2018); Brautović et al. (2017); Bessa et al. (2016); Wu and Lai (2021)	Chen and Lin (2012); Flavián et al. (2019); Hebbel-Seeger (2017); Pakanen and Arhipainen (2014); Bleize and Antheunis (2019); Barnes (2016); Broeck et al. (2017); Obrist et al. (2013); Philpot, Glancy, Passmore, Wood, and Fields (2017); Animesh et al. (2011); Bleumers, Broeck, Lievens, and Pierson (2014); Yoon et al. (2018); Brautović et al. (2017); Cisse (2017); Zulkiewicz, Boudewyns, Gupta, Kirschenbaum, and Lewis (2020); Kim (2015); Felli, Liu, Ullah, and Sepasgozar (2018)	Adachi et al (2020); Lee, Sergueeva, Catangui, and Kandaurova (2017); Tse et al. (2017); Saiheng (2018); Damme, Anissa, Marez, and Leuven (2019); Speicher et al. (2018); Luo et al. (2016); Rauschnabel et al. (2015); Passmore et al. (2016); Damme et al. (2019)	Cheng and Wang (2011); , Väättäjä, and Kauhanen (2017); Roettl and Terlutter (2018); Singh (2019); Skouteris et al. (2014); Yoganathan et al. (2018); Florès (2014); Kim, Baek, and Yoon (2020); Terlutter et al. (2013); Yaoyuneyong et al. (2016); Yim et al. (2018); Adnan et al. (2020); Ostaci, Secara, Møller, Nygaard, and Holte (2018); Choi et al. (2018); Violante, Vezzetti, and Piazzolla (2019); Aitamurto et al. (2018)

As shown in Figure 2.1, the first group of literature categorised the studies on 360-degree video advertisement characteristics, for example, the innovative features of video advertisements such as storytelling techniques, immersive and role of vividness. The second group of literature categorised the effects of 360-degree video advertisements, while the third group of literature focused on the 360-degree video viewing devices. The fourth group categorised 360-degree video advertising research at different social cognition stages.

2.4.1 Studies on 360-degree video advertisement characteristics

The first group of studies on the 360-degree video advertisement characteristics focused on the innovative features of the video advertisements such as storytelling techniques, immersive and role of vividness. Table 2.1 further summarises the findings of the studies which focused on 360-degree video advertisement characteristics

Table 2.1: Summary of the findings of the studies which focused on 360-degree video advertisement characteristics

Source	Key Concepts	Methodology /Data collection	Key Findings
Wu and Lai (2021)	Immersive storytelling techniques	Surveys	Contributed by introducing a mechanism to convert the psychological response to this 'visiting' experience into a destination image
Ausin-Azofra et al. (2021)	Immersive storytelling techniques	Surveys	Researchers found that 360-degree ads for durable products result in positive emotions and can lead to the risk of not noticing some of the content, according to an experiment comparing 360-degree video ads and static (2D) videos
Mabrook and Singer (2019)	Immersive storytelling techniques	Theoretical paper	This essay proposed three conceptual approaches to examine virtual reality journalism through Actor-Network Theory, normative theory, and a sociological perspective

Feng (2018)	Narrative structure of the video ad in terms of transportation Advertisement usefulness Emotional responses Consumer attitudes	Experiments	The difference in ad effectiveness between a 360-degree narrative video and a standard narrative video becomes significant under the condition that the role of perceived ease of navigation is considered
Feng, Xie, & Lou, (2019)	Narrative structure of the video Perceived ad novelty Presence Consumer attitudes	Experiments	The difference in ad effectiveness between a 360-degree narrative video and a standard narrative video becomes significant under the condition that the role of perceived ease of navigation is considered. A 360-degree narrative video ad outperforms a standard narrative video ad when viewers navigate smoothly, use visual and/or auditory cues to enhance the viewing experience, clearly know where the desired point of view originates, and have control of the viewing direction.
Bassbouss et al. (2019)	Storytelling elements	Technical paper	Introduced a new tool that allows creating interactive 360-degree videos with storytelling elements. The integrated editing tool identified through this study allows content creators to easily create stories.
Shin (2018)	Immersive storytelling context	Experiments	Explored the immersive storytelling context, developing and testing a VR experience model that integrates presence, flow, empathy, and embodiment. Developed an integrated research model showing how different levels of immersion and user empathy in VR storytelling contribute to a user's cognitive process.
Habig (2016)	The view-through rate of 360-degree and standard video ad	Experiments	Compared 360-degree video advertisement and a standard video advertisement in terms of more viewer engagement. Results indicated that 360-degree in-stream ads underperformed the standard ad on view-through rate, across desktop and mobile with a lower retention rate. However, 360-

			degree ads also had a higher click-through rate, meaning that viewers were more interested in checking out the full-length version of the video
Boer et al. (2010)	Role of presence in a 3D display for advertising as compared to a 2D display for advertising	Experiments	The 3D display enhances the feelings of presence and produces a more positive brand attitude and outperforms 2D displays for eye-catching out-door advertising
Brautović et al. (2017)	Immersive	Surveys	Examined the concept of immersiveness in journalism based on 360-degree video content Virtual reality content improves engagement with news results in a high level of empathy
Bessa et al. (2016)	Sense of presence Cybersickness	Surveys	Measured the sense of presence and cybersickness of a 360-degree video and a 3D video. Both 360-degree and 3D videos don't cause cyber sickness or sense of presence.
Kerrebroeck et al. (2017)	Virtual reality (VR) in the context of transformational brand experience appeals, focusing on the role of vividness	Theoretical paper	Three-dimensional conceptual framework is presented, offering a systematic review of the literature on vividness effects in marketing communications.
Shi (2017)	Perceived innovativeness Customer equity	Surveys	Investigated the effectiveness of leveraging 360-degree video commercial campaigns. The 360-degree video advertisements have higher perceived innovativeness and customer equity which differs across genders

Based on the Table 2.1- summary of studies on 360-degree video advertisement characteristics—the findings could be categorised into three major themes: storytelling techniques, immersiveness and the role of vividness.

Storytelling techniques

Traditionally, people used standard videos, but today 360-degree video technology is emerging as a new form of immersive storytelling technique (Bassbouss et al., 2019; Mabrook & Singer, 2019; Shin, 2018). The storytelling elements or the narrative structure of the 360-degree videos contain the episodes consisting of actors engaged in actions to achieve goals and a sequence initiated by events and actions resulting in outcomes (Escalas, 1998). Hence, narrative advertising is defined as advertising composed of narratives or an advertisement that tells a story (Feng, Xie, & Lou, 2019). When considering the literature on storytelling techniques or flow of narrative structure, it was found that 360-degree narrative video advertisements outperformed than traditional narrative video advertisements, under the condition of perceived ease of navigation (Ausin-Azofra et al., 2021; Wu & Lai, 2021; Feng, 2018; Feng, Xie, & Lou, 2019). In this study, the perceived ease of navigation refers to the extent to which a viewer, based on the story line in a 360-degree video advertisement, easily knows where the desired area of focus is and navigates the video smoothly without experiencing any unexpected changes of context or angle. Further, Mabrook and Singer (2019) stated the importance of using 360-degree videos for news organisations, due to the immersive storytelling technique. Bassbouss et al. (2019) highlighted the interactive storytelling elements of 360-degree videos and Shin (2018) showed the effectiveness of 360-degree video commercial campaigns due to the high levels of immersion.

Immersiveness

The immersive qualities in 360-degree video literature refers to the flow of the content, audience engagement or video viewing rates and sense of presence (Brautović et al., 2017). When considering the literature on immersiveness, several studies identified the positive influence of different characteristics in immersiveness on 360-degree video advertising. For example, Google partnering with Columbia Sportswear created an ad campaign around two USA Olympic skiers enjoying an epic season in Chile to find out whether 360-degree video

ads drive more viewer engagement than standard video ads (Habig, 2016). Even though 360-degree in-stream ads underperformed the standard ads on view-through rate, across desktop and mobile with a lower retention rate, the 360-degree ads had a higher click-through rate, meaning that viewers were more interested in watching the full-length version of the video (Habig, 2016). Similarly, it was found that 3D display images enhance the feelings of presence, produce a more positive brand attitude and outperform 2D displays for eye-catching outdoor advertising (Boer et al., 2010). Further, Brautović et al. (2017) identified that 360-degree video content improves engagement for news results. In contrast, Bessa et al. (2016) measured the sense of presence and cybersickness (motion sickness that occurs as a result of exposure to immersive technologies such as virtual reality and augmented reality) of a 360-degree video and a 3D video and found that both 360-degree and 3D videos do not cause cybersickness or sense of presence.

Role of vividness

The role of vividness refers to the imagery richness, which is vital in product presentations and marketing communications as it enables more realistic representations of products or environments (Choi & Taylor, 2014). Kerrebroeck et al. (2017) presented a three-dimensional conceptual framework, offering a systematic review of the literature on vividness effects in marketing communications. Shi (2017) conducted the first study investigating the effectiveness of leveraging a 360-degree video commercial campaign and found that 360-degree video advertisements have higher perceived innovativeness and customer equity which differs across genders. Therefore, when considering the literature on 360-degree video advertisement characteristics, many researchers focused on the characteristics of 360-degree video advertisements, mainly the storytelling techniques, immersiveness and role of vividness as mentioned above.

2.4.2 Studies on outcomes of 360-degree video advertisements

The second group of studies were categorised based on the outcomes of the 360-degree video advertisement characteristics. The studies on the effects or outcomes of 360-degree video advertisements mainly focused on consumer experience, individual dispositions, and consumer satisfaction. Table 2.2 further summarises the findings of the studies which focused on the effects of 360-degree video advertisements.

Table 2.2: Summary of studies on the effects of 360-degree video advertisements

Source	Key Focus	Methodology /Data collection	Key Findings
Chen and Lin (2012)	Experiential marketing Customer experience	Surveys	Compared the performance (experiential marketing, customer satisfaction and behavioural intentions) between two-dimensional and three-dimensional tour itinerary promotion and proved the value of three-dimensional tour itinerary promotion.
Flavián et al. (2019)	Consumer experience	Literature review	Physical and virtual objects improved through virtual reality, augmented reality and mixed reality provides a better consumer experience.
Pakanen and Arhippainen (2014)	Consumer experience	Observation notes	Described two user studies with three web-based 3D virtual travel destination marketing portals. Findings indicated that 3D virtual travel destination marketing portals can enhance 2D web pages, if they offer the possibility to explore the location freely and through different kinds of virtual activities.
Barnes (2016)	Consumer experience	Ericsson Consumer Lab survey data	Developed a framework to measure the impact of virtual reality upon the role of presence, consumer VR experiences and consumer engagement. VR marketing experience can influence the emotional, cognitive, and behavioural changes of individuals.

Broeck et al. (2017)	Consumer experience	Semi-structured interviews	First comparative study on the user experience with 360-degree videos on mobile devices. 360-degree videos provide more interaction with the content. Scene transitions need careful composition. 360-degree video technology (resolution, video type) affects the user viewing experience.
Obrist et al. (2013)	Consumer experience	Surveys	Investigated people's perception of 3D television in home context. The users experience a realistic viewing experience with a feeling of more involvement
Philpot et al. (2017);	Consumer experience	Interviews	Explored user experience of panoramic video by considering the differences between viewing in a head-mounted display (HMD) and viewing in a CAVE-like environment. The users' viewing experience is similar in both viewing conditions (no differences were identified). The level of presence is higher for panoramic videos in both viewing conditions.
Animesh et al. (2011)	Consumer experience	Surveys	Investigated how technological and spatial environments in virtual worlds influence the participants' virtual experiences and how experiences subsequently affect their response. Developed a research model to capture and understand the impact of the two key dimensions of immersive virtual worlds (e.g., technological, and spatial) on users' virtual experiences and subsequent purchase decision.
Zulkiewicz et al. (2020)	-Consumer experience	Case study	Created a 360-degree video that portrays the experience of a migraine sufferer to be used as a stimulus in an online study to understand patient experience.
Kim (2015)	Consumer experience	Surveys	Investigated the level of garment size variation that viewers could perceive with three-dimensional (3D) virtual try-on technology and examined how accurately the technology allowed viewers to perceive the size variations. The viewers could rate larger sizes as larger and smaller sizes as smaller, proportionally. The technology allowed the viewers to rank different sizes of virtual pants in the correct order. Overall, the virtual try-on technology had the capacity of showing size variations clearly enough for viewers to perceive and discriminate the size differences.

Hebbel-Seeger (2017)	Individual dispositions	Surveys	First exploratory study in sports which explored the 360-degree videos in combination with VR glasses on athletic training processes using individual dispositions and experiences. 360-degree videos have a high potential for adaptation for athletic training processes by exploring the content individually, at least regarding the image segment.
Bleize and Antheunis (2019)	Individual dispositions	Literature review	Perceived enjoyment, social influence, customization, and ease of use are important factors that influence purchase intent in virtual worlds. Enjoyment of the virtual world, beliefs and attitudes of others, avatar customization, and easy-to-use virtual world applications can increase users' willingness to purchase products in the virtual world.
Yoon et al. (2018)	Consumer satisfaction	Experiments, Surveys	Firstly, the main effects of video ad type, perceived autonomy, satisfaction, telepresence, and ad attitude were significantly higher in 360-degree video ads than in 2D video ads except for brand attitude and purchase intention. Secondly, participants perceived higher autonomy in the mobile-screen condition than desktop-screen condition Thirdly, this study found that 360-degree video advertising is more effective than 2D advertising, under desktop screen condition.
Felli et al. (2018)	Customer satisfaction	Technical paper with field experiments	An innovative field experiment developing and idealizing an immersive visualisation mechanism for buildings using VR-based technologies to help post-construction sales. 360-degree cameras increased the customer satisfaction and the needs of in-person inspections and data collection for engineers.

Based on Table 2, findings could be categorised into three major themes: consumer experience, individual dispositions, and consumer satisfaction.

Consumer experience in 360-degree video advertising

Consumer experience in 360-degree video advertising literature refers to interaction with the video advertisement and its effect on consumers' present experiences with the product (Lin, 2016; Yang, Huang, Yang, & Yang, 2017). When considering the literature on consumer experience, several researchers identified that three dimensional images and videos are more effective than two dimensional images and videos in promoting travel destinations (Chen & Lin, 2012; Pakanen & Arhippainen, 2014). The user experience with panoramic videos offered a higher consumer experience with more audience engagement (Barnes, 2016; Broeck et al., 2017; Flavián et al., 2019; Obrist et al., 2013; Philpot et al., 2017). Animesh et al. (2011) developed a research model to capture and understand the impact of the two key dimensions of immersive virtual worlds (e.g., technological and spatial) on users' virtual experiences and subsequent purchase decision. Zulkiewicz et al. (2020) created a 360-degree video that portrays the experience of a migraine sufferer to be used as a stimulus in an online study to understand patient experience and found that 360-degree videos are important for health marketing because they have the potential to enhance the health-related attitudes and behaviours of the audience. Further, it was identified that 360-degree videos are effective in the apparel sector, as Kim (2015) investigated the level of garment size variation that viewers could perceive with three-dimensional (3D) virtual try-on technology and examined how accurately the technology allowed viewers to perceive the size variations.

When considering the visual comprehension within the video advertisements, no statistically significant differences were identified among genders (Liaudanskaitė et al., 2018). Visual images can be used to predict customer behaviour based on eye movements, fixation times, gaze landing sites, and areas of interest (Liaudanskaitė et al., 2018). Several versions (neutral, positively and negatively valence) of popular ads are tracked and eye fixation times are analyzed in relation to affective and gender factors (Liaudanskaitė et al., 2018). Shorter fixations representing unconscious processing of visual information do not show statistically significant differences between genders when analysing how affectively charged images are perceived in digital advertisements (Liaudanskaitė et al., 2018). Regarding the print advertisements, women seem to favour information-rich advertisements more than men, a finding that is consistent with the ascribing of elaborate processing to women for print advertisements (Meyers-Levy and Maheswaran 1991; Putrevu & Lord, 2004).

Individual dispositions in 360-degree video advertising

Individual dispositions can be considered as a habit, a preparation, a state of readiness, or a tendency to act in a specified way (Iverson & Kuruvilla, 1995). Further, it reflects the concept of individual behaviours such as attitudes, intentions and actions (Iverson & Kuruvilla, 1995). Hebbel-Seeger (2017) explored the 360-degree videos in combination with VR glasses on athletic training processes using consumer experiences and habits. Additionally, it was found that 360-degree videos have a high potential for adaptation for athletic training processes by exploring the content individually, at least regarding the image segment. Bleize and Antheunis (2019) found that perceived enjoyment, social influence, customization and ease of use are vital factors that affect purchase intention in virtual worlds. Moreover, enjoyment of the virtual world, beliefs and attitudes of others, avatar customization, and easy-to-use virtual world applications can increase users' willingness to purchase products in the virtual world. Bleumers et al. (2014) developed a human-centred design approach to identify issues and opportunities users anticipate in omni-directional videos from a user perspective and identified a few bottlenecks such as the concern to miss key parts of a television programme while looking around.

Consumer satisfaction in 360-degree video advertising

While the literature holds significant differences in the definition of satisfaction, all the definitions share some communal elements (Giese & Cote, 2000). When examined as a whole, three general constructs can be identified under consumer satisfaction: 1) consumer satisfaction is a response (emotional or cognitive); 2) the response affects are based on a particular focus (expectations, product, consumption experience); and 3) the response occurs at a particular time (after consumption, after choice, based on accumulated experience) (Giese & Cote, 2000). Yoon et al. (2018) found that customer satisfaction regarding the video ad type, perceived autonomy, satisfaction, telepresence, and ad attitude were significantly higher in 360-degree video ads than in 2D video ads. This can be further justified based on a field experiment that developed and idealized an immersive visualisation mechanism for buildings using virtual reality-based technologies to help post-construction sales in which Felli et al. (2018) identified that 360-degree cameras increased customer satisfaction and the needs of in-person inspections and data collection for engineers. Therefore, when considering the literature on studies of

different effects of 360-degree video advertisements, it is evident that many researchers have focused on consumer experience gained through 360-degree video advertisements rather than the individual dispositions and consumer satisfaction.

2.4.3 Studies on 360-degree video viewing devices

The third group of studies on the 360-degree video viewing devices can be divided into two main themes: high-level technology consumed devices and low-level technology consumed devices. Table 2.3 shows the summary of studies on the effects of 360-degree video advertisements.

Table 2.3: Summary of studies on the effects of 360-degree video advertisements

Source	360-degree video viewing devices	Methodology /Data collection	Key Findings
Adachi, Cramer, and Song (2020)	The 360-degree video viewing using head mounted display (HMD)	Experiments	Investigated the effectiveness of different devices used to view 360-degree tourism promotional videos on destination image formation and intention to visit. For Tourism, 360-degree video viewing using head-mounted display (HMD) offers more sense of presence which creates positive image of the destination.
Lee et al. (2017)	Google Cardboard VR platform	Surveys	Examined the potential for using Google Cardboard VR in business classrooms as a content delivery platform. Google Cardboard VR platform was not superior to flat screen format in its content delivery with respect to novelty, reliability, and understandability.

Tse et al. (2017)	Magic window Google Cardboard Headphones	Interviews	Investigated 360-degree viewing platform (magic window/google cardboard) and headphone use (with/without) effect on film immersion for a 360-degree video fire rescue. Headphones increased immersion for google cardboard, but decreased immersion for magic window. Head-mounted displays increase presence, but do not necessarily lead to more empathy and greater interest in the 360-degree videos.
Saiheng (2018)	Head Mounted display Mobile phone VR holder	Surveys, Interviews	Evaluated the usability of two VR displays (head-mounted display and a mobile phone VR holder) by using six metrics: ease of use, engagement, emotion, comprehension, enjoyment, and comfortableness. The 360-degree viewing devices affect the comprehension and enjoyment level of the users.
Speicher et al. (2018)	The 360-degree live-stream videos	Interviews	Presented a framework for 360-degree video-based multi-user collaboration to allow collaborators to view and annotate 360 live-stream videos. 360-degree videos create more immersive user experiences and limit the interactiveness by limiting the experience to a single user.
Luo et al. (2016)	Holotable	Technical Paper	Assessed the Holotable (360-degree and 3D image display device) 3D motion images can be displayed easily through Holotable
Rauschnabel et al. (2015)	Google Glass Microsoft HoloLens	Experiments	Investigated the role of personality in predicting media usage by analysing smart glasses, such as Google Glass or Microsoft HoloLens. Social conformity and functional benefits influence consumers 'intention to adopt Google Glass
Passmore et al. (2016)	Headsets Flat screen	Semi-structured interviews	Compared the user experience of 360-degree videos viewed using headsets and flat screen and found that panoramic video viewers have high sense of presence and engagement when viewing the video through headsets than the flat screen condition.

Damme et al. (2019)	Google Cardboard Head Mounted Display	Experiments, Surveys	Experimental study on the effect of immersion on news experience and distant suffering was undertaken, comparing four 360-degree video conditions: single viewpoint, drag-and drop 360-degree, 360-degree with a cardboard VR device, and 360-degree with a head-mounted VR device that assesses whether 360-degree international disaster news leads to a higher sense of presence, higher enjoyment, higher subjective involvement towards the topic, and increased engagement with distant suffering of the victim.

Low-level technology viewing devices

Low-level technology viewing devices refers to any technology requiring low-level technology with low amount of scientific and engineering techniques (Grupp, 1995). Many researchers examined the potential differences of 360-degree viewing platforms including head-mounted display (HMD), and flat screen. When considering the studies on 360-degree video viewing tools, several researchers identified the high sense of presence and engagement when viewing the 360-degree videos using different 360-degree video viewing platforms such as Head Mounted Display (HMD) (Adachi et al., 2020; Saiheng, 2018) and Flat screen (Passmore et al., 2016).

High-level technology viewing devices

High-level technology viewing devices refers to any technology requiring the most sophisticated scientific equipment and advanced scientific and engineering techniques (Grupp, 1995). When considering the studies on 360-degree video viewing tools, several researchers identified more user immersive experience and higher enjoyment with higher subjective involvement, when viewing the 360-degree videos using different 360-degree video viewing platforms such as Google Cardboard (Damme et al., 2019; Lee et al., 2017; Tse et al., 2017), Holotable (Luo et al., 2016), Microsoft HoloLens and Google Glass (Rauschnabel et al., 2015).

2.4.4 Studies on 360-degree video advertising research on different social cognition processes

Social cognition

Social cognition in social psychology refers to how people process, store and apply information about other people and social situations (Wyer & Srull, 2014a). Moreover, social cognition means the unique process that enables human beings to interpret social information and behave appropriately in a social environment (Wyer, 2003). Cognitive psychologists have named several cognition stages of human beings which include mental processes such as learning persuasion, memory, decision making, individual attitudes, information storage and retrieval (Fazio & Olson, 2003). It focuses on the role that cognitive processes play in individual social interactions (Wyer & Srull, 2014a). Many studies on 360-degree video advertising research focused on several social cognition stages such as learning persuasion, consumer attitude change, consumer brand memory, recalling and recognition abilities. Table 2.4 further summarises the findings of the studies which focused on 360-degree video advertising research investigating different social cognition stages.

Table 2.4: Summary of studies on the effects of 360-degree video advertisements

Source	Key constructs	Social cognition stage	Methodology /Data collection	Key Findings
Cheng and Wang (2011)	Student's application ability	Learner persuasion	Self-reported questionnaire	Applied a 3D virtual learning environment to facilitate marketing student's application ability. This study designed a 3D virtual supermarket to help business students to transform abstract class theory into concrete application ability in the real world.
Skouteris et al. (2014)	Healthy eating patterns	Learner persuasion	Surveys	A cluster-randomised trial in a preschool that promoted healthy eating to young children using the active play and sustainability consciousness in early childhood curricula, addressing the Ben10™ problem. Identified several healthy eating practices and processes to be added for the preschool curriculum to promote healthy eating patterns among children.
Adnan et al. (2020)	Learning ability Repeated exposure	Learner persuasion	Online surveys	Examined how VR experiences and 360-degree videos were used to teach three difficult languages (English, Mandarin and Arabic) in a university setting . Immersion followed by repeated exposure helped the learners to acquire positive student learning experience.
Choi et al. (2018)	Learning ability	Learner persuasion	Technical Paper	Developed a novel authoring framework for mobile VR contents and a play-based learning model for marine biology education. More experienced elements in VR contents improve the immersion and active participation among learners.
Violante et al. (2019)	Learning experience	Learner persuasion	Self-report surveys/Experiments	The 360-degree videos have been designed and implemented in an engineering program. The 360-degree videos have been evaluated by the students as highly immersive and engaging environments that surround them and offer them an increased sense of presence, giving them a 360-degree view of the environment.

Kelling et al. (2017)	Emotional connection	Attitude formation	Experiments, Surveys, Interviews	Applied 360-degree videos to market an airport and local attractions for a distant destination. 360-degree videos improved emotional connection, maintained the engagement and attention on viewing context.
Roettl and Terlutter (2018)	Brand placement	Attitude formation	Surveys	Analysed the experience of the players and how brands that are placed in the video games been affected in an identical video game that is either played in a 2D and 3D with Head-Mounted-Display (HMD) version. The user presence was higher in 3D version video game than 2D version video game, but neither arousal nor attitude towards the video game differed. Memory for the placed brands was lower in the HMD 3D version than in the 2D video game, whereas attitudes towards the brands were not affected.
Yaoyuneyong et al. (2016)	Brand attitudes Brand preferences	Attitude formation	Surveys	Consumer preferences and attitudes toward augmented reality hypermedia print advertisements The print advertisements which used augmented reality hyper media had quicker response, and more novelty, and ad effectiveness than traditional print advertisements.
Singh (2019)	Development of Trust	Attitude formation	Survey and post-study interview	Developed a conceptual model to build trust among tenants and landlords using 360-degree videos
Ostaci et al. (2018)	The 360-degree videos as a tool for recruiting new students	Attitude formation	Experiments, Interviews, Surveys	This study developed a virtual reality promotional tool through a user-centred approach. The application was designed in collaboration with the public relations (PR) department of Aalborg University Esbjerg as a prototype tool for recruiting new students. Both the VR-System and the Tablet-System are effective in using 360-degree footage for promotional purposes.
Florès (2014)	Consumer attitude	Attitude formation	Book Review with mixed methods	Reported results from a laboratory experiment investigating effects of media modality (traditional unidirectional video content vs. 360-degree

				omnidirectional video content) on attitudes toward the disaster communication content.
Aitamurto et al. (2018)	Sense of presence Attitude change	Attitude formation	Experiments	Examined sense of presence, attitude change, perspective-taking, and usability of 360-degree videos. The 360-degree split view increased the viewers' feeling of personal responsibility for resolving gender inequality, desire to rewatch the video, fear of missing out, and feeling of missing the full story.
Kim et al. (2020)	Buying behaviour	Recalling and recognition ability	Surveys	Examined the effect of 360-degree rotatable product images on consumer purchase intention. Proposed a research model to empirically examine the effects of 360-degree rotatable product images on consumer purchase intention. The sensory vividness effect of 360-degree rotatable images enhances the purchase intentions of the buyers.
Terlutter et al. (2013)	Recalling & recognition Brand placements	Recalling and recognition ability	Surveys	Based on the limited cognitive capacity model of information processing and the levels-of-processing effect theory, authors investigated how the delivery modes of classic 2D videos compared to 3D or 4D videos influence recall and recognition of brands placed in a prominent or in a subtle way The subtle brand placements are negatively affected by the enhancement of 3D or 4D as compared to 2D movies, whereas a prominent brand placement in the movie benefits from 3D technology
Yim et al. (2018)	Brand memory	Consumer memory	Surveys	Explored the viewers' memory of brand names embedded in a soccer game when presented as a 2D display and as a 3D display and found that sports involvement enhances viewers' attention to a sports game and when the viewers pay more attention to a sports game in the 3-D version, they are less likely to remember the brands embedded in the stadium, while the opposite is found in the 2-D version.

Based on Table 4, findings could be categorised into six major social cognition stages: learner persuasion, emotional connection, attitude formation, decision making, recalling and recognition ability and consumer memory.

Learner persuasion

Persuasion refers to human communication that is devised to influence the autonomous actions and judgements of others (Cyr, Head, Lim, & Stibe, 2018). When considering the 360-degree video advertising literature, many researchers identified that 360-degree videos could persuade the learning process. For example, Cheng and Wang (2011) showed the effectiveness of 3D virtual learning environment for marketing students. The 360-degree videos been used to persuade learners with regard to healthy eating patterns (Skouteris et al., 2014), language teaching (Adnan et al., 2020), marine biology education (Choi et al., 2018) and engineering education (Violante et al., 2019).

Attitude formation

An attitude is a general opinion or a feeling about some person, object, or issue. Attitude formation occurs through either direct experience or the persuasion of others or the media (Lange, Kruglanski, & Higgins, 2011). When considering the 360-degree video advertising literature, several researchers identified that the user presence was higher in the 3D version video games than the 2D version video games, with regard to brand replacement (Roettl & Terlutter, 2018). Moreso, the consumer preference was higher for the augmented reality printed hyper media than traditional print advertisements (Yaoyuneyong et al., 2016), and virtual reality promotional tools were identified as more effective in developing trust among tenants and landlords (Singh, 2019) and for recruiting new students for universities (Ostaci et al., 2018). Florès (2014) reported the effectiveness of virtual reality videos in forming consumer attitudes toward disaster communication. Kelling et al. (2017) applied 360-degree videos to market an airport and local attractions for a distant destination and found that 360-degree videos improved emotional connection and maintained the engagement and attention on viewing. Finally, Aitamurto et al. (2018) identified that 360-degree videos have a higher sense of presence, increased usability and more ability to change attitudes.

Recalling and recognition ability

Recalling and recognition ability in social psychology refers to the process of remembering information stored in long-term memory (Janicik & Larrick, 2005). Based on the limited cognitive capacity model of information processing and the levels-of-processing effect theory, Terlutter et al. (2013) investigated how the delivery modes of classic 2D videos compared to 3D or 4D videos influence recall and recognition of brands placed in a prominent or in a subtle way. It was found that the subtle brand placements are negatively affected by the enhancement of 3D or 4D movies compared to 2D movies, whereas a prominent brand placement in the movie benefits from 3D technology. Kim et al. (2020) examined the effect of 360-degree rotatable product images on consumer purchase intention. Results demonstrated that the sensory vividness effect of 360-degree rotatable images enhances the purchase intentions of the buyers due to recall and recognition ability.

Consumer memory

Memory is the process of retaining and remembering events and past experiences (Hudmon, 2009). Memory has many functions and has been classified in various ways by researchers namely, sensory memory, working memory, long-term memory, visual memory, visual short-term memory, spatial short-term memory, iconic memory, photographic memory, episodic memory and semantic memory (Solso, MacLin, & MacLin, 2005; Terry, 2017). When considering the 360-degree video advertising literature, Yim et al. (2018) explored the viewers' memory of brand names embedded in a soccer game when presented as a 2D display and as a 3D display and found that sports involvement enhances viewers' attention to a sports game and when the viewers pay more attention to a sports game in the 3-D version, they are less likely to remember the brands embedded in the stadium, while the opposite is found in the 2-D version. Therefore, when considering the literature on studies of social cognition processes in 360-degree video advertisements, it is evident that many researchers have focused on attitude formation and learner persuasion.

2.5 Justification of the research gap

Memory is the process of retaining and remembering events and past experiences (Hudmon, 2009). Memory has many functions and has been classified in various ways by researchers as sensory memory, working memory, long-term memory, visual memory, visual short-term memory, spatial short-term memory, iconic memory, photographic memory, episodic memory and semantic memory (Solso et al., 2005; Terry, 2017).

Consumer visual memory

Human visual memory is central and fundamental to cognition and remains one of the core areas of human cognition processes (Andreopoulos & Tsotsos, 2013; DiCarlo & Cox, 2007). To date, researchers have defined visual memory as the ability to recall or remember images, scenes, words or other information presented in visual form (Sarica & Usluel, 2016). In the human brain there are several activation areas for visual images related to information processing (Kulp, Edwards, & Mitchell, 2002). When considering the consumer memory-related research, Rossiter et al. (2001) identified that consumer research has largely ignored product-relevant information stored in visual memory. Further, they emphasised that most marketing research tools are verb-centric and need to be enriched with techniques that accommodate non-verbal expressions of perception and learning as all these stimuli reach the brain through visual systems. Recently, Park et al. (2015) identified that a combination of topics such as visual merchandising, social cognition, visual memory, and repeated viewing of visual memory remains relatively unexplored in advertising, and they need to combine with psychology.

Importance of consumer visual memory for advertising

Visual marketing methods such as print advertisements and television commercials can be considered as specific types of scenes (Wedel & Pieters, 2007). The pictures can convey information more efficiently than textual messages (Geise & Baden, 2015). The visuals in a product save buyers' time and effort, since they can learn more about the products or services without clicking into the details' pages (Wu et al., 2016). As this advertising strategy became common, advertisers used many complex pictures to advertise their products which resulted in a serious visual overload problem. Consequently, it became difficult for buyers to locate and

process product information (Mazzoni, Vannucci, & Batool, 2014). To deal with this problem, some sellers used a simple picture strategy and displayed only product images to attract buyer's attention (Wu et al., 2016).

Further, visual memory plays a significant role in advertising (Bleize & Antheunis, 2019). For example, recent research which compared the visual appearance of solar panels' physical appearance showed that visual memory plays an important role in the preferences of potential consumers (Bao, Honda, El Ferik, Shaukat, & Yang, 2017). Further, McNeal and Ji (2003) found that for cereal products, it is not only the list of brand names in children's minds, but rather an elaborated symbolic environment made up of visuals and verbal codes that makes them remember the brand name of the cereal product. Other examples include, visual animations improving recognition effects for banners (Kuisma, Simola, Uusitalo, & Öörni, 2010), and advertising messages featuring pleasant nature images facilitating higher memory scores (Hartmann, Apaolaza, & Alija, 2013).

Billboard advertisements that are more visually salient get noticed more, as usage of attractive colours and bright and dark contrasts in the advertisement's design creates a more favourable memory for the brand (Wilson, Baack, & Till, 2015). Similarly, a study on colour codes and text descriptions in the labels of nutrition products found that the combination of colour codes and text descriptors seems to be the most effective alternative to increase attentional capture and understanding of nutritional information (Antúnez, Giménez, Maiche, & Ares, 2015). The effect of visual or pictorial cues has been evidenced in studies on voluntary recall in children and adults. For example, for small children (kindergartners and second graders), pictorial cues facilitated recall of a short video seen one week earlier (cues were designed to cue memory for persons involved in the event, the setting, actions, and conversations in the film) and specifically increased memory accuracy (Roebbers & Elischberger, 2002). Table 2.5 shows the summary of the studies on consumer visual memory for different video formats.

Table 2.5 : Summary of the studies on consumer visual memory for different video formats

Source	Key Constructs	Methodology	Key Findings
Wu et al., (2016)	Digital video advertisements	Experiments	The results of a laboratory experiment suggest that buyers are more influenced by the conspicuousness of a product picture than the information conveyed by it when it is visually overwhelming.
Yang et al., (2006)	Action video games	Experiments	It was found that participants had low levels of explicit memory (recognition test) for the brands, but they showed implicit memory (word fragment test) for the brand names that were placed in the video games.
Roettl & Terlutter (2018)	2D & 3D videos	Experiments/ Focus Groups	VR advertisements are more effective in terms of memory than classic web ads
Sonntag & Xing (2013)	3D videos	Surveys	The immersive feeling and aesthetic response of 3D videos enhanced the viewing experience
Keng & Liu (2013)	2D & 3D videos	Experiments	Persuasion-oriented self-referencing with 2D static images tends to be less effective than 3D dynamic display with avatar image-based advertising.

Digital video advertisements with focus on consume visual memory finds effective with conspicuousness of a product picture than the information conveyed by it when it is visually overwhelming (Wu et al., 2016). Yang et al., (2006) found that participants had low levels of explicit memory (recognition test) for the brands, but they showed implicit memory (word fragment test) for the brand names that were placed in the video games. Further, VR advertisements are more effective in terms of memory than classic web ads (Roettl & Terlutter,

2018; Sonntag & Xing, 2013). Persuasion-oriented self-referencing with 2D static images tends to be less effective than 3D dynamic display with avatar image-based advertising (Keng & Liu, 2013).

Additionally, several researchers examined the positive influence of visual memory on advertisements and impact for buying behaviour in different ways. For example, Elder and Krishna (2012) found that the way a product is visually depicted can facilitate mental simulation, with significant behavioural consequences. Huettl and Gierl (2012) reported that visual artwork used in advertisements or on product packaging affects perceptions of luxury and contributes positively to attitudes toward the products. Krishna, Cian, and Sokolova (2016) found visual aesthetics to be a key determining factor of advertisement effectiveness as the images in the viewer's mind plays a large role in affecting evaluations toward the advertisement and the product. Visual design can be considered as an important element of web advertising success and the role of visual dimensions in forming online purchase intentions. With web advertising growing to be a huge industry, Shaouf et al. (2016) found that web advertising's visual cues influence consumers' purchasing intention through advertising attitudes and brand attitudes.

Consumer visual memory and multiple viewing

Pechmann and Stewart (1988) described advertising repetition effects as the “differential effects of each successive advertising exposure, or the differential effects of a given exposure within a sequence of exposures” (Page 287). There is a strong relationship between consumer visual memory and repeated viewing (Kaakinen, Hyönä, & Viljanen, 2011). It can be assumed that objects that are fixated for a longer time are also remembered better than objects that attract shorter fixation times (Hollingworth, 2005; Tatler, Gilchrist, & Land, 2005). An experimental investigation using a new brain imaging technique, termed steady-state probe topography, investigated whether patterns of brain activity in the left or right frontal hemispheres could identify which frames from new TV commercials would be recognised by consumers one week later. Findings revealed that video scenes held on screen for 1.5 seconds or longer were better recognised, and that scenes that elicited the fastest brain activity in the left frontal hemisphere were better recognised (Rossiter et al., 2001). Therefore, visual content that stimulates left-brain activity creates memorable advertising. This finding has resulted in a new method of pre-testing commercials (Rossiter et al., 2001).

Similarly, very few researchers identified the effects of repeated viewing on human memory in various settings such as education, psychology, and marketing. For example, in the education context, Silverman (2013) revealed repeated viewing as a factor which improves vocabulary learning among school children. Skouteris et al. (2007) explored the effects of repeated viewing on comprehension of explicitly and implicitly presented information in an animated movie and found that repeated viewing facilitated children's explicit comprehension of the central character in the animated movie.

In the marketing context, it has been argued that repeated viewing gradually makes initially incomprehensible stimuli understandable, increasing children's level of engagement and their ability to process information about the story (Skouteris et al., 2007). The first empirical study to investigate the effects of repeated viewing on young children's comprehension of television was conducted by Sell, Ray, and Lovelace (1995) who found that repeated viewing of the 'Sesame Street' video tapes improved pre-school children's ability to comprehend the plot (Sell et al., 1995; Skouteris & Kelly, 2006). In psychology research, repeated viewing of a video about a burglary created high confidence among viewers in their memory about the suggested events of the video (Battista, Mangiulli, Herter, Curci, & Otgaar, 2020; Zaragoza & Mitchell, 1996). Cox and Cox (2002) examined the effect of repeated exposure on consumers' aesthetic preferences and how this effect may vary depending on the nature of a product's visual design. The results suggested that preferences for visually complex product designs tend to increase with repeated exposure, while preferences for visually simple product designs tend to decrease with repeated exposure. Furthermore, repeated viewing of television programs facilitates children's comprehension and understanding on learning content (Skouteris et al., 2007). According to Huston and Wright (1983), repeated viewing makes initially incomprehensible stimuli gradually understandable and by increasing the level of engagement and ability to interpret information among people. When considering the 2D and 3D videos, repeated exposure was found to affect the visual comprehension memory due to higher number of eye movements (Li et al., 2016; Cockburn & McKenzie, 2002).

Consequently, this study investigates the consumer visual memory of 360-degree video advertisements and standard video advertisements under two main conditions namely, single viewing and repeated viewing, which leads to the formation of the two gaps as shown in Table 2.6

Table 2.6: Summary of studies on the effects of 360-degree video advertisements

Study Gap	Research Question
Limited research focused on consumer visual memory of 360-degree and standard video advertisements under single viewing conditions.	RQ 1: What is the differential effect of 360-degree versus standard video advertisements on visual memory under single viewing conditions?
Limited research focused on consumer visual memory of 360-degree and standard video advertisements under multiple viewing conditions.	RQ 2: What is the differential effect of 360-degree versus standard video advertisements on visual memory under repeated viewing conditions?

The ability to recall information in the form of visual images requires a strong theoretical underpinning with special reference to social cognition stages (Andreopoulos & Tsotsos, 2013; DiCarlo & Cox, 2007). Therefore, by considering the applicability of the human social cognition process, the theory of social information processing developed by Wyer (2003) was selected as this theory focuses on how people process, store and apply information about other people and social situations through theoretical constructs directly relating to human social cognition processes such as comprehension, memory storage and retrieval, inference, judgement, decision making, and output generation (Wyer & Kardes, 2020).

2.6 Investigating visual memory through the lens of social psychology

In the current literature, there are three theories of social information processing which are essentially different. The first theory was developed in 1978 by Salancik and Pfeffer. This theory explained that social information can affect perceptions, attitudes and behaviours (Zalesny & Ford, 1990) and provided a basis for predicting social influences on employee cynicism specifically focusing on human resource management. Forty years (40) years ago, Salancik and Pfeffer developed the social information-processing perspective of job attitudes which differentiated the existing human resource management theories such as Maslow's Hierarchy of Needs Theory and Realm Expectancy Theory. Since needs-based theories view attitudes as a function of personal characteristics, Salancik and Pfeffer (1978) proposed that attitude and needs are cognitive aspects resulting from the processing of information about the

previous experience and behaviours in a social context (Zalesny & Ford, 1990). However, this theory did not provide theoretical assumptions considering any other social cognition stage (such as memory, information retrieval, comprehension, decision making) other than job attitude formation.

The second theory, developed in 1980 by Wyer and Srull provided a metaphorical representation on how people process, store and apply information about other people and social situations (Wyer & Srull, 1986). This theory showed how the comprehension of information occurs at each stage of cognitive activity; for example, the computation of a subjective judgement, transformation of this judgement into a response, goal stimulation process based on the existing information, memory storage and retrieval processes. It also suggested theoretical assumptions for each social cognition stage of information processing (Wyer & Srull, 1986). This is the only theory which provided a metaphorical diagram, representing the stages of social information processing. Therefore, many researchers have used the theoretical constructs of this theory to investigate social cognition areas such as comprehension, organisation of information in memory, inference and integration, and the generation of overt responses in advertising research (Van Lange et al., 2012).

The third theory was developed in 1992 by Joseph Walther. It can be classed as an interpersonal communication theory. This theory explains how people interact and develop relationships online, without non-verbal cues in a computer-mediated environment (Walther, 2008). This is an interpersonal communication theory that suggests online relationship development might require more time than traditional face-to-face relationships. This theory facilitates the exchange of personal and relational information which helps to develop personal relationships and impressions to manage online interpersonal relationships. It has three assumptions which are, 1) computer-mediated communication offers unique opportunities to connect with people, 2) the online communicators deliver favourable impressions of themselves to others and 3) online interpersonal relationships need more time and more accumulated messages to develop intimacy levels similar to face-to-face interpersonal relationships (Walther, 2011). However, Walther's theory did not focus on any social cognition stages such as memory, information retrieval, comprehension, decision making) other than interpersonal communication. Table 2.7 presents the similarities and differences of the three different social information-processing theories.

Table 2.7: Similarities and differences of the three theories

Theory	Similarities	Differences
Social information-processing theory of (Salancik & Pfeffer, 1978)	Social psychology theory Focused on the social cognition stage of job attitude formation	This theory only contributes to predict social influences on employee cynicism
Social information-processing theory of Wyer (1980)	Social psychology theory Focused on the social cognition stage of memory, information retrieval, comprehension, decision making and goal stimulation	This theory provided a metaphorical representation considering all the social cognition stages
Social information-processing theory of (Walther, 1992)	Focused on the social cognition stage of interaction	Interpersonal communication theory Focused on the development of interpersonal relationships in computer-mediated environment

The applicable theory for this study is the social information processing by Wyer and Srull (1980) as this is the only theory which provides a metaphorical representation considering all the social cognition stages involved in the processing of information in the human mind (for example: memory, information retrieval, comprehension, decision making). The social information-processing theory of Salancik and Pfeffer (1978) focused only on the social cognition stage of attitude formation, while the social information-processing theory of Walther (1992) focused only on the development of interpersonal relationships in a computer-mediated environment.

2.6.1 A Theory of Social Information Processing by Wyer and Srull (1980)

A theory of social information processing by Wyer and Srull in 1980, was revised many times (in 1986, 1989 and 2003) (Van Lange et al., 2012). The initial version of this theory consisted of a conceptualization of information processing among human beings. This is a social psychology theory that focuses on several aspects of the social cognition stages of human beings. For example, it focuses on how people process, store and apply information about other people and social situations (Wyer & Martin, 1986). Moreover, this theory is also a useful theoretical framework for conceptualizing and integrating the deliberate and automatic processes that occur at different stages of cognitive functioning, including comprehension,

memory storage and retrieval, inference, judgement, decision making, and output generation (Van Lange et al., 2012).

According to Wyer (2003), until the mid-1970s, there was no interest among researchers to develop a conceptual framework by combining the social cognition stages of human beings such as comprehension, memory storage and retrieval, inference, judgement, decision making, and output generation. Consequently, a new theory was developed by Thom Srull who was a graduate at the time at University of Colorado (Van Lange et al., 2012). His team which consisted of several experts in the field of social psychology worked on a book chapter related to a person's memory. During the process, he realised that there was no theory or conceptual framework that focused on the reason one type of information took priority over another in human memory functioning (Wyer, 2003).

Further he realised that human memory and judgement is not a single process, but rather a combination of several social cognition processes including comprehension, memory storage and retrieval, inference, judgement, decision making, and output generation. As mentioned by Lange et al. (2011), this task became more challenging than expected as they had to develop the first metaphorical flow diagram, consisting of a number of processing units (each pertaining to a different stage of processing) and memory storage units, all of which were interconnected by pathways that indicated the transmission of information from one unit to another. As a result, this theory was modified quite a few times (in 1980, 1986, 1989 and in 2003) as mentioned before.

The first draft of the model which was produced in 1980 was updated numerous times to account for new phenomena and to eliminate doubts (Wyer & Martin, 1986). The 1989 version of the model contributed to the existing research by identifying new empirical issues in the field of social psychology (Wyer & Martin, 1986). This aspect is further discussed in the next few sections in chapter 2. Some of the major contributions are: theorising on the antecedents of humour elicitation (Wyer & Collins, 1992), the role of traits, group stereotypes, and specific behaviours in the cognitive representation of persons (Wyer & Martin, 1986), the representation of event sequences (Wyer et al., 2002) and the most recent, conducted by Jiang (2008), which tested the comprehension of information and information-processing units on visual appeals in advertising. However, the original Wyer and Srull (1989) model was not

successful in comprehending the information about familiar persons and events without substantially modifying its assumptions. This challenge led to the conceptualisation of the most recent version in 2003 (Van Lange et al., 2012).

The response of the humans to the information they receive can often be conceptualised as a result of an arrangement of mental operations (Wyer & Kardes, 2020). The theory of social information processing by Wyer (2003) provides a framework by integrating the phenomena identified in social cognition areas such as comprehension, organisation of information in memory, inference and integration, and the generation of overt responses of social information-processing research (Van Lange et al., 2012). The conceptualization of information processing which is developed in this conceptual framework is multifaceted (Van Lange et al., 2012). This theory consists of three major memory units, four special purpose processing units, and an executor that directs the flow of information between these units (Van Lange et al., 2012). The three major memory units include the Workspace, Permanent Storage unit and Goal Specification Box (Van Lange et al., 2012). The four processing units include the Comprehender, Encoder, Inference Maker and Response Selector (Van Lange et al., 2012).

2.6.2 Theoretical constructs

The system architecture consists of rectangles that represent the storage units and ovals or circles that represent processing units (Van Lange et al., 2012), (refer to Figure 2). Arrows denote the direction of transmission of cognitive material between these units (Van Lange et al., 2012). The system architecture consists of an input information section, sensory store, comprehender, workspace, executor, permanent storage unit, goal specification box, encoder, inference maker and response selector (Van Lange et al., 2012). These theoretical constructs were further elaborated under section 1.2, definitions and terms in chapter 1.

Input information

First, the input information enters to the system which defines the raw data. These input information transfer to the sensory store unit which divide raw input information based on the five sensors of the human beings such as sight, smell, taste, touch, and hearing (Van Lange et al., 2012).

Sensory Store

This is a storage unit which divides raw input information based on the five sensors of the human beings as mentioned above (Wyer, 2003).

Comprehender

The comprehender is the initial processing unit of this model that interprets input information in terms of general verb, noun, and adjective concepts. Input information encoded by the comprehender to semantic concepts will then be stored in permanent storage unit and in the first section of the workspace unit (Wyer, 2003).

Workspace

The short-term memory is represented through Workspace Unit (Van Lange et al., 2012). This unit consists of four sections (Please refer Figure 2). The first section of the workspace unit stores *information that has recently been transmitted to it by the comprehender*. The second section of the workspace unit stores *information acquired by the processing unit of encoder*. The third section of the workspace stores *information acquired by the processing unit of inference maker*. The fourth section of the workspace stores *information acquired by the processing unit of response selector* (Van Lange et al., 2012; Van Lange et al., 2012; Wyer, 2003). Further, information is retained in the Workspace if it is likely to be involved in attaining goals that exist at the time (Wyer, 2003). However, if an objective has been attained, or if information has not been employed for some time, the workspace may be cleared to facilitate the identification of material that is of more immediate relevance (Van Lange et al., 2012). In this case, features of the original input information that have not been involved in higher order goal directed processing (and, therefore, are not contained in a knowledge representation that is transmitted to Permanent Storage) are irretrievably lost (Wyer, 2003).

Executor

Contrasting to comprehender, executor should operate consciously. Executor does not act as either a storage unit or a processing unit. It acts as a distributor of the information among the storage and processing units which directs the flow of information (Wyer, 2003). Executor operates through the instructions taken from the storage units (workspace, permanent storage unit and goal specification box) and processing units (encoder, inference maker, response

selector) (Van Lange et al., 2012). The consciousness resides in the Executor as it has access to the information transmitted by the comprehender to the workspace and to information in permanent storage. It also transfer the information which will stimulate goals in the human brain to goal specification box (Van Lange et al., 2012). Finally, executor is responsible of the output generated by the special purpose processing units of encoder, inference maker and response selector. Nevertheless, the activities of the Comprehender and other processing units, which are governed by procedures that are stored in the libraries of these units, are not subject to awareness (Van Lange et al., 2012; Van Lange et al., 2012; Wyer, 2003).

Permanent Storage Unit

The Permanent Storage Unit represents the long-term memory of the human brain (Wyer, 2003). The permanent storage unit assumes that each mental representation formed as a result of the information with unique memory trace. Therefore, this information can enter to the system in the initial stage (before processing via comprehender) or through later stage (after processing through the comprehender) (Hintzman, 1986).

Goal specification box

This unit act as a temporary storage unit which activate the goals of the human brain using the processed information in the system (Van Lange et al., 2012). The procedures or goal schemas in this unit will be activated based on the information stored in the permanent storage unit and workspace unit (Van Lange et al., 2012). According to Wyer and Kardes (2020), Goal specification Box has the capacity to store more than one goal schema at one time. This further, shows that system can stimulate more than one goal in the human brain simultaneously (Van Lange et al., 2012).

Encoder

The processing unit of encoder or the organiser is responsible to extract the high-order interpretations of the information received through executor and forms mental representations consisting of several features (Van Lange et al., 2012). In the theory of social information processing by Wyer 2003, he named four special processing units as each is responsible to perform a specific function. The first one is comprehender, second one is encoder, third one is

inference maker and last one is the response selector (Wyer & Martin, 1986). The encoded information store in the second section of the 'Workspace' as presented in Figure 2.

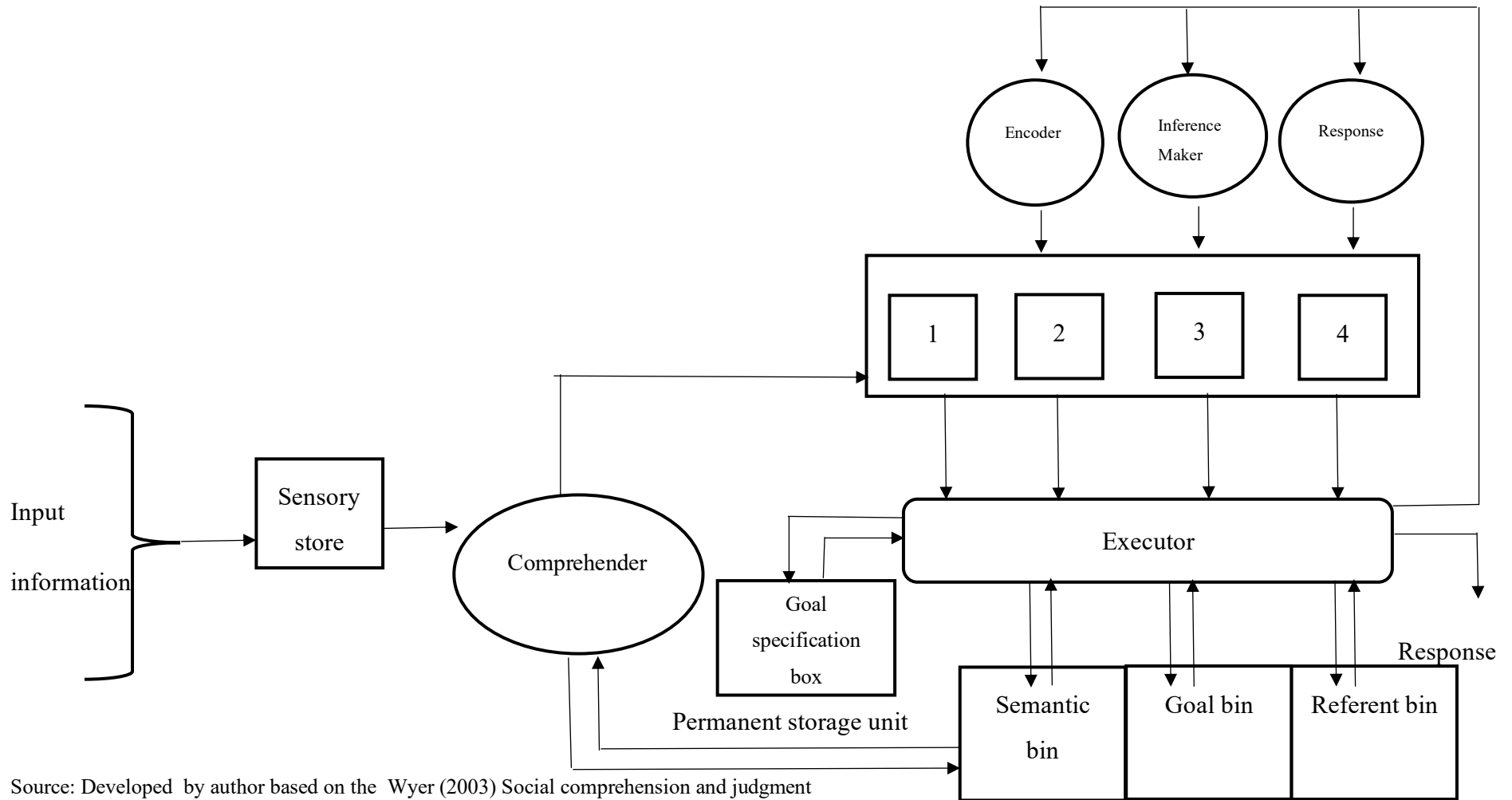
Inference maker

The next special purpose processing unit of inference maker combines the implications of information to form a subjective judgement (Van Lange et al., 2012 et al., 1991; Van Lange et al., 2012; Wyer, 2003). This unit will extract information that are useful to judge the product based on the given information of the advertisement. Subsequently, this information which are applicable to judge the product will be stored in the third section of the workspace unit as showed in Figure 2.

Response selector

The last special purpose processing unit is response selector which transforms subjective inferences into an overt or meaningful response. This could be a behavioural decision, a judgement provided through a category response scale or a verbal response (Wyer, 2003). The information which leads the ultimate response of the person will then be stored in the fourth section of the Workspace which leads to the final consumer response. Moreover, Figure 2.2 demonstrate the metaphorical representation of this theory in which rectangles represents the storage units and ovals or circles representing processing units and arrows denoting the direction of transmission of cognitive material between these units.

Figure 2. 2: Metaphorical representation of social information-processing theory of Wyer and Srull (1980)



2.6.3 Theoretical contribution over the years

The theory of social information processing by Wyer and Srull in 1980 is the first comprehensive theoretical formulation of the way people use information they receive from social environments to make judgements and behavioural decisions (Wyer & Srull, 2014b).

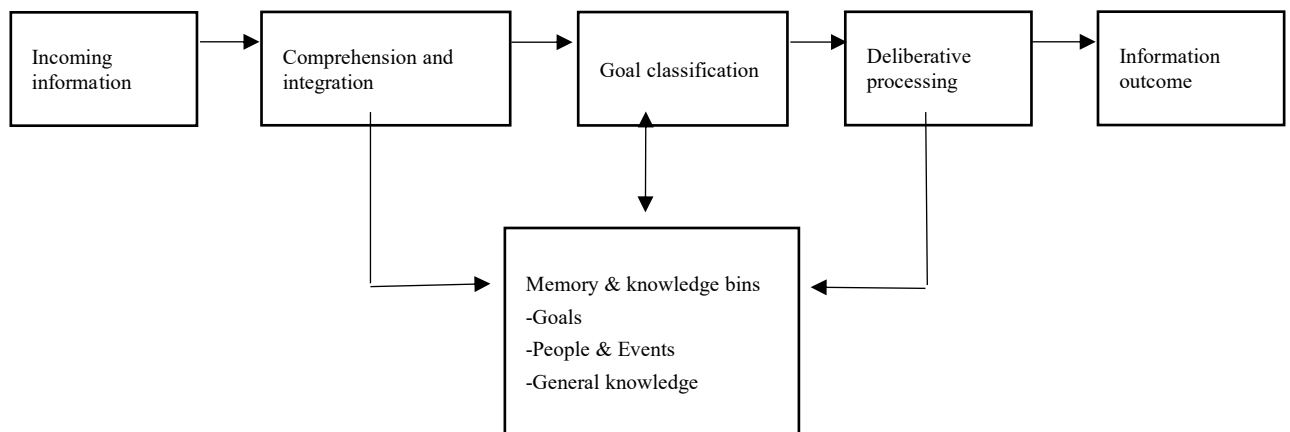
1980 to 1986 version

The social information-processing theory developed in 1980 by Wyer and Srull, was iterated many times respectively in 1980 (McCarthy et al., 2018); 1986 (Van Lange et al., 2012); 1989 (Van Lange et al., 2012); 2003 (Wyer, 2003) and 2020 (Wyer & Kardes, 2020). Srull and Wyer's (1980) model demonstrated that different stimuli, which are created from the information, lead to different behavioural outcomes (McCarthy et al., 2018; Srull & Wyer, 1986). The theoretical constructs of this model contributed to social psychology, by identifying that more hostility-related stimuli lead to more hostility-related behaviours (McCarthy et al., 2018). This assumption of Srull and Wyer had a significant influence on the field of social cognition after 1979.

Srull and Wyer proved this fact through two experiments (McCarthy et al., 2018). First, they tested how much "activation" of a primed mental representation (operated by exposing people to one or more of the priming stimuli) should be associated with the extent to which social judgements are affected. Secondly, they tested the activation of primed mental representations which decline with time, thereby reducing the influence of the primers on subsequent social judgements (McCarthy et al., 2018). Further et al. (1983) analysed the goal classification concept and found that despite the information presented, behavioural changes (such as aggression) could occur due to unnecessary goal activation, meaning that conscious and unconscious information processing also should be included in the model.

As a result, in their 1986 version, conscious and unconscious information processing was further included by adding the memory and knowledge bin concept (Van Lange et al., 2012). Since conscious and unconscious information processing was identified as a vital element, this theory further elaborated that conscious awareness affects subsequent perceptions (Lord, 1985). Figure 2.3 shows the model developed during 1980 to 1986.

Figure 2. 3: Cognitive processing model



Source: (Wyer & Srull, 1986)

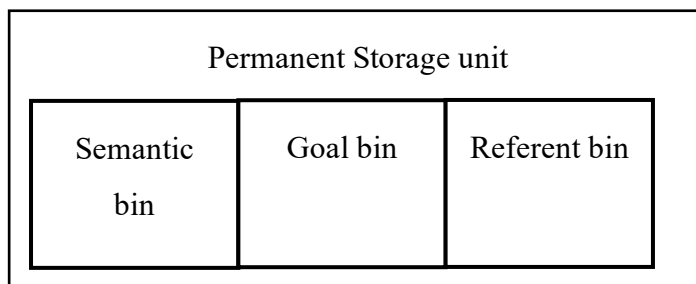
Developed by author based on Wyer & Srull, (1986)

In the 1980 model, the theoretical constructs contributed to social psychology by identifying that more hostility-related stimuli lead to more hostility-related behaviours (McCarthy et al., 2018). Further, Carver et al. (1983) analysed the goal classification concept and found that despite the information presented, behavioural changes (such as aggression) could occur owing to unnecessary goal activation. Lynch, Marmorstein, and Weigold (1988) identified the recall ability of the attributes and the goal stimulation process through product evaluations using the theoretical assumptions presented in the ‘Goal Classification’ unit.

1989 version

As discussed above, Srull and Wyer developed the first metaphorical representation (Figure 2) of the theory considering that mental routines of a person may include many different social cognition stages such as: (1) attentional and perceptual processes, (2) encoding and organizational processes, (3) storage and retrieval processes, (4) higher order integration and judgement processes, (5) response selection processes, and (6) affective and emotional reactions (Srull & Wyer, 1986). Moreover, in the 1989 version of the model, the permanent storage unit (which represents long-term memory) was divided into three segments (Van Lange et al., 2012). These three elements were termed “storage bins” as shown in Figure 2.4 (Van Lange et al., 2012).

Figure 2. 4: Permanent storage unit in 1989 version



Developed by author based on Lange et al. (2011)

The permanent storage consisted of several content-addressable “storage bins.” Firstly, the semantic bin contains the general semantic concepts transferred by the comprehender in the early stage of input information processing (Van Lange et al., 2012). Secondly, the goal bin contains goal-schemas that are retrieved by the executor for use in guiding goal-directed activity (Van Lange et al., 2012). The remaining information store is the referent bin which includes material relating to specific referents of goal-directed processing such as names of the people, objects, events and situations (Van Lange et al., 2012).

In the 1989 model, theoretical constructs such as ‘Goal Specification Box’, ‘Comprehender’, ‘Encoder’ and ‘Permanent Storage Unit’ were tested in various settings including psychology, education, and marketing. The role of control processes and structural constraints in models of memory and social judgement has been examined by Srull and Wyer, (1983) using the theoretical assumptions of the ‘workspace’ unit, through six experiments. Their study contributed to the education sector by identifying several issues contributing to information retrieval and memory storage processes among students. Further, Potts and Swisher, (1998) examined the effects of televised safety models on children's willingness to take physical risks and their ability to identify injury hazards in common situations using the theoretical assumptions presented in the processing unit of ‘comprehender.’ Using three studies, Stapel, Koomen, and Velthuijsen (1998) demonstrated that the direction of context or information accessibility effects on consumer judgement is dependent on the comparison relevance and distinctness of the activated information. Stapel et al. (1998) utilized the theoretical assumptions of the processing unit of ‘inference maker’ and ‘response selector’ to evaluate the impact of accessible information on consumer judgements.

The most common issue in advertising research over past decades was the failure to link memory for information presented in an advertisement and product evaluation (Srull, 1986). For example, Srull (1986) investigated consumer memory for information presented in an advertisement and judgement based on product evaluation using the theoretical assumptions of the memory storage units and processing units of the theory. Similarly, Hoch and Ha (1986) examined the influence of advertising on how and what consumers learn from product experience by testing the retrieval process of the theory. Additionally, Carver et al. (1983) suggested that the process of viewing a model's behaviour involves the activation of an interpretive goal schema. This study analysed the goal specification box concept which includes goal schemas in Wyer and Srull's (1989) model. Around the same time, Yi (1991) assessed the influence of contextual priming on advertising effects thereby affecting the overall impact of the advertisement through theoretical assumptions on memory storage units, comprehender and encoder. Schmitt (1994) used two experiments to show that the interpretation and evaluation of the visual component of an advertisement are determined in part by a primed context. However, this study did not use the theoretical assumptions on recalling the past information, but instead used the theoretical assumptions on memory units in Wyer and Srull's 1989 model.

In addition to the 'Goal Specification Box' and 'Comprehender', several studies examined memory using the theoretical assumptions presented in 'Permanent Storage Unit' and 'Sensory Store' (Van Lange et al., 2012). For instance, eye movements are important indicators of visual attention. Therefore, Wedel and Pieters (2000) developed a model through 'Permanent Storage Unit' theoretical assumptions presented in Wyer and Srull's (1989) theory. This study identified that eye fixations on print advertisements lead to memory for the advertised brands. The model is adjusted to eye-movement data that are collected during exposure of subjects to advertisements in magazines, and subsequent recognition of the brand in a perceptual memory task (Wedel & Pieters, 2000). Miall (1988) identified a specific way in which contextual priming influences advertising effects using the theoretical assumptions on information retrieval from Wyer and Srull's (1980) model. It is proposed that prior exposure to contextual factors activates certain product attributes in consumers' knowledge structure and subsequently increases the likelihood that they interpret ambiguous product information in terms of these activated attributes, thereby affecting the overall impact of the advertisement (Miall, 1988).

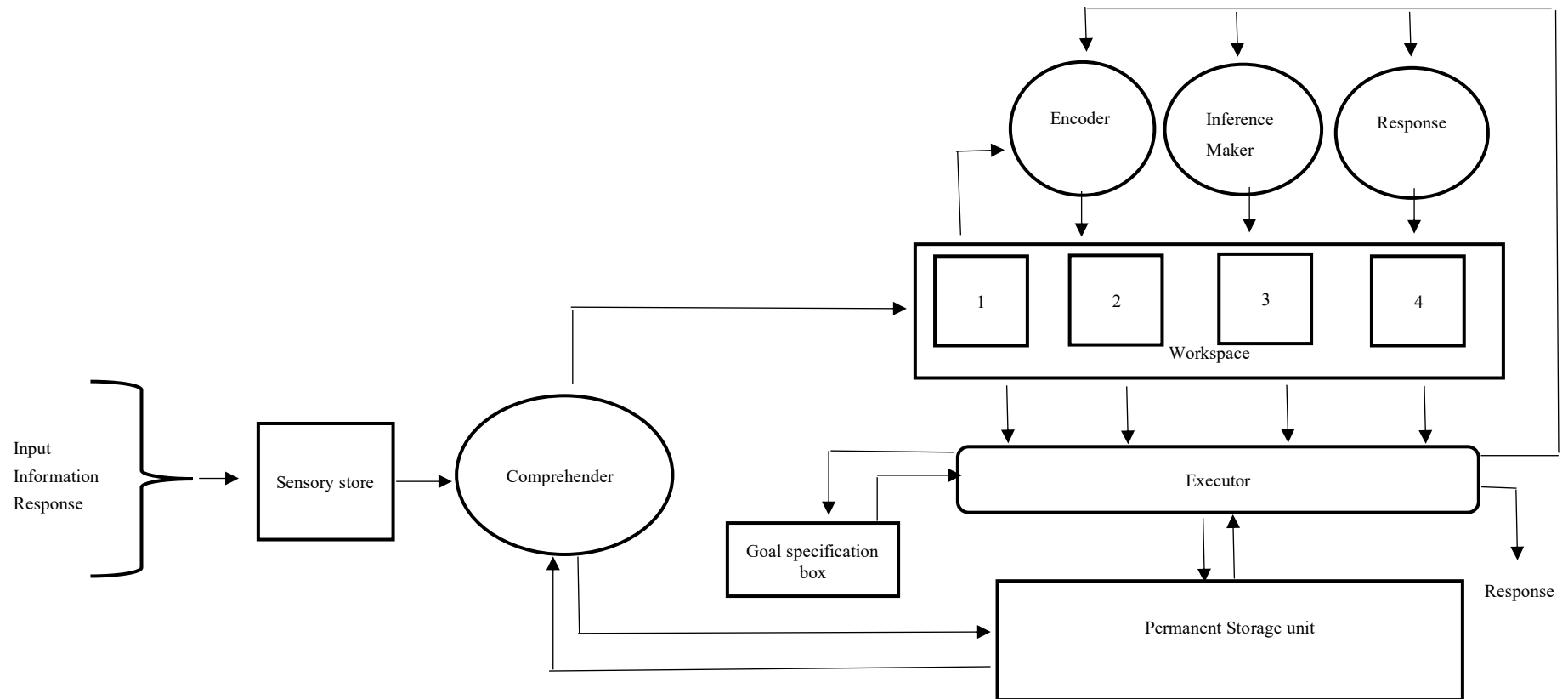
Wyer and Unverzagt (1985) discussed the effects of instructions to disregard information on its subsequent recall and making judgements in terms of the theoretical assumptions on a person's memory. The theoretical assumptions of the 'Permanent Storage Unit' which represents the person's memory have been investigated on a number of targeted people by Srull and Wyer (1983) under the topic of behavioural information.

Even though the 1989 version's theoretical assumptions have been used to investigate various knowledge gaps in a variety of phenomena (Wyer & Srull, 1989), several issues were identified regarding the theoretical assumptions of the permanent storage unit and comprehender (Van Lange et al., 2012). Firstly, the comprehender had access only to the semantic bin in Permanent Storage (please refer to Figure 2). This indicates that new stimulus information is first stored as general semantic concepts and that referent-specific concepts are not applied until a later stage of processing (Van Lange et al., 2012). Secondly, the 1989 model failed to consider the role of visual imagery. Though the comprehender was supposed to process information in different sense modalities, the role of visual imagery in comprehending verbal information was disregarded (Van Lange et al., 2012).

2003 version

Consequently, in the 2003 version, it was assumed that the comprehender had access to the permanent storage unit directly considering that some people take decisions owing to the information stored in long-term memory based on their previous experiences (Van Lange et al., 2012). While the 1989 model failed to consider the role of visual imagery, the 2003 model revised the assumptions of the comprehender by adding that comprehended information includes the feature of the mental images, objects and even verbal statements whose features are spatially and temporally organised (Van Lange et al., 2012). Further, the 2003 version removed the storage bin concept of the permanent storage unit. Figure 2.5 depicts the 2003 version of the model.

Figure 2.5: Metaphorical representation of the social information-processing theory of Wyer's (2003) model



Source: Developed by author based on Wyer (2003), Social comprehension and judgement: The role of situation models, narratives, and implicit theories: Psychology Press

Theoretical constructs such as ‘Goal Specification Box’, ‘Comprehender’, ‘Encoder’ and ‘Permanent Storage Unit’ were tested in various settings including psychology, education, and marketing in the 2003 version of the model (Van Lange et al., 2012). The most recent study on marketing was conducted by Jiang (2008). This study tested comprehension of information and information-processing units on visual appeal in advertising through the theoretical assumptions presented in the processing unit of comprehender. Wyer et al. (2008) tested the visual and verbal processing strategies in comprehension and judgement in print advertisements through theoretical assumptions of the processing unit of comprehender. Furthermore, Adaval et al. (2007) assessed the impact of pictures on narrative-and list-based impression formation by using the comprehension and integration processing units of the model regarding a person’s behavioural descriptions.

Similarly, Lee and Faber (2007) explored the conditions under which product placement in an on-line game will be noticed and remembered from the perspective of the limited-capacity model of attention. Findings indicated that location of brand messages in the game, game involvement, and prior experience in playing games influence brand memory. Brand memory was investigated using the theoretical constructs presented in Wyer and Srull’s (2003) model. Since products are rarely described completely, consumers often form interpretations that go beyond the information provided by the advertiser (Kardes et al., 2004). Further, Kardes et al. (2004) reviewed research on the processes, bases, and the judgement contexts in which interpretations are formed on products and identified that most basic processes include induction (inferences from specific instances to general principles) versus deduction (inferences from general principles to specific instances). Additionally, stimulus-based inferences are formed on-line (as information is encountered) using situationally available information, whereas memory-based (or theory-based) inferences are formed using prior knowledge and experience (Kardes et al., 2004). Moreover, Dou et al. (2010) investigated brand positioning strategies using search engine marketing by means of the Wyer (2003) model’s assumption on activation of goal schemas.

Furthermore, the assumptions in Wyer and Srull’s (2003) model been used to develop new models on impression formation (Klein & Loftus, 1990). Similarly, Wyer and Srull (1986) emphasised the role of prior knowledge and the goal-directed nature of social information processing and presented a model of how the human cognitive system operates in its natural

social context. Furthermore, Patterson (1995) developed a parallel processing model of nonverbal communication that emphasises the interdependence of behavioural and person perception processes from a functional perspective on social interaction by considering the theoretical assumptions of Wyer and Srull's (1986) model. In 2010, Haynie et al. contributed to business research by developing a new model to investigate the foundations of an 'entrepreneurial mindset' described by scholars as the ability to sense, act, and mobilise under uncertain conditions by considering the theoretical assumptions of Wyer's (2003) model. With regard to corporate advertising and decision making, Biehal and Sheinin (1998) proposed a conceptual framework with a set of research propositions, also using Wyer and Srull's (1989) model. Mussweiler and Strack (1999) proposed a model named as 'Selective Accessibility', using the information retrieval theoretical assumptions presented in Wyer and Srull's (1989) model.

2020 version

The most recent study of Wyer and Kardes (2020) was a selective review of the theory of social information processing. This version identified a few modifications to some of the assumptions of comprehension, storage, and retrieval process in Wyer (2003) model. Firstly, the processes that mediate goal directed behaviour develop from comprehension of information to a generation of a clear response. This information processing could occur in any different stage and could be either automatic or deliberative (it is a mixture of both automatic and deliberative processes). Therefore, the assumption on goal-directed processing of information (Goal specification box) cannot be conceptualised and could be misleading (Wyer & Kardes, 2020).

Secondly, 'Executor' (which acts as a distributor of the information among the storage and processing units which direct the flow of information) transfers the information to the special purpose processing units such as encoder, inference maker and response selector (Wyer & Kardes, 2020). The automatic processes involved in the special purpose processing units such as encoder, inference maker and response selector must be further conceptualised, for instance, the sequence of steps, the automatic processes etc. (Wyer & Kardes, 2020). Therefore, this study will use the workspace unit theoretical assumptions of Wyer (2003) version to explore the differential effects of consumer visual memory on 360-degree and standard video advertisements.

Table 2.8: Summary of the studies based on the evolution of the theoretical application

Source	Key Focus	Method	Context	Theoretical constructs	Theoretical implications
1980-1989					
Srull and Wyer (1983)	Examined the role of memory and social judgement for cognitive activities that lead to recall and judgments.	Experiments /Interviews	Social psychology	Short-term memory through workspace unit of Wyer and Srull's (1980) model	The theoretical concept of 'workspace' is examined for structural properties and a variety of control processes that govern its operations on short-term memory recall and social judgement among people.
Srull and Wyer (1989)	A theoretical model of a person's memory and judgement has been developed through this study .	Experiments	Behavioural psychology	Recalling and judgement through Srull and Wyer (1989) model	The model developed accounts for many factors that are known to affect the recall of social information, the making of interpersonal judgements, and the relation between what is recalled and the judgements that are made.
Wyer and Srull (1986)	Presents a model of how the human cognitive system operates in its natural social context.	Experiments	Social psychology	Information retrieval through Srull and Wyer's (1989) model	The model stresses numerous sorts of social judgements and affective reactions, memory and behavioural decision making, on the output end.

Wyer, Bodenhausen, and Srull (1984)	Developed a model to show how characteristic and behavioural information is structured in memory among people.	Experiments	Social psychology	Recalling and judgement through response selection and inference maker—Srull and Wyer's (1989) model	This model shows how characteristic and behavioural information is structured in memory, and how it is used to predict both recall and recognition of information about people and groups.
Srull (1986)	A general model of the relationship between recall and judgement is presented, along with various empirical tests	Experiments	Advertising	Long-term memory through permanent storage unit Srull and Wyer's (1989) model	Findings contribute to the advertising research by providing a consistent relationship between memory for information presented in an advertisement and product evaluation.
Srull (1983)	Memory for behavioural information was tested under settings in which the number of target people and the number of behaviours associated with each target person were both altered at the same time.	Experiments	Social psychology	Recalling through goal specification box—Srull and Wyer's (1989) model	The role of self-generated retrieval cues and conceptually distinct types of retrieval are discussed.

Hoch and Ha (1986)	Examined the influence of advertising on how and what consumers learn from product experience.	Surveys	Advertising	Information retrieval process through Srull and Wyer's (1989) model	First experiment showed that when consumers have access to unambiguous evidence, judgements of product quality are dependent only on the objective physical evidence and unaffected by advertising. The second experiment showed that advertising influenced quality judgements by affecting the encoding of the physical evidence; retrieval of ad-consistent evidence also appeared to occur, though to a lesser degree.
Lynch et al. (1988)	Investigated conditions that led consumers to use recalled prior evaluations versus recalled brand attribute information as inputs to brand choices.	Experiments	Advertising	Goal schemes been evaluated through Goal specification box	Consumers use a potential input to make a choice if it is accessible in memory and if they perceive it as more diagnostic than other accessible potential inputs.
1990-2009					
Klein and Loftus (1990)	Examined how people represent information about others in memory when they form impressions.	Experiments	Personality and Social Psychology	Information retrieval through Srull and Wyer's (1989) model	The theoretical concepts of Srull and Wyer's (1989) model were used to examine the different behaviours due to differences in memory and impression formation.

Adaval et al. (2007)	Examined the impact of pictures on narrative and list-based impression formation.	Experiments	Behavioural psychology	Comprehension through Srull and Wyer's (1989) model	The influence of pictures on comprehension and integration is examined using theoretical concept of Comprehender in Srull and Wyer's (1989) model.
Albarracín and Kumkale (2003)	Three studies examined the implications of a model of affect as information in persuasion.	Experiments /Interviews	Personality and Social Psychology	Information retrieval Srull and Wyer's (2003) model	When message recipients think moderately, an extraneous affect may have an impact because they recognise their emotional reactions as potential criteria but fail to dismiss them as irrelevant.
Potts and Swisher (1998)	Examined physical risks and injury hazards of televised safety models on children's ability to identify injury hazards in common situations.	Experiments	Paediatric Psychology	Long-term memory through permanent storage unit Srull and Wyer's (1989) model	The goal of this study was to see how broadcast safety models affected children's willingness to take physical risks and their capacity to recognise injury threats in everyday scenarios using the theoretical constructs of Srull and Wyer's (1989) model.
Wedel and Pieters (2000)	The frequency of eye fixations was recorded for each consumer and advertisement with infrared eye-tracking methodology.	Experiments	Advertising	Accumulation of information in memory and effect of eye fixations in Srull and Wyer's (1989) model	Across the two magazines, fixations to the pictorial and the brand systematically promoted accurate brand memory, but text fixations did not. Brand surface has a particularly prominent effect. The more information that is extracted from an ad during fixations, the shorter the latency of brand memory is and when subjects are

					exposed to an ad later, they tend to identify it better.
Lee and Faber (2007)	Explored the conditions under which product placement in an on-line game will get noticed and be remembered from a perspective of the limited-capacity model of attention.	Experiments	Advertising	This study used Wyer's (2003) model component of experience (goal specification box) and did not test other memory units.	Findings also demonstrate that the degree of congruity between the product category of a brand and game content influences brand memory such that highly incongruent brands are better recalled than either moderately incongruent brands or highly congruent brands.
Jiang (2008)	Examined influence of comprehension of information on visual perspectives.	Experiments	Advertising	This study used Wyer's (2003) model comprehension theoretical assumptions	Visual processing strategy and verbal processing strategy can be initiated either as a chronically accessible method or through situational factors.
Wyer et al. (2008)	Two different processing strategies were identified to understand integration of information.	Experiments	Consumer psychology	This study examined comprehension and integration processing units of Wyer's (2003) model	Two different processing strategies are postulated to underlie the integration and activation of information in daily life: (a) chronic individual differences in the disposition to process information visually vs. verbally (b) situational factors that influence the relative accessibility of these strategies in memory, and (c) characteristics of the information to be processed.

2010- Present

Haynie, Shepherd, Mosakowski, and Earley (2010)	Developed a framework to investigate the foundations of an ‘entrepreneurial mindset’ based on ability to sense, act, and mobilize under uncertain conditions.	Experiments /Interviews	Behavioural psychology	Information retrieval Srull and Wyer’s (2003) model	Integrated several streams of literature from social and cognitive psychology toward a model that specifies entrepreneurial metacognition as situated in the entrepreneurial environment.
Ali (2021)	The effect of Turkish–Kurdish political connections on Kurdish consumer behaviour towards Turkish items was explored.	Surveys	Behavioural psychology	Accumulated knowledge of the consumer in Wyer and Kardes (2020)	Product judgement and boycott participation have a major impact on purchase readiness. Boycott participation and boycott motivation have a considerable influence on purchase aversion.
Demsar, Sands, Rosengren, and Campbell (2022)	The impacts of the two elements of ad creativity: originality and appropriateness, were studied separately.	Surveys	Consumer psychology	Accumulated knowledge of the consumer in Yeung and Wyer (2004)	The findings show that under a crisis, creativity operates differently, with originality and appropriateness having different effects on consumers.
Onal and Kumkale (2021)	In a performance evaluation environment, researchers investigated the effectiveness of a source-monitoring approach in minimising	Experiments	Consumer psychology	Forming impressions and expectancies through using the assumptions of Wyer’s (2003) model	Improvements in recognition memory were attributed to a greater reliance on specific memory traces in the training condition of the participants.

	halo error and negative bias.				
Wyer and Kardes (2020)	Authors proposed a theoretical framework for integrating these processes, and a survey of representative research and theory that may be conceptualised using this framework.	A selective review and conceptual framework	Social psychology	Information retrieval in Srull and Wyer's (2003) model	Although dual-process models have been applied to the cognitive operations that underpin consumer judgement, they are often restricted in their capacity to capture and characterise the processes that occur at different levels of cognitive activity.

Table 2.8 further shows that it is necessary to use proper theoretical constructs to investigate the different social cognition stages appearing under consumer psychology research including the investigation of short-term memory through ‘workspace unit’, interpersonal judgements through ‘goal specification box’ and long-term memory through ‘permanent storage unit’. The sampling techniques, data collection methods, and development of the interview questions (based on the themes identified through the literature) will be presented in chapter 3.

2.7 Conclusion

In conclusion, this study contributes important findings to current research by exploring consumer visual memory in 360-degree video version advertisements and standard video advertisements through the lens of a social psychology theory. As mentioned above, this is the first study to compare the consumer visual memory of 360-degree video advertisements and standard video advertisements using a social information-processing theory. This chapter starts with a detailed discussion on background of advertising followed with an overview on digital video advertising. This section further discusses digital video advertising platforms including 360-degree video advertisements. Next section provides a categorisation of existing literature on 360-degree videos and consumer visual memory. The first group of studies on the 360-degree video advertisement characteristics focused on the innovative features of the video advertisements such as storytelling techniques, immersive and role of vividness. The research gaps included lack of focus on video advertisement characteristics such as combination of concepts investigating the immersive storytelling techniques and role of vividness towards storytelling techniques within the video advertisement.

The second group of studies were categorised based on the outcomes of the 360-degree video advertisement characteristics. The studies on the effects or outcomes of 360-degree video advertisements mainly focused on consumer experience, individual dispositions, and consumer satisfaction with lack of studies focusing on repeated exposure or repetitive behaviour. The third group of studies on the 360-degree video viewing devices can be divided into two main themes: high-level technology consumed devices and low-level technology consumed devices with more research focusing on low-level technology viewing devices. The fourth group of studies focused on the 360-degree video advertising research on different social cognition processes. Through this section it was found that many studies on 360-degree video advertising research focused on several social cognition stages such as learning persuasion, consumer attitude change, consumer brand memory, recalling and recognition abilities. The major research gaps which were identified through this section includes that the ability to recall information in the form of visual images requires a strong theoretical underpinning with special reference to social cognition stages (Andreopoulos & Tsotsos, 2013; DiCarlo & Cox, 2007).

The next section provides a detailed justification of the research gap by linking the literature on importance of consumer visual memory for advertising and repeated viewing on advertisements. The last few sections of this chapter have reviewed the pertinent literature pertaining to 360-degree video advertising and the theory of social information processing posited by Wyer (2003) to gain a comprehensive theoretical understanding of the relevant gaps in the current research. Particularly, in the latter part of this chapter, theoretical contributions of a theory of social information processing by Wyer (2003) further establishes that none of the studies applied this theory in the 360-degree and standard video advertising research (Feng, Xie, & Lou, 2019). The next chapter outlines the research methodology of this study.

Chapter 3: Research Approach and Methods

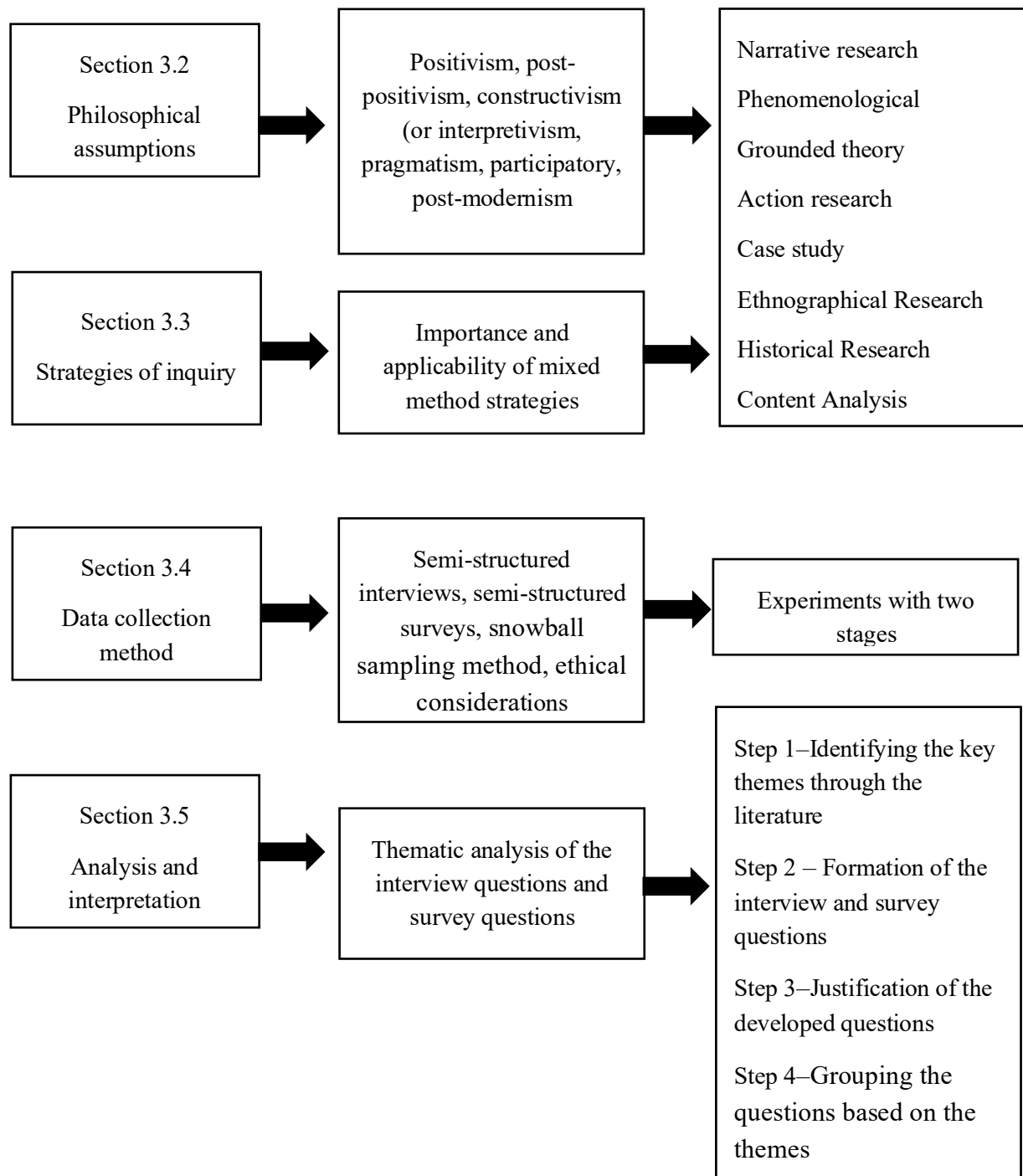
“Stories give life to data and data gives authority to stories” - *Wendy Newman*

3.1 Introduction

The previous chapter reviewed the literature on 360-degree video advertising and consumer visual memory research. Further, in chapter two, the rationale for the selection of 360-degree video advertising and consumer visual memory investigation was justified with the applicable social psychology theory of social information processing by Wyer (2003). The main research questions of “What is the differential effect of 360-degree versus standard video advertisements on visual memory under single viewing conditions?” and “What is the differential effect of 360-degree versus standard video advertisements on visual memory under repeated viewing conditions?” were further highlighted under this section in terms of the research methodology used. Therefore, this chapter is specifically devoted to justifying the selected research methods such as sampling techniques, data collection, ethical considerations, research design and development of the interview questions based on the themes and methods identified through the literature.

Using the research framework illustrated in Figure 3.1, this chapter begins by identifying the appropriate philosophical assumptions underpinning the research approach. The next section of the chapter proceeds to identify the strategy of inquiry which restates the research objectives and research questions and justification of the research since this study uses a mono-method qualitative approach. The final two sections of this chapter elaborate the data collection approach, analysis, and interpretation with further justification of the interview and survey questions, sampling techniques, thematic analysis, and ethical considerations. Finally, the summary and conclusion are provided at the end of this chapter.

Figure 3. 1: Research framework



Source: Adapted from (Creswell, 2009; Crotty, 1998)

Research planning is vital to ensure that research design and implementation is consistent with the research purpose and objective, resulting in outcomes that are useful (Aaker et al., 2008). The research planning consists of several stages. Accordingly, Figure 1 further elaborates the overview of each stage of the research methodology adopted in this study.

3.2 Philosophical assumptions

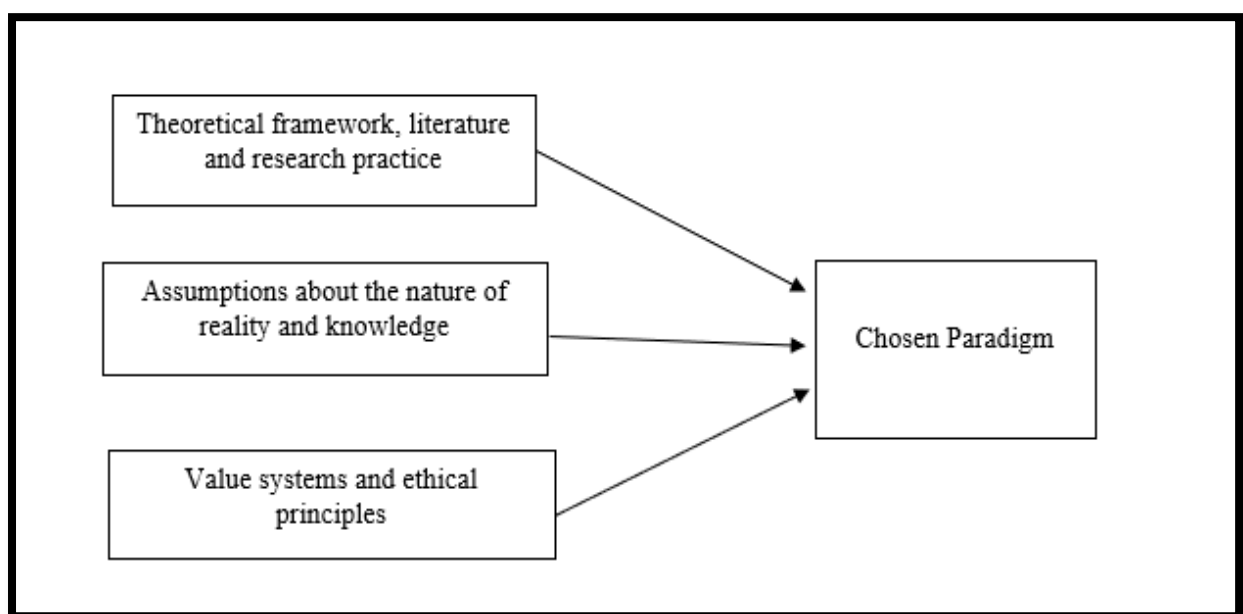
The research paradigms can be considered as the methods that have been used to understand the reality of the world, to construct knowledge, and to collect facts about the world (Tracy, 2010). The basis differs in relation to ontology, epistemology, axiology and methodology (Tracy, 2010). When considering the historical development of qualitative research, Lincoln and Guba (1985) asked, “How can an inquirer persuade his or her audiences that the research findings of an inquiry are worth paying attention to (page 290)?” which encouraged qualitative scholars to offer more important insights about the best practices for qualitative research (Bochner, 2000; Tracy, 2010). Further, qualitative research is becoming more popular among social science researchers and within organizational studies owing to the sensitivity it attracts towards the research context that is useful to researchers in variety of fields (Bryman, Stephens, & Campo, 1996). However, due to similarities and differences between quantitative and qualitative methods, it is impossible to quantify the superiority of one method over another, as both methods can have benefits and different research requires different methods (Howitt, 2019; Tracy, 2010).

3.2.1 Research paradigms

The concept of research paradigm can be considered as one of the major indefinable concepts for higher degree research students and even early-career researchers (Kivunja & Kuyini, 2017). The purpose of this section is to draw attention to the concept of ‘research paradigm’ using literature. Specifically, Kuhn (1962) defined the word ‘paradigm’ as a philosophical way of thinking. In education research, the word paradigm is defined as a researcher’s ‘worldview’ which refers to a perspective, or thinking, or school of thought, or set of shared beliefs, that informs the meaning or interpretation of research data (Mackenzie & Knipe, 2006). Furthermore, this demonstrates how a researcher sees the world, and how she or he interprets and acts within that world. Guba and Lincoln (1988) defined paradigms as a basic set of beliefs or worldview that guides a research action. Similarly, Denzin and Lincoln (2011) defined

paradigms as human creations, in which the researcher is driven by the data or a specific meaning. The paradigm is important as it demonstrates the researcher's views about a discipline, and influences what should be studied, how it should be studied and how the results of the study should be interpreted. Therefore, it is evident that a paradigm is a shared worldview that represents the beliefs and values in a discipline and that guides how problems are solved (Schwandt, 2001). A paradigm thus leads researchers to ask certain questions and use appropriate approaches to systematic inquiry or methodologies. The basis differs as ontology, epistemology, axiology, and methodology are considered (Tracy, 2010). Figure 3.2 depicts the factors influencing the choice of a paradigm.

Figure 3. 2: Factors influencing the choice of a paradigm



Source: Chilisa, B., & Kawulich, B. B. (2012). Selecting a research approach: paradigm, methodology and methods. *Doing Social Research, A Global Context*. London: McGraw Hill.

3.2.2 Essential elements of a research paradigm

According to Lincoln and Guba (1985), a research paradigm includes four elements namely, epistemology, ontology, methodology and axiology. These elements comprise the basic assumptions, beliefs, norms, and values of each paradigm. Table 3.1 further illustrates the definitions of these four elements.

Table 3.1: Essential elements of a research paradigm

	Definition of the research paradigm
Epistemology of a Paradigm	Epistemology in Greek means knowledge. In social science research, epistemology is used to describe how people come to know something or what counts as knowledge within the world (Cooksey & McDonald, 2011). Moreover, Schwandt (1997) described it as the study of the nature of knowledge and justification .
Ontology of a Paradigm	Ontology is a branch of philosophy that assumes that something makes sense or is real (Scotland, 2012) This paradigm covers studies about the nature of existence or reality as well as the basic categories of things that exist and their relations (Scotland, 2012). These research categories examine the assumptions of the researchers about a social phenomenon (Scotland, 2012).
Methodology of a Paradigm	Methodology refers to the research design, methods, approaches and procedures used in an investigation that is well planned to find out something (Keeves, 1997). For instance, data collection, sampling techniques and data analysis are all parts of the broad field of methodology (Keeves, 1997).
Axiology of a Paradigm	Axiology refers to the ethical issues involve with planning a research proposal. It further demonstrates the philosophical approach to making decisions of value or the right decisions (Finnis, 1980). It includes defining, assessing, and understanding concepts of right and wrong behaviour relating to the research (Finnis, 1980).

Even though several research paradigms have been proposed by researchers, the most common paradigms used in business research are positivism, interpretivism and pragmatism (Lancaster, 2007).

3.2.3 *The dominant research paradigms applied in marketing research*

There are many different research paradigms proposed by researchers; however, the most commonly used paradigms in the field of business research are positivism, interpretivism, and pragmatism (Saunders et al., 2009). According to the French philosopher, Auguste Comte (1798–1857), the *positivist paradigm* defines a worldview to research, which is grounded in what is known in research methods as the scientific method of investigation (Kivunja & Kuyini, 2017). The positivist paradigm develops the argumentation assuming that the majority of processes are perceived as a certain variation of actions of people and their relationships (Lancaster, 2007). Social science research applications of some methods in certain settings are difficult and uncontrollable. As an example, unlike the chemist, the social science researcher does not have a laboratory to conduct the research; therefore, statistical analysis and verification is problematic (Lancaster, 2007). Positivism research philosophy is solely based on the factor of experience/perceptions as a reliable source of knowledge neglecting the other measurable variables such as time, space, root cause etc. In business research, positivism research includes quantitative and mixed method research.

The positivist researcher focuses on a prevailing theory in a specific context and then tests it (Carson et al., 2001). Positivism research tends to test hypotheses which address cause and effect in marketing research. As an example, when addressing cause and effect in marketing research, the hypothesis might state that “all other things being equal, an increase in advertising activity will stimulate new sales.” Therefore, it is evident that rather than the theory-building phase from prior work, the emphasis is given more on the theory-testing phase in positivist research projects with more deductive reasoning. For example, research relies on deductive logic, formulation and testing of hypotheses, offering operational definitions and mathematical equations, calculations, extrapolations to derive conclusions (Kivunja & Kuyini, 2017). The converse applies in interpretivist research projects (Carson et al., 2001).

Conversely, *interpretivist paradigm* also offers a greater possibility of a bias on behalf of the researcher, thus undermining the reliability. Willis et al. (2007) mentioned that interpretivism usually seeks to understand a specific context, and the core belief of the interpretive paradigm is that reality is socially constructed. Therefore, the interpretive paradigm allows researchers to view the world through the perceptions and experiences of the participants (Thanh & Thanh,

2015). Ambiguities in human language can be documented in the analysis (Ochieng, 2009). Furthermore, the interpretive paradigm uses those experiences to construct and interpret his understanding from gathered data (Thanh & Thanh, 2015). In business research, interpretivist research includes qualitative research which focuses on a rich and holistic approach to explore the phenomenon in depth, which is a major characteristic of qualitative research (Tracy, 2010). Carson et al. (2001) mentioned that an interpretivist seeks answers specifically on “*why*”, “*what*” and “*how*” research questions with more inductive reasoning. In summary, the interpretivism paradigm allows researchers to explore a phenomenon by interpreting the understanding of individuals.

Pragmatism can serve as a philosophical program for social science research, irrespective of whether that research uses qualitative, quantitative or mixed methods (Morgan, 2014). According to Feilzer (2010) the *pragmatism paradigm* consists of the primary viewpoints of mixed research. Although the possibility of pursuing pragmatism as a paradigm for social research is not a new concept (Gage, 1989; Howe, 1988), its frequent connection with mixed methods research has heightened the awareness of pragmatism (Biesta, 2010; Hall, 2013). Mixed method research improves knowledge with multiple perspectives including both qualitative and quantitative research (Johnson et al., 2007). Pragmatism avoids the argumentative issues in the reality, and accepts theoretically, the existence of the extraordinary and the realities that are open to empirical inquiry and positions itself towards answering practical issues in the “real world” (Johnson et al., 2007).

The two extremes of positivism and interpretivism are the *critical theory* and *post-positivism* paradigms. Post-positivism means ‘a certain pluralism’ that balance both positivist and interpretivist approaches. Further, it focuses on researching the issues in the context of involving the experiences of the majority and announcing the results of what the majority says is acceptable (Wildemuth, 1993). On the other hand, post-positivism along with quantitative analysis includes the perspectives of historical, comparative, philosophical and phenomenological analysis (Fischer, 1998). Post-positivism focuses on the discovery of universal and critical theory or rules (Thanh & Thanh, 2015). According to Plack (2005), the critical theory paradigm is a synthesis of alternative paradigms that share a set of basic beliefs such as materialism, feminism, and neo-Marxism. Plack (2005) also posits that post-positivism or realism assumes that the objective world does not exist beyond the human mind. In contrast

to traditional theory that further explores and confirms the status quo, critical theory challenges the status quo and strives for a balanced and democratic society (Asghar, 2013). It is particularly concerned with the issue of power relations within society, and the interaction of race, class, gender, education, economy, religion and other social institutions that contribute to a social system (Asghar, 2013). Consequently, these five paradigms, namely positivism, interpretivism, pragmatism, critical theory and post-positivism are characterised by the four inquiry areas—ontology, epistemology, axiology, and methodology (see Table 3.2.)

Table 3.2: Comparison of five research philosophies in business and management research

Ontology - (nature of reality or being)	Epistemology-(what constitutes acceptable knowledge)	Axiology (role of values)	Typical methods
<i>Positivism</i>			
Real, external, independent, one true reality (universalism) granular (things), ordered	Scientific method, observable and measurable fact, law-like generalisations, numbers, casual explanation, and prediction as contribution	Value-free research, researcher is detached, neutral and independent of what is researched, researcher maintains objective stance	Typically, deductive, highly structured, large samples, measurement. Typically, quantitative methods of analysis, but a range of data can be analysed.
<i>Critical Realism</i>			
Stratified or layered (the empirical, actual and real), external, independent, intransient, objective structures, casual mechanisms	Epistemological relativism, knowledge historically situated and transient, facts are social constructions, historical casual explanation as contribution	Value-laden research, researcher acknowledge bias by world views, cultural experience and upbringing; researcher tries to minimize bias and errors; researcher is objective as possible	Retroductive, in-depth historically situated analysis of pre-existing structures and emerging agency; range of methods and data types to fit subject matter
<i>Interpretivism</i>			
Complex, rich, socially constructed through culture and language, multiple meanings, interpretations, realities, flux of processes, experiences, and practices	Theories and concepts are very simple, focus on narratives, stories, perceptions and interpretations, new understandings, and worldviews as contribution	Value-bound research; researchers are part of what is researched, subjective, researcher interpretations are the vital contributions, researcher reflexive	Typically, inductive small samples, in-depth investigations, qualitative methods of analysis, but a range of data can be interpreted
<i>Postmodernism</i>			

Nominal, complex, rich, socially constructed through power relations; some meanings or interpretations and realities are dominated or silenced by others, flux of processes, experiences and practices	What counts as “truth” and “knowledge” is decided by dominant ideologies. Focus on absences, silences, and oppressed/repressed meanings, interpretations and voices, exposure of power relations and challenge of dominant views as contribution	Value-constituted research; researcher and research embedded in power relations. Some research narratives are repressed and silenced at the expense of others. Researcher radically reflexive	Typically, deconstructive—reading texts and realities against themselves—in- depth investigations of anomalies, silences and absences; range of data types, typically qualitative methods of analysis
<i>Pragmatism</i>			
Complex, rich, external. “Reality” is the practical consequences of ideas. Flux of processes, experiences and practices	Practical meaning of knowledge in specific contexts. “True” theories and knowledge are those that enable successful action. Focus on problems, practices and relevance. Problem solving and informed future practice as contribution.	Value-driven research. Research initiated and sustained by researcher’s doubts and beliefs. Researcher reflexive.	Following research problem and research question. range of methods—mixed, multiple, qualitative, quantitative, action research—emphasis on practical solutions and outcomes.

Source: Saunders, M., Lewis, P., & Thornhill, A. (2009). *Research methods for business students*. Pearson education.

3.2.4 Justification of the chosen paradigm

As this study explored the consumer visual memory of 360-degree and standard video advertisements using a qualitative approach, the applicable paradigm will be interpretivism as opposed to positivism which focuses on quantitative methods (Hudson & Ozanne, 1988). Table 3.3 further compares how the chosen paradigm of interpretivism is applicable to the proposed study as opposed to the positivism paradigm.

Table 3.3: Interpretivism vs. Positivism paradigms

Characteristic	Interpretivism	Positivism
Methodology	This study uses a mono-method qualitative approach using semi-structured interviews as the main data collection method.	This study does not use a quantitative or mixed methodology (pragmatism)
Scope	This study focuses on a rich and holistic approach to explore in-depth the phenomenon, which is the visual memory—a major characteristic of qualitative research. (Tracy, 2012)	This study does not incorporate empirical evidence which is evident in the positivist research (Tracy, 2010, 2012) such as hypothesis or data analysis
Research question	The main research question of the study is “ <i>what</i> ”, while most of the qualitative research questions starts from “ <i>why</i> ”, “ <i>what</i> ”, and “ <i>how</i> ”. (Carson et al., 2001)	In most the quantitative research, the research question starts with how many, how often, or how much (Bista, 2016).
Structure of methodology	This study does not include a hypothesis component or any measurable conceptual framework. The data will be analysed based on the derived codes and themes using the qualitative data analysis tool of NVivo (Hanson et al., 2005)	A study that follows positivist philosophies often has a hypothesis and a theory-testing part with a statistical data analysis approach (Neuman, 2014)
Philosophical assumptions	Aiming for interpretation and understanding (Goldkuhl, 2012)	Aiming for explanation and prediction (Goldkuhl, 2012)

Conceptual assumptions	Concerned with understanding the phenomenon using informant's perspective, assuming a dynamic and negotiated reality (Goldkuhl, 2012)	Concerned with discovering facts about social phenomena, assuming fixed and measurable reality (Goldkuhl, 2012)

Further, when justifying the chosen paradigm of interpretivism, the positivist researcher usually builds a prevailing theory through a conceptual framework in a specific context and then tests it (Hanson et al., 2005). Therefore, positivism research tends to test hypotheses using a data analysis approach. As an example, when addressing cause and effect in marketing research, the hypothesis might state, “all other things being equal, an increase in advertising activity will stimulate new sales”. It is apparent that rather than the theory-building phase from prior work, the emphasis is given more on the theory-testing phase by positivist researchers. Positivist research is more structured and measures theories. Owing to the structure of positivist research, the researcher maintains a distance perspective of objectivity that is suitable for positivist research (Heshusius & Ballard, 1996).

Conversely, the interpretivist research project seeks to understand a specific context using the socially constructed or perceived knowledge rather than the thoughts governed by hypotheses and stated theories (Hanson et al., 2005). Carson et al. (2001) stated that, an interpretivist seeks answers specifically on “*why*”, “*what*” and “*how*” research questions with more inductive reasoning. Bista (2016) indicated that quantitative research answers questions such as “*how many*”, “*how often*”, or “*how much*”. The proposed study aims to answer the research questions of, “What is the differential effect of 360-degree versus standard video advertisements on visual memory under single viewing conditions?” and “What is the differential effect of 360-degree versus standard video advertisements on visual memory under repeated viewing conditions?”, according to Bista (2016) and Carson et al. (2001), thus facilitating the applicability of qualitative methodology and interpretivist philosophy. Moreover, interpretivism is more suitable as this research explores the themes and concepts using the data collected through semi-structured interview transcripts which will further analyse using the qualitative data analysis software of NVivo (Hanson et al., 2005). Another major characteristic of qualitative research is the focus on specific context in a detailed manner (Tracy, 2010).

Qualitative researchers are interested in people's beliefs, personal experiences, and different viewpoints leading to different meanings from the perspective of the people (Goldkuhl, 2012; Hanson et al., 2005). Qualitative research does not include statistical analysis and empirical calculation (Goldkuhl, 2012; Hanson et al., 2005). This research investigates consumer visual memory using the theoretical assumptions of the 'workspace' unit in Wyer's (2003) theory of social information processing. Investigating or exploring a specific component in a detailed manner is a major characteristic in qualitative research as identified by Tracy (2012), which further justifies the applicability of the chosen paradigm of interpretivism.

3.2.5 Quantitative Method vs Qualitative Methodology

This study incorporates a qualitative methodology as this is another form of marketing research exploring the insights of both consumer psychology and advertising research. This study simply expands the level of knowledge by dialogue and regeneration, despite the fact of measurement, while the literature provides evidence that qualitative research interprets the phenomena in terms of the meanings given by the people (Ereaut, 2002). For instance, Rossman et al. (2011) stated "qualitative research has two unique features; one is, the researcher is the means through which the study is concluded and second is the purpose is to learn about some facet of the social world". This creates a view of learning that sees the learner as the constructor of knowledge rather than a receiver (Rossman & Rallis, 2011). This study developed the semi-structured interview and survey questions based on the theoretical assumptions presented in the 'workspace' unit of the theory of social information processing by Wyer (2003). These theoretical assumptions eliminate the potential limitations of the research design to ensure reliability and validity, in addition to minimize the researcher's influence in collecting data, which is generally considered as a major drawback in qualitative research. Table 3.4 summarises the key differences between qualitative and quantitative research.

Table 3.4: Comparison of qualitative and quantitative research

Dimensions	Qualitative method	Quantitative method
Nature of reality	Subjective	Objective
Type of research	Exploratory	Descriptive
Focus of research	Examines the depth of the phenomenon	Test specific hypotheses
Reasoning	Reasoning is dialectic and inductive	Reasoning is logistic and deductive
Research questions	What? Why? (Classification, meaning)	How many? Strength of association?
Literature review	May be done as study progresses or afterwards	Must be completed early in the study
Sample size	Sample size is not a concern; seeks “informal rich” sample, small sample size	Sample size is represented using “n”, large sample size
Data analysis	Non-statistical, coding, categories, themes; basic element of analysis is words/ideas	Statistical inference, estimation; basic element of analysis is numbers
Outcome	Develop an initial understanding	Recommend a final course of action

Source: Adapted from (Amaratunga et al., 2002; Ochieng, 2009; Zikmund et al., 2012; Creswell & Clark, 2007; Proctor, 2005; Tracy, 2010, 2012)

Therefore, the applicable research paradigm is interpretivism and the applicable research methodology is the mono-method qualitative approach as this study uses the qualitative data collection approaches of both semi-structured interviews and open-ended surveys. The next section further demonstrates the qualitative research approach of this study using data collection and sampling techniques.

Further, since the main scope of this study is to explore consumer visual memory, the applicability of quantitative methods is questionable based on the previous studies (Cowan, 2010; Cowan et al., 2005; Santoro et al., 2016) to measure visual memory. For example, working memory capacity varies among individuals, predicts individual differences in intellectual ability, and changes throughout life (Cowan, 2010; Cowan et al., 2005; Santoro et al., 2016). As a result of multiple mechanisms that retain information, it has been difficult to

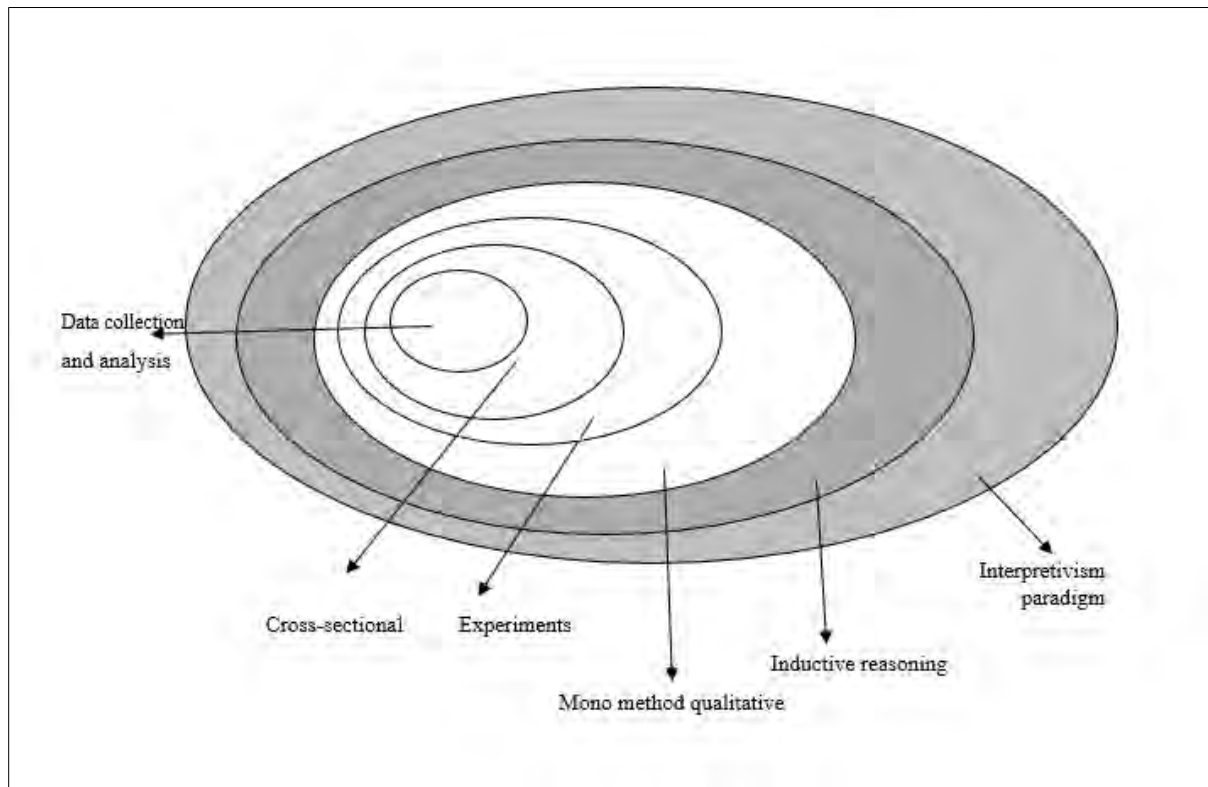
determine the capacity limit of working memory (Cowan, 2010; Cowan et al., 2005; Santoro et al., 2016) thus showing the applicability of qualitative methods over a quantitative approach.

3.3 Research method

This study investigates consumer visual memory of 360-degree and standard video advertisements using the theoretical assumptions presented in the ‘workspace’ unit of Wyer’s (2003) theory of social information processing. Based on the research onion framework of Saunders et al. (2009), the data collection and data analysis procedures and techniques can be divided based on philosophies, approaches, strategies, choices and time horizons.

When considering the *philosophies*, the applicable research paradigm is interpretivism owing to qualitative nature of this study. Since this research design involves qualitative data analysis, the applicable approach is inductive reasoning and not deductive reasoning (inductive reasoning focuses on developing a theory while deductive reasoning focus on testing the theory (George, 2019)). The strategy of this research is survey questionnaire and semi-structured interviews which can be considered as the main data collection instrument. The chosen research design includes the mono-method qualitative experimental approach. The time horizon of this study is cross-sectional and not longitudinal. Although a longitudinal study could enhance the understanding of trends over time in the video advertising trends, the cross-sectional design is used limit the scope of this research, as this study only focuses the phenomenon of consumer visual memory and video advertisements in detailed manner. Figure 3.3 depicts the research design of this study through the research onion framework of Saunders et al. (2009).

Figure 3. 3: Research onion framework of the study



Source: Developed by the author based on the research onion framework of Saunders et al. (2009)

The selected method of this study can be justified as follows. Studies which used the theory of social information-processing assumptions by Wyer (2003) in a social psychology context to explore working memory are:(Adaval & Wyer, 1998, 2004; Wedel & Pieters, 2000; Wyer, 2006). The only study which tested the ‘Workspace’ using theoretical assumptions is, (Srull & Wyer, 1983) who used an experimental approach. As ‘workspace’ unit represents the consumer visual memory component, this study investigated consumer visual memory of 360-degree and standard video advertisements using the four theoretical assumptions presented in the ‘workspace’ unit. Since the research design is an experimental approach, the data collection is performed using open-ended survey questionnaire and semi-structured interviews, which can be further justified as follows.

Semi-structured interviews and open-ended surveys were selected as the means of data collection due to two primary considerations. Firstly, this method is suitable for the exploration of the perceptions and opinions of participants regarding complex and sometimes sensitive

issues, and the method enables probing for more information and clarification of answers (Kallio et al., 2016; Smith et al., 2018). For example, when participants watch the video, (either the 360-degree video version or the standard video version) they have freedom to express their thoughts and feelings in addition to the interview questions. Secondly, this method is most appropriate as semi-structured interview questions have a format organised through the theoretical assumptions of Wyer's (2003) model. Therefore, the main benefit of the semi-structured interviews is that the interviewer has more control over the participant in comparison to other qualitative data collection methods, such as Delphi and structured questionnaires (Creswell & Poth, 2016; Tracy, 2010).

The semi-structured interviews consist of several key questions that help to understand the research areas to be explored, but also allow the interviewer or interviewee to diverge in order to pursue an idea or response in more detailed manner (Twining et al., 2017). This type of interview is most common in the marketing and social science sectors, as it provides participants with some guidance on what to talk about, which many find helpful, for example, the product or brand experience (Gill et al., 2008). Owing to the higher flexibility of this method, compared to structured interviews, semi-structured interviews allow researchers to explore and discover information that is vital for participants but may not have previously been thought as appropriate by the research team (Gill et al., 2008). Therefore, it was identified that open-ended surveys and semi-structured interviews are more appropriate data collection methods for this study, under an experimental approach (Creswell & Poth, 2016; Tracy, 2010).

3.3.1 Justification of the research design

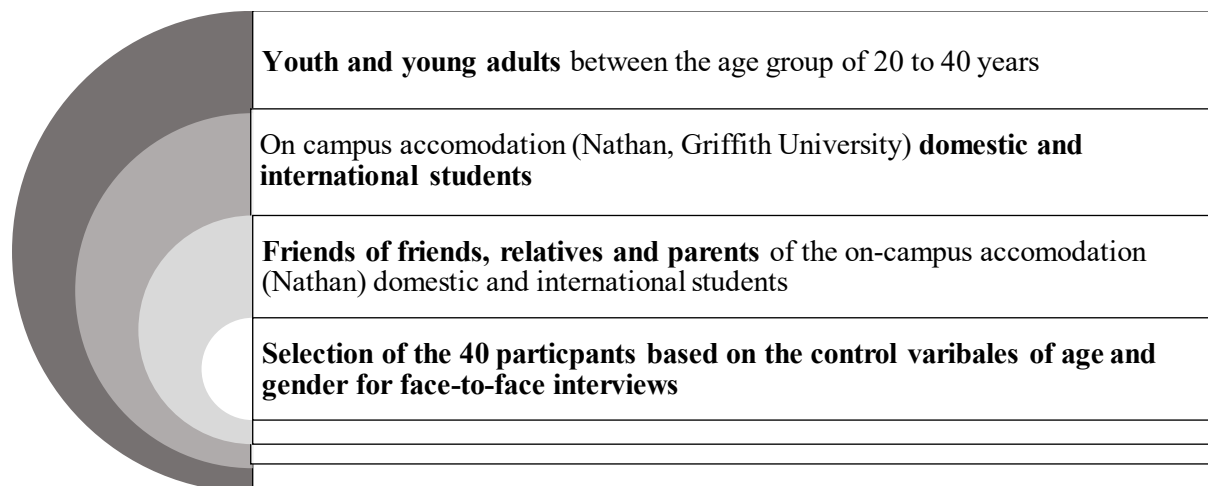
The main data collection instrument is open-ended surveys and semi-structured interviews. This method can be further justified based on the precedent of studies as follows (Robinson & Mendelson, 2012; Oates et al., 2003; Dixon et al., 2014). The first research question (RQ1– What is the differential effect of 360-degree versus standard video advertisements on visual memory under single viewing conditions?) will be addressed using study 1, whereas the second research question of (RQ2– What is the differential effect of 360-degree versus standard video advertisements on visual memory under repeated viewing conditions?) will be addressed using study 2. This study is qualitative, involving semi-structured interviews and open-ended surveys of two groups (who receive different stimuli for 360-degree and standard video

advertisements). The qualitative results will be compared to identify the differences in themes for consumer visual memory for 360-degree and standard video advertisements.

Digital technologies have been used in many parts of the world and are becoming a universal method of people interacting with each other (Peng, 2001). The rapid development of the technology has offered several important opportunities for elderly people, such as browsing the internet, sending e-mails, having telephone conversations, reading news, sending postcards, doing personal banking and so on (Huda, 2019). Golant (2017) stated that older people have a tendency towards smart technology adoption under several conditions, such as when they feel more stressed because of their unmet needs; have greater resilience (stronger perceptions of self-efficacy and a greater openness to new information); and are more strongly persuaded by their sources of outside messaging (external information) and their past experiences (internal information). Further it was found that elderly people have a higher resistance toward change or adoption of new technology (Golant, 2017; Nikouet al., 2020).

When considering the adoption levels of youth toward new technology, mobile technologies and social media act as powerful tools to reach, engage and retain youth and young adults between the age group of 20 to 40 years (Hightow-Weidman et al., 2015). In a study on the Canadian manufacturing sector, it was found that young employees had fewer problems with technology adoption than elderly employees with regard to more technologically innovative activities (Baldwin & Lin, 2002). Several researchers used the ability of high adaptability of youth toward new technology for many aspects such as to prevent the spread of sexual diseases (Hightow-Weidman et al., 2015; Widman et al., 2018); to prevent and treat substance abuse among youth (Marsch & Borodovsky, 2016); in higher education (Gordon et al., 2016; Subramaniam et al., 2018), to improve mental health (Orlowski et al., 2016; Orlowski et al., 2015); and, to promote healthy behavioural patterns (Sadeh-Sharvit, 2019). This study intends to collect data from youth (age group: 20-40 years). The main reason to select youth (age group: 20-40 years) for this study is due to the higher adoptability for new technology as mentioned above. Figure 3.4 shows the steps in selection of participants.

Figure 3.4: The steps in selection of participants



Note: Filtering variable under each step is highlighted in bold text

Further, this study used the snowball sampling method as this is a mono-method qualitative study. Snowball sampling can be applied to both quantitative and qualitative research (Tenzek, 2017). The participants were divided into two groups (Group A and Group B) with 20 people (10 females and 10 males) in each group. This study used snowball the sampling method for two main reasons. Firstly, snowball sampling accurately reflects the population being studied as participants will be recruited through Griffith University (Nathan) on-campus accommodation students by using the “friends of friends” approach. The friends, relatives and even parents of the on-campus accommodation domestic and international students will be selected under sampling procedures. As a result of this recruitment, the opinions of the participants with diversified backgrounds (multi-cultural) and within the age group of 20 to 40 years can be obtained.

Secondly, there will be several control variables in this study: age, gender, and video advertisement version. For example, any mistakes in the representation of the population have the potential to weaken the accuracy of the study results (Price et al., 2015). If the researcher selects the participants using a simple random sampling method, there could be gender imbalances in which more females could be selected than males, or vice versa. This will result in under-representation of the males and over-representation of the females. The video advertisement type (the paired video version of standard and 360-degree) will be controlled to

maintain the same levels of user experience. These errors in the representation of the population have the potential to diminish the accuracy of the study (Tracy, 2010), therefore, a non-probability sampling plan using the snowball sampling technique applies in this study. When considering the unit of analysis, the study focuses on a group level, as it compares the visual memory of the 360-degree and standard video advertisements of the participants in two groups (Creswell & Poth, 2016; Sharma, 2017).

3.3.2 Data collection

The first step is to search on YouTube for the available 360-degree version video advertisements and their standard version counterparts, for the purpose of ensuring that while the ad format is different, other factors (e.g., story plot, characters, and visual elements) remain the same. The existing 360-degree video advertisements have been used to increase the ecological validity of the study. Geuens and Pelsmacker (2017) mentioned that new advertising formats, such as virtual reality, “require realistic stimuli that reflect the real world of advertising” (page 85). For this study, a detailed YouTube search was conducted to find all the available 360-degree video advertisements with both 360-degree and their standard counterparts. Due to the limited number of 360-degree video advertisements on YouTube that have paired standard versions, a total of eight video advertisements were identified as having available both versions (Yang & Mueller, 2019). Table 3.5 presents the links of the identified advertisements.

Table 3.5: The links to the existing 360-degree video advertisements with both 360-degree and paired standard versions

Video Name	360-degree version video link	Standard version video link
Lipton, “New Lipton Magnificent Matcha Takes You Inside the Cup”	https://www.youtube.com/watch?v=S_hpD7teoow	https://www.youtube.com/watch?v=7Myri_gIqT4&t=3s
Lipton, “Enticing Chai Tea Takes You Inside the Cup”	https://www.youtube.com/watch?v=abq5NWAQkPA	https://www.youtube.com/watch?v=TRatZtvIeLo
Columbia Sportswear, “Passing the Torch”	https://www.youtube.com/watch?v=NmGOQuSDFmM	https://www.youtube.com/watch?v=OAFIL3pmB5I
Nescafé “Good Morning, World”	https://www.youtube.com/watch?v=beo_Ln00RGc	https://www.youtube.com/watch?v=VOOvpXFOPpY&t=43s
How far Australia 60- Expedia	https://www.youtube.com/watch?v=VcaT_wRwmuw	https://www.youtube.com/watch?v=dEmETcYkvBw
Mercedes-Benz, “Loki”	https://www.youtube.com/watch?v=vVNylwQRUQM&t=63s	https://www.youtube.com/watch?v=arZVGwhfkoA&t=55s
BMW Eyes on Gigi Hadid	https://www.youtube.com/watch?v=owmi4DkihYo	https://www.youtube.com/watch?v=AfmMAVWK4Sw
Infiniti Q50 Virtual Test Drive	https://www.youtube.com/watch?v=Jx0rL4EJizU	https://www.youtube.com/watch?v=S1b9Ssxuu2s

Please note: The same advertisement with two different video versions (360-degree and standard)

From the eight available video advertisements (Lipton Magnificent Matcha, Columbia Sportswear, Mercedes-Benz, Nescafé, BMW, Expedia, and Infiniti) the Lipton Matcha advertisement was selected. The “Magnificent Matcha Tea” advertisement promoted a new tea product and had a higher number of visuals than the other video advertisements, such as Columbia Sportswear, Nescafé, Expedia.com, BMW, Mercedes-Benz, Expedia, and Infiniti which fall under the definition of visual memory investigation of this study (e.g., human visual memory activation is higher for novel scenes than repeated scenes due to the activation of hippocampal regions in the brain, Köhler et al. (2002)). As a result, this study selected the

advertisement for Magnificent Matcha Tea. Table 3.6 presents the links of the identified 360-degree video advertisements with both 360-degree and paired standard versions.

Table 3.6: The links of the selected 360-degree video advertisements with both 360-degree and paired standard versions

Video Name	360-degree version video link	Standard version video link
Lipton, “New Lipton Magnificent Matcha Takes You Inside the Cup”	https://www.youtube.com/watch?v=S_hpD7teoow	https://www.youtube.com/watch?v=7Myri_gIqT4&t=3s

Please note: The same advertisement with two different video versions of 360-degree and standard*

According to Flick (2015), primary data can be considered as the data that are collected by a researcher from first-hand sources such as surveys, interviews or experiments. Primary data will be collected with the research project in mind, directly from the primary sources (Corti & Thompson, 2006; Tracy, 2010). This study is mono-method qualitative study involving semi-structured interviews and questionnaires of two groups (who receive different stimuli for 360-degree and standard video advertisements). It is considered as the most appropriate method of data collection, in contrast to open-ended surveys and semi-structured questionnaires, as the researcher can have a face-to-face discussion with the participant using a proper structure which ensures that the most applicable questions have been asked from all the respondents, thus allowing the researcher to make comparisons between the different responses (Tracy, 2010).

3.3.3 Summary of the experiments

The Magnificent Matcha Lipton tea advertisement standard version was used for Group A participants and the Magnificent Matcha Lipton tea advertisement 360-degree version was used for Group B participants. Study 1 addressed the first research question after participants viewed the video advertisement (either 360-degree version or standard version) once and study 2 addressed the second research question after participants viewed the video advertisement (either 360-degree version or standard version) for a second time. The second experiment took place one week later. In the second experiment, the same set of participants was invited to watch the same advertisement under multiple viewing times (two times) after a one-week

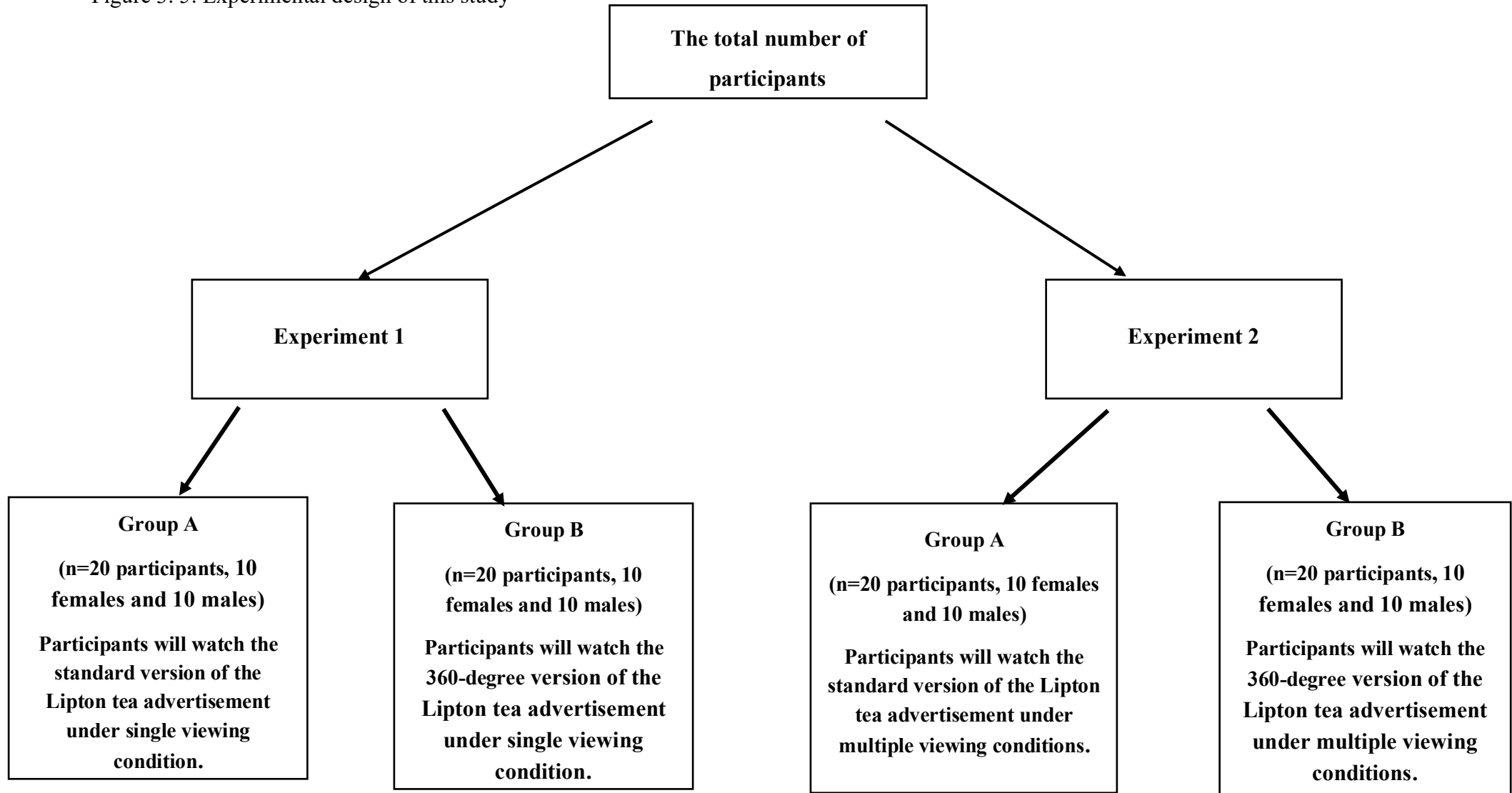
delay. The one-week timeline was chosen to avoid fatigue in the participants as experiment one took about two hours' time (2 hours) to complete. When viewing the 360-degree video advertisement, participants used Google Cardboard, which is a type of eyewear that functions as a display device. This platform was designed to encourage interest and development in VR applications using a fold-out cardboard viewer (Butcher et al.,2016). With a Google Cardboard-compatible app, the smartphone display image is split into two, one for each eye, with barrel distortion applied to counter pincushion distortion. These lenses enable stereoscopic (3D) images with an expansive field of view (Butcher et al.,2016). The 360-degree video technology and virtual reality goggles were created with the intention of allowing viewers to interact with the content of the videos, instead of just sitting and watching. This device was used to view 360-degree videos which offer an immersive view by allowing the person to choose where to look. Below is the detailed explanation of the visuals in this advertisement. Table 3.7 further illustrates the screenshots of the main visuals in this advertisement.

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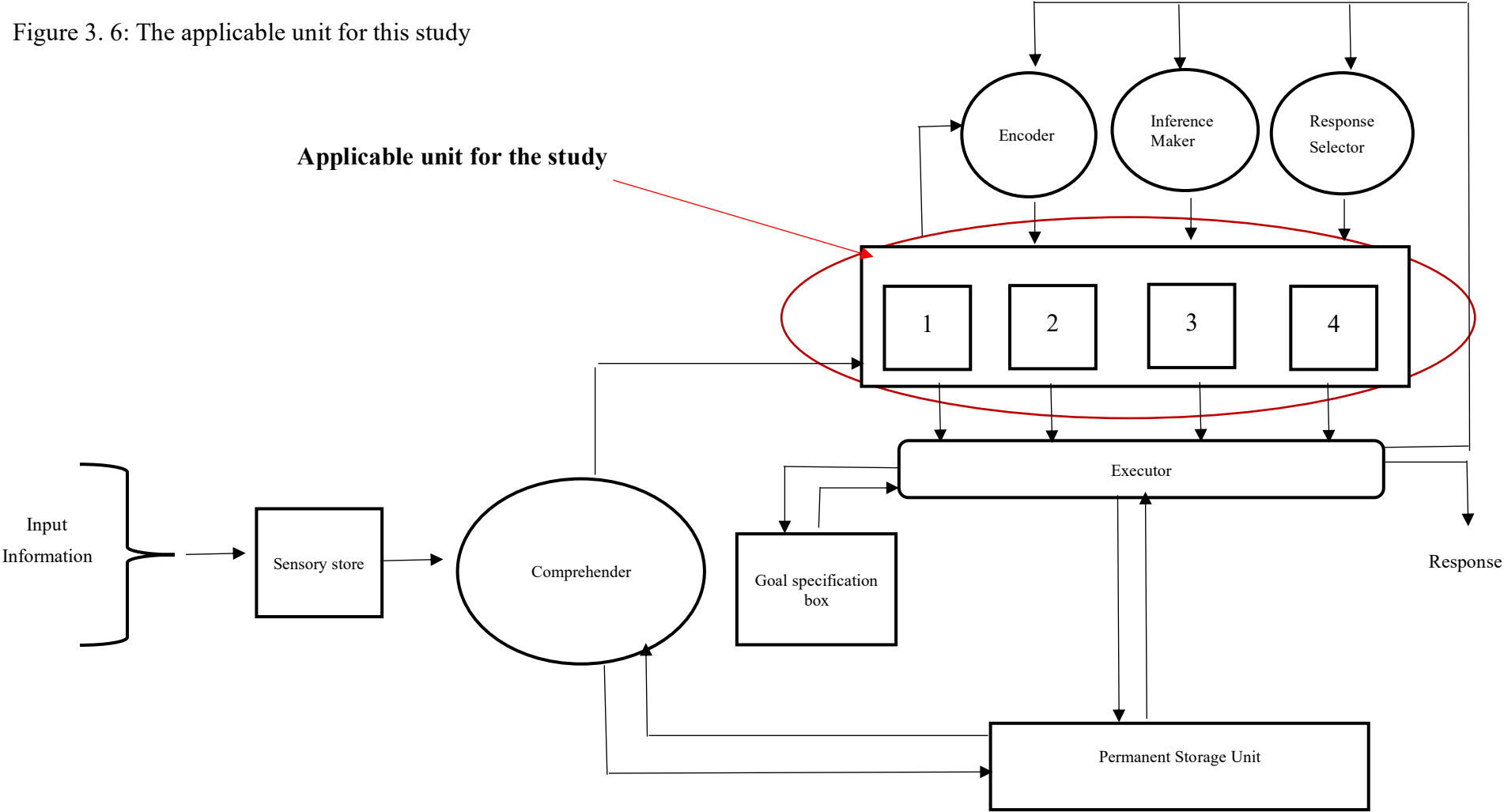
Based on the seven visuals above, the visual memory measurement dyads are identified based on the four theoretical assumptions of the workspace unit of the theory of social information processing by Wyer (2003). Figure 3.5 further illustrates the experimental design of this study as follows:

Figure 3. 5: Experimental design of this study



A sample size of 40 participants was considered as appropriate for this experiment. In experimental studies, a mean value of 30 to 50 sample size is considered as appropriate to investigate an in-depth phenomenon under qualitative experimental approaches (Guetterman et al., 2015; Mason, 2010). For example, Morse, (2000) recommended 20 to 30 interviews as a suitable number in experimental research with two to three interviews per individual. The basic principle of experimental methods is that it permits a more complete and synergistic application of data than a separate quantitative and qualitative data collection and analysis. Therefore, in social science experimental research, a sample size between 30 and 50 is considered as appropriate under qualitative data collection conditions (Guetterman et al., 2015). The data collected through semi-structured interviews and surveys will be analysed using the NVivo software to compare the differences in themes for consumer visual memory for 360-degree versus standard video advertisements. Figure 3.6 further illustrates the applicable unit in the theory (workspace unit) which will be used in developing the questions.

Figure 3. 6: The applicable unit for this study



The summary of the methodology is presented in Table 3.8.

Table 3.7: Summary of the research methodology

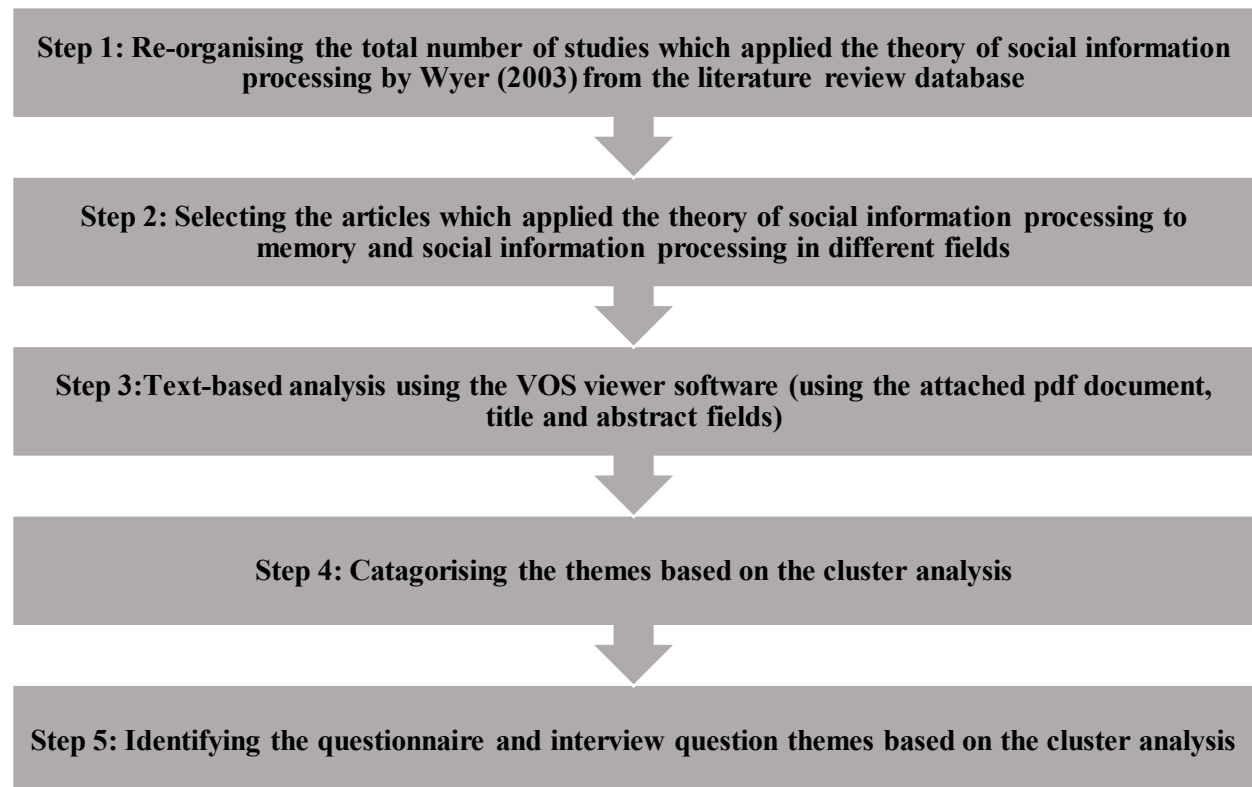
Different elements	Study 1	Study 2
Research Question	RQ1: What is the differential effect of 360-degree versus standard video advertisements on visual memory under single viewing conditions?	RQ2: What is the differential effect of 360-degree versus standard video advertisements on visual memory under repeated viewing conditions?
Research method	Qualitative method involving semi-structured interviews and surveys of two groups (who received different stimuli for 360-degree and standard video advertisements)	Qualitative method involving semi-structured interviews and surveys of two groups (who received different stimuli for 360-degree and standard video advertisements)
Research Gap	Limited research has focused on consumer visual memory of 360-degree and standard video advertisements under multiple viewing conditions	Limited research has focused on consumer visual memory of 360-degree and standard video advertisements under multiple viewing conditions
Data analysis	The qualitative results will be compared to identify the differences in themes using NVivo software.	The qualitative results will be compared to identify the differences in themes using NVivo software.
Viewing time	Single viewing	Multiple viewing (second viewing)

3.4 Development of the survey and interview questions

To understand the prominent themes on consumer memory and to prepare the interview and survey questions, the author conducted a cluster analysis based on the clusters of the documents, using a text-based analysis from the VOS-viewer software. The development of semi-structured interview questions comprises several stages. First, all studies which applied the theory of social information processing by Wyer (2003) are regathered from the literature review section. Next, the selected articles which applied the theory of social information processing to different fields were entered (the author selected 10 as the minimum number of occurrences of a term and from the 710 terms in total, 21 met the threshold—the relevance

score was 60%) (Shah et al., 2019)—for a text-based analysis using the VOS viewer software (using the title and abstract fields) (Ford et al., 2021; Sinkovics, 2016). Then the emerged clusters were further categorised to develop questions. Figure 3.7 further illustrates the steps involved in developing the questions.

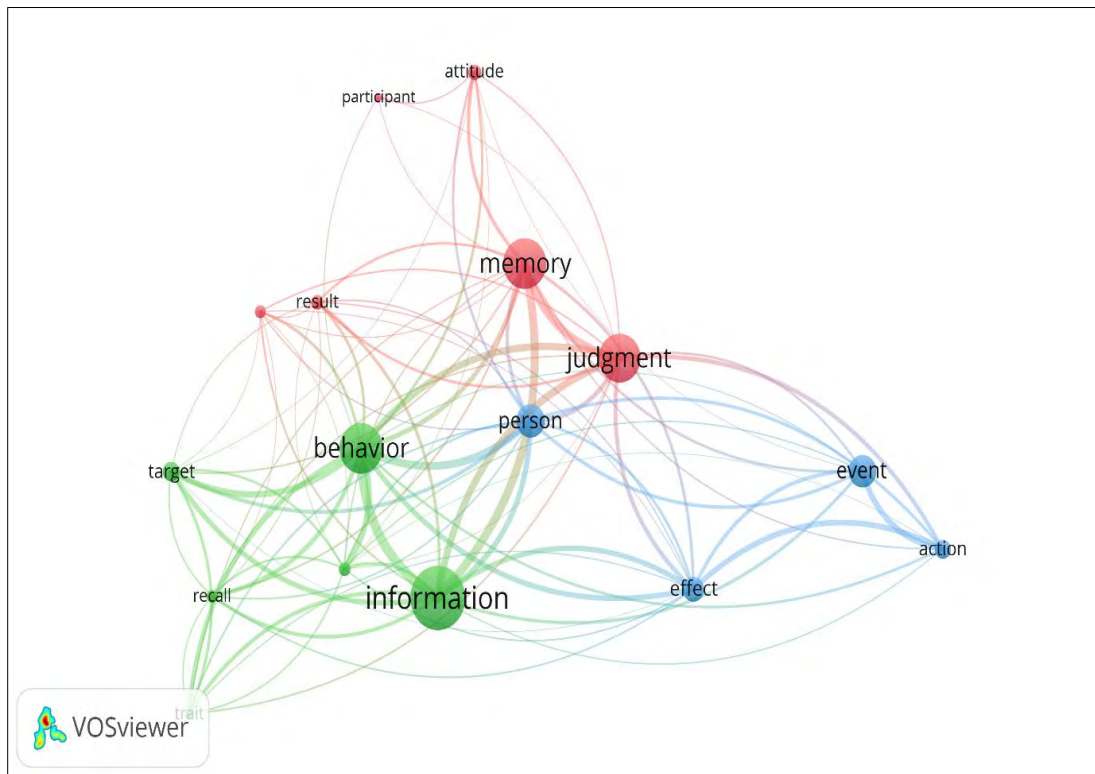
Figure 3. 7: The steps involved in developing the questions



3.4.1 Text-based cluster analysis

In bibliometric and scientometric research, researchers often use mapping and clustering techniques to identify the most prominent or emerging themes in the current field of study (Waltman et al., 2010). Using VOS viewer, the articles can be categorised based on the abstract and the title. These articles can be further divided into several groups using the most repetitive words and synonyms (Waltman et al., 2010). The analysis resulted in a network diagram with three major clusters under the themes of information-processing methods, individual characteristics, and information-processing outcomes. Figure 3.8 depicts the resultant network diagram with three clusters.

Figure 3. 8: Network Diagram



Developed using VOS viewer software

Based on the three clusters, the author identified the most prominent research in the field of consumer visual memory as follows. Table 3.9 illustrates the clusters derived from the text-based analysis.

Table 3.8: Cluster analysis

Cluster 1 (6 items) – Information-processing approach	Cluster 2 (6 items) - Individual characteristics	Cluster 3 (4 items)- Information-processing outcome
Attitude	Behaviour	Action
Implication	Emotions	Effect
Judgement	Information	Event
Memory	Recall	Person
Participant	Target	
Result	Traits	

Cluster 1 analysis – Information-processing methods

The first cluster contains themes on information-processing approaches such as attitude, implication, judgement, memory, participant, and result. This cluster shows that most of the researchers who applied the theory of social information processing by Wyer (2003) focused on aspects such as attitude, implication, judgement, memory, participant and result.

Attitude

‘Attitude’ means a settled way of thinking or feeling about something which is unique to each person (Albarracín et al., 2005). The theme ‘attitude is substantial as it shapes people's perceptions of the social and physical world and influences overt behaviours. It has been shown that attitudes have memory and judgement components (Albarracín et al., 2005). The memory component involves representations of the attitude in permanent memory and the judgement component involves on-line evaluative thoughts generated about an object at a particular time and place (Albarracín et al., 2008). Bizer et al. (2006) conducted three experiments and tested whether attitudes are created through on-line or whether memory-based processing could influence the resultant strength of those attitudes. In each study, participants were presented with 20 behavioural statements about a person named Marie. Whereas some participants were asked to evaluate Marie based upon each statement and then report their overall evaluation (on-line processing), others were asked to focus on the sentence structure and to evaluate Marie only after they had read all the sentences (memory-based processing). Even when controlling for attitude accessibility, attitudes created through on-line processing were stronger than attitudes created through memory-based processing (Bizer et al., 2006).

Implication

‘Implication’ in social psychology refers to an action or state of being involved in something (McDougall, 2015; Moon & Trevino-Rangel, 2020). For example, social events can be described from the perspective of either a person in the situation in which the event occurs (e.g., “John came into...”) or as an outside observer (“John went into...”). It has been found that when individuals are disposed to form visual images, they have difficulty comprehending both verbal statements and pictures when the perspective from which the event is described differs from the perspective from which they have encountered similar events in daily life (Jiang & Wyer, 2009).

Judgement

‘Judgement’ refers to the ability of the person to make considered decisions or come to sensible conclusions (McDougall, 2015). In earlier research, it was found that memory and judgement depend on the ability to retrieve information from memory (Hastie & Park, 1986). Frank (1986) confirmed that purchasing decisions of a product were highly dependent on memory-based judgements more so than factual information recall ability.

Memory

The theme ‘memory’ refers to the system of acquiring, storing, retaining and retrieving of information (Albarracín et al., 2005). In a study by Park et al. (2001), it was identified that bipolar attributes (a disorder associated with episodes of mood swings ranging from depressive lows to manic highs) are associatively linked in memory but are stored as separate concepts rather than as values along a bipolar continuum. The previous research on memory for schema-relevant information (a structured framework or plan) has produced contradictory results. Some studies demonstrated memory selectivity for schema-consistent information, while others demonstrated memory selectivity for schema-inconsistent information. Further, overall results showed a slight overall memory advantage for schema-inconsistent information (Rojahn & Pettigrew, 1992). Srull and Wyer (1983) examined memory and social judgement using the theoretical concept of the Workspace unit in the social information-processing theory of Wyer (2003). As predicted by the theoretical concept of the Workspace unit, it was identified that relatively complicated cognitive activities lead to lower levels of recall and a greater divergence of judgements than less complicated cognitive activities (Srull & Wyer, 1983).

Participant

‘Participant’ denotes the personal characteristics and behaviours of people due to their memorising capabilities. For example, Kim et al. (2009) conducted a study on the effects of temporal distance and memory on consumer judgements. Once a product has been evaluated for use, the circumstances can change, and it must be re-evaluated for use at a different time. In this study, four experiments investigated the processes of these re-evaluations. Participants received information about a product that had implications for both desirability and the feasibility of using it, while anticipating either its immediate or future use. They were later asked to re-evaluate the product for use at either the same or a different point in time.

Participants who re-evaluated the product for future use based their judgements on desirability considerations regardless of when they had considered using it initially. However, participants who re-evaluated the product for immediate use also based their judgements on desirability considerations unless they had initially considered immediate use as well (Kim et al., 2009).

Result

The theme ‘result’ depicts the ultimate outcome of the information-processing approach. For example, Martin et al. (1993) hypothesized that people’s moods have motivational or processing implications but are the input to other processes that determine their motivational implications. For example, in an experiment on reading a series of behaviours to form an impression, when told to read the behaviours until they felt they had enough information, those with positive moods (PMs) stopped sooner than those with negative moods (NMs). When told to stop when they no longer enjoyed reading the behaviours, those with negative moods stopped sooner than those with positive moods (Martin et al., 1993).

Cluster 2 analysis- Individual characteristics

The second cluster contains themes on individual characteristics such as behaviour, emotions, information, recall, target, and traits. This cluster shows that most of the researchers who applied Wyer’s (2003) theory of social information processing focused on aspects such as behaviour, emotions, information, recall, target, and traits.

Behaviour

The term ‘behaviour’ can be considered as the way in which one acts or conducts oneself, especially towards others (McDougall, 2015). In earlier research it was found that the way in which information is initially encoded into memory often has a profound effect on subsequent behaviour and judgements of the person (Srull & Wyer, 1980).

Emotions

‘Emotions’ can be considered as the feelings deriving from one's situations, mood, or relationships with others (McDougall, 2015). Over the past several decades, social psychology researchers have focused on studies regarding the emotional disorders, such as anxiety and depression (Mineka et al., 2003).

Information

‘Information’ refers to the details or facts provided as inputs under the information-processing aspect (McDougall, 2015). Wyer (2014) presented the first theoretical model of social information processing. Further, Srull and Wyer (1989) examined two general types of information about a person in terms of specific behaviours a person has manifested and additional abstract personality dispositions or behavioural tendencies to develop their theoretical framework. This theoretical framework accounts for a large number of factors that are known to affect the recall of social information, the making of interpersonal judgements, and the relation between what is recalled and the judgements that are made (Srull & Wyer, 1989). Further, earlier researchers had already found a direct relationship between memory and decision making (Vollrath et al., 1989). Wyer (2008) presented several examples of the role of knowledge accessibility at different stages of information processing, including the attention to and comprehension of information, the representation of the information in memory, the computation of inferences based on previously acquired knowledge, and behaviour decisions. Wyer (2003) suggested a general theoretical formulation of the way that the sort of information acquired in daily life is comprehended and represented in memory, and how it is later used as a basis for judgements and behavioural decisions. The information people receive during daily life experience is often transmitted both verbally and visually. Two different processing strategies are postulated to underlie the integration of this information, the activation of which may be influenced by (a) chronic individual differences in the disposition to process information visually vs. verbally, (b) situational factors that influence the relative accessibility of these strategies in memory, and (c) characteristics of the information to be processed (Wyer, 2008).

Recall

Recalling means the process of bringing some details, event, or situation back into one's mind (McDougall, 2015). In a study conducted by Adaval and Wyer (2004) on the effects on memory for protagonists’ statements and nonverbal behaviours, it was found that different mental representations created through the acquired information influence people’s. Participants in three experiments watched a movie of an interaction, with the objective of comprehending the information in the movie. Later, participants were asked to write their impressions of the characters involved or alternately describe the sequence of events that occurred in the movie.

Communicating impressions of the protagonists decreased recognition of the statements that protagonists made but had little effect on the recognition of nonverbal behaviours. However, describing the sequence of events that occurred decreased recognition of both statements and nonverbal behaviours. A visual reminder of protagonists' behaviours increased recognition of both these behaviours and the statements that accompanied them, whereas an auditory reminder of protagonists' statements decreased recognition of nonverbal behaviours (Adaval & Wyer, 2004). Three experiments with undergraduate subjects investigated the mental representations that people form when they recall and chronologically order their personal experiences (Fuhrman & Wyer, 1988). The study findings indicated that when considering the judgements of personal experiences and judgements of others' experiences, people tend to focus more on others' experiences than they do of their own (Fuhrman & Wyer, 1988).

Target

An aim or a personal goal can be considered under the theme 'Target' (McDougall, 2015). Wyer (2014) presented a theory about how people form impressions about other people by combining information about a person with prior knowledge found in long-term memory. Further, researchers identified that a goal or a specific target strongly influences the information-processing aspects of an individual (Fuhrman & Wyer, 1988).

Traits

The theme 'traits' refer to the personality characteristics of a person (McDougall, 2015). In earlier days, researchers found a direct relationship between the personality traits and encoded information (Fuhrman & Wyer, 1988). A person may encode the information depending on personality traits, behaviour, and their memory capacity.

Cluster 3 analysis- Information-processing outcome

The third cluster contains themes on information-processing outcomes such as action, effect, event, and person. This cluster shows that most of the researchers who applied the theory of social information processing by Wyer (2003) focused on aspects such as action, effect, event, and person as follows.

Action

The fact or process of doing something, typically to achieve an aim can be considered as an action (Wyer, 2014). Narrative forms of mental representation and their influence on comprehension, communication and judgement have rapidly become one of the main foci of research and theory, not only in psychology but also in other disciplines, including linguistics, sociology, and anthropology (Wyer, 2014).

Effect

The theme of ‘effects’ refers to the impressions formed in the human mindset. An impression means a concept, idea, notion, or a thought (Wyer, 2014). Personal impression affects the information-recalling ability (Winke & Wyer, 1996; Wyer & Gordon, 1982).

Event

Something that happens or takes place is an event (Badiou, 2007). Psychological distance has been shown to influence how people construe an event such that greater distance produces a high-level construal (characterized by global or holistic processing) and lesser distance produces a low-level construal (characterized by detailed or feature-based processing) (Wyer et al., 2010). The memorial representations of events that result from different types of goal-directed cognition are conceptualized based on the general model of information processing proposed by Wyer and Srull (1980, 1984). The actions comprising target events were generally more likely to be recalled together and in chronological order when subjects had learned about them with either an impression formation or an empathy objective than when they had read about them with the goal of remembering them (Bodenhausen & Wyer, 1985).

Person

In this research, the theme ‘person’ refers to the beliefs and factors that influence behaviours of a person, such as personal preferences. Wyer and Albarracín (2005) identified that representation of beliefs in memory and the factors that influence their formation and change varies based on the nature of beliefs and their relation to other cognitions (e.g., attitudes, opinions, and other types of judgements. People receive the information with some particular objective in mind (Wyer & Gordon, 1984). The information will be stored according to structure in the memory. On the other hand, an understanding of the structure and content of the cognitive representations formed on the basis of information, and of which aspects of these

representations are most appropriate to be used to make judgements, may provide considerable insight into the determinants of social inferences and decisions (Wyer & Gordon, 1984). Moreover, based on the above-presented text-based cluster analysis, the emerged themes will be further categorised based on the theoretical assumptions presented in the ‘Workspace’ unit of Wyer’s (2003) theory of social information-processing theory. Table 3.10 presents the applicable themes under each theoretical assumption.

Table 3.9: The applicable themes under each theoretical assumption

Themes representing the theoretical assumptions of ‘Comprehender’	Themes representing the theoretical assumption of ‘Encoder’	Themes representing the theoretical assumption of ‘Inference maker’	Themes representing the theoretical assumption of ‘Response selector’
Information	Event	Participant	Emotions
Memory	Person	Implication	Result
Recall	Action	Effect	Judgement
	Behaviour	Target	Attitude
		Traits	

Therefore, based on the above-presented text-based analysis, the themes which were identified through the literature will be used to develop the questions, combined with the four major theoretical assumptions presented in the ‘Workspace’ unit of the theory of social information-processing theory by Wyer 2003.

3.4.2 Developing the questions of the open-ended survey based on the above cluster analysis

The themes emerging from the afore-mentioned cluster analysis and workspace theoretical assumptions will be used in developing the questions for the open-ended surveys.

Stage 1- First section of the workspace contains information that has recently been transmitted to it by the processing unit of ‘comprehender.’

In here the first set of open-ended surveys questions represent the theoretical assumptions 1A and 1B, that is, that the Comprehender is an initial comprehension device that interprets input information in terms of general verb, noun, and adjective concepts (theoretical assumption 1A)

and the first section of the ‘Workspace’ unit stores information that has recently been transmitted to it by the ‘Comprehender’(theoretical assumption 1B). Therefore, based on the above-presented text-based cluster analysis, Table 3.11 shows the key questions as follows:

Table 3.10: Key questions of the open-ended surveys

Assumptions	Key Focus	Themes emerged through text-based cluster analysis	Key elements in the questions
Theoretical assumption 1A	An initial comprehension device that interprets input information in terms of general verb, noun, and adjective concepts	Memory	How many main visuals were there in this advertisement?
Theoretical assumption 1A	An initial comprehension device that interprets input information in terms of general verb, noun, and adjective concepts	Recall	Which elements such as objects, people, actions, do remember in this advertisement?
Theoretical assumption 1B	Contains information that has recently been transmitted to it by the processing unit of Comprehender	Information	What is the main idea of this advertisement depicting through these visuals?

Stage 2 – Second section of the workspace contains information that has been transferred by the special-purpose processing unit of ‘encoder.’

The second set of open-ended survey questions represent the theoretical assumptions 2A and 2B which contain the acquired concepts and knowledge that have been used by the special-purpose processing unit of ‘encoder’ to attain specific processing objectives. Encoder is responsible for organizing the high-order interpretations of information and forms mental representations consisting of several features. In here, the theoretical assumption in the second unit will be used to develop the questions. The second section of the Workspace unit contains acquired concepts and knowledge that have been used by special-purpose processing unit of

‘encoder’ to attain specific processing objectives (theoretical assumption 2A) and encoder is responsible for organizing the high-order interpretations of information and forms mental representations consisting of several features (theoretical assumption 2B). Therefore, based on the above presented text-based cluster analysis, Table 3.12 shows the key questions as follows.

Table 3.11: Key questions of the open-ended surveys

Assumptions	Key Focus	Themes emerged through text-based cluster analysis	Key elements in the questions
Theoretical assumption 2A	Encoded concepts and knowledge	Events/Objects	Have you noticed these objects in this advertisement? (examples: temple, beach, house, leaf’s)
Theoretical assumption 2A	Encoded concepts and knowledge	Person	Which elements do you remember in terms of people?
Theoretical assumption 2B	Identifying the high-order interpretations of information	Actions/ Behaviour	Have you noticed any actions in this advertisement?
Theoretical assumption 2B	Organizing the high-order interpretations of information	Events Person Actions /Behaviour	What is the order of the main visuals as you remember?
Theoretical assumption 2B	Forms mental representations consisting of several features	Events Person Actions /Behaviour	What kind of information comes to your memory while watching this video?

Stage 3- The third section of the workspace contains information that has been used by the special-purpose processing unit, ‘inference maker’, to attain specific processing objectives. Inference maker combines the implications of information to form a subjective judgement.

The third set of open-ended survey questions represents the theoretical assumption 3A and 3B which contains information that has been used by the special-purpose processing unit ‘inference maker’ to attain specific processing objectives (theoretical assumption 3A) and inference maker combines the implications of information to form a subjective judgement (theoretical assumption 3B). Therefore, based on the above-presented text-based cluster analysis, Table 3.13 shows the key questions as follows:

Table 3.12: Key questions of the open-ended surveys

Assumptions	Key Focus	Themes emerged through text-based cluster analysis	Key elements in the questions
Theoretical assumption 3A	Attain specific processing objectives (Inference maker)	Effect	Do you remember any product image?
Theoretical assumption 3A	Attain specific processing objectives (Inference maker)	Implication	Have you noticed any brand name? if so, how many times?
Theoretical assumption 3B	Combines the implications of information to form a subjective judgement	Target Participant Traits	What is the most applicable goal for you?
Theoretical assumption 3B	Combines the implications of information to form a subjective judgement	Target Participant Traits	What is the most applicable goal for you?

Stage 4–The fourth section of the workspace contains information that has been used by the special-purpose processing unit ‘Response Selector.’ The Response Selector transforms subjective inferences or judgements into an overt response.

In this section, the fourth set of open-ended surveys questions represent the theoretical assumptions 4A and 4B which contain information that has been used by the special-purpose processing unit ‘response selector’ (theoretical assumption 4A). The response selector

transforms subjective inferences into an overt response (theoretical assumption 4B). Therefore, based on the above presented text-based cluster analysis, Table 3.14 shows the key questions as follows:

Table 3.13: Key questions of the open-ended surveys

Assumptions	Key Focus	Themes emerged through text-based cluster analysis	Key elements in the questions
Theoretical assumption 4A	Contains information that has been used by special-purpose processing unit 'response selector'	Result	I think the images presented in this advertisement are very interesting.
Theoretical assumption 4A	Contains information that has been used by special-purpose processing unit 'response selector'	Judgment	I think the images presented in this advertisement will influence my buying decision.
Theoretical assumption 4B	Transforms subjective inferences or judgements into an overt response	Attitude	Why do you think that these information in the visuals are applicable for your buying decision?
Theoretical assumption 4B	Transforms subjective inferences or judgements into an overt response	Emotions	What do you feel after viewing these visuals?

Therefore, based on the above text-based cluster analysis, a total of 16 structured questions were developed. The next section elaborates the development of the semi-structured interviews based on the above-presented cluster analysis.

3.4.3 Developing the questions of the semi-structured interviews based on the above cluster analysis

The themes emerging from the above cluster analysis and the workspace theoretical assumptions will be used to develop the questions of the semi-structured interviews.

Stage 1- First section of the workspace contains information that has recently been transmitted to it by the processing unit of Comprehender.

The first set of interview questions represents the theoretical assumptions 1A and 1B which state that the Comprehender is an initial comprehension device that interprets input information in terms of general verb, noun, and adjective concepts (theoretical assumption 1A) and the first section of the ‘Workspace’ unit stores information that has recently been transmitted to it by the ‘Comprehender’(theoretical assumption 1B). Therefore, based on the above-presented text-based cluster analysis, Table 3.15 shows the identified key themes.

Table 3.14: Key themes and questions formed through literature

Assumptions	Key Focus	Themes emerged through text-based cluster analysis	Key elements in the questions
Theoretical assumption 1A	An initial comprehension device that interprets input information in terms of general verb, noun, and adjective concepts	Memory Recall	What is this advertisement is about? What are the visuals that helped you get this initial idea?
Theoretical assumption 1B	Contains information that has recently been transmitted to it by the processing unit of Comprehender	Information	Explain this video advertisement only using the main visuals you have noticed from beginning to end

Stage 2–The second section of the workspace contains information that has been transferred by the special-purpose processing unit of ‘encoder’

The second set of interview questions represents the theoretical assumptions 2A and 2B which contains the acquired concepts and knowledge that have been used by the special-purpose processing unit of ‘encoder’ to attain specific processing objectives. Encoder is responsible for organizing the high-order interpretations of information and forms mental representations consisting of several features. In this section, the theoretical assumption in the second unit will be used to develop the questions. The second section of the Workspace unit contains acquired concepts and knowledge that have been used by the special-purpose processing unit of ‘encoder’ to attain specific processing objectives (theoretical assumption 2A) and the encoder is responsible for organizing the high-order interpretations of information and forms mental representations consisting of several features (theoretical assumption 2B). Therefore, based on the above-presented text-based cluster analysis, Table 3.16 shows the identified key themes.

Table 3.15: Key themes and questions formed through literature

Assumptions	Key Focus	Themes emerged through text-based cluster analysis	Key elements in the questions
Theoretical assumption 2A	Contains acquired concepts and knowledge that have been used by special-purpose processing unit of ‘encoder’	Objects Events Person	Explain the people you have noticed Explain the places you have noticed Explain the objects you have noticed
Theoretical assumption 2B	Encoder is responsible of organizing the high-order interpretations of information and forms mental representations consisting of several features	Action Behaviour	Explain more about the colours that you have noticed. Explain the behaviours or interpersonal activities you have noticed

Stage 3–The third section of the workspace contains information that has been used by the special-purpose processing unit ‘inference maker’ to attain specific processing objectives. Inference maker combines the implications of information to form a subjective judgement.

The third set of interview questions represents the theoretical assumptions 3A and 3B which contain information that has been used by the special-purpose processing unit ‘inference maker’ to attain specific processing objectives (theoretical assumption 3A) and inference maker combines the implications of information to form a subjective judgement (theoretical assumption 3B). Therefore, based on the above presented text-based cluster analysis, Table 3.17 shows the identified key themes.

Table 3.16: Key themes and questions formed through literature

Assumptions	Key Focus	Themes emerged through text-based cluster analysis	Key elements in the questions
Theoretical assumption 3A	Attain specific processing objectives (Inference maker)	Participant Traits Effect	Do you remember any visual with a specific brand name or a brand logo ? Do you think these visuals are effective or can be noticed easily?
Theoretical assumption 3B	Combines the implications of information to form a subjective judgement	Target Implication	What kind of goals were activated from you? If so, please elaborate the visuals which helped you to activate your goals?

Stage 4–The fourth section of the workspace contains information that has been used by the special-purpose processing unit, ‘Response Selector.’ The Response Selector transforms subjective inferences or judgements into an overt response.

The fourth set of interview questions represents the theoretical assumptions 4A and 4B which contains information that has been used by special-purpose processing unit ‘response selector’ (theoretical assumption 4A) and response selector transforms subjective inferences into an overt response (theoretical assumption 4B). Therefore, based on the above presented text-based cluster analysis, Table 3.18 shows the identified key themes.

Table 3.17: Key themes and questions formed through literature

Assumptions	Key Focus	Themes emerged through text-based cluster analysis	Key elements in the questions
Theoretical assumption 4A	Contains information that has been used by special-purpose processing unit 'response selector'	Attitude Emotions	Explain about the information in these visuals which are applicable for your buying decision? (For example, my decision is health based, green tea visuals appeal for me) Why do you think that these information in the visuals are applicable for your buying decision?
Theoretical assumption 4B	Transforms subjective inferences or judgements into an overt response	Judgement Result	Do you think these video tape visuals are useful to promote a tea brand? What kind of information comes to your memory while watching this video? (It can be based on your previous product experience) Can you link these visuals with the advertisement purpose? (Freshness through tea leaf journey) What is your opinion about the visuals presented in this advertisement?

The cluster-based text analysis identified themes which can be grouped based on the four theoretical assumptions presented in Workspace. As a result, the author was able to develop 17 semi-structured interview questions using the 16 themes of three major clusters under information-processing approach, individual characteristics, and information-processing

outcome. The next section justifies the selected methodology of this study and discusses the generalisability, validity, and reliability issues of the study.

3.5 Generalisability, validity, and reliability issues

Evaluating the quality of research is important if findings are to be utilized in practice and incorporated in the practical business world (Creswell & Poth, 2016; Tracy, 2010). The most common generalisability issue of qualitative research is that the personal nature of the interview could make findings much more difficult to generalise as participants may effectively be answering different questions (Diefenbach, 2009). This impact will be mitigated by the researchers preparing the face-to-face semi-structured questions using a pre-determined and organised manner, as the interview questions will be based on the four theoretical assumptions of the 'Workspace' unit. Additionally, the skills of the interviewer will play a significant role when gathering rich qualitative data using the semi-structured interviews, such as attending to create a relationship with the participant, and a context that allows the participant to reflect upon their experience in relation to the phenomena under study (Creswell & Poth, 2016; Tracy, 2010).

Creswell and Clark (2007) defined validity as the accuracy of the findings. Consequently, to ensure the validity of this study, the final report will be sent back to the supervisory team after the data analysis to confirm the rigor in research and to avoid the potential sources of errors. This further guarantees that the data analysis does not include any personal opinions of the researcher and only the accurate interpretations given by the interviewees. Reliability denotes the consistency of the research approach (Creswell & Poth, 2016; Tracy, 2010). The reliability will be maintained in two ways: firstly, a cross check of the codes and themes with the help of the supervisory team, secondly, this study uses NVivo 12, the qualitative computer software package, to determine the level of consistency of the derived themes and conceptual maps (Creswell & Clark, 2007).

3.6 Ethical considerations

Since the main data collection focused young adults between the age group of 20 to 40 years, an ethical clearance letter was required from Griffith University Human Research Ethics Committee (HREC) to collect data. The selection of the participants commenced with friends of friends, relatives, and parents of the on-campus accommodated (Nathan) domestic and

international students. The ethical clearance letter was requested from the Griffith University on March 25th, 2021. The data collection was conducted from 25th of April to 29th of July 2021. Based on the intention of the study, age and gender were controlled via snowball sampling by making each group comparative. For example, the total number of 40 participants were divided into two groups, Group A and Group B, with 20 people (10 females and 10 males) in each group. With a semi-structured interview format, the agenda was relatively set; however, the interviewer was free to follow the respondent's train of thought and to explore indirect areas that arose such as experience and feelings aroused from the videos watched. The main advantage of the semi-structured interview and open-ended survey data collection method is that the interviewer has more control over the participant in comparison with other qualitative data collection methods, such as Delphi and structured questionnaires (Creswell & Poth, 2016; Tracy, 2010).

3.7 Conclusion

Using the research framework illustrated in Figure 3.1, this chapter illustrated the appropriate philosophical assumptions underpinning the research approach, justification of the research method including the sampling procedure, data collection and development of the research questions based on the themes identified through the literature. This section also included the strategy of inquiry which restated the research objectives and research questions and justification of the appropriate research paradigm and the mono-method qualitative approach. Further, this chapter included the justification of the chosen data collection methods, generalizability, validity, and reliability issues. Finally, the ethical considerations and conclusion are provided at the end of this chapter.

Chapter 4 : Study 1- Results

“More than 150 million people view videos online every year, most of them ripe to hear your business’s pitch if you produce and market your video effectively”- *Vern Marker*

4.1 Introduction

The previous chapter provided an overview of the research methodology used in this study with a detailed overview regarding experiment 1 and experiment 2. This chapter explains the qualitative findings of experiment 1. It commences by providing an overview of experiment 1, followed by a discussion regarding the equipment used in this experiment, and presents the results of experiment 1 separately based on female and male responses. Consequently, this section addresses research question one which is (“What is the differential effect of 360-degree versus standard video advertisements on visual memory under single viewing conditions?”) The qualitative results will be compared to identify the differences in themes for consumer visual memory for 360-degree and standard video advertisements at the end of this chapter.

4.2 Stimuli Design

The visual memory assessment was developed based on the four theoretical assumptions of the workspace unit in the social psychology theory of social information processing by Wyer (2003). This was created to allow participants to identify the most remembered visuals in the video versions of 360-degree and standard video advertisements. The adapted four theoretical assumptions of the workspace unit have informed the development process and subsequent investigation presented in this research. According to the theory of social information processing by Wyer (2003), working memory refers to a person's ability to store and process a limited amount of data for a short time (Baddeley et al., 2020; Cowan, 2017). It increases linearly throughout childhood and adolescence until around 14 to 15 years of age when it is deemed to have reached adult-like levels of performance (Gathercole et al., 2004). Individual variances in working memory exist at every stage of development (Baddeley et al., 2020; Gathercole et al., 2004).

Therefore, in this theory, the workspace unit which represents working memory is divided into four sections. The four theoretical assumptions presented in the workspace unit in the theory are comprehender, encoder, inference maker and response selector. The first section of the workspace contains information that has been recently transmitted to it by the processing unit of *comprehender* (Wyer, 2012). The second section of the workspace contains information that has been transferred by the special-purpose processing unit of the *encoder*. The third section of the workspace contains information that has been used by the special-purpose processing unit of *inference maker* to attain specific processing objectives (Wyer, 2012). Inference maker combines the implications of information to form a subjective judgement. The fourth section of the workspace contains information that has been used by the special-purpose processing unit *response selector* (Wyer, 2012). The Response Selector transforms subjective inferences or judgements into an overt response (Wyer, 2012). Information is kept in the workspace for as long as it is likely to be useful in achieving current goals. If a target has been met, or if the information has not been used in a long time, the workspace may be cleared to make it easier to find urgent information. Features of the original input data that were not included in higher-order goal-directed processing (and hence are not incorporated in a knowledge representation that is transported to *permanent storage (long term memory)* are irreversibly lost in this instance) (Wyer, 2012).

4.2.1 Exploring the content in visual memory

Visual memory is the ability to remember or recall information from the past, such as activities, pictures, or words (De Jager et al., 2017; Endress & Potter, 2014; Sarica & Usluel, 2016). A two to five-minute audio-visual clip integrating images, voice-over narration, and additional audio is referred to as digital storytelling (De Jager et al., 2017). Digital advertising storytelling, multimedia literature, digital narrative or even digital literature are different terms used to describe the evolution of how to tell stories (De Jager et al., 2017). The previous ten years have seen a revolution in entertainment and information systems, forcing to reconsider how people use these new tools to create new ways of communicating and transmitting tales (Zambrano, 2018). Someone who wants to convey a tale no longer has to only write; they also need to understand how to use the interactive features of modern digital media such as different video versions (2D, 3D and 360-degrees) (Zambrano, 2018). Storytelling first became popular in the United States in the 1990s, and it has since grown in importance in the realm of communication,

as well as in other domains such as politics, education, and consumption. It is natural because everyone enjoys telling us stories (not only when we are children) (De Jager et al., 2017; Zambrano, 2018). Being different, looking more personable, and being closer can help you communicate messages among so many others (Zambrano, 2018). Therefore, storytelling ability was used in advertising as it is a discipline that has mastered the ability to transmit a subtle advertising message (De Jager et al., 2017; Zambrano, 2018). The primary purpose of storytelling is to establish a connection with clients (De Santis, 2019). It seeks intimacy, empathy, and connection with users who are unwilling to consume products in the same way they have in the past (De Santis, 2019). Therefore, it is necessary to investigate new means of communication in marketing to promote the product for customers by assessing visual memory (De Jager et al., 2017; De Santis, 2019; Zambrano, 2018).

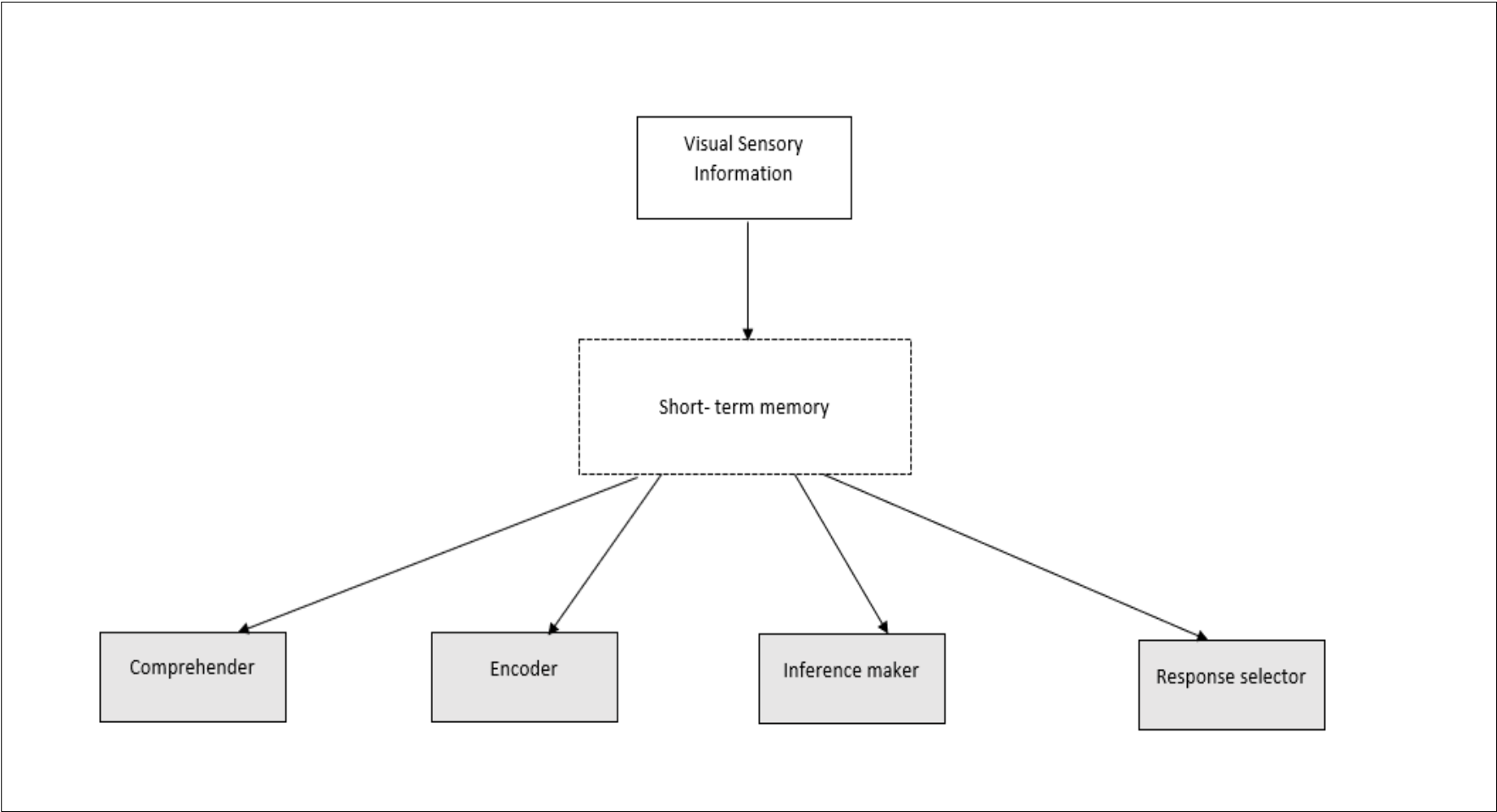
Working memory has evolved due to the recurrent differentiation of its concept of memory (Wyer, 2012). The working memory model assumes that the short-term store serves as a temporary working memory for storing and manipulating information, allowing people to accomplish a variety of cognitive activities (Wyer, 2012). Visual memory is a complex process involving many different parts of cognition, and cognitive researchers are always working to develop tests that separate each of these distinct aspects (Casas, 2020; Fellman et al., 2020; Gathercole & Pickering, 2001). While cognition is a holistic process that allows an individual to comprehend and evaluate their environment, it is difficult to determine where and why deficiencies emerge, without the capacity to isolate each function (Casas, 2020). Visual memory, similar to verbal memory, has a short-term, working term, and long-term component (Schwering & MacDonald, 2020). It is also hypothesised that, unlike verbal memory, it has a separate storing facility for different types of information (e.g., spatial and object). As a result, when evaluating an individual's visual memory, the task used should reflect the brain area and stimuli of relevance (Schwering & MacDonald, 2020).

While the majority of memory tests are verbal and stem from decades of research into memory for auditory information, the established paradigms that support these tests have theoretical linkages to memory for all senses (Baddeley et al., 2020; Casas, 2020; Fort et al., 2004; Gathercole et al., 2004; Kirchner, 1958). When it comes to constructing visual memory tests, the most difficult challenge is overcoming the methodological restrictions that have been repeatedly recognised when attempting to display visual information in isolation (Dzikon,

2020). This includes the capability of presenting abstract data in both static and dynamic formats. The use of language has an impact on visual memory since language is deeply ingrained in adult cognition and difficult to ignore, especially when asking people to recognise familiar items (Dzikon, 2020; Feng et al., 2021). Long administration periods, difficulty distinguishing between verbal and visual encoding processes, and the inability to display dynamic information in a standardised manner demonstrate the breadth of issues researchers confront while constructing visual evaluations (Dzikon, 2020; Feng et al., 2021). When testing the various components of visual memory, span tasks are the most typical measures of short-term memory within memory evaluations, as an individual's span is identical to their short-term memory capacity (Dzikon, 2020; Feng et al., 2021; Onișor & Ioniță, 2021).

Yet, current studies aimed at determining visual span have produced inconclusive results in terms of capacity (Bays & Husain, 2008; Da Costa et al., 2020; Zhang & Luck, 2008). Regardless of modality, a variety of elements have been identified as having the ability to alter memory capacity. Some of these, such as mood, tension, and hunger, are related to common sources of experimental error and are so difficult to control (Bell et al., 2021; Onișor & Ioniță, 2021). Despite the mounting evidence against memory as a unified system, there was debate over the nature of the short-term store, and numerous models have been proposed. However, these models shared some common characteristics, and Wyer et al. (2003) were able to combine them to create a model that summed up thinking at the time. Even though it is claimed that the core section of working memory can be used for storage, Wyer (2003) claimed that it is primarily responsible for control processes such as setting up appropriate phonemic "rehearsal" routines. To put it another way, the central executive loads the workspace unit and gets data from it as needed. In the theory of social information processing by Wyer (2003), the aspects on short-term storage; visual span or capacity; various components of visual memory; span tasks; verbal and visual encoding processes; visual comprehension; inference making, and response-selecting aspects were addressed through the 'workspace' unit. Therefore, the four theoretical assumptions presented in the workspace unit in this theory was used (which is comprehender, encoder, inference maker and response selector) to further investigate the components of visual memory of the participants. Figure 4.1 further demonstrates the variables used in the design process of the experiments.

Figure 4.1: The proposed model used to develop the experiments



To be able to explore whether there are differences in the capacities for each of the pathways, it is important to develop a series of tasks that measure each of the components highlighted in Figure 4.1. These tasks are outlined in Table 4.1 as follows.

Table 4.1: Summary of the Developed Assessment Tasks

	Activity 1	Activity 2
General Memory	Multifactorial Memory Questionnaire Working Memory Questionnaire	Multifactorial Memory Questionnaire Working Memory Questionnaire
Short-term visual Memory	Workspace unit theoretical assumptions (comprehender, encoder, inference maker and response selector) of a theory of social information processing by Wyer (2003)	Workspace unit theoretical assumptions (comprehender, encoder, inference maker and response selector) of a theory of social information processing by Wyer (2003)

The preliminary phase of this experiment involved the development of tasks that could measure short-term visual memory of the 360-degree and standard video advertisement separately. Therefore, before investigating capacity differences in visual short-term memory, Experiment 1 of this thesis involved the development and piloting of a series of visual memory tasks. The next section discusses the development process of the questions for Activity 1.

4.2.2 Designing the experiment

Experiment 1 of this study starts by introducing the format of the activity to participants. The participant will be instructed to watch the video advertisement once (either 360-degree video version or standard video version). The standard version of the video advertisement means viewing the video through the desktop and the 360-degree video version means video viewing through Google Cardboard. The first three questions assess the demographic information of the participant such as gender, age, familiarity with the product, and check whether the participant has viewed this advertisement before using a visual screenshot of the video advertisement. Figure 4.2 (refer Appendix 3A) demonstrates the visual screenshot used in this study. To maintain the accuracy of the study, participants will be disqualified if they have watched this advertisement before or are familiar with this image.

There is a multidimensional construct called metamemory which covers what people believe about memory and how people control and monitor it (Dunlosky & Thiede, 2013). Therefore, the 'Multifactorial Memory Questionnaire' (MMQ) style was utilized to accurately measure the day- to-day memory levels of the participants (Troyer & Rich, 2018). An important objective of the MMQ, which can be used clinically and in research, is the evaluation of subjective memory functions (meaning it identifies memory abilities, problems remembering in various situations, and strategies used generally) (Fort et al., 2004). It is important to measure meta-memory accurately when assessing and intervening clinically. For example, subjective memory impairment predicts cognitive decline (Mogle et al., 2021; Reid & MacLulich, 2006; Sheppard et al., 2021) and is a diagnostic criterion for mild cognitive impairment (Cogswell et al., 2021; Petersen, 2004). Questionnaire items were developed based on a survey of the literature (Cogswell et al., 2021; Petersen, 2004).

According to the contentment items, researchers examine how satisfied people are with their memory, focusing on emotional states associated with memory impairment, such as embarrassment, worry, or satisfaction. The strategy items assess how frequently individuals employ memory aides in their daily lives. Specifically, the ability items assess ways in which people might forget things on an everyday basis, such as forgetting to take medication or paying a bill (Illman et al., 2015). The MMQ includes three scales that score distinct aspects of metamemory. Test takers are asked to rate items on a five-point Likert scale based on their experiences in the previous two weeks. The three MMQ scales and their metamemory domains are as follows (Troyer & Rich, 2018) :

1. MMQ-Satisfaction (formerly called MMQ Contentment): This scale assesses one's recall of contentment, concern, and overall evaluation. The degree of agreement with each of the 18 assertions is assessed. The scale runs from 0 to 72, with higher scores indicating greater happiness.
2. MMQ-Ability: This scale assesses how well you think you remember things in ordinary life. Over the prior two weeks, respondents were asked to rate how often they made each of 20 typical memory errors. The scale runs from 0 to 80, with higher scores indicating stronger self-reported recall capacity.

3. MMQ-Strategy. This scale assesses how well people employ practical memory tactics and aids in everyday life. Over the prior two weeks, respondents were asked to rate how often they employed each of 19 memory methods. The scale runs from 0 to 76, with higher scores indicating more memory methods are used.

The MMQ was created to test many aspects of metamemory that could be relevant for clinical evaluation and intervention. In this study, MMQ was used to assess the day-to-day memory of the participants and to evaluate the visual memory of each participant towards the video advertisement. Therefore, after considering the triple aspects of contentment, ability and strategy, the author added Question 4 up to Question 9 in the survey (Please refer to Appendices) to assess the strength of the working memory of the participants. Here, a five-point Likert scale was used to assess the responses with (1) indicating strongly disagree; (2) disagree; (3) moderate; (4) agree; and (5) indicating strongly agree. The mean, median, standard deviation, and variance analysis was conducted using the SPSS statistical software. The results of the existing dataset of the 360-degree video version participants (males and females) and the standard video version participants (males and females) regarding their general memory are as follows.

4.2.3 Quantitative results of daily memory of the participants

Memory is similar to most cognitive abilities and is a serial process in which information must pass through each stage of processing in a specific order (Martin & Ford, 2018; Wyer, 2003). Atkinson and Shiffrin (1968) pioneered this line of reasoning with their model of memory, which emphasises the serial process of remembering and their model has since guided much of the subsequent research into this cognitive domain. When considering the several memory measurements, MMQ was created to test many categories of metamemory that could be relevant for clinical evaluation and intervention. Consequently, the six selected questions to assess the memory levels of the participants represent the three categories of contentment, ability, and strategy sections of MMQ. Table 4.2 indicates the mean, median, standard deviation, and variance results of the six questions.

Table 4.2: SPSS data results

Memory capacity	Question 4	Question 5	Question 6	Question 7	Question 8	Question 9
	Memory Capacity	Memory Capacity	Self-opinion	Self-opinion	Self-opinion	Trust
Mean	3.75	1.82	4.07	3.97	1.92	3.87
Median	4.00	2.00	4.00	4.00	2.00	4.00
Standard Deviation	0.80	0.87	0.94	0.76	0.91	0.75
Variance	0.65	0.76	0.89	0.58	0.84	0.57

Question four investigates how the person is generally pleased with their memory ability. This shows a mean value of 3.75 for the 40 participants. Further, this value indicates that participants are confident in their ability to remember things. Question five examines the beliefs of the participants regarding the capacity of the memory. This value is 1.82 which is the lowest among all the given questions. This further indicates that most of the participants are not confident in their memory capacity. Question six indicates the participants' ability to remember important information. The mean value for this question is 4.07 which is the highest of all the other questions. Question seven and eight assess memory capacity with the age of the participants considered. Most of the participants accept that their memory is good for their age with a mean value of 3.97, but a smaller number of participants believe that their memory is worse than most other people of their age with a mean value of 1.92. Question nine examines the confidence level among the participants in their ability to remember things. This value is 3.87 which is the highest indicating that, even though most of the participants believe that their memory is worse than most other people of their age, they have more confidence in their ability to remember things.

4.2.4 Working Memory Questionnaire

The Working Memory Questionnaire (WMQ) is a self-administered instrument that measures three aspects of memory. The questionnaire was written in three stages: The first stage was to conduct a literature review with a focus on research into the complaints of patients with severe

traumatic brain injury and their families, a close relative, or a rehabilitation expert who observed regularly (Brooks & McKinlay, 1983). The second step was conducting informal interviews with participants, especially patients who had previously been enrolled in cognitive rehabilitation programmes (Cicerone et al., 2019; Vallat-Azouvi et al., 2009). The third stage was to consider theoretical models of working memory (Baddeley et al., 1986), which suggested that this concept encompassed not only short-term memory but also attention and executive control (Vallat-Azouvi et al., 2012). The goal of the WMQ was to address working memory problems in ordinary life. The questionnaire asked about dual-tasking, mental effort, and distractibility, as well as short-term storage and attentional and central executive elements of working memory.

The WMQ consists of 30 questions divided into three domains of ten questions each (Vallat-Azouvi et al., 2012). However, the questions were presented in a set, pseudo-random order, such that questions related to the same area were not presented consecutively, avoiding response bias. The first domain was short-term storage, which refers to the ability to keep information in short-term memory for a limited amount of time. Distractibility, mental tardiness, mental weariness, and dual-task processing were all questions in the second domain. The third domain dealt with executive functions of working memory, such as decision-making, planning time, and shifting. Therefore, Q10 to Q36 were designed using the working memory questionnaire structure concept in line with the four theoretical assumptions of the workspace unit in social information-processing theory by Wyer (2003). In constructing the survey, the author adapted MMQ and WMQ concepts in designing the questions.

4.3 Equipment selection

Virtual reality (VR) has the potential to enhance the consumer experience while also making it pleasant (Song et al., 2021). Even though virtual reality, and 3D, 2D, 4D, 360-degree video have been present for over 40 years (Minocha, 2015), it has only recently become popular for consumer use. According to Mantovani (2001), virtual worlds can provide a rich, interactive, engaging, instructional context, facilitating experience (Song et al., 2020). Through an experientially engaging procedure, VR's capacity to engage customers in the marketing process can lead to improved mastery and retention of new knowledge (Song et al., 2021). Using a

communication medium, a person might feel physically present in a virtual environment (Mantovani, 2021; Steuer, 1992). In comparison to traditional two-dimensional (2D)-based flat-screen, VR is a richer medium that provides a better sensation of presence and interactivity, aside from offering more visual and audio signals (Azmi et al., 2021; Sharkey & Kenna, 2021; Subawaet al., 2021; Yung et al., 2021).

In this research, the 360-degree video advertisement was viewed using Google Cardboard. The Google Cardboard app was installed from the Google Play store to the mobile phone. These devices were ordered through the VR Gear Australia company. Google Cardboard is a virtual reality platform created by the search engine giant, Google. The platform was created as a low-cost system to foster interest and development in virtual reality applications (Google, 2016). Its name comes from the fold-out cardboard viewer into which a smartphone is plugged. Users can either create their viewers from basic, low-cost components using Google's standards or buy one that has already been built (Google, 2016). Users install Cardboard-compatible mobile apps on their phones, place them in the rear of the viewer, then view material via the lenses to use the platform (Google, 2016). A total of 40 units were ordered for the 40 participants. The 20 participants who will be viewing the standard video version will also receive a new Google Cardboard as compensation for participation. Additionally, 10 Lipton green tea bottles were purchased to give to the participants who were not qualified for the experiment. Figure 4.3 2 (refer Appendix 3B) shows the photos of the equipment and tea bottles.

4.3.1 Google Cardboard

Google Cardboard is a stereoscopic viewer with a low-price tag which is compatible with the majority of smartphone devices (Google, 2016). It is possible to employ technology existing in people's pockets to give an immersive on-site study of video commercials by building a mobile App with Google Cardboard (Google, 2016). In this research, the author investigated consumer visual memory for 360-degree and standard video advertisements by using the Google Cardboard to view the 360-degree video version. When referring to the 360-degree video version, there are different viewing devices. In comparison to projection displays or desktop-based virtual reality, Head-mounted Displays (HMDs) deliver the most immersive experience (Gutierrez et al., 2008). These HMDs, which often include a sound system and a display screen

with a motion-tracking system, give a computer-generated 360-degree or virtual reality environment that simulates the real-world experience (Villani et al., 2012).

The author designed the research study with the following goals in mind. Despite its technological advancements, high-quality virtual reality HMDs are still expensive and complex to use, thus making them inaccessible for many users (Lee et al., 2017; Omieno et al., 2013). As a result, Google Cardboard HMD was used (Google, 2016) as the primary 360-degree viewing platform. With its low cost and simple assembly, Google Cardboard has been recently unveiled as Google's attempt at virtual reality, making it more accessible (Google, 2016). The step-by-step instructions on setting up Google Cardboard are as follows. Firstly, the Google Cardboard need to be unfolded and separated from the pack. Secondly, the separated pack needs to pop up to form a viewer. Thirdly, the tabs and lenses are inserted. Finally, the smart phone is inserted and folded upwards.

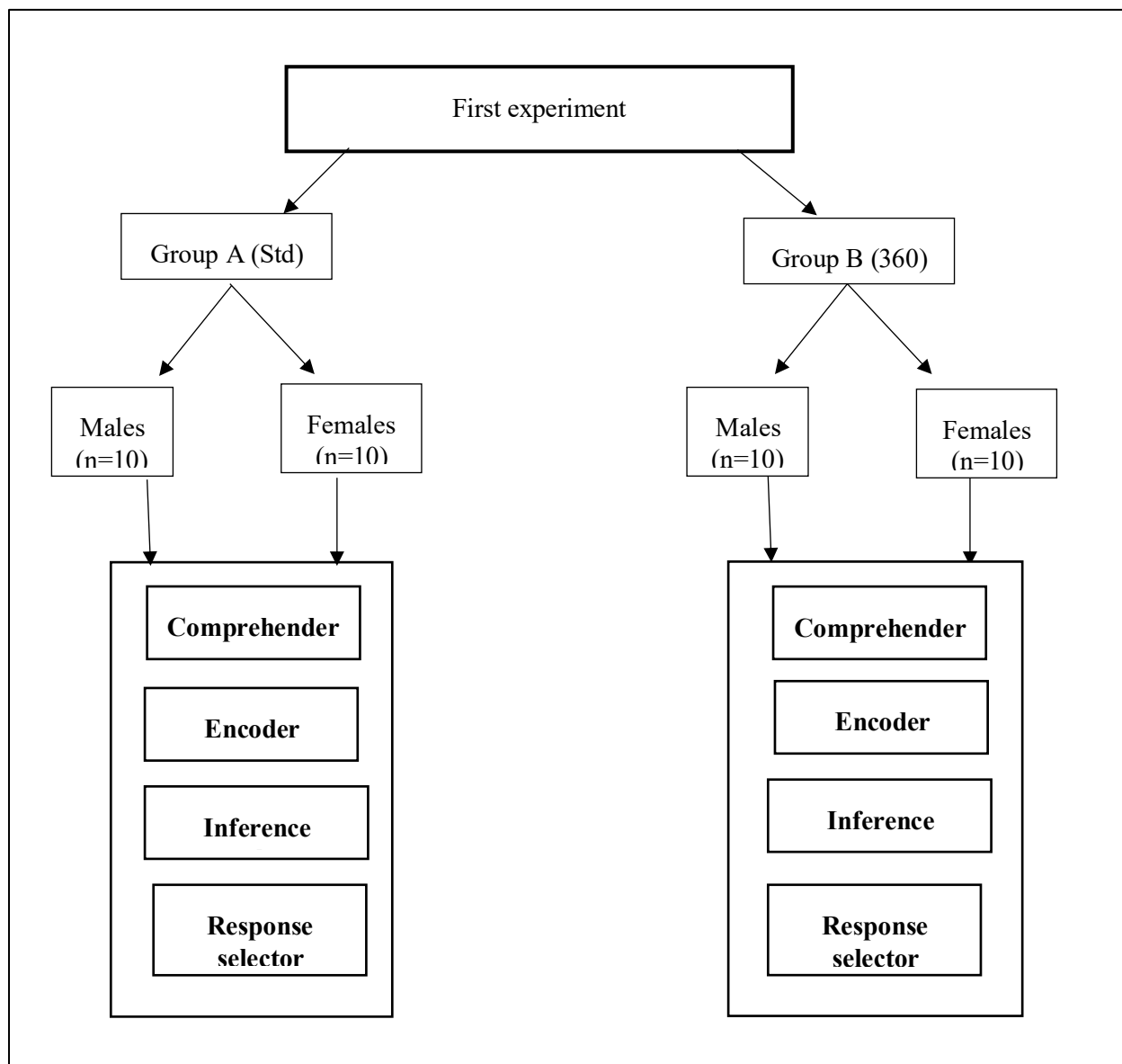
In the first experiment, participants were divided into two groups as Group A and Group B. Group A participants watched the 360-degree version of the Magnificent Matcha Lipton tea video advertisement and Group B participants watched the standard version of the Magnificent Matcha Lipton tea video advertisement under single viewing conditions. The images below demonstrate the viewing experience of the same image under standard and 360-degree video conditions. The second experiment took place one-week later. In the second experiment, the same set of participants were invited to watch the same advertisement under multiple viewing times (two times) one week later. The one-week timeline was allocated to avoid the fatigue of the participants as experiment one took about two hours (2 hours) to complete. Similarly, the Group A participants watched the 360-degree version of the Magnificent Matcha Lipton tea video advertisement and Group B participants watched the standard version of the Magnificent Matcha Lipton tea video advertisement under multiple viewing conditions.

The Google Cardboard device was given at the end of the two experiments. To avoid sharing devices, a unique name tag was placed in each device indicating the name of the participant. The accessibility of Google Cardboard is one of its most appealing features. It is lightweight and portable, and it works with practically any phone (Google, 2016). Google Cardboard is a low-cost stereoscopic viewer that works with most smartphones (Google, 2016). By 2016, it has gathered a user base of over 5 million people. Cardboard apps have been downloaded over

25 million times. Google Play is a search engine that allows you to download different apps (Google, 2016). Currently, Google Cardboard allows for easy viewing of 360-degree photographs and movies, which is ideal for usage in marketing campaigns (Krasnov, 2018).

While recognising that there are more advanced 360-degree platforms on the market (e.g., Samsung Gear VR, Oculus), this technology was chosen as it will be more appropriate for usage in a university context (Tse et al., 2017; Van Damme et al., 2019; Wang et al., 2018). Other platforms are expensive (at the time of writing, the estimated per-person cost for the Samsung Gear VR was around AUD 129 which would be \$5160 (40*129) in total. Oculus Rift was AUD 599 per person and HTC Vive was AUD 899 per person). Therefore, this study selected the more portable option and less expensive option, which is Google Cardboard. Google Cardboard is a virtual reality headset that can be purchased for as little as \$20 per person (costing a total of AUD 800). Further, for the purpose of this study, purchased 10 Lipton iced tea bottles ($\$1.85 \times 10 = \$18.50$). These iced tea bottles were purchased to give to the participants who were disqualified from the experiment. The ethical clearance was granted on the 7th of March 2021. The survey questions were finalized on the 19th of March 2021. The equipment arrived on the 31st of March 2021. The data collection was conducted between the 5th of April to 30th of May. The data analysis phase of the first experiment is shown in Figure 4.2 diagram. It further illustrates the data analysis phase of the first experiment.

Figure 4.2: Diagram of the data analysis phase of the first experiment



In this chapter, the qualitative results of Group A (standard version of the advertisement) and Group B (360-degree video version of the advertisement) participants for experiment 1 are as follows. Since the survey questions were divided based on the four aspects (comprehension; encoding; inference making; response selecting) of working memory, the results will be recorded based on these four aspects.

4.4 Data Analysis Phases

The following subsection describes the use of the NVivo toolkit (QSR International) to analyse data (O'Neill, 2013). It details the data analysis process in four stages, including a descriptive analysis, drawing of conclusions, and assessing the validity of the theory. Several resources were used for data analysis, including interviews, voice recordings, transcriptions, and research articles (Di Gregorio, 2000; O'Neill, 2013). A variety of data analysis procedures were employed in the analysis of the data, including developing resources, coding by nodes, and running queries to generate conclusions which enabled the development and verification of theories (Di Gregorio, 2000; O'Neill, 2013). In addition to qualitative analysis, NVivo can also be used with a literature review (Di Gregorio, 2000). Researchers can deal with large amounts of data with greater accuracy and easy access to resources (Hutchison et al., 2010; O'Neill, 2013). Data analysis using NVivo adds rigor to the process (Dollah et al., 2017). NVivo is designed to cover three main phases of the research process: analysis of data, theoretical development, and presentation of results (Hutchison et al., 2010). Previous studies have employed NVivo in qualitative research using the experimental research method (O'Neill, 2013).

4.4.1 Stages of data analysis

It is crucial that the techniques are presented in a logical manner to make it possible for the reader to follow the analytical procedure (Hutchison et al., 2010). A variety of methods have been proposed for the analysis of data using QSR NVivo. It has been found to be useful to use O'Neill's (2013) toolkit for this research, and thus, a similar data analysis procedure was followed throughout the entire chapter. Table 4.3 presents the stages followed in analysing the data.

Table 4.3: Stages of data analysis in this research study

Stages of NVivo QSR toolkit	The steps involved in each stage of the process
Stage 1: Descriptive	Participants demographic information with data sets
Stage 2: Topic	Cluster Analysis of coded material using word similarity
Stage 3: Analytic	Analytic using content analysis through word cloud and query results
Stage 4: Drawing conclusions	Matrix-coding query verification to assess the validity of themes

4.4.2 Stage 1: Participants demographic information with data sets

Designing a database for the research study is the first step of data analysis with NVivo (O'Neill, 2013). The experiments took around 1 to 2 hours in total to complete for each participant. First, the participant was asked to complete the first few sections of the information sheet to determine whether they had watched this advertisement before. If the participants had watched it before, then they were identified as disqualified. The 40 participants included 20 males and 20 females. The demographic details of the participants are as follows (please refer to Table 4.4 and Table 4.5).

Table 4.4: Demographic details of the 20 participants under standard video viewing conditions

Demographic details	Age Group	Gender	Nationality
P 1	30-40 years	Male	Sri Lanka
P 2	30-40 years	Male	Germany
P 3	20-30 years	Male	India
P 4	30-40 years	Male	Bangladesh
P 5	30-40 years	Male	Sri Lanka
P 6	20-30 years	Male	Africa
P 7	30-40 years	Male	China
P 8	30-40 years	Male	Malaysia
P 9	20-30 years	Male	Australia
P 10	20-30 years	Male	Australia

P 11	20-30 years	Female	Denmark
P 12	20-30 years	Female	Sri Lanka
P 13	20-30 years	Female	Sri Lanka
P 14	20-30 years	Female	Turkey
P 15	20-30 years	Female	Australia
P 16	20-30 years	Female	Australia
P 17	30-40 years	Female	Sri Lanka
P 18	30-40 years	Female	Sri Lanka
P 19	20-30 years	Female	India
P 20	20-30 years	Female	Pakistan

Source: Developed by author *Note: P 1=Participant 1

As demonstrated above the 20 participants under standard video viewing conditions 60% were between the age group of 20-30 years while 40% were between 30-40 years. These participants represented different nationalities including Australia (20%); Sri Lanka (30%); China (5%); Bangladesh(5%); Germany(5%); Denmark (5%); Turkey(5%); Africa(5%); India (10%); Pakistan(5%) and Malaysia (5%). The next Table 4.6 shows the demographic details of the 20 participants of 360-degree video viewing conditions.

Table 4.5: Demographic details of the 20 participants under 360-degree video viewing conditions

Demographic details	Age Group	Gender	Nationality
P 21	30-40 years	Male	India
P 22	30-40 years	Male	Philippine
P 23	20-30 years	Male	Pakistan
P 24	30-40 years	Male	Bangladesh
P 25	30-40 years	Male	China
P 26	20-30 years	Male	Hong Kong
P 27	30-40 years	Male	Bangladesh
P 28	30-40 years	Male	China

P 29	20-30 years	Male	Africa
P 30	20-30 years	Male	Sri Lanka
P 31	20-30 years	Female	India
P 32	20-30 years	Female	Australia
P 33	20-30 years	Female	Australia
P 34	20-30 years	Female	Saudi Arabia
P 35	20-30 years	Female	Australia
P 36	20-30 years	Female	Malaysia
P 37	30-40 years	Female	Thailand
P 38	30-40 years	Female	Papua New Genia
P 39	20-30 years	Female	Bangladesh
P 40	20-30 years	Female	Sri Lanka

Source: Developed by author *Note: P 1=Participant 1

As demonstrated above, of the 20 participants under the 360-degree conditions, 45% were between the age group of 20-30 years while 55% were between 30-40 years. These participants represented different nationalities including Australia (15%); Sri Lanka (10%); Saudi Arabia (5%); China (10%); Bangladesh (10%); Thailand (5%); Philippines (5%); Africa (5%); India (10%); Pakistan (5%); Hong Kong (5%); Papua New Guinea (5%) and Malaysia (5%).

The primary data include the interview and survey transcripts with voice recordings. In NVivo QSR, it is considered as the internals, that is, the primary research details that are imported or created in NVivo, such as documents, pdfs, audio, and video data sets (O'Neill, 2013). The internals for this research comprised audio files of interviews, transcriptions and twenty interviews with participants as primary data. In this stage, the data transcripts were initially divided into two parts—females and males. Then these transcripts were further divided based on the four categories of encoder, comprehender, inference maker and response selector. The voice recordings of the participants were transcribed into word documents manually by the researcher during the period 20th of April 2021 to 31st of May 2021.

4.4.3 Stage 2: Cluster Analysis of coded material using word similarity

The second stage of the process involved developing themes based on the transcripts. It also included the coding of interview material and the grouping of related concepts under the one heading called a 'node' which was used to analyse the data later (Hutchison et al., 2010). As soon as the material has been coded, NVivo enables the user to highlight the selected text and give the coding stripes a specific colour (Hutchison et al., 2010). Coding stripes are used to provide a visual overview of how nodes might relate to each other and to display concepts that are emerging (Hutchison et al., 2010). Cluster Analysis of coded material using word similarity was used for each section under visual encoder, visual comprehender, visual-based response selection and inference maker to identify the themes (O'Neill, 2013).

As a result, sixteen word similarity cluster maps were developed considering the visual comprehension of females in standard video version; visual comprehension of males in standard video version; visual comprehension of females in 360-degree video version; visual comprehension of males in 360-degree video version; visual encoding of females in standard video version; visual encoding of males in standard video version; visual encoding of females in 360-degree video version; visual encoding of males in 360-degree video version; visual-based inference maker of females in 360-degree video version; visual based inference-maker of males in 360-degree video version; visual-based inference maker of females in standard video version; visual-based inference maker of males in standard video version; visual-based response selection of females in 360-degree video version; visual-based response selection of males in 360-degree video version; visual-based response selection of females in standard video version; visual-based response selection of males in standard video version.

This cluster analysis covered almost all the themes identified through the word cloud analysis. Four major themes have been identified based on the key concepts under the visual comprehension category—colour detection, facial expressions, visual memory of locations, and plot. Three major themes have been identified under the visual encoder category—visual memory for objects, actions, and people. Two major themes have been identified under the visual inference-maker category—visual memory for emotional engagement and behavioural engagement. Two major themes have been identified under the visual response selector category—visual memory for product details and product benefits. The Cluster Analysis of

coded material using word similarity was used to validate the themes derived through NVivo (O'Neill, 2013). Therefore, the thematic validation has been fulfilled through this step.

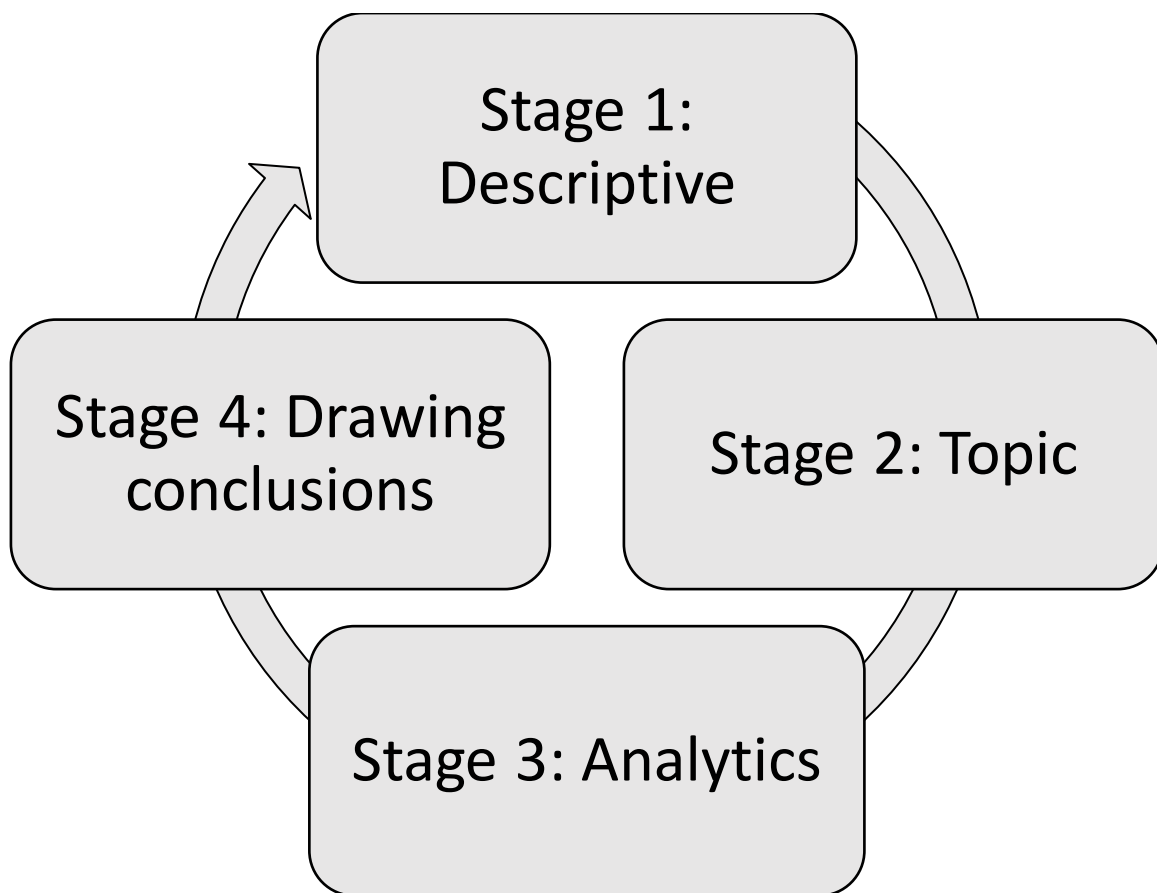
4.4.4 Stage 3: Analytics using content analysis through word cloud and query results

Content analysis has been considered a research methodology that observes textual data for patterns and structures, identifies key features and develops categorisations in order to extract the meaning from the text (Gray & Densten, 1998). Various tools are available in NVivo software to conduct content analysis, including automatic coding, coding stripes, coding density assessment, content linking, memos, and annotations (Bytheway, 2013). Some of the methods include creating hierarchies by merging nodes; developing datasets; developing models; the visualising data; and visualization techniques such as cluster analysis and using queries and word cloud maps (Bytheway, 2013; Hutchison et al., 2010; O'Neill, 2013). Therefore, this study used query result analysis and word cloud analysis to analyse the derived themes.

4.4.5 Stage 4: Matrix-coding query verification to assess the validity of themes

Researchers can use the matrix-coding query function to search for information directly from the perspective of their research questions (Bytheway, 2013; Hutchison et al., 2010; O'Neill, 2013). In addition, they can identify multidimensional aspects and subcategories of a research study. In this study, matrix coding queries were used to discover the answers to the research questions (Bytheway, 2013; Hutchison et al., 2010; O'Neill, 2013). For example, the influence of the theme colour detection for 360-degree and standard video advertisements and the extent of interaction for 360-degree video advertisement and standard video advertisement under visual encoding category. Figure 4.3 further illustrates the NVivo QSR toolkit-based analysis used in this study.

Figure 4.3: NVivo QSR toolkit-based analysis



The next section presents the NVivo thematic analysis for visual comprehension. This determines the ability of the participants to comprehend the information within the visuals presented in the advertisement. The second section presents the NVivo thematic analysis for visual encoding. This determines the ability of the participants to encode the details within the visuals. The third section presents the NVivo thematic analysis for visual inference makers, and determines the ability of the participants to identify the visuals which influence the buying decision. The fourth section presents the NVivo thematic analysis for visual response selection. This determines the information within the visuals which affects the buyer response.

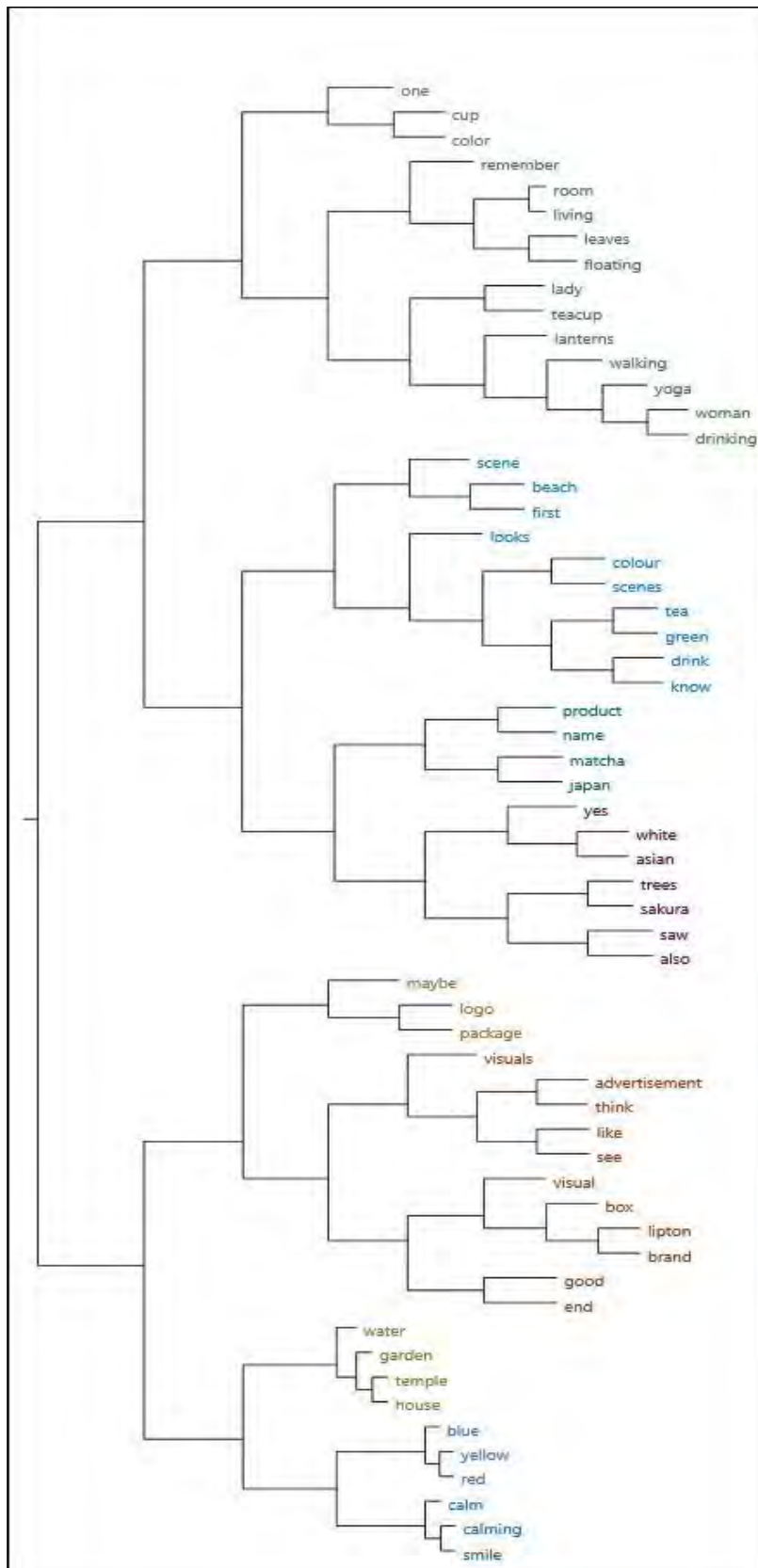
4.5 NVivo analysis for visual comprehension

The NVivo findings of the analysis were divided into four parts of the workspace unit as visual comprehension, visual encoding, visual inference making and visual response selection. Therefore, the corresponding sections illustrate the NVivo analysis of these four parts in the next sub sections.

4.5.1 NVivo analysis for visual comprehension–female participants of the standard video version

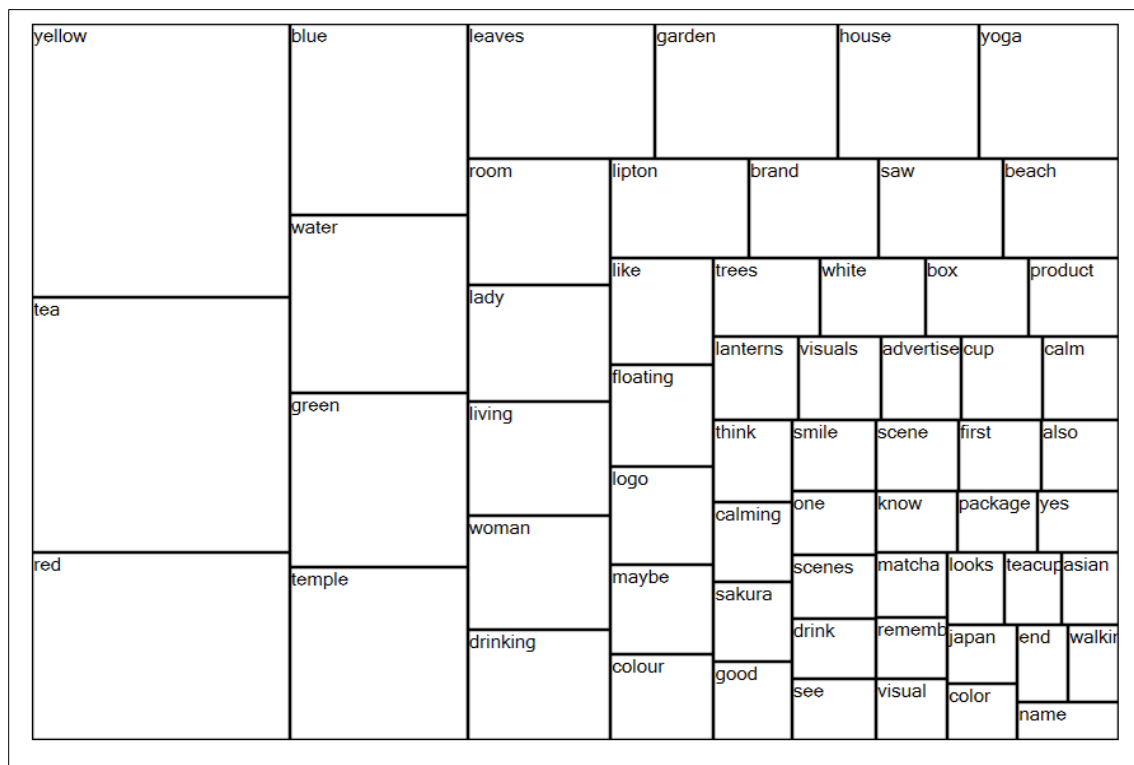
Thematic technique is an approach used to identify, analyse, and summarise the patterns within the data which was enacted through NVivo software (O'Neill, 2013). It is argued that NVivo is useful in organising unstructured information, for example, interviews and reports to extract themes (Di Gregorio, 2000; Dollah et al., 2017; Hutchison et al., 2010; O'Neill, 2013). The use of NVivo makes the analysis less time consuming in terms of identifying the themes through concepts (Di Gregorio, 2000; Dollah et al., 2017; Hutchison et al., 2010; O'Neill, 2013). As the software interprets and explore the meanings of the textual data, the four stages of NVivo QSR toolkit-based analysis were used in this thesis (O'Neill, 2013). As mentioned in the four stages above, development of the themes from the transcripts includes coding interview material and grouping related concepts under a single heading is referred to as a "node" for later analysis. NVivo assists the user in highlighting selected text and giving a particular colour to coding stripes following the coding process (Di Gregorio, 2000; Dollah et al., 2017; Hutchison et al., 2010; O'Neill, 2013). Coding stripes are used to provide a visual representation of how nodes might relate to each other and to display emerging concepts (Di Gregorio, 2000; Dollah et al., 2017; Hutchison et al., 2010; O'Neill, 2013). For this research study, initial themes were developed from the node cluster diagram as follows. Figure 4.4 illustrates the node cluster diagram using word similarity approach (Di Gregorio, 2000; Dollah et al., 2017; Hutchison et al., 2010; O'Neill, 2013)

Figure 4. 4: Node cluster diagram using word similarity approach



Based on the above node cluster diagram, the coding in-between the concepts can be further illustrated, as below. For example, the concepts including “water”, “temple”, “beach” , “garden” and “house” can be classified separately as the main theme of locations. Based on tree map analysis, the density of each concept was checked to label the theme accurately. A tree map is a visual representation of hierarchical data displayed as a series of nested rectangles of varying sizes. To compare the number of coding references, the researcher created a tree map of the nodes (Di Gregorio, 2000; Dollah et al., 2017). Consequently, the tree map analysis conducted through NVivo further showed the effect of each selected node (based on the rectangle’s size) towards the concepts generating the main themes. Figure 4.5 illustrates the tree map analysis (Di Gregorio, 2000; Dollah et al., 2017).

Figure 4.5: Tree map analysis



The concepts of ‘yellow’, ‘red’ and ‘blue’ showed a higher effect of each selected themes of colour detention and objects. Based on tree map analysis and node cluster diagram, the themes were identified as follows.

Table 4.6: Thematic classification based on the tree map analysis and node cluster diagram

Themes	Concepts derived from node cluster diagram	Concepts derived from tree map analysis
Colour detection	Blue; yellow; green; red; white; colour; scenes	Yellow; blue; red: colour; visual; scenes; colour
Visual memory of locations	Temple; beach; garden; leaves; water; room; living; house; lanterns ; scenes	Water; temple; living; house; garden; lanterns

The next section further explores the major themes based on the query results (Di Gregorio, 2000; Dollah et al., 2017). The NVivo findings of the female participants of the standard video version showed two major themes under visual comprehension. These two themes are visual memory for locations and colour detection based on the cluster analysis of coded material using word similarity. According to the query results, female participants under standard video viewing conditions comprehended information in the advertisement regarding colours and locations.

Major themes related to females who viewed the standard video version

The main themes indicate the names of some colours—green, white, maroon, blue, yellow, and pink. Some of the locations noticed were the temple, garden, beach and living room. This further demonstrates that the colour comprehension among female participants was high. Some of the NVivo findings on these themes are as follows.

Table 4.7: NVivo query findings on colour comprehension and locations among female participants

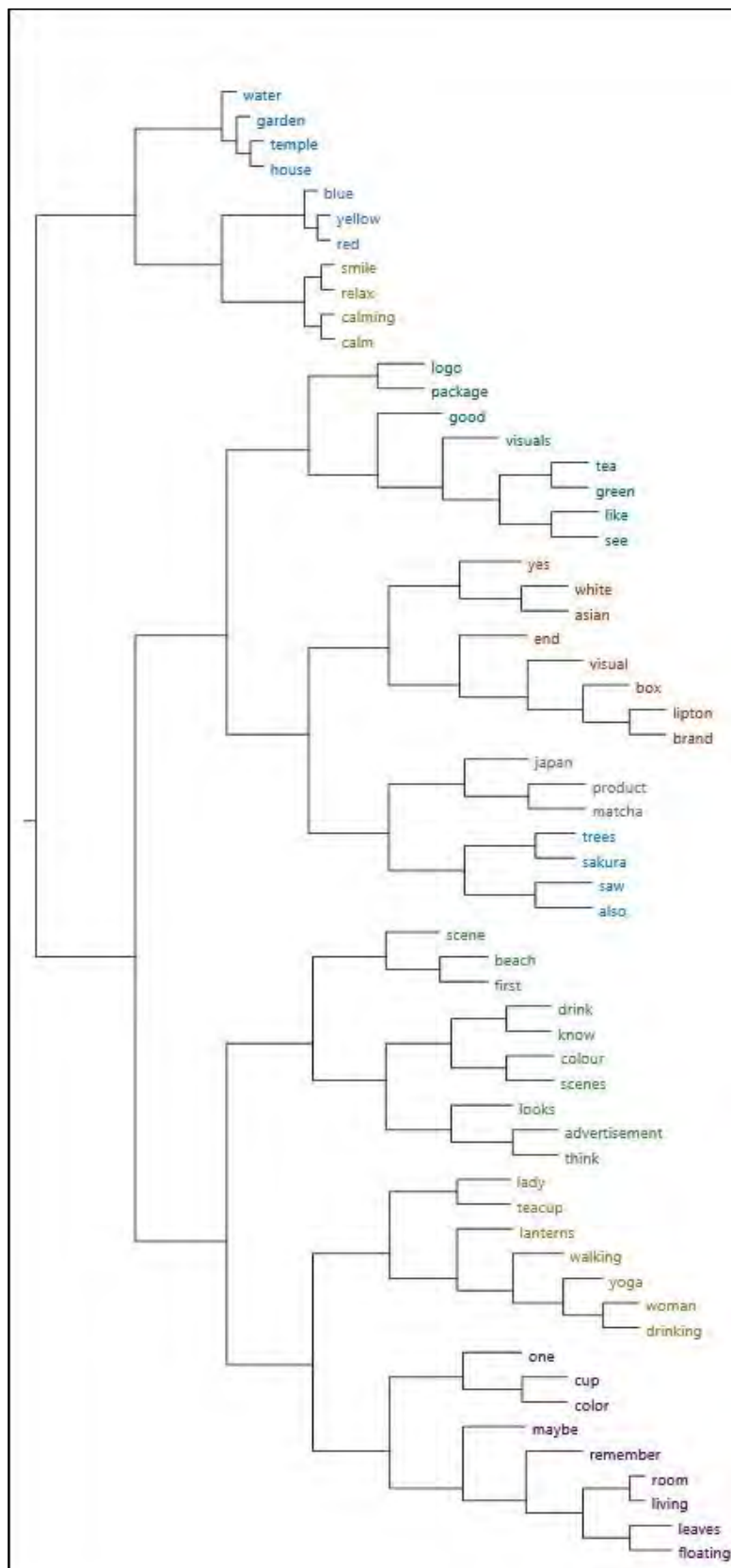
Theme	Codes	NVivo QSR query results
Colour detection	Green	*I do not personally like a green colour so the green leaves floating in green colour water looks too much for me..... (P11) * Green water reminds me that this is a green tea advertisement.....(P12) * First, I saw the green water with Matcha product name and logo. Second, I saw the colourful garden with a woman standing and walking.....(P11)
	White	* The living room walls look white, but I prefer some light cream colour and not plain white for the walls.....(P11) * The white colour background looks dull for me. I would prefer some dark colours over white especially for the living room (P19) * Ash colour sofa does not match for a modern living room, so I think it is better to have some white or light blue colour sofa.....(P18)
	Maroon	* Lady was wearing a maroon colour top (P20) * I noticed the lady wearing a maroon colour blouse with a black colour pants (P14) * I noticed that there was a lady, and she was wearing a red or maroon colour blouse (P16)
	Pink	* I prefer some pink colour portrait in the living room with some pink flowers or with something artistic in it.....(P20)
	Yellow	* She should have worn a yellow colour top and not a maroon colour top; To match with the background colours of the advertisement.....(P18) * I saw some lighted up candles floating in the yellow colour background (P11) * I noticed in the temple scene, some pale yellow or goldish beam (P20)

Visual memory of locations	Temple	* I noticed a Japanese temple..... (P17) * I noticed some Asian building....something with Chinese architecture similar to the buildings in Chinese traditional movies... (P14) * It started with floating leaves and then some trees, and then a temple and a lady drinking tea inside a house (P18)
	Garden	* There were some trees, and I noticed a pink colour Sakura tree in a garden (P16) * a woman standing under the cherry blossoms tree <i>in the garden (P11)</i> * The swirling leaves and then a garden with blossoms and lake....(P12) * A garden with Sakura trees and red colour bridge....(P15)
	Beach	* I saw a lady doing yoga beside the beach....it is a bit unusual scene(P11) * Sunny time and a girl doing yoga in beach.....(P19)
	Living room	* I saw some water with green leaves and a lady drinking tea also a temple, a yoga girl in the beach and I saw a nice garden..... also a nicely furnished living room with a lady drinking tea...(P19)”
	Water	* The swirling leaves and then a garden with blossoms and lake....(P12) * I saw the green water with leaves with Matcha product name and logo...(P13)

A word frequency analysis in NVivo QSR for the female participants who viewed the standard video version was conducted under the visual comprehension category. Based on the word cloud NVivo QSR analysis, the themes on colour detection and visual memory on locations can be further justified.

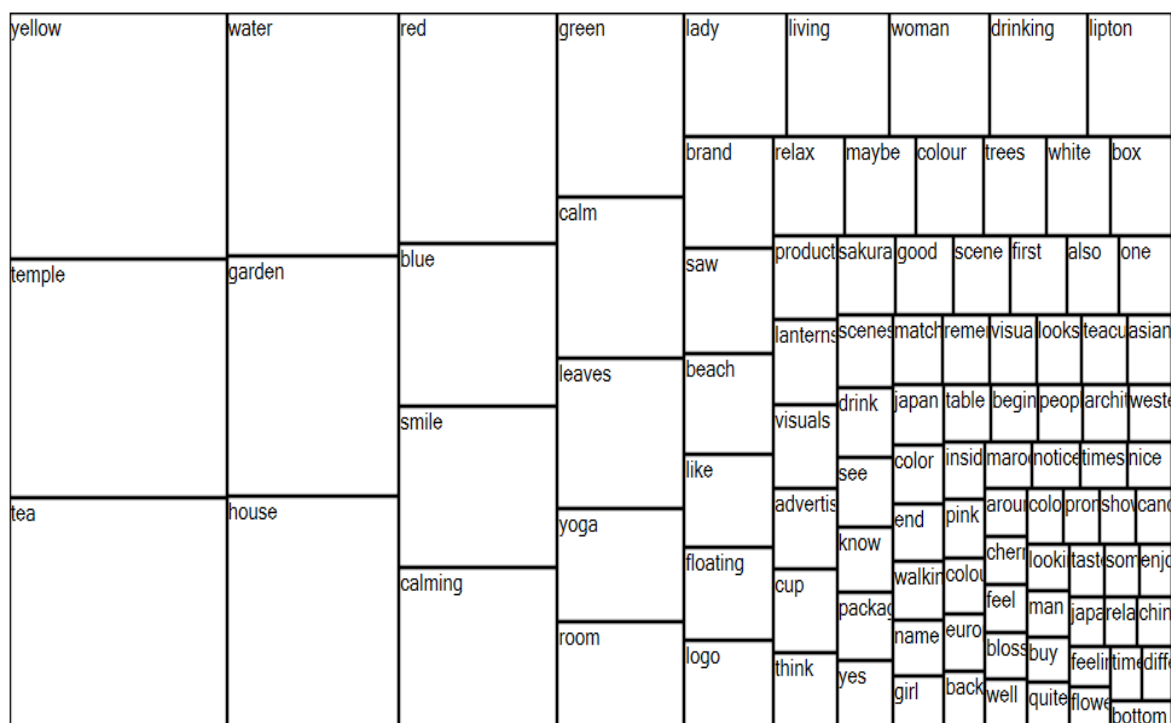
Initial themes were developed from the node cluster diagram as follows. Figure 4.7 illustrates the node cluster diagram using word similarity approach (Di Gregorio, 2000; Dollah et al., 2017; Hutchison et al., 2010; O'Neill, 2013).

Figure 4.7: Node cluster diagram using word similarity approach



Based on the above node cluster diagram, the coding in-between the concepts can be further illustrated as below. For example, the concepts including “water”, “garden”, “temple”, “house” can be classified separately as the main theme of locations. Based on a tree map analysis, the density of each concept was checked to label the theme accurately. A tree map is a visual representation of hierarchical data displayed as a series of nested rectangles of varying sizes. To compare the number of coding references, the researcher created a tree map of the nodes (Di Gregorio, 2000; Dollah et al., 2017). Therefore, the tree map analysis conducted through NVivo further showed the effect of each selected node (based on the rectangle’s size) towards the concepts generating the main themes. Figure 4.8 illustrates the tree map analysis as follows (Di Gregorio, 2000; Dollah et al., 2017).

Figure 4.8: Tree map analysis



After filtering out the meaningless words, such as maybe, like, example, one etc., the tree map analysis highlighted the concepts such as calming, clam, smile, happy, looking, and around to further illustrate the main theme of facial expressions. Based on tree map analysis and the node cluster diagram, the themes were identified as follows.

Table 4.8: Thematic classification based on the tree map analysis and node cluster diagram

Themes	Concepts derived from node cluster diagram	Concepts derived from tree map analysis
Facial expressions	Smile; relax; calming; calm	Calm; calming; smile; relax; visuals; think
Visual memory of locations	Water; garden; temple; house	Water; temple; garden; leaves; living; room; scenes

The next section further explores the major themes based on the query results (Di Gregorio, 2000; Dollah et al., 2017). The NVivo findings of the male participants of the standard video version showed two major themes under visual comprehension. These two themes were visual memory for locations and facial expressions based on the cluster analysis of coded material using word similarity. According to the query results, it is further clear that male participants under standard video viewing conditions comprehended information in the advertisement regarding locations and facial expressions in the visuals.

Major themes related to males who viewed standard video version

The main themes indicate some facial expressions including relaxing, smiling, and calm or peacefulness. This further demonstrates that the male participants comprehended mainly the facial expressions in visuals and similar to female participants, they also noticed the locations. Some of the NVivo findings on these themes are as follows.

Table 4.9: NVivo query findings on locations and facial expressions among male participants

Theme	Codes	NVivo QSR query results
Facial expressions	Calm	* The lady looks calm and peaceful.....(P9) * The environment with tea leaves and water makes more peaceful.... I would say that it makes you calm....(P10)
	Relaxing	* The living room setting with the couch and fireplace makes you more relaxing (P2) * The swirling leaves in the water makes you relax (P1) * The lady doing yoga implies relaxation and mindfulness (P3)

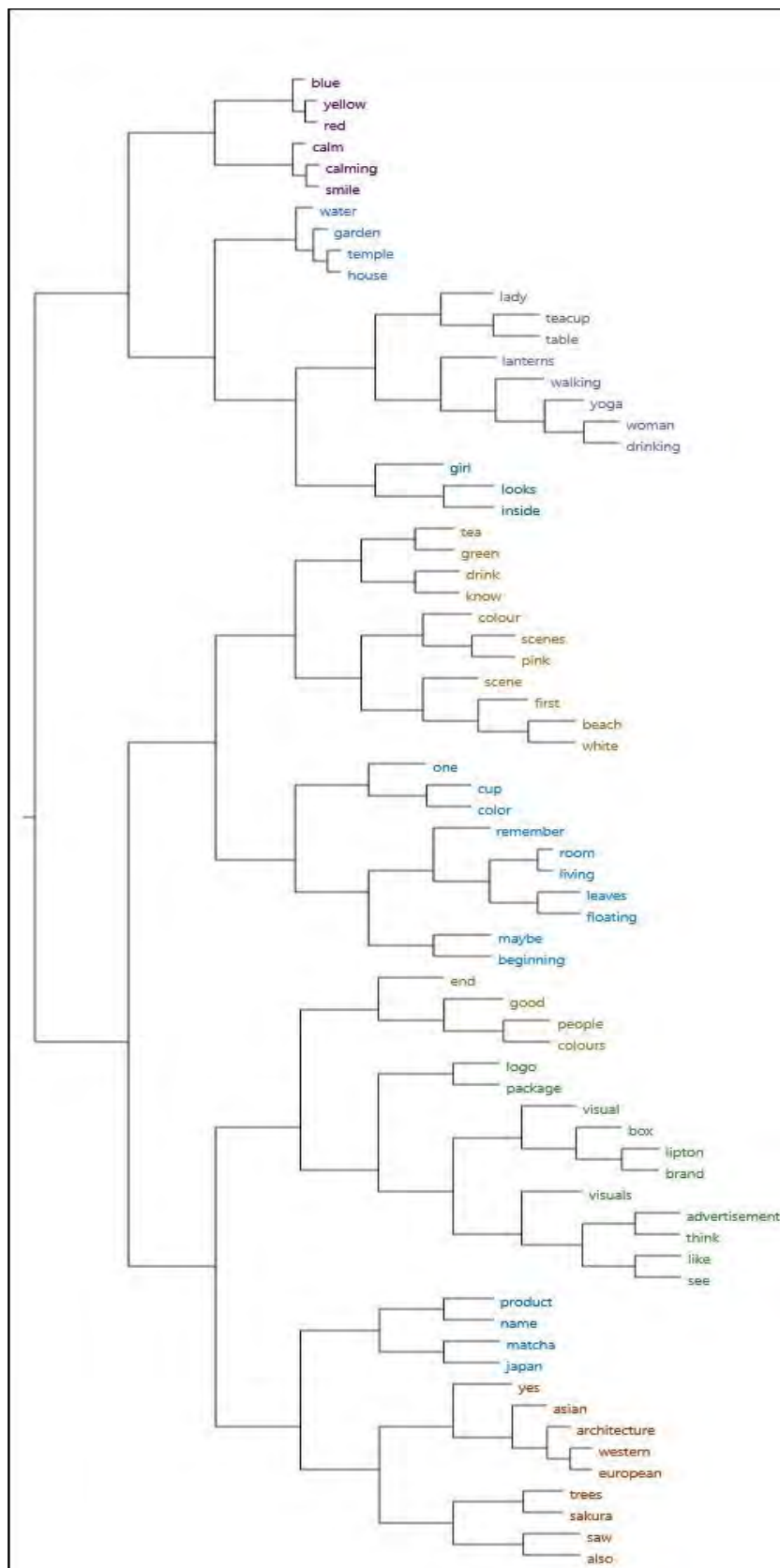
	Smiling	* The lady is smiling with a cup of tea in her hand (P5) * I noticed that the lady looks happy because there was a smile on her face....(P7)
Visual memory for locations	Garden	* Yes, I noticed a garden with some Sakura trees.....(P8) * Yes, there was a garden with pink trees (P7) * I have seen the lantern floating around and there was a temple with some Japan buildings and some people floating the lanterns another screen of a garden with trees some Sakura trees. Full of flowers.....(P10)
	House	* So first I saw some watery motion and a person was standing in front of her house .tea garden around the house she was looking into the house maybe she was thinking the effect of this tea leaves.....(P4) * I did not notice a house but there was a modern living room with a fireplace(P6)
	Leaves	* Some bacteria flowing in the water...(P4) * Some tiny leaves swirling in the water...(P2) * Normally we pour tea leaves into the green water and then it boils, and we keep it for few seconds before drinking...Am I correct about making tea?..... (P3)
	Beach	* There was a beach, and a girl was doing some yoga” (P8) * There was a beach, and a young lady was practising yoga (P7) * I noticed a girl on the beach who was working out inside a tent.....(P2)

A word frequency analysis in NVivo QSR for the male participants who viewed the standard video version was conducted under the visual comprehension category. Based on the word cloud NVivo QSR analysis, the themes on facial expressions and visual memory on locations can be further justified.

[illegible]

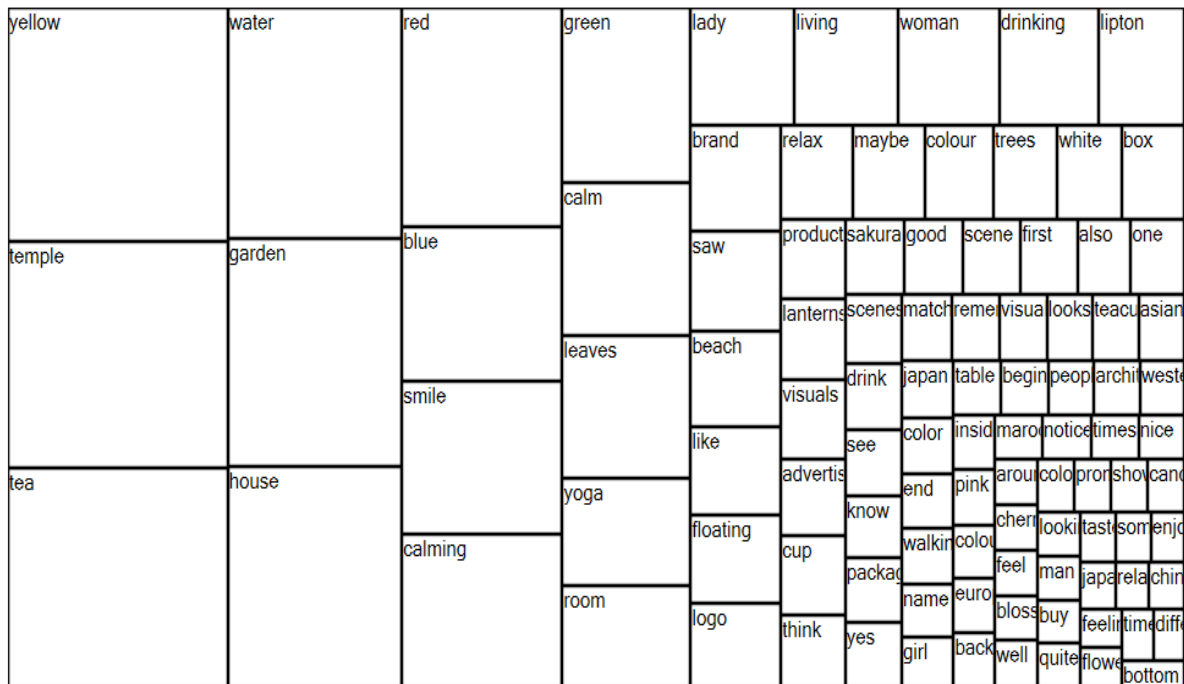
Initial themes were developed from the node cluster diagram as follows. Figure 4.10 illustrates the node cluster diagram using the word similarity approach (Di Gregorio, 2000; Dollah et al., 2017; Hutchison et al., 2010; O'Neill, 2013).

Figure 4.10: The node cluster diagram using word similarity approach



Based on the node cluster diagram above, the coding in-between the concepts of colours such as blue, yellow, and red highlight the colour detection node more than the facial expressions. Based on tree map analysis, the density of each concept was checked to label the theme accurately. Figure 4.11 illustrates the tree map analysis (Di Gregorio, 2000; Dollah et al., 2017).

Figure 4.11: Tree map analysis



The NVivo findings of the female participants of the 360-degree video version resulted in two major themes similar to the standard video version under visual comprehension. These two themes are visual memory for locations and colour detection. According to the query results, it is further clear, that female participants under the 360-degree video version viewing conditions comprehended information in the advertisement regarding locations and colour detection.

Table 4.10: Thematic classification based on the tree map analysis and node cluster diagram

Themes	Concepts derived from node cluster diagram	Concepts derived from tree map analysis
Colour detection	Blue; yellow; red; green; colour; pink	Yellow; blue; red: colour; pink; white
Visual memory on locations	Water; garden; temple; house; room; living	Temple; garden; house; leaves; room; beach; living

The next section further explores the major themes based on the query results (Di Gregorio, 2000; Dollah et al., 2017). The NVivo findings of the female participants of the 360-degree video version showed two major themes under visual comprehension. These two themes were visual memory for locations and colour detection based on the cluster analysis of coded material using word similarity. According to the query results, it is further clear that female participants under standard video viewing conditions comprehended information in the advertisement regarding locations and colours in the visuals.

Major themes related to females who viewed the 360-degree video version

The main themes indicate the names of some colours including green, white, maroon, blue, and pink. Some of the locations noticed were the garden, beach and living room. This further demonstrates that the colour comprehension among female participants was high. Some of the locations noticed were the garden, beach, and house. Some of the NVivo findings on these themes are as follows.

Table 4.11: NVivo query findings on colour comprehension and locations among female participants

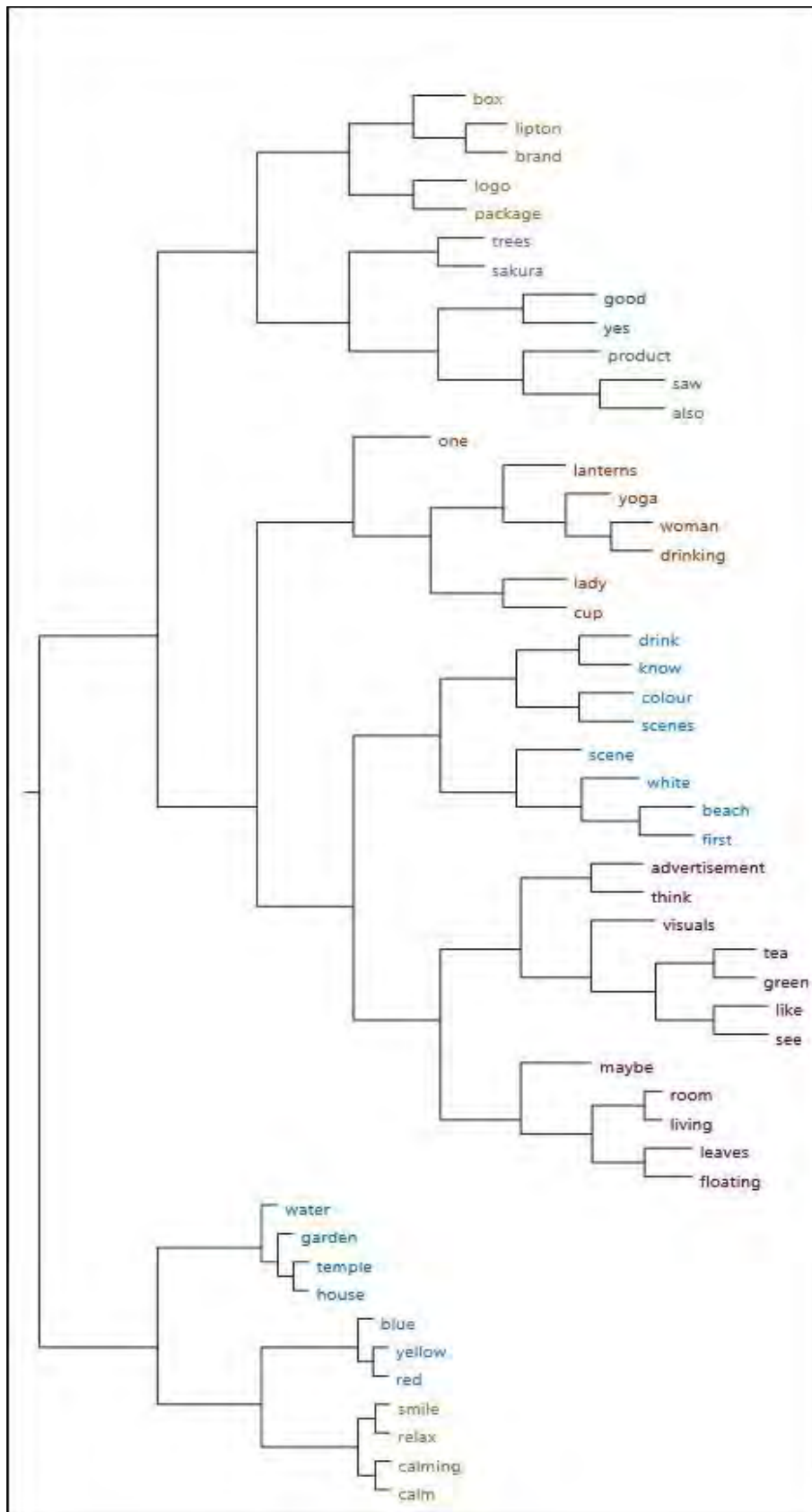
Theme	Codes	NVivo QSR query results
Colour detection	Green	Colour shows me it is green tea....(P38) * Beginning I noticed green leaves swirling around...(P37) I do not like green, so it is yellow for me...Yellow or maroon colour suits more than green....(P33) Some greenish things burst into the water. I could see that visual with garden popping up...(P32)" Until the end, I did not know this is a green tea advertisement.....(P38)... The first scene green looks good and also it is a happy and calming colour.....(P34) When I see the colour green it suits me it is comforting even the water makes peaceful like nature and trees.....(P37) Good and happy colours and calming colours. They are like most noticeable colours for a tea as it is yellow. Hey, let's get energised with calming yellow. The pale colour yellow is not good, so they used multiple colours. The yoga hut is tang colour even the temple is gold, and

	these colours are very eye-catching. Black and other colours are less even red are less. They used dark colours to explain the buildings like the rooftop of the temple. The tea leaves were green even. The beach is very white, and all look very visible. So white beach shows the sunshine and the feeling of the sun. Red is very vivid, and leaves represented by green colour.....(P32)
Maroon	* A lady was there wearing a maroon colour blouse(P40) * The lanterns were maroon colour(P39) * There was a maroon colour sleeping bag in the living room(P39) * The lady was wearing a red or maroon colour top and black pants(P36) * Floating candles and lanterns were maroon colour.(P38)
White	* The living room walls were white, and I saw some white colour curtains(P31) * There were some white colour curtains in the scene with a girl doing yoga beside the beach... inside there were some white colour curtains.....(P31) * A white lady was drinking some tea in the living room(P39) * The sky was clear blue with some white clouds(P37)
Blue	* The sky was clear blue with some white clouds(P37) * It is too much green.....I prefer blue over green.(P40)
Pink	* I saw some small objects and then the pink cherry blossoms and the snow.....(P40) * The pink colour tree in the garden is very noticeable(P40) I think they are how can I say, mmm I think they are not boring but dull colours. Not eye-catching to me. Except for the cherry blossom because it is pink and bright(P34)

Visual memory on locations	Garden	* Garden with a red colour bridge(P32) * First tea liquid, then the garden, and then some lanterns and.....(P33) * I saw some Sakura flowers in the garden...(P37) * I saw some pink colour trees in a park(P34)
	Beach	* I would say that it is a white beach.....(P38) * The order of the visuals is first the leaves, water, garden, temple, beach and living room.....(P38)
	Living room	* In the end, I saw the living room.....(P38) * And then there was some living room quiet, and nobody has seen.....(P37) * I was in a living room, and it was an ordinary living room(P34) * I think it is a modern living room with some modern furniture and a fireplace.....(P33)
	Water	* Water bubbles and leaves.....(P32) * Leaves were in the boiling water with water bubbles...(P35) * Tea leaves floating in green water...(P39) * Then the middle there was some water waves.....(P37) * Suddenly LIPTON logo appeared from the water(P35)

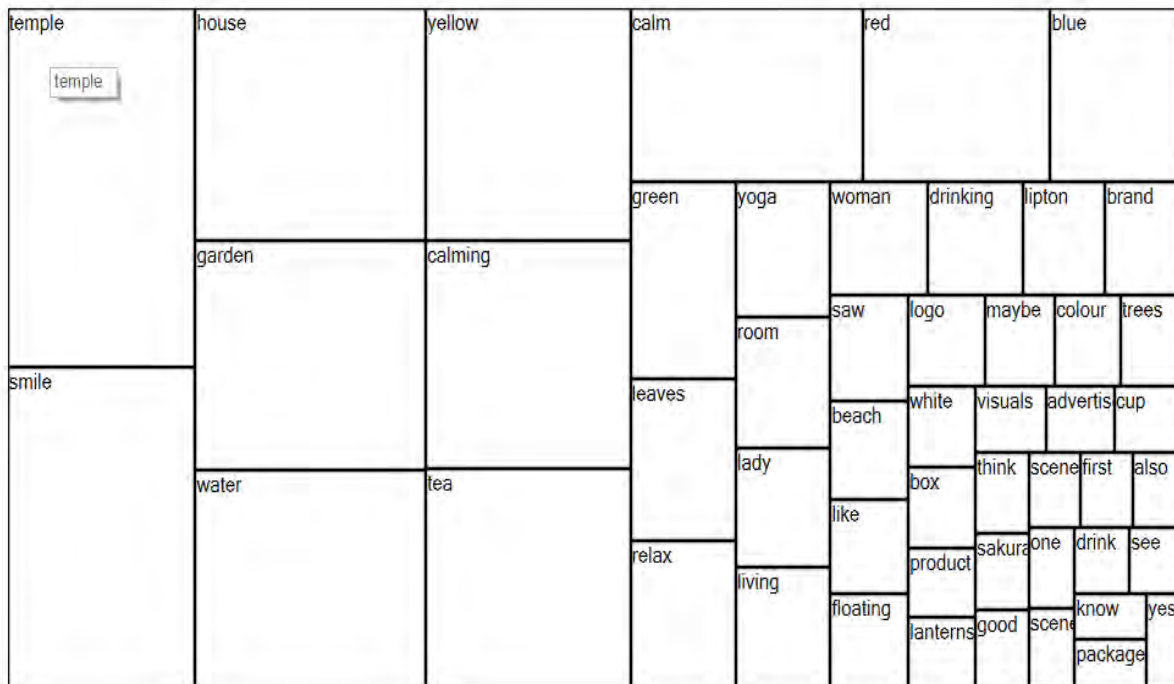
A word frequency analysis in NVivo QSR for the female participants who viewed the 360-degree video version was conducted under the visual comprehension category. Based on the word cloud NVivo QSR analysis, the themes on colour comprehension and visual memory on locations can be further justified.

Figure 4.13: The node cluster diagram using word similarity approach



Based on the above node cluster diagram, the coding in-between the concepts of facial expressions and locations can be further justified. The coding on colours is less in comparison to the coding on facial expressions. Based on tree map analysis ,the density of each concept was checked to label the theme accurately. Figure 4.14 illustrates the tree map analysis (Di Gregorio, 2000; Dollah et al., 2017).

Figure 4.14: Tree map analysis



The NVivo findings of the male participants of the 360-degree video version showed two major themes similar to standard video version under visual comprehension. These two themes are visual memory for locations and facial expressions. According to the query results, it is clear that male participants under the 360-degree video version viewing conditions comprehended information in the advertisement regarding locations and facial expressions.

Table 4.12: Thematic classification based on the tree map analysis and node cluster diagram

Themes	Concepts derived from node cluster diagram	Concepts derived from tree map analysis
Facial expressions	Good; smile; relax; calming; calm	Calming, smile, clam, relax

Visual memory on locations	Trees; Sakura; lanterns; beach; room; living; water; garden; temple; house	Temple; garden; house; water; room; visuals

The next section further explores the major themes based on the query results (Di Gregorio, 2000; Dollah et al., 2017). The NVivo findings of the female participants of the 360-degree video version showed two major themes under visual comprehension. These two themes are visual memory for locations and facial expressions based on the cluster analysis of coded materials using word similarity. According to the query results, it is evident that male participants under standard video viewing conditions comprehended information in the advertisement regarding locations and facial expressions in the visuals.

Major themes related to males who viewed 360-degree video version

The main themes indicate some facial expressions including smiling, and calm or peacefulness. This further demonstrates that the male participants comprehended mainly the facial expressions in visuals and like the female participants, they also noticed the locations. Some of the NVivo findings on these themes are as follows.

Table 4.13: NVivo query findings on facial expressions and locations among male participants

Theme	Codes	NVivo QSR query results
Facial expressions	Calm	* The lady seemed to be at ease.....(P21) * Tea leaves and water create a more tranquil environment.....(P22)
	Smile	* With a cup of tea in her hand, the lady smiles.....(P21) * Because she had a smile on her face, I saw that the lady appeared to be happy.....(P21). * Lady sipping tea shows relaxation and happiness.....(P23)

Visual memory for locations	Water	* At the start under water feeling and then the logo of Lipton appeared(P26) * Inside under water there were swirling leaves(P27). * Some bacteria were there in the water.....(P24) * It was water and water, and I was waiting until I see something else.....(P27) * Flashed candles on water.....(P28)
	Room	* It shows energy and living room lady sipping tea shows relaxation.....(P22) * Water waves suddenly connecting with the living room.....(P30) * When the water bubbles disappear, the living room scene appears(P29)
	House	* Some breeze and inside the house are a good matching time for a tea I guess(P28) I saw some furniture inside a house...(P22)
	Garden	* That garden had some trees and also a red bridge....(P22)... * Some Sakura flowers were there in the garden(P22) * I saw some cherry blossoms in the garden(P21)
	Temple	* Next, I saw a Chinese temple(P22) * night-time and then some snow and a temple.....(P24) * In the temple roof top, I saw a gold beam.....(P25)

A word frequency analysis in NVivo QSR for the male participants who viewed the 360-degree video version was conducted under the visual comprehension category. Based on the word cloud NVivo QSR analysis, the themes on facial expressions and visual memory on locations can be further justified.

Further, NVivo QSR content analysis observed textual data for patterns and structures, identified key features and developed categorisations to extract the meaning from the text (Gray & Densten, 1998). In this study, visualization techniques such as cluster analysis and using the queries and word cloud maps' approach was used to interpret the themes (Bytheway, 2013; Hutchison et al., 2010; O'Neill, 2013). However, to validate the conceptual findings, it is necessary to conduct a matrix coding analysis to identify the multi-dimensional aspects and sub-categories of the research study (Bytheway, 2013; Hutchison et al., 2010; O'Neill, 2013). Matrix coding analysis enables the researcher to validate the thematic findings derived from NVivo from the perspective of the research questions (Bytheway, 2013; Hutchison et al., 2010; O'Neill, 2013).

4.5.5 Cross-case analysis using matrix coding queries to validate themes

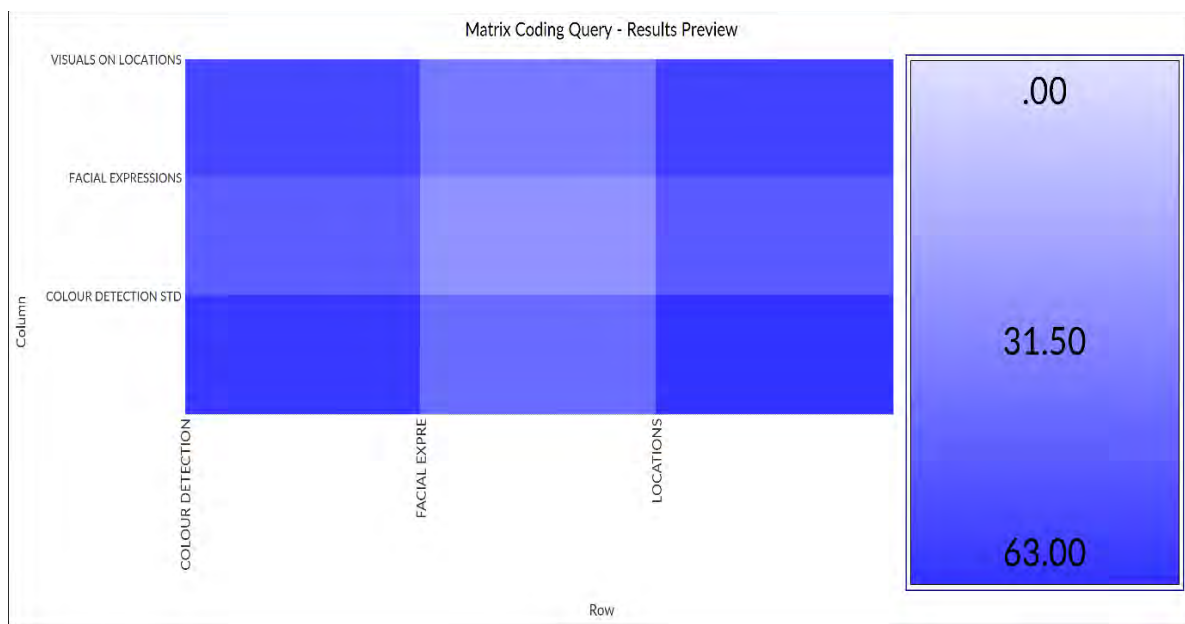
A matrix-coding query is a method for conceptual and theoretical development and to validate the themes derived from the qualitative analysis (Bytheway, 2013; Hutchison et al., 2010; O'Neill, 2013). Researchers can utilize the matrix-coding query function to look for information directly from the perspective of the research question (Hutchison et al., 2010). Furthermore, they are useful in identifying the multidimensional aspects and subcategories of a research study (Hutchison et al., 2010). In this research study, matrix coding analysis was conducted to check the validity of the derived themes and the inter-relationships between the queries in terms of 360-degree and standard video advertisements.

Table 4.14: Matrix-coding query analysis for 360-degree and standard video advertisements under visual comprehension

	A : COLOUR DETECTION... ▼	B : FACIAL EXPRESSIONS ▼	C : VISUALS ON LOCATI... ▼
1 : COLOUR DETECTION ▼	61	48	56
2 : FACIAL EXPRE ▼	43	29	38
3 : LOCATIONS ▼	63	49	58

Based on the above Table 4.14; the comparison query results produced three nodes on colour detection, visuals on locations and facial expressions, indicating the three themes. These three nodes represented 30 to 65 of the frequently occurring words in-between the transcripts, further showing the validity of the derived themes based on the cross-case matrix analysis (Hutchison et al., 2010).

Figure 4.16: Matrix-coding query: Results preview



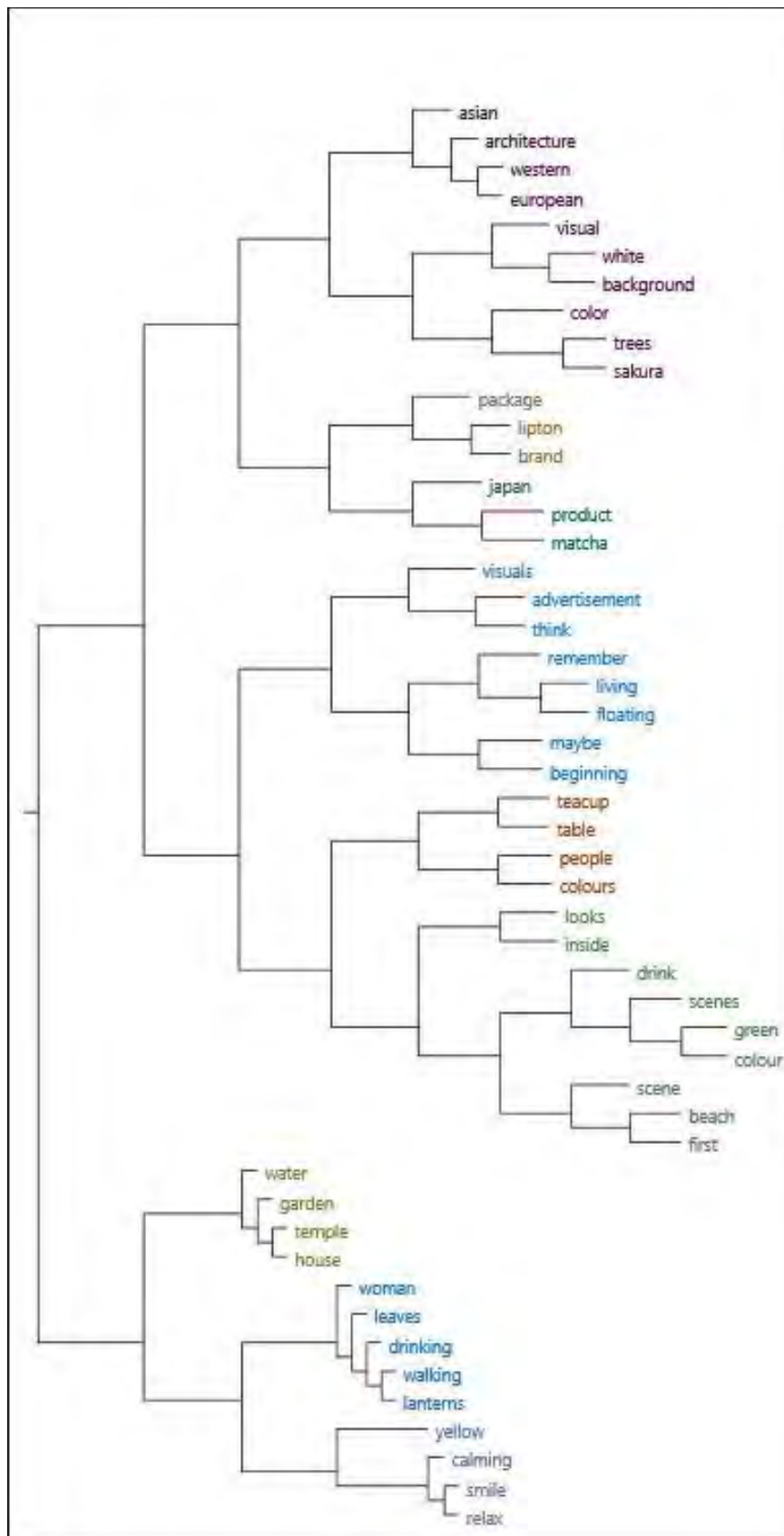
4.6 NVivo analysis for visual encoding

The NVivo findings of the analysis are divided into four parts of the workspace unit—visual comprehension, visual encoding, visual inference making and visual response selection.

4.6.1 NVivo analysis for visual comprehension – female participants of the standard video version

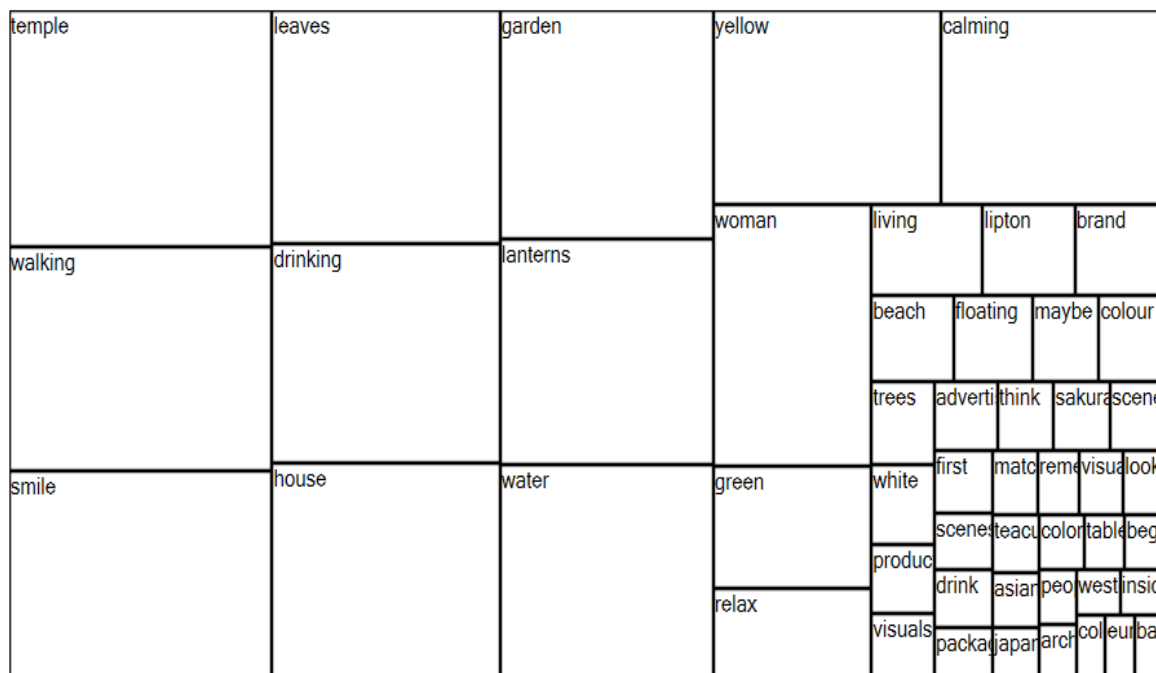
The NVivo findings of the female participants of the standard video version showed three major themes under visual encoding. The three themes are, visual memory for actions, visual memory for objects and visual memory for people. According to the query results, it is evident that female participants under standard video viewing conditions encoded information in the advertisement regarding actions, objects, and people. For this research study, initial themes were developed from the node cluster diagram as follows. Figure 4.17 illustrates the node cluster diagram using the word similarity approach (Di Gregorio, 2000; Dollah et al., 2017; Hutchison et al., 2010; O'Neill, 2013).

Figure 4.17: The node cluster diagram using word similarity approach



Based on the above node cluster diagram, the coding in-between the concepts can be further illustrated as below. For example, the concepts including “trees”, “Sakura”, “teacup”, “table” can be classified separately as one main theme of objects. Based on tree map analysis, the density of each concept was checked to label the theme accurately. A tree map is a visual representation of hierarchical data displayed as a series of nested rectangles of varying sizes. To compare the number of coding references, the researcher created a tree map of the nodes (Di Gregorio, 2000; Dollah et al., 2017). Therefore, the tree map analysis conducted through NVivo further showed the effect of each selected node (based on the rectangle size) towards the concepts generating the main themes. Figure 4.18 illustrates the tree map analysis as follows (Di Gregorio, 2000; Dollah et al., 2017).

Figure 4.18: Tree map analysis



The NVivo findings of the **female** participants of the **standard video version** showed three major themes under visual encoder. These three themes are visual memory for objects, people and actions. According to the query results, it is further clear that female participants under **standard video** viewing conditions encoded information in the advertisement regarding objects and actions more than the theme people.

Table 4.15: Thematic classification based on the tree map analysis and node cluster diagram

Themes	Concepts derived from node cluster diagram	Concepts derived from tree map analysis
Objects	Teacup, table	Temple, leaves, garden, lanterns, house, water, product
People	People, woman, lady	Woman, people
Actions	Remember, think, beginning, drinking, walking, calming, smile, relax	Walking, smile, drinking, relax, calming, living

Therefore, the next section further explores the major themes based on the query results (Di Gregorio, 2000; Dollah et al., 2017). The NVivo findings of the female participants of the standard video version showed three major themes under visual encoder. These three themes are visual memory for objects, people and actions based on the cluster analysis of coded materials using word similarity. According to the query results, it is further clear that female participants under standard video viewing conditions encoded information in the advertisement regarding objects and actions more than the theme people.

Major themes related to females who viewed standard video version

The main themes indicate the names of some actions shown in the visuals, objects, and people. This further demonstrates that the female participants were noticed quite a lot of objects within the visuals other than people and actions. Some of the NVivo findings on these themes is as follows.

Table 4.16: NVivo query findings on the encoding of actions, people, and objects among female participants

Theme	Codes	NVivo QSR query results
Actions	Yoga	* I saw a lady doing yoga on the beach which is a bit unusual (P19) * She was inside a hut, yoga hut or yoga platform maybe (P17) * A lady was exercising near the beach (P15)
	Drinking	* There were two girls...one was drinking tea...(P19) * Started with a person drinking tea from the table in a living room setting....(P20) * She was drinking tea and relaxing in er living room (P16)
	Walking	* A person walking up the steps in the temple (P20) * She was walking in the garden and looking at the trees (P20) * A lady was walking in the temple and there were many small temples beside her (P15) *No, just the person walking I could not work out what he was doing (P14)
Objects	Tea	* Started with a person drinking tea from the table in a living room setting....(P13) * She was drinking tea and relaxing in er living room (P15) * Some tea leaves were swirling and mixing with water (P16)
	Lanterns	* and the background was nice with some floating maroon colour lanterns...(P19) * People were wishing happiness through some lighted up lanterns...(P20)
	Leaves	* The tea leaves diffusing in water then it.....(P18) * ...transition back to green tea leaves diffusing to water and temple....(P15) * couch tea on coffee table leaves tangling together white walls and...(P16) * Tea leaves floating in the water.....(P19)

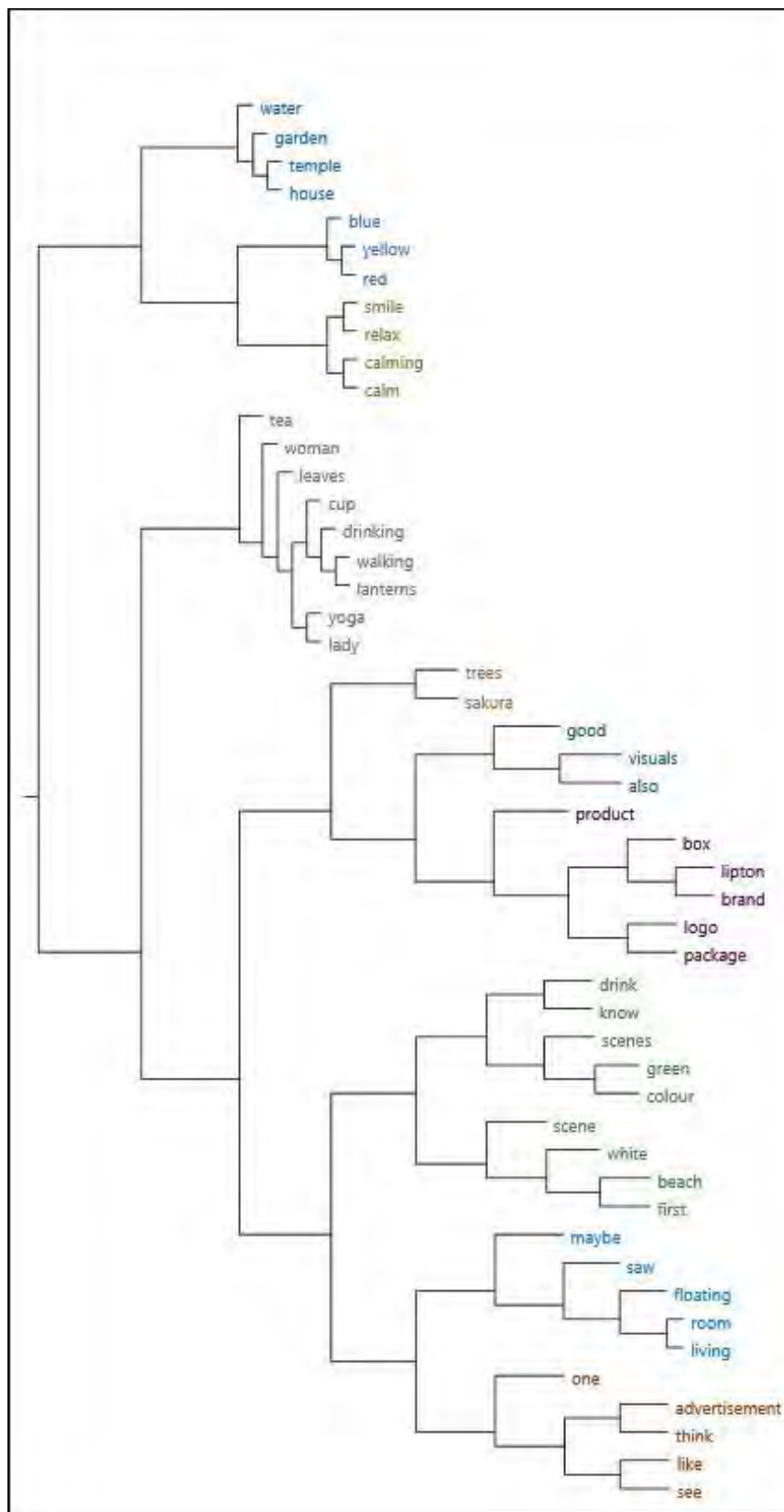
4.6.2 NVivo analysis for visual encoding -male participants of the standard video version

The NVivo findings of the **male participants of the standard video version** showed three major themes under visual encoding similar to the female participants. These three themes are visual memory for actions, visual memory for objects and visual memory for people.

Major themes related to males who viewed standard video version

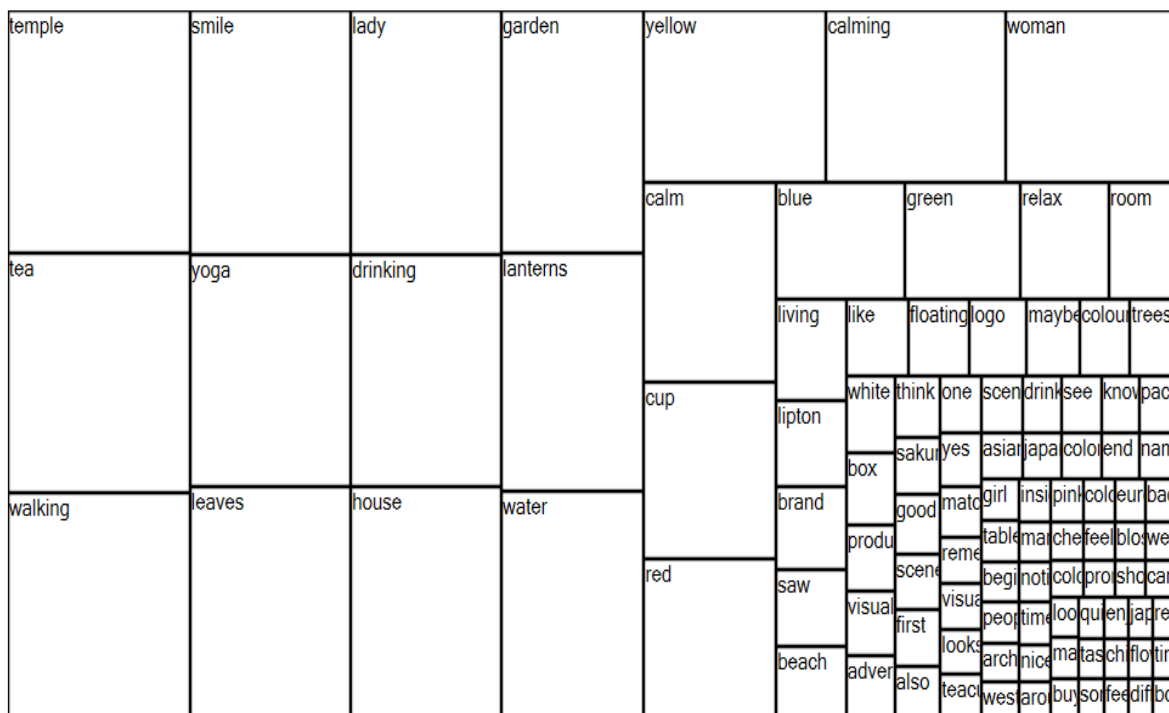
According to query results, it is further clear that male participants under standard video viewing conditions encoded information in the advertisement regarding actions, objects, and people. The main themes indicate the names of some actions shown in the visuals, objects, and people. This further demonstrates that the male participants were also able to notice quite a lot of objects within the visuals other than people and actions. Initial themes were developed from the node cluster diagram as follows. Figure 4.20 illustrates the node cluster diagram using word similarity approach (Di Gregorio, 2000; Dollah et al., 2017; Hutchison et al., 2010; O'Neill, 2013).

Figure 4.20: The node cluster diagram using word similarity approach



Based on the above node cluster diagram, the coding in-between the concepts can be further illustrated as below. For example, the concepts including “water”, “tea”, “cup”, “leaves” can be classified separately as one main theme of objects. Based on tree map analysis the density of each concept was checked to label the theme accurately. A tree map is a visual representation of hierarchical data displayed as a series of nested rectangles of varying sizes. To compare the number of coding references, the researcher created a tree map of the nodes (Di Gregorio, 2000; Dollah et al., 2017). Therefore, the tree map analysis conducted through NVivo further showed the effect of each selected node (based on the rectangle size) towards the concepts generating the main themes. Figure 4.21 illustrates the tree map analysis as follows (Di Gregorio, 2000; Dollah et al., 2017).

Figure 4.21: Tree map analysis



The NVivo findings of the male participants of the **standard video version** showed three major themes under visual encoder. These three themes are visual memory for objects, people, and actions. According to the query results, it is further clear that male participants under **standard video** viewing conditions encoded information in the advertisement regarding objects and actions more than the theme people.

Table 4.17: Thematic classification based on the tree map analysis and node cluster diagram

Themes	Concepts derived from node cluster diagram	Concepts derived from tree map analysis
Objects	Tea, water, cup, leaves	Temple, tea, leaves, house, cup
People	Woman, lady	Lady, woman
Actions	Smile, relax, calming, calm, drinking, walking, floating, think, remember	Walking, smile, yoga, calm, relax, living, floating, think, saw

Therefore, the next section further explores the major themes based on the query results (Di Gregorio, 2000; Dollah et al., 2017). The NVivo findings of the male participants of the standard video version showed three major themes under visual encoder. These three themes are visual memory for objects, people and actions based on the cluster analysis of coded materials using word similarity. According to the query results, it is further clear that male participants under standard video viewing conditions encoded information in the advertisement regarding objects and actions more than theme people similar to above condition under female participants.

Major themes related to males who viewed standard video version

The main themes indicate the names of some actions shown in the visuals, objects, and people. This further demonstrates that the male participants noticed quite a lot of objects and actions within the visuals than people. Some of the NVivo findings on these themes are as follows.

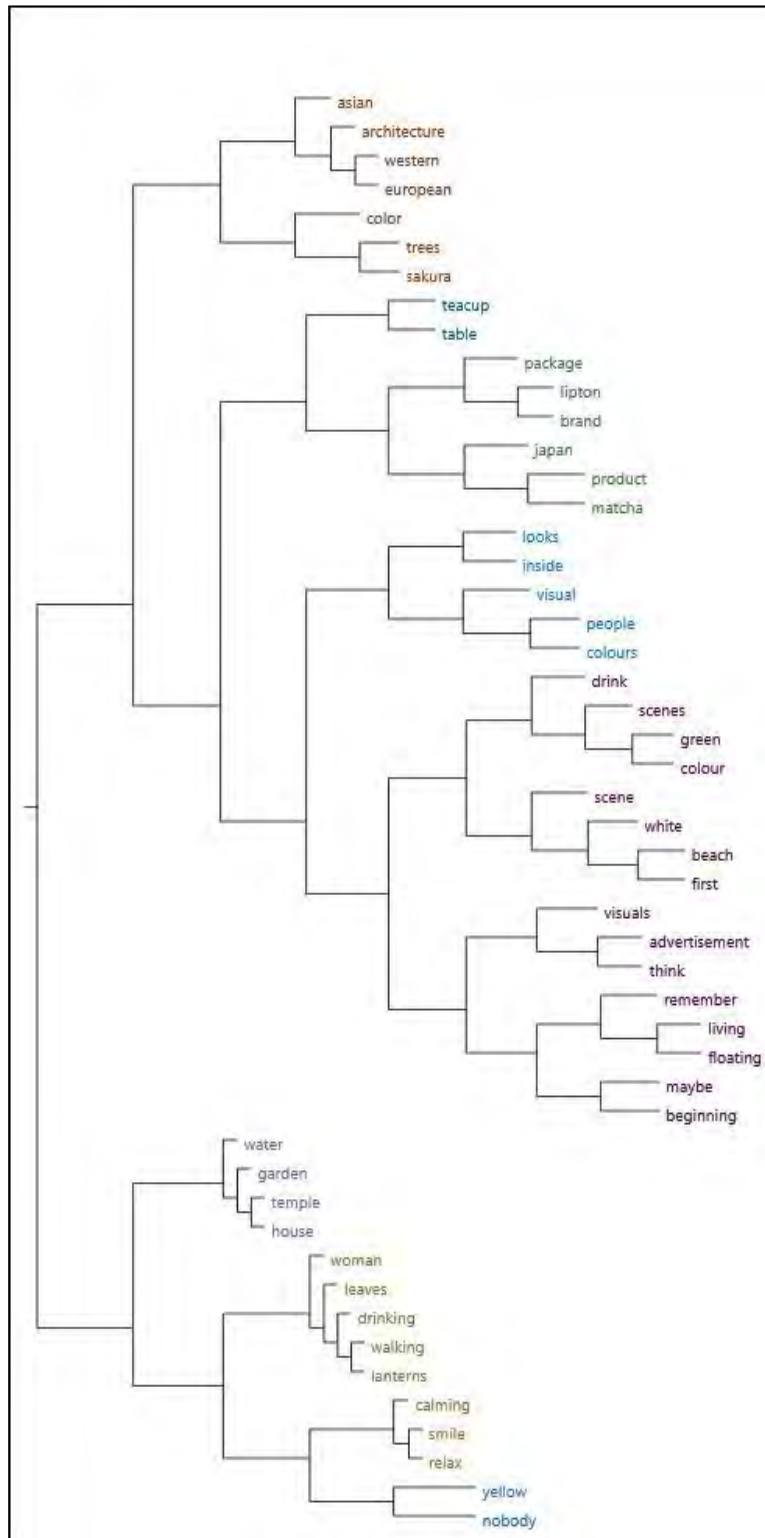
Table 4.18: NVivo query findings on the encoding of actions, people, and objects among male participants

Theme	Codes	NVivo QSR query results
Actions	Yoga	* A lady doing yoga on the beach (P1) * A yoga posture in the beach (P4) * She was doing some exercises or some mindfulness activities (P2)
	Drinking	* ...after that, they were drinking tea (P5) * She was drinking some tea and looks relaxed (P1) * The lady was drinking tea....(P7)

Objects	Tea	* The lady was drinking tea....(P7) * ...after that, they were drinking tea (P5) * She was drinking some tea and looks relaxed(P1) * Some tea leaves floating in the water(P6) * A beautiful white lady drinking some tea (P3)
	Water	* Some tea leaves floating in the water (P6) * Small leaves in water(P5) * Mixing process of tea with water was going on how quickly...(P7) * Quickly it can melt with water. It is very small leaves (P4) * Tea leaves were coming out of the water...(P4) * The water is green in colour... (P2) * Some green colour powder diffusing in the water (P8) * The watery background in the first few scenes (P9)
	Leaves	* Small leaves in water (P5) * Quickly it can melt with water. It is very small leaves (P2) * Tea leaves were coming out of the water...(P2)
	Cup	* She was putting the empty cup on the table (P7) * The tea is in the cup it looks like green...(P5) * Not engaging with a cup of tea with someone but.... * ...and zooming out of the cup woman drinking tea(P1)
	Trees	* Some Sakura trees (P7) * I do not know the name but there was a pink colour tree with some pink colour flowers (P8) * Ok, then I will elaborate it more like this....the trees in the garden...(P2)
People	Woman	* Woman drinking tea at the end (P2) *Yes, it is a woman...not a man.... if I am not mistaken it was a woman who was walking in the garden... (P6)
	Lady	* A lady drinking tea (P4) * A beautiful white lady drinking some tea(P3) * The lady was drinking tea....(P7) * One lady was walking in the garden, and she was looking at the bridge...(P6)" * A lady doing yoga on the beach(P7)

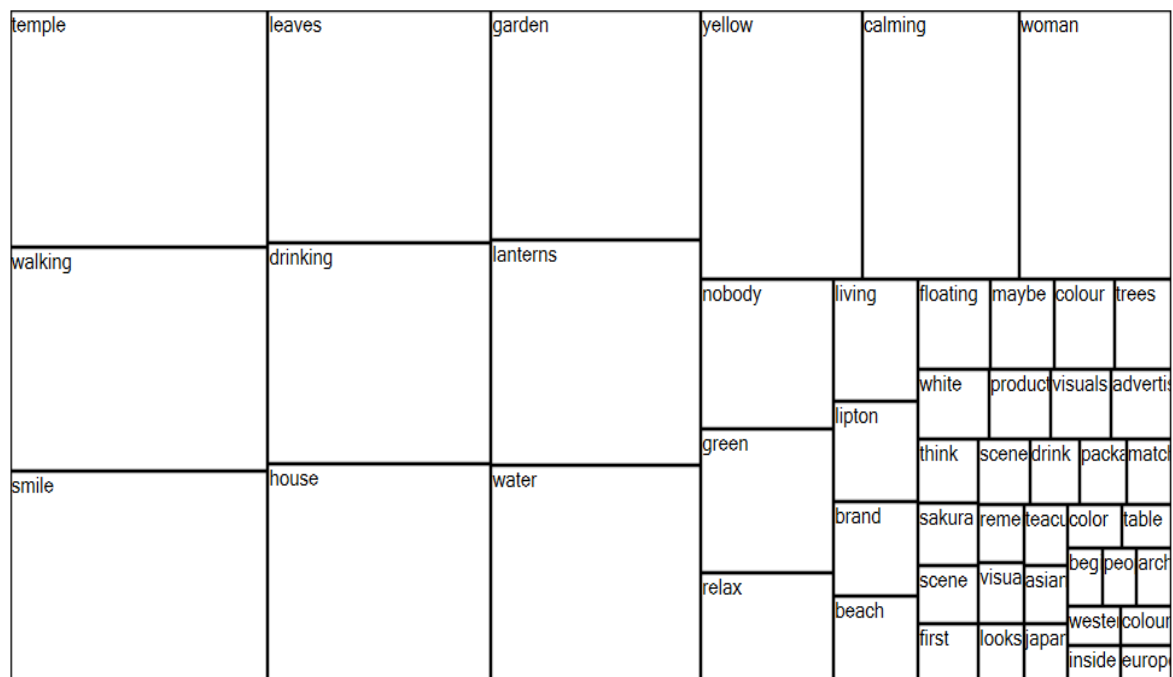
similarity approach (Di Gregorio, 2000; Dollah et al., 2017; Hutchison et al., 2010; O'Neill, 2013).

Figure 4.23: The node cluster diagram using word similarity approach



Based on the above node cluster diagram, the coding in-between the concepts can be further illustrated as below. For example, the concepts including “trees”, “Sakura”, “cup”, “leaves” can be classified separately as one main theme of objects. Based on tree map analysis the density of each concept was checked to label the theme accurately. A tree map is a visual representation of hierarchical data displayed as a series of nested rectangles of varying sizes. To compare the number of coding references, the researcher created a tree map of the nodes (Di Gregorio, 2000; Dollah et al., 2017). Therefore, the tree map analysis conducted through NVivo further showed the effect of each selected node (based on the rectangle size) towards the concepts generating the main themes. Figure 4.24 illustrates the tree map analysis as follows (Di Gregorio, 2000; Dollah et al., 2017).

Figure 4. 24: Tree map analysis



The NVivo findings of the female participants of the **360-degree video version** showed three major themes under visual encoder. These three themes are visual memory for objects, people and actions. According to the query results, it is further clear that female participants under **360-degree video** viewing conditions encoded information in the advertisement regarding objects and actions more than the theme people.

Table 4.19: Thematic classification based on the tree map analysis and node cluster diagram

Themes	Concepts derived from node cluster diagram	Concepts derived from tree map analysis
Objects	Trees, teacup, table, Sakura, product, scenes	Temple, leaves, lanterns, Lipton, Sakura
People	People, woman, nobody	Nobody, woman
Actions	Calm, smile, relax, drinking, walking	Walking, smile, drinking, calming, relax, living

The next section further explores the major themes based on the query results (Di Gregorio, 2000; Dollah et al., 2017). The NVivo findings of the female participants of the 360-degree video version showed three major themes under visual encoder. According to the query results, it is further apparent that female participants under the 360-degree video viewing conditions encoded information in the advertisement regarding objects and actions more than the theme people similar to the above condition under standard video version.

Major themes related to females who viewed the 360-degree video version

The main themes indicated the names of some actions shown in the visuals, objects, and people. This further demonstrates that the female participants incorrectly identified the presented woman as a man under the 360-degree video version. Further, most of the participants did not notice a person or any action due to the 360-degree (panorama) effect. However, they were able to notice some main objects within the visuals. Some of the NVivo findings on these themes are as follows.

Table 4.20: NVivo query findings on the encoding of actions, people, and objects among female participants

Theme	Codes	NVivo QSR query results
Actions	Drinking	* A lady drinking tea in her living room (P37) * I saw a hand of a lady but couldn't see more as I did not move around... (P34) * Maybe it is a lady drinking tea...not sure....(P33)
	Floating	* One woman was looking up and some leaves were floating...(P37) * Leaves were floating, and I saw a dog....(P34) * Floating candles and floating green leaves(P38) * Some lanterns were floating in the river.....(P40)
Objects	Tea	* A lady drinking tea in the living room (P37) * The background colours look similar to the colour of the teacup in her hand (P40) * She was sipping some tea from her teacup (P36)
	Teacup	* She was sipping some tea from her teacup (P39) * The background colours look similar to the colour of the teacup in her hand (P40) * Yes exactly, it is a teacup and was there in the final living room scene on the table (P36)
	Leaves	* Floating candles and floating green leaves (P38) * Leaves were floating (P34) * Some leaves and lanterns were floating in the water(P37)
	Forgot	* It is not good. It is kind of unaffordable and forgets easily. The colour grade is not good in the video and the people will remember more if the video colour combination is good * I do not remember all the objects in each visual because did not move the thing around and also the transition time was so quick. Very hard to remember all and tempts to forget easily... I recommend bright colours and natural colours. Not so many colours. In technical movies, you can see that blue. For this yellow and orange is good (P37) * Colour combine with the resolution is very hard to pick up (P35)

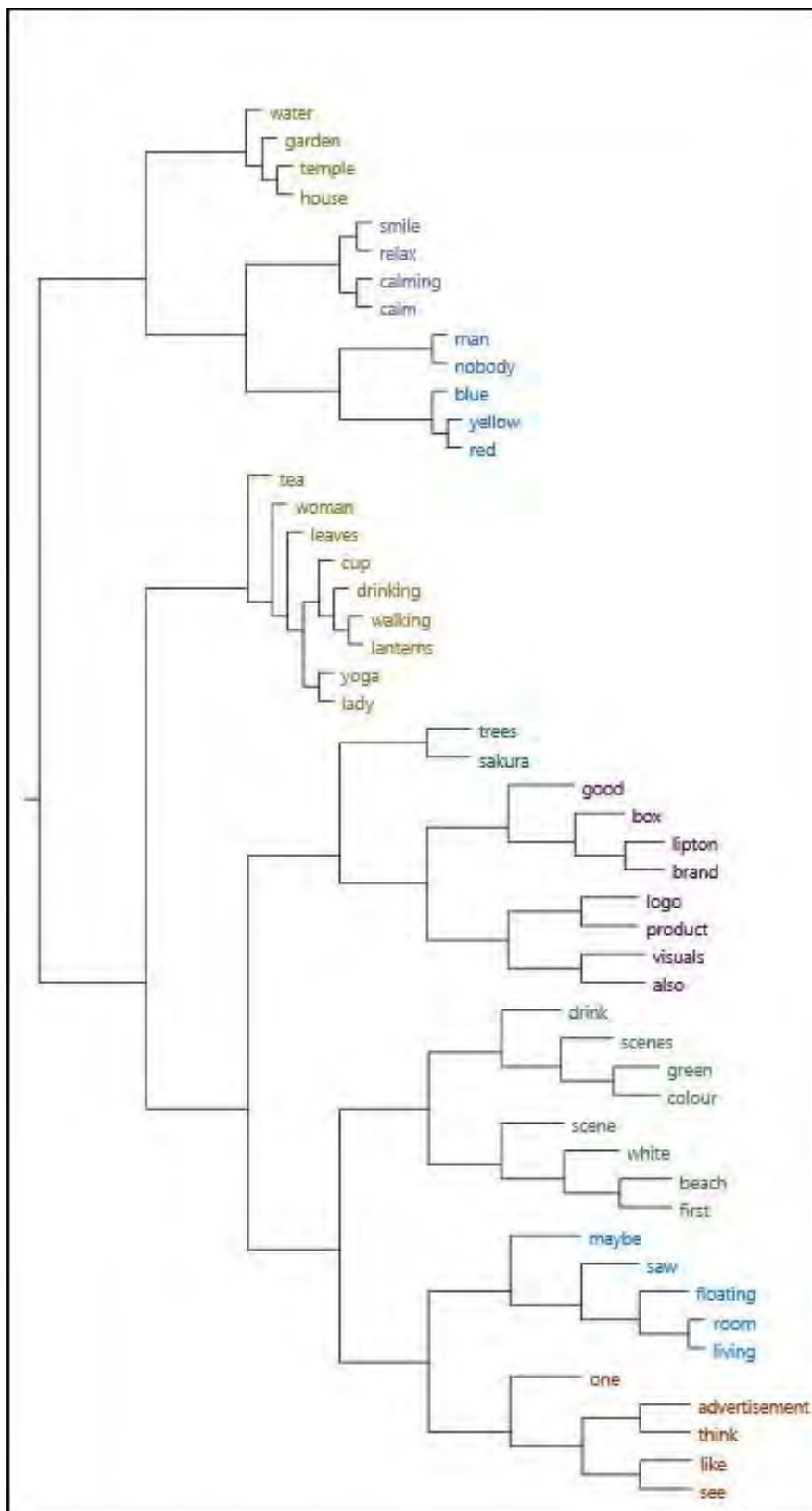
People	Man	* A man was walking, I think. The place is a snow-covered area with the cherry blossoms in the garden (P34) *One man in the beginning. I am confused whether it is a woman or a man. The first visual was not clear to me (P34)
	Nobody	* I did not notice anybody. The bottled inside and I noticed a living room. Also, some Green colour water too (P32) I like the colours it represents nature and a kind of natural feeling. The colours are suitable for this advertisement...but there was nobody...no person(P32) * There was someone ...maybe I had to move it around, but I did not see it (P34)
	Lady	* A lady drinking tea in the living room (P37) * More visually appealing visuals are there like some locations. People seem calmer. I think I saw different people and a lady doing yoga. And I think in every scene there was a lady in the temple and the lantern's scene. The lady at the end was there all the time...(P38)
	Woman	* One woman was looking up and some leaves were floating...(P40) * I noticed one woman. A Tree without leaves and a lamp also a sofa, and some brown colour thing.... Maybe lanterns (P39)

A word frequency analysis in NVivo QSR for the female participants who viewed the 360-degree video version was conducted under the visual encoding category. Based on the word cloud NVivo QSR analysis, the themes on actions, objects and people can be further justified.

[illegible]

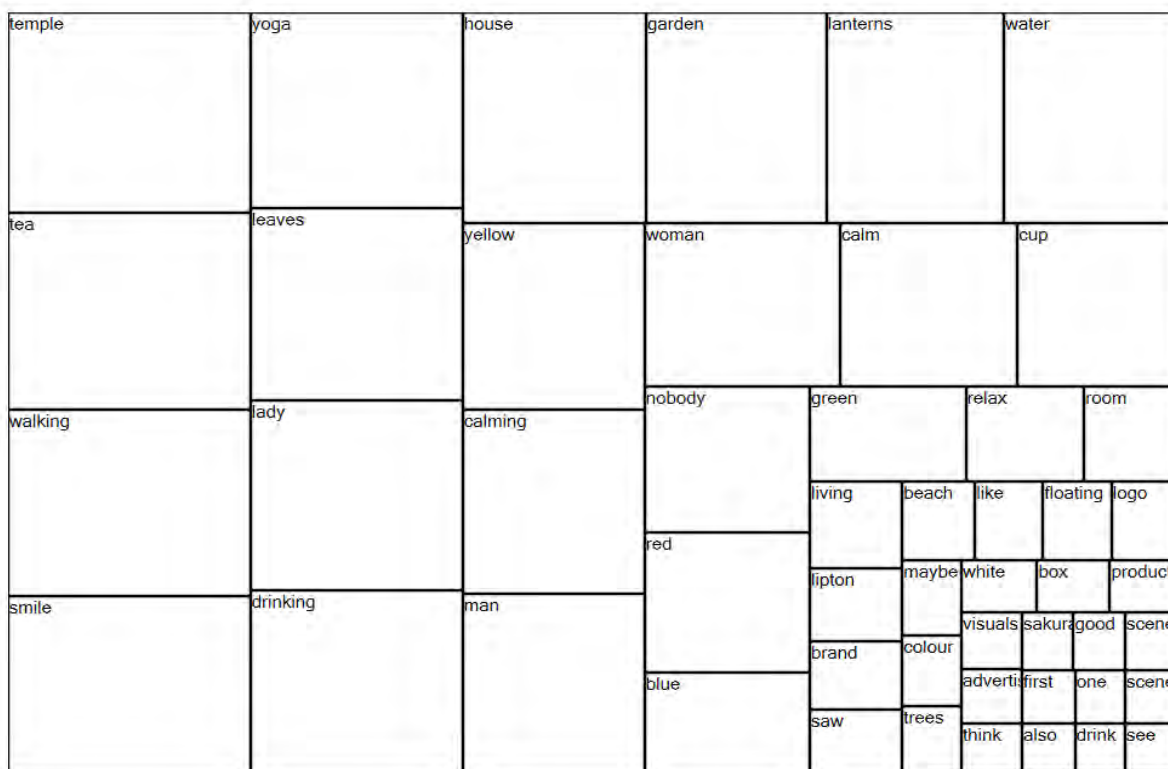
The NVivo findings of the male participants of the 360-degree video version revealed the three themes of actions, objects, and people presented within the visuals. According to the query results, it is confirmed that the male participants under 360-degree video viewing conditions encoded information in the advertisement regarding actions, objects, and people. However, in the 360-degree video version, these results were less than the standard video version, as most of the participants did not notice all the presented actions, objects, and people within the visuals. Furthermore, most of the answers were incorrect regarding the presented actions, objects, and people. For this research study, initial themes were developed from the node cluster diagram as depicted in Figure 4.26, which illustrates the node cluster diagram using the word similarity approach (Di Gregorio, 2000; Dollah et al., 2017; Hutchison et al., 2010; O'Neill, 2013).

Figure 4.26: The node cluster diagram using word similarity approach



Based on the above node cluster diagram, the coding in-between the concepts can be further illustrated as below. For example, the concepts including “water”, “trees”, “cup”, “leaves” can be classified separately as one main theme of objects. Based on tree map analysis the density of each concept was checked to label the theme accurately. A tree map is a visual representation of hierarchical data displayed as a series of nested rectangles of varying sizes. To compare the number of coding references, the researcher created a tree map of the nodes (Di Gregorio, 2000; Dollah et al., 2017). Therefore, the tree map analysis conducted through NVivo further showed the effect of each selected node (based on the rectangle size) towards the concepts generating the main themes. Figure 4.27 illustrates the tree map analysis as follows (Di Gregorio, 2000; Dollah et al., 2017).

Figure 4.27: Tree map analysis



The NVivo findings of the male participants of the 360-degree video version showed three major themes under visual encoder. These three themes are visual memory for objects, people and actions. According to the query results, it is further clear that male participants under 360-degree video viewing conditions encoded information in the advertisement regarding objects and actions than the theme people.

Table 4.21: Thematic classification based on the tree map analysis and node cluster diagram

Themes	Concepts derived from node cluster diagram	Concepts derived from tree map analysis
Objects	Water; tea; leaves; cup; scenes	Tea, leaves, house, lanterns, cup
People	Man, nobody, woman	Woman, lady, nobody
Actions	Smile, relax, calm, walking, drinking	walking, drinking, smile, relax, calm, living

Therefore, the next section further explores the major themes based on the query results (Di Gregorio, 2000; Dollah et al., 2017). According to the query results, it is evident that female participants under 360-degree video viewing conditions encoded information in the advertisement regarding objects and actions than theme people similar to the above condition under the standard video version.

The NVivo findings of the male participants in the 360-degree video version showed similar results to the female participants under the 360-degree video version. There were no gender differences regarding the findings under visual encoding. The NVivo QSR analysis on word frequency query results is as follows. According to the query results, it is clear that male participants under 360-degree video viewing conditions encoded information in the advertisement regarding actions, objects, and people; however, in the 360-degree video version, these results were less than the standard video version, as most of the participants did not notice all of the presented actions, objects, and people within the visuals. Additionally, most of the answers were incorrect regarding the presented actions, objects, and people. These findings are similar to the findings of female participants under 360-degree video viewing conditions.

Major themes related to males who viewed the 360-degree video version

The main themes indicate the names of some actions shown in the visuals, objects, and people. This further demonstrates that, similar to female participants, male participants also incorrectly identified the presented woman as a man under the 360-degree video version. Further, most of the participants did not notice a person or any action due to the 360-degree (panorama) effect;

however, they were able to notice some main objects within the visuals. Some of the NVivo findings on these themes are as follows.

Table 4.22: NVivo query findings on the encoding of actions, people, and objects among male participants

Theme	Codes	NVivo QSR query results
Actions	Drinking	* Lady performing yoga and a lady sitting in the room drinking some tea (P25) * At the end of the advertisement a woman drinking tea and put her cup on the coffee table next to Lipton package of matcha (P26)
	Yoga	* Lady performing yoga and a lady sitting in the room drinking some tea (P25) * Lady performing yoga inside some wooden hut near a beach (P26) * Maybe they are trying to demonstrate mindfulness through yoga activities (P22)
	Floating	* Some floating leaves diffusing in the water (P22) * Objects were floating, leaves were flying, and some water bubbles were appearing...(P21) * Flowers floating with the liquid...(P23) * Floating objects in the water (P21) * The beginning scene is greenish and then night-time with lanterns blowing to the sky and then red colour is there, so it is eye-catching...(P22) * Candles were floating in the sky (P24)
Objects	Leaves	* Swirling leaves in a pool...(P28)
	Water	* It was a green liquid maybe some water with green tea colour ...(P25)
	Cup	* At the end of the advertisement a woman drinking tea and put her cup on the coffee table next to Lipton package of matcha (P26) * Colours are fine for me, but the room is not quite understandable with the used colours, if it is tea, I like to see something black with aroma and someone smelling the tea or coffee from their cup (P30)

People	Lanterns	* Some lighted up candles...I would say (P30) * I think it is some lanterns...have you watched any Thai movies? In those movies, these kinds of lanterns are there...where you make a wish and float it in the air....(P29)
	Table	* At the end of the advertisement a woman drinking tea and put her cup on the coffee table next to Lipton package of matcha (P26)
	Lady	* Lady performing yoga and a lady sitting in the room drinking some tea (P25) * Lady performing yoga inside some wooden hut near a beach (P27) * First, I saw the green water with Matcha product name and logo. Second, I saw the colourful garden with a woman standing and walking. Then I saw flashed candles floating from bottom to top and then there was a temple and a beach with a woman doing yoga. The final scene is a woman enjoying tea in her living room. I do not remember that a kid was playing maybe the daughter of that lady. No idea... (P27)
	Nobody	* I did not notice anyone in the living room....maybe I have to move my google cardboard ...nobody(P28) * I did not notice anybody.....(P29)
	Man	* Not quite sure, whether it is a man or a woman....(P28) * A man was walking...in every scene...he is not an ordinary man....he is short and rarely could see in each scene (P28)
	Woman	* At the end of the advertisement a woman drinking tea and put her cup on the coffee table next to Lipton package of matcha (P26) * Listening to peers and a woman diving in the water (P24)

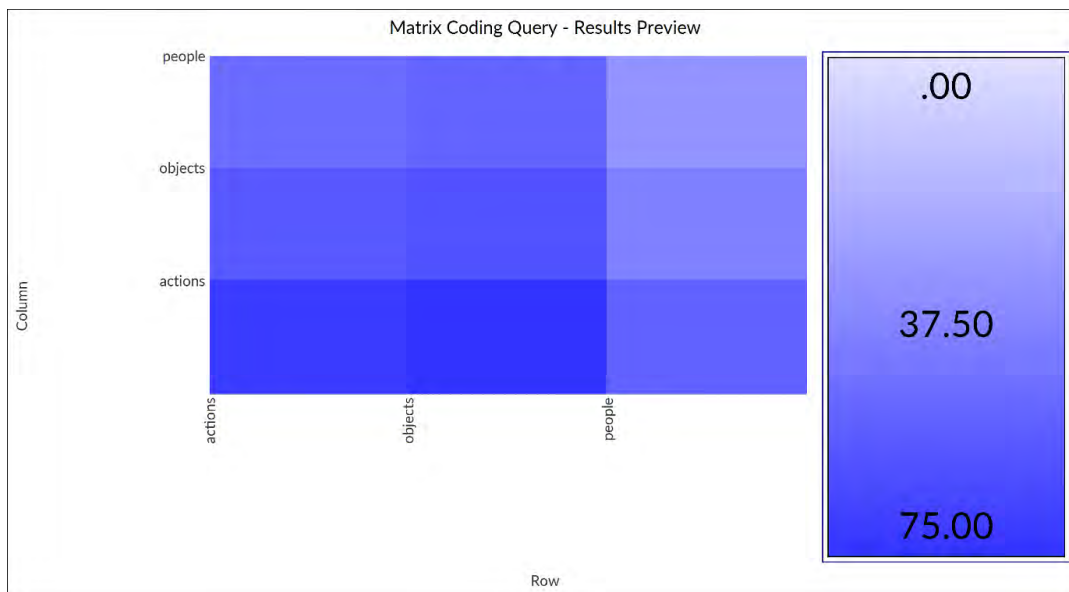
A word frequency analysis in NVivo QSR for the male participants who viewed the 360-degree video version was conducted under the visual encoding category. Based on the word cloud NVivo QSR analysis, the themes on actions, objects and people can be further justified.

Table 4.23: Matrix-coding query analysis for 360-degree and standard video advertisements under visual encoder

		A : actions ▼	B : objects ▼	C : people ▼
1 : actions ▼	▼	72	59	51
2 : objects ▼	▼	75	62	54
3 : people ▼	▼	55	42	34

Based on the above Table 4.23, the comparison query results produced three nodes on objects, actions and people, indicating the three themes. These three nodes represented 40 to 75 frequently occurring words in-between the transcripts further showing the validity of the derived themes based on the cross-case matrix analysis (Hutchison et al., 2010).

Figure 4.29: Matrix-coding query: Results preview



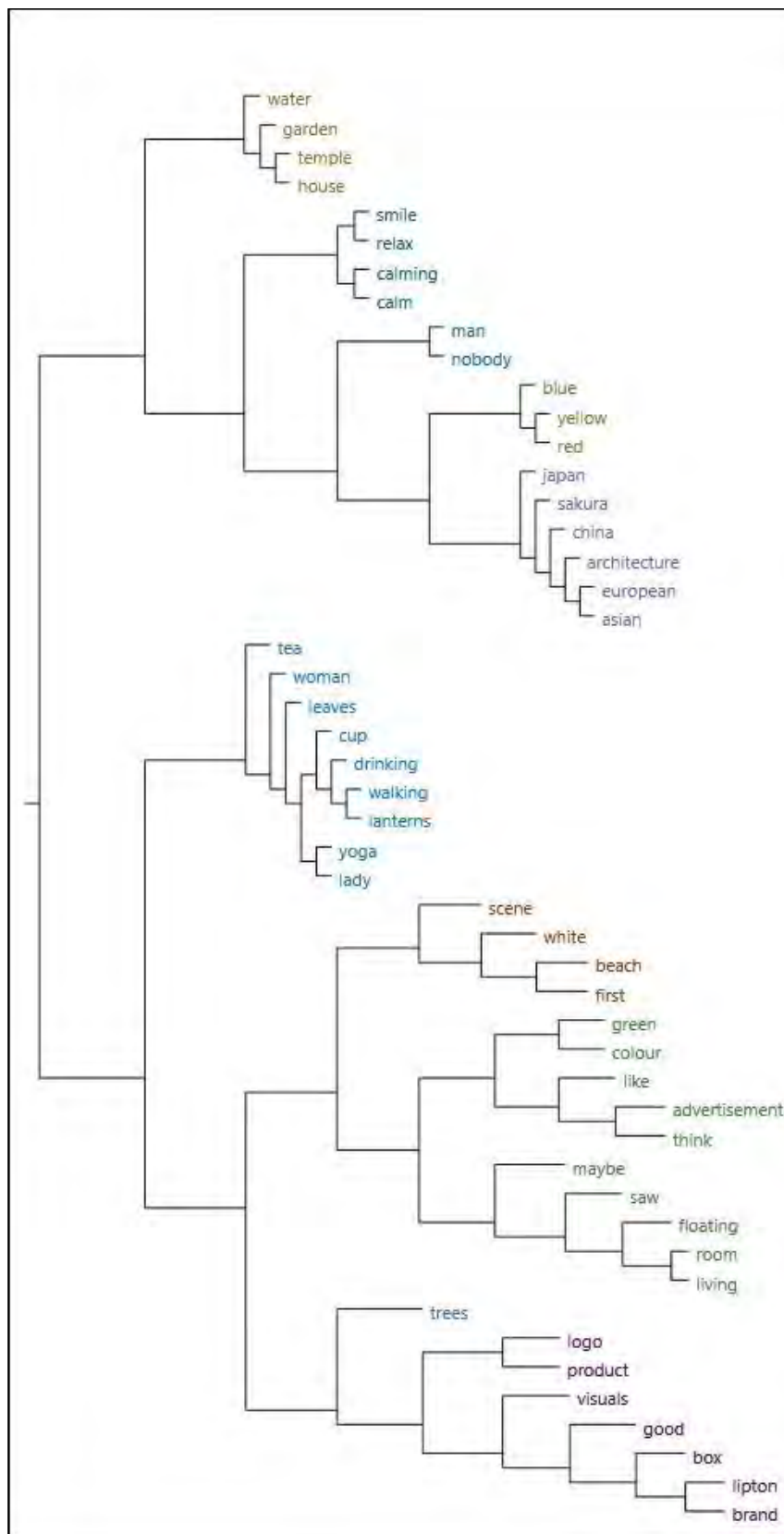
4.7 NVivo analysis for inference maker

The NVivo findings of the analysis are divided into four parts of the workspace unit—visual comprehension, visual encoding, visual inference making and visual response selecting. Therefore, this section illustrates the NVivo analysis of the visual inference-making section of the workspace unit.

4.7.1 NVivo analysis for visual inference maker – female participants of the standard video version

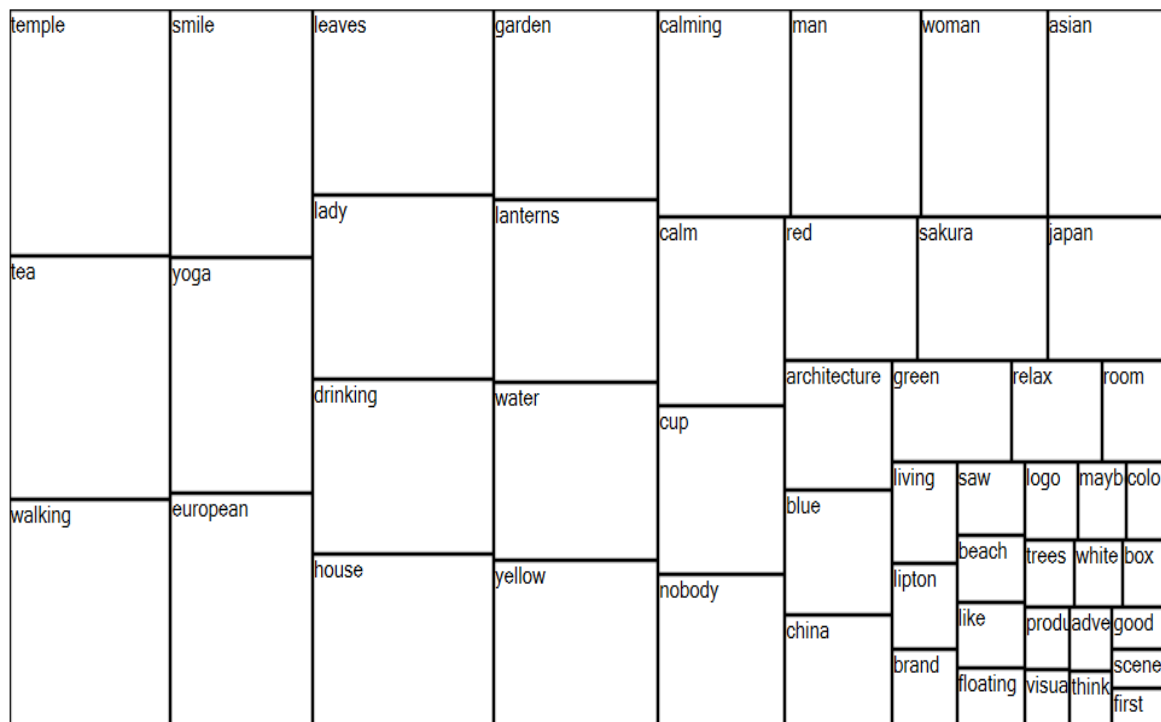
The NVivo findings of the female participants of the standard video version showed one major theme under visual-based inference maker namely, multi-cultural symbols. For this research study, initial themes were developed from the node cluster diagram as follows. Figure 4.30 illustrates the node cluster diagram using the word similarity approach (Di Gregorio, 2000; Dollah et al., 2017; Hutchison et al., 2010; O'Neill, 2013).

Figure 4.30: The node cluster diagram



Based on the above node cluster diagram, the coding in-between the concepts can be further illustrated as below. For example, the concepts including “Japan”, “Sakura”, “architecture”, “European” can be classified separately as one main theme of multi-cultural symbols. Based on tree map analysis, the density of each concept was checked to label the theme accurately. A tree map is a visual representation of hierarchical data displayed as a series of nested rectangles of varying sizes. To compare the number of coding references, the researcher created a tree map of the nodes (Di Gregorio, 2000; Dollah et al., 2017). Therefore, the tree map analysis conducted through NVivo further showed the effect of each selected node (based on the rectangle size) towards the concepts generating the main themes. Figure 4.31 illustrates the tree map analysis as follows (Di Gregorio, 2000; Dollah et al., 2017).

Figure 4.31: Tree map analysis



The NVivo findings of the male participants of the standard video version showed one theme under visual based inference maker, multi-cultural symbols. According to the query results, it is clear that female participants under standard video viewing conditions used this information in the advertisement when forming their buying decision.

Table 4.24: Thematic classification based on the tree map analysis and node cluster diagram

Themes	Concepts derived from node cluster diagram	Concepts derived from tree map analysis
Multi-cultural symbols	Japan, Sakura, China, architecture, European, Asian, temple, visuals, fireplace	Temple, European, lanterns, Asian, Sakura, Japan

The next section further explores the major themes based on the query results (Di Gregorio, 2000; Dollah et al., 2017). According to the query results, it is clear that female participants under standard video viewing conditions used information in the advertisement regarding multi-cultural symbols. The NVivo QSR analysis on word frequency query results is as follows.

Major themes related to females who viewed the standard video version

The main themes indicate the names and information of some multi-cultural symbols such as Sakura trees representing Japan, the architecture of the buildings, and the temple. Some of the names include Asia, China, Japan, Western and European. Some of the NVivo findings on this theme are as follows.

Table 4.25: NVivo query findings on inference maker among female participants

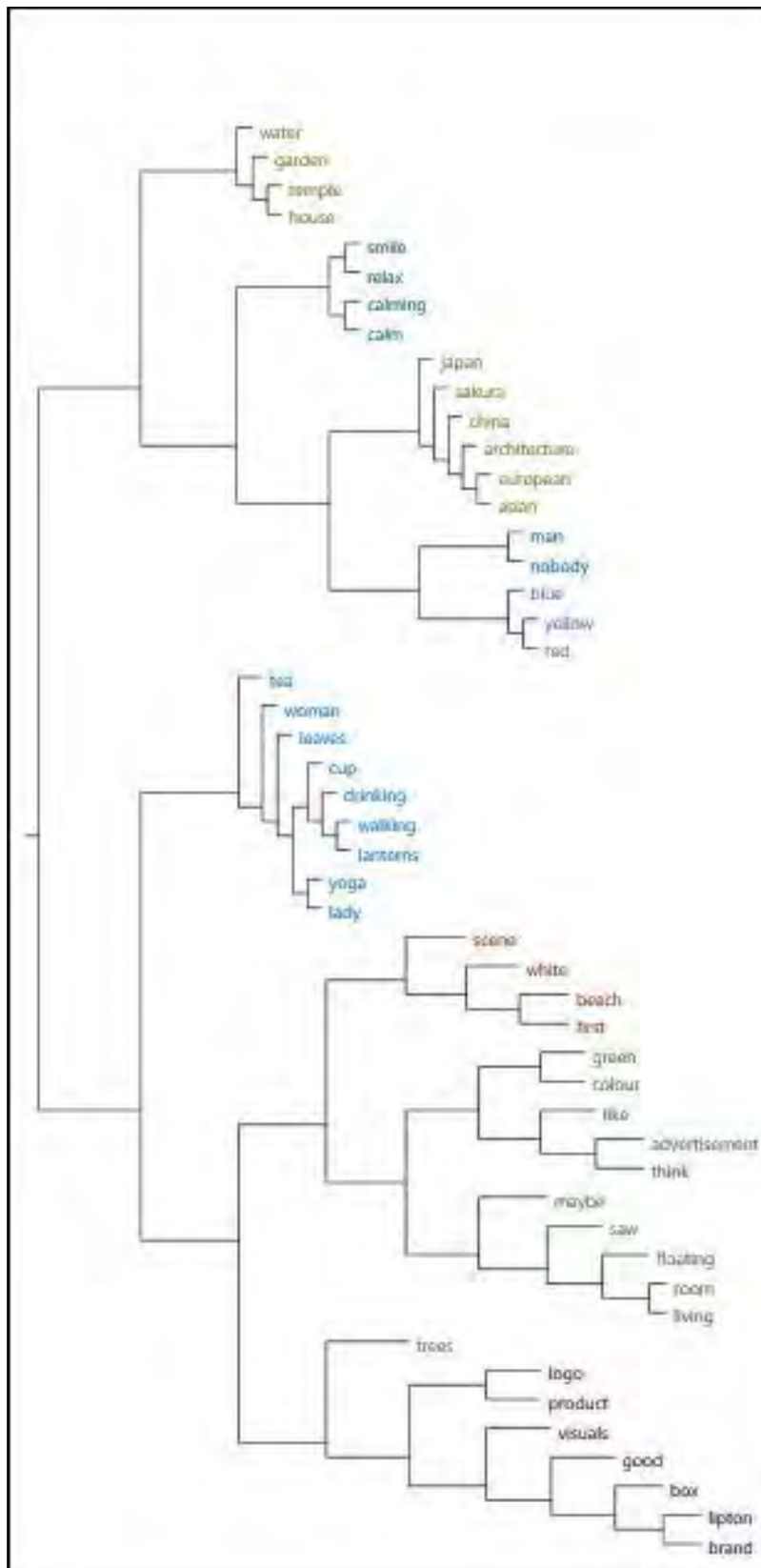
Theme	Codes	NVivo QSR query results
Multi-cultural symbols	Temple	* It looks like an Indian temple to me....(P19) * I noticed a temple in the third or fourth visual...(P18) * It is a Japanese temple with unique architecture in Japan (P17) * I saw flashed candles floating from bottom to top and then there was a temple and a beach with the woman doing yoga...(P18) * First, I saw the tree leaves and then a garden with a lady. There was a river and some Sakura trees and then I saw the temple she was going upstairs of the temple and then the yoga at beach oh yes finally it is the living room (P17)

Sakura	* I saw some Sakura trees in the garden... and also a lady looking at those trees....(P18) * First, I saw the tree leaves and then a garden with a lady. There was a river and some Sakura trees and then I saw the temple she was going upstairs of the temple and then the yoga at beach oh yes finally it is the living room (P17)
Yoga	* She was doing yoga, so it means that tea, yoga, energy and health for me (P14) * Yoga poses demonstrates the mindfulness (P19) * I got it now....so it means that after doing yoga you can regain your energy through tea (P19) * I saw flashed candles floating from bottom to top and then there was a temple and a beach with a woman doing yoga...(P18) * First, I saw the tree leaves and then a garden with a lady. There was a river and some Sakura trees and then I saw the temple she was going upstairs of the temple and then the yoga at beach oh yes finally it is the living room (P17)
Western	* It was a western type living room with some modern furniture, sofa and a fireplace (P17) * It is a western setting because the lady was a white lady, and she looks very beautiful (P20)
Architecture	* I think I remember some Japanese architecture in those buildings....(P17)
Asian	* Lipton is famous in Asia (P17) * Yes, it is because Asians drink green tea (P15) * Asian temple and some Asian symbol which demonstrates happiness....you know these lighted candles.....I do not know the exact name...(P15)
China	* I do not know, maybe Lipton is a Chinese product and it that's why they show Chinese symbols in this advertisement.....(P14) * It is a Chinese temple...and I saw some Chinese lanterns(P11)
European	* It shows European lifestyle(P20) * European style living room setting with a nice couch and a fireplace (P11)

4.7.2 NVivo analysis for visual inference maker – male participants of the standard video version

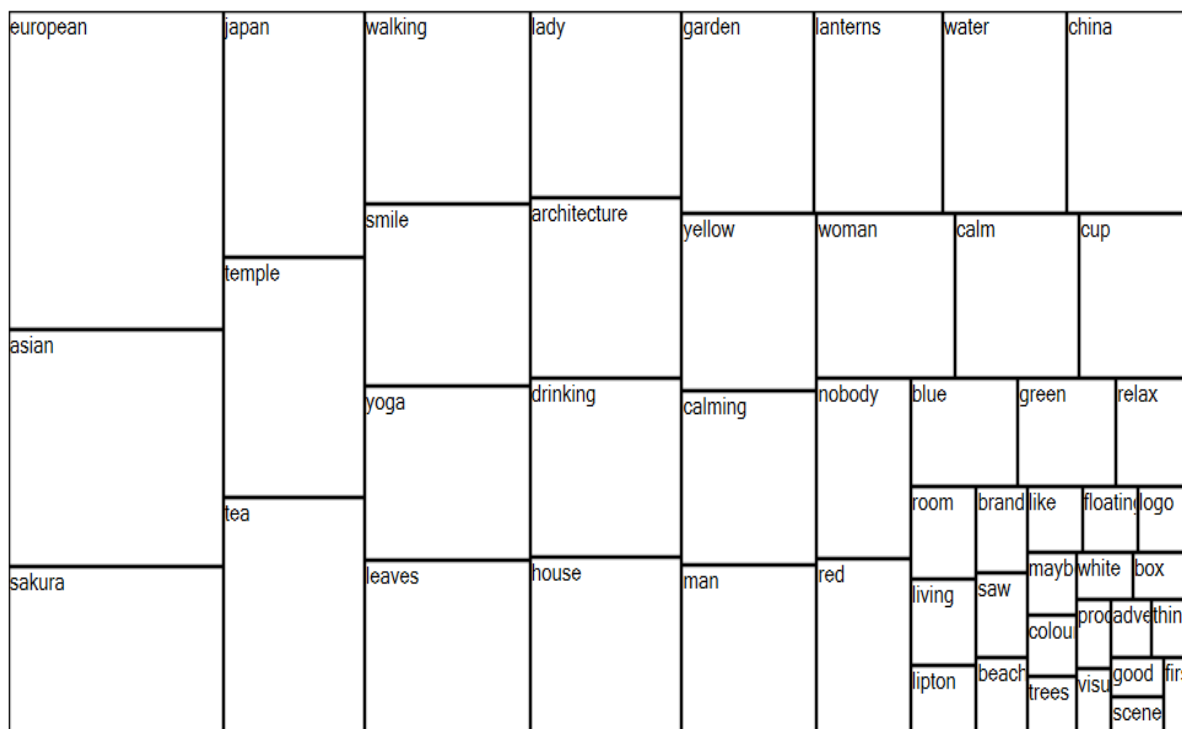
The NVivo findings of the male participants of the standard video version showed one theme as multi-cultural symbols under the inference-maker category, similar to female participants. According to the query results, it is further clear that male participants under standard video viewing conditions were able to remember information in the advertisement regarding multicultural symbols, similar to female participants. Figure 4.33 illustrates the node cluster diagram using the word similarity approach (Di Gregorio, 2000; Dollah et al., 2017; Hutchison et al., 2010; O'Neill, 2013).

Figure 4.33: The node cluster diagram



Based on the above node cluster diagram, the coding in-between the concepts can be further illustrated as below. For example, the concepts including “Japan”, “Sakura”, “architecture”, “European” and “Asian” can be classified separately as one main theme of multi-cultural symbols. Based on tree map analysis, the density of each concept was checked to label the theme accurately. A tree map is a visual representation of hierarchical data displayed as a series of nested rectangles of varying sizes. To compare the number of coding references, the researcher created a tree map of the nodes (Di Gregorio, 2000; Dollah et al., 2017). Therefore, the tree map analysis conducted through NVivo further showed the effect of each selected node (based on the rectangle size) towards the concepts generating the main themes. Figure 4.34 illustrates the tree map analysis (Di Gregorio, 2000; Dollah et al., 2017).

Figure 4.34: Tree map analysis



The NVivo findings of the male participants of the standard video version showed one theme under visual-based inference maker namely, multi-cultural symbols. According to the query results, it is evident that male participants under standard video viewing conditions used this information in the advertisement when making their buying decision.

Table 4.26: Thematic classification based on the tree map analysis and node cluster diagram

Themes	Concepts derived from node cluster diagram	Concepts derived from tree map analysis
Multi-cultural symbols	Japan, Sakura, Asian, China, architecture, European	European, Japan, Asian, temple, China, architecture

The next section further explores the major themes based on the query results (Di Gregorio, 2000; Dollah et al., 2017). According to the query results, it is patent that male participants under standard video viewing conditions used information in the advertisement regarding multi-cultural symbols. The NVivo QSR analysis on word frequency query results is as follows.

Major themes related to females who viewed the standard video version

The main themes indicate some information of multi-cultural symbols such as Sakura trees which represent Japan, architecture of the buildings, temple. Some of the names include Asia, China, Japan, Western and European. These findings are similar to the findings of female participants. Some of the NVivo findings on this theme are as follows.

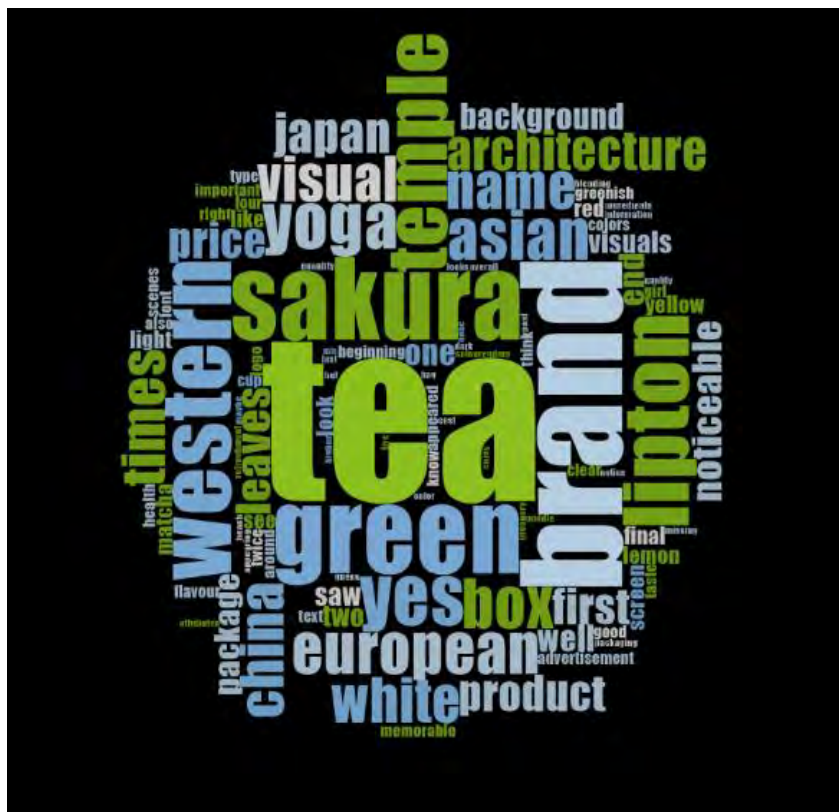
Table 4.27: NVivo query findings on inference maker among male participants

Theme	Codes	NVivo QSR query results
Multi-cultural symbols	Sakura	* Another screen of a garden with Sakura trees...(P1) * Trees full of Sakura flowers (P5) * First, I saw leaves in the water; then the vibrant scenarios, it is too fast I do not remember the visuals sorry. Can I see that again? I can remember pink Sakura cherry blossoms (P5) * First, I saw green colour water and a brand logo. Then I saw a woman drinking it. And then a garden with Sakura trees and I saw a temple. Also, I saw candles floating in a river and a beach with a yoga woman. And then a living room with a woman drinking tea (P6)
	Western	* It is a western setting with a modern living room and a comfortable couch (P6)

Temple	* The white background temple (P8) * I have seen the lantern floating around the river and there was a temple (P7)
Yoga	* First, I saw green colour water and a brand logo. Then I saw a woman drinking it. And then a garden with Sakura trees and I saw a temple. Also, I saw candles floating in a river and a beach with a yoga woman. And then a living room with a woman drinking tea (P6) * I do not do yoga or any mindfulness activity. So, these visuals do not appeal to me (P9)
Asian	* You know these lighted candles.....I don't know the exact name... Some kind of Asian symbols popular in Japanese and Korean movies... (P10) * I do not drink tea. For me it is coffee. So, this advertisement is applicable for Asians who are consuming green tea regularly (P9)
European	* A lovely couch and a fireplace in a European style living room (P3) * It portrays a European way of life (P5)
China	* Some Chinese tea bags are biodegradable ... (P7)
White	* She is a white lady, so definitely it is a western setting (P3) * The first impression was that this tea will take you to different places white woman standing in front of Asian buildings...(P3)
Architecture	* I recall some Japanese architecture in those structures....(P5)
Japan	* The product shows coolness and hydrating aspects, matcha visuals shows Japan lanterns and pagodas to show the locations of tea....(P1) *For me it is Japan pagoda, summer festivals, prominent pagoda temples, sand, beach, iconic and mindfulness with mental clarity, so the living room is where you have friends and family....maybe they are trying to provide too much information using these visuals (P5)

A word frequency analysis in NVivo QSR for the male participants who viewed the standard video version was conducted under the visual inference-maker category. Based on the word cloud NVivo QSR analysis, the above theme can be further justified as follows.

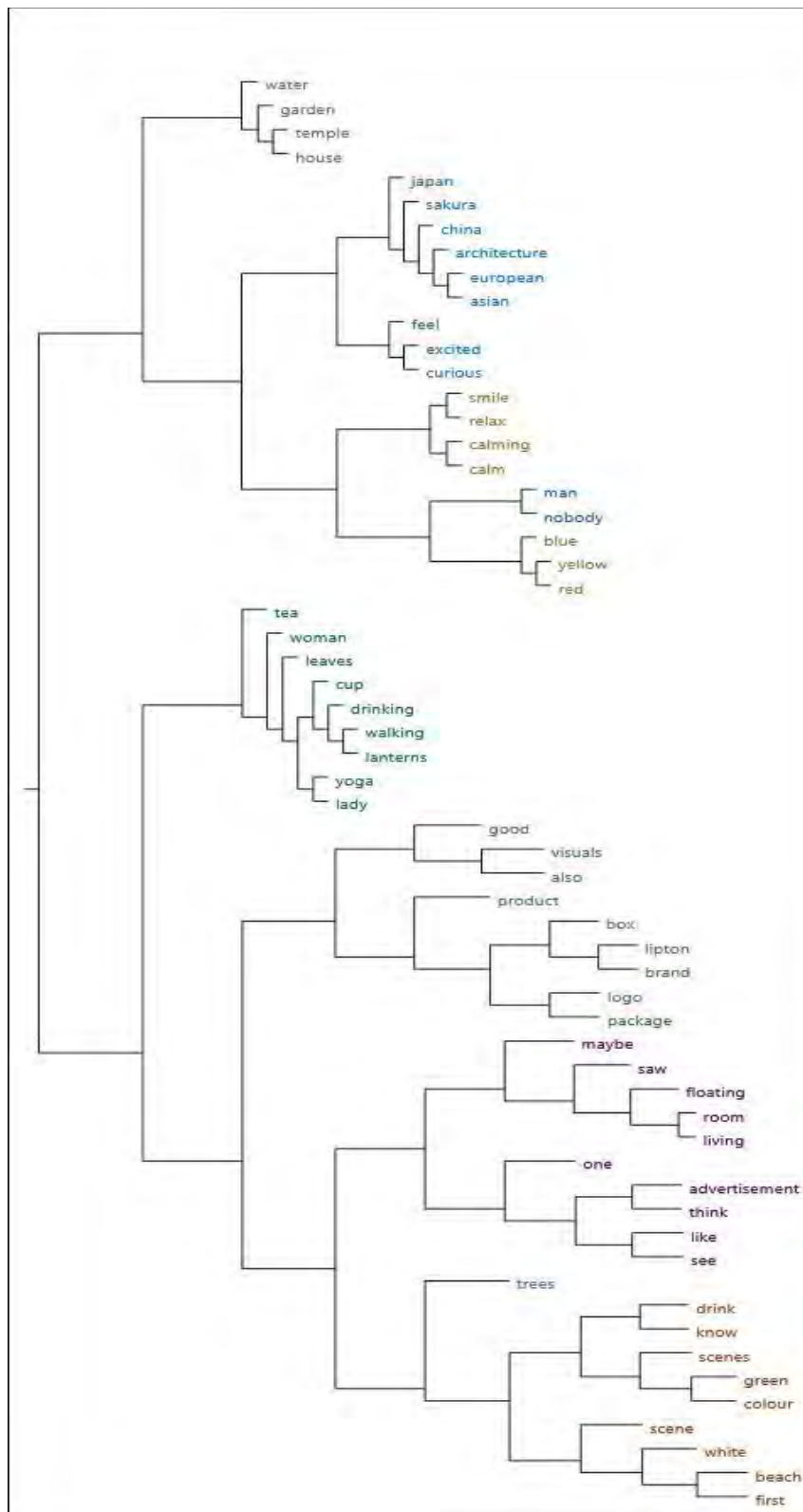
Figure 4.35: NVivo QSR word cloud analysis – standard video version (male participants)



4.7.3 NVivo analysis for visual inference maker – female participants of the 360-degree video version

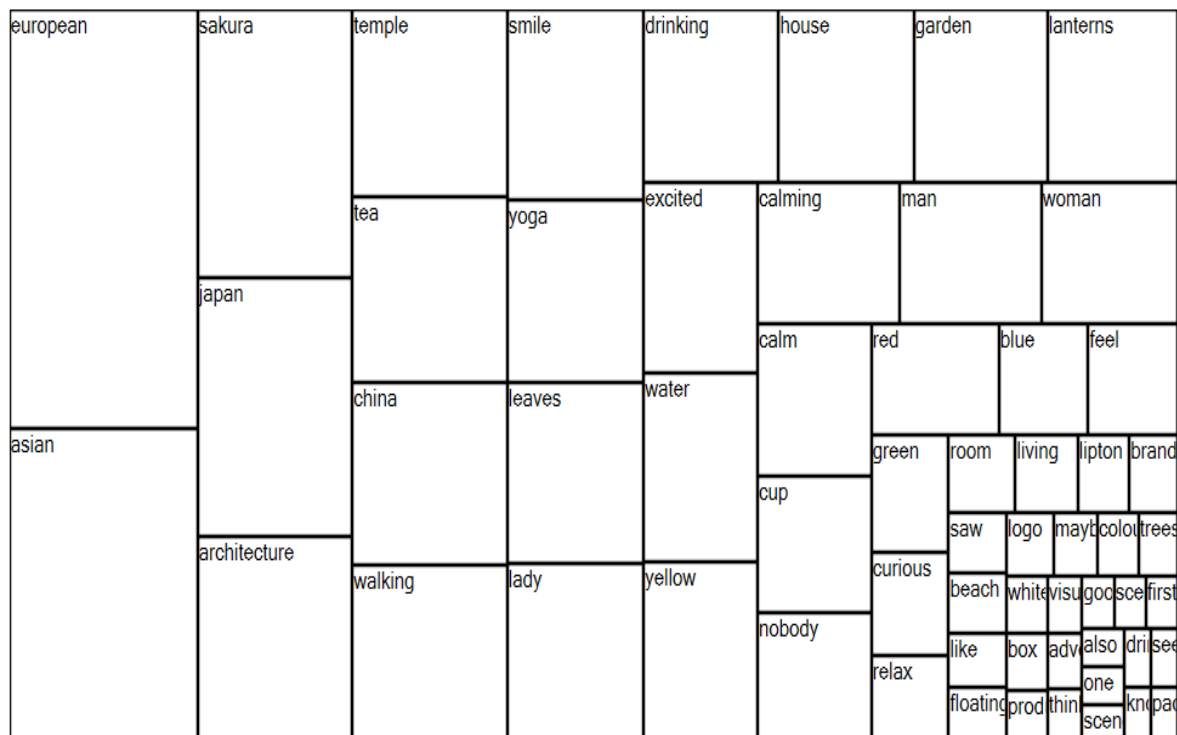
The NVivo findings of the female participants of the 360-degree video version showed two themes namely, multi-cultural symbols and behavioural engagement, under the inference-maker category, similar to male participants. According to the query results, it is apparent that female participants under the 360-degree video viewing conditions were able to remember information in the advertisement regarding multicultural symbols, similar to standard video advertisement participants. Figure 4.36 illustrates the node cluster diagram using the word similarity approach (Di Gregorio, 2000; Dollah et al., 2017; Hutchison et al., 2010; O'Neill, 2013).

Figure 4.36: The node cluster diagram



The NVivo findings of the female participants of the 360-degree video version revealed the theme, multi-cultural symbols and behavioural engagement. According to the query results, it is evident that female participants under the 360-degree video viewing conditions were able to remember information in the advertisement regarding multicultural symbols and they also had some behavioural engagement. Based on the above node cluster diagram, the coding in-between the concepts can be further illustrated as below. For example, the concepts including “excited”, “feel”, “curious” can be classified separately as one main theme of behavioural engagement. Based on tree map analysis, the density of each concept was checked to label the theme accurately. A tree map is a visual representation of hierarchical data displayed as a series of nested rectangles of varying sizes. To compare the number of coding references, the researcher created a tree map of the nodes (Di Gregorio, 2000; Dollah et al., 2017). Therefore, the tree map analysis conducted through NVivo confirmed the effect of each selected node (based on the rectangle size) towards the concepts generating the main themes. Figure 4.37 illustrates the tree map analysis as follows (Di Gregorio, 2000; Dollah et al., 2017).

Figure 4.37: Tree map analysis



The NVivo findings of the female participants of the 360-degree video version showed two themes under visual-based inference maker as multi-cultural symbols, and behavioural

engagement. According to the query results, it is evident that female participants under the 360-degree video viewing conditions used this information in the advertisement when making their buying decision.

Table 4.28: Thematic classification based on the tree map analysis and node cluster diagram

Themes	Concepts derived from node cluster diagram	Concepts derived from tree map analysis
Multi-cultural symbols	Japan, Sakura, China, architecture, European, Asian	Sakura, Asian, temple, China, architecture, European, Japan
Behavioural engagement	Feel, excited, curious	Calming, excited, feel, curious

The next section further explores the major themes based on the query results (Di Gregorio, 2000; Dollah et al., 2017). According to the query results, it is evident that female participants under 360-degree video viewing conditions used information in the advertisement regarding multi-cultural symbols and behavioural engagement. The NVivo QSR analysis on word frequency query results is as follows.

Major themes related to females who viewed 360-degree video version

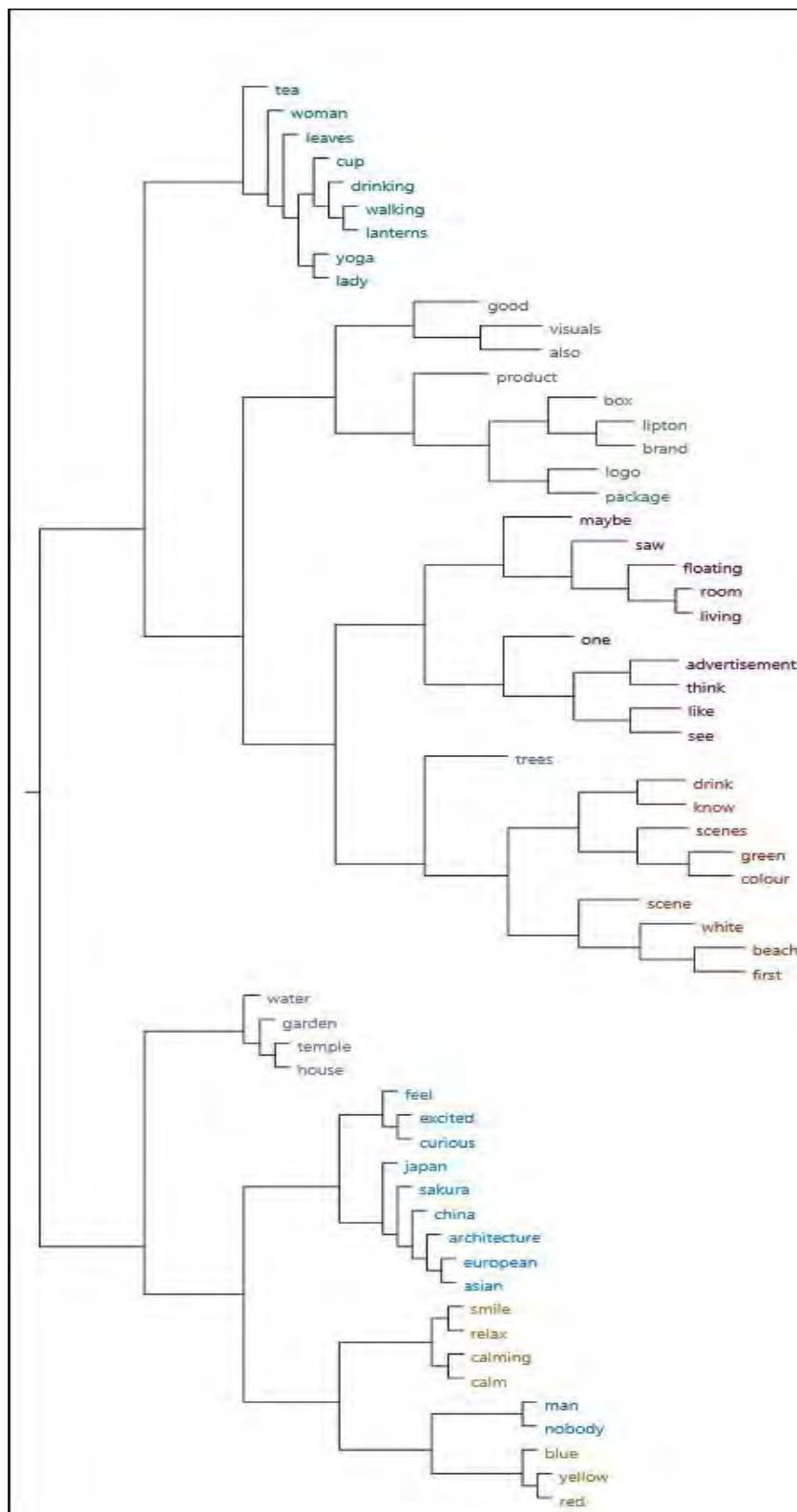
The main themes include some information of multi-cultural symbols such as Sakura trees which represent Japan, the architecture of the buildings, and the terms such as Asian, Western and European. Moreover, new terms depicting behavioural engagement include feelings such as curiosity and excitement. Some of the NVivo findings on this theme are as follows.

Table 4.29: NVivo query findings on inference maker among female participants

Theme	Codes	NVivo QSR query results
Multi-cultural symbols	Temple	*An Asian temple...(P31) * I saw a Buddhist temple and a lady looking at it (P39)
	Architecture	* Some old Asian architecture...(P40)

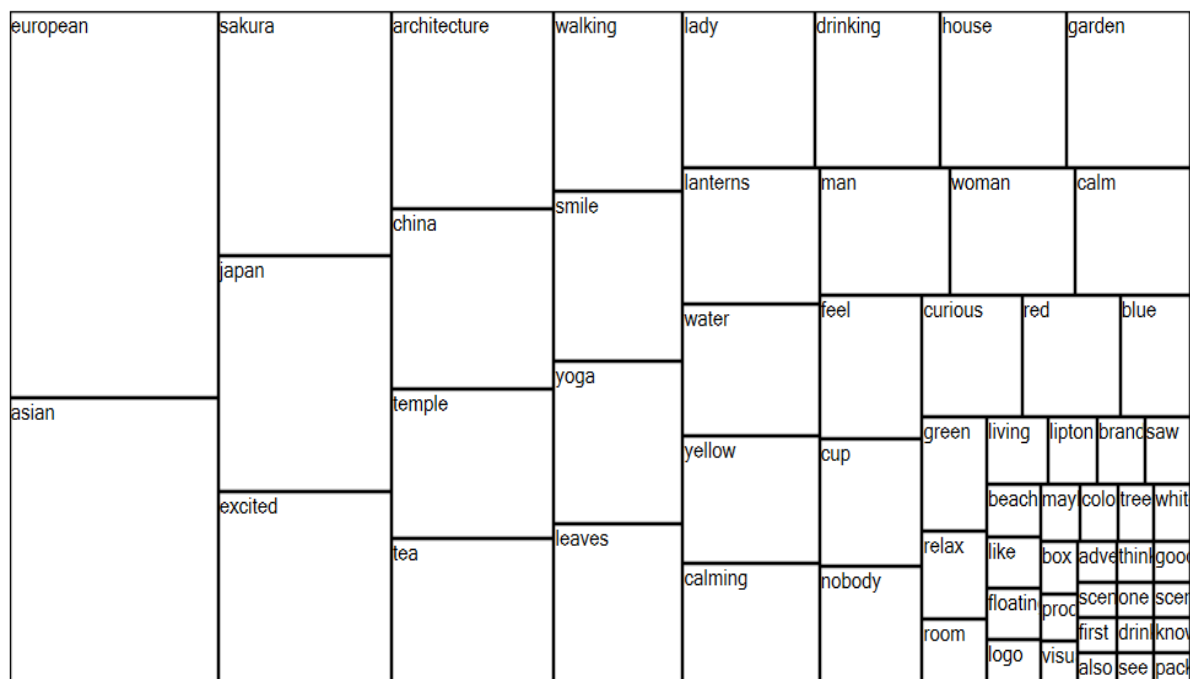
Behavioural engagement	Sakura	*For me mainly relaxing. That is the only thing that appeals to me. I think the floating leaves and Sakura trees made me think it...(P40)
	Asian	* I want to taste and see the energy I never tasted before. Travelling around the world gives that it tastes good feeling. It is very prominent here when you think of tea Lipton tea is here. Why do Asian's drink tea if it does not taste good...(P35) * It is the quality. It is an assumption that certain brands have certain tastes and qualities. If it is matcha I will not buy it. It is not so strong for me. I look for green tea of a quality brand. For me, it is a brand that most Asians do consume but I am not a fan of Lipton...(P34) * An Asian temple...(P31) * Some old Asian architecture...(P40)
	European	* She looks like a European lady...(P40) * It is a European style living room, a nice couch and a fireplace was there, and I also noticed a metal kettle(P40)
	Western	* A Western type living room. But it looks lonely. No children or family.... I am from Eastern culture. If it is an advertisement in our country (Bangladesh) it will be with some family..... I did not see any family here (P39)
	Curious	* I am not interested in buying the product because of this advertisement...but I felt very curious from the beginning as I thought initially that this is going to be a washing powder or dishwashing advertisement....(P38)
	Feel	* I felt the cold breeze in the garden (P38) * Yes, I felt the boiling water and floating leaves visuals....(P32) * I like Lipton as it is refreshing and cleansing. The cleansing means the internal things in your stomach... so I can feel it here (P36)
	Excited	* It is very exciting and immersive (P40) * I had to find the Lipton Logo by myself as it was there in the bottom of the tea bottle, and I had to look at the bottom to see it...so it is very exciting that I have to check it by myself (P32)

Figure 4.39: The node cluster diagram



The NVivo findings of the male participants of the 360-degree video version showed the theme multi-cultural symbols and behavioural engagement. According to the query results, it is clear that male participants under the 360-degree video viewing conditions were able to remember information in the advertisement regarding multicultural symbols and they also had some behavioural engagement. Based on the above node cluster diagram, the coding in-between the concepts can be further illustrated as below. For example, concepts including “excited”, “feel”, “curious” can be classified separately as one main theme of behavioural engagement. Based on tree map analysis, the density of each concept was checked to label the theme accurately. A tree map is a visual representation of hierarchical data displayed as a series of nested rectangles of varying sizes. To compare the number of coding references, the researcher created a tree map of the nodes (Di Gregorio, 2000; Dollah et al., 2017). Therefore, the tree map analysis conducted through NVivo further showed the effect of each selected node (based on the rectangle size) towards the concepts generating the main themes. Figure 4.40 illustrates the tree map analysis as follows (Di Gregorio, 2000; Dollah et al., 2017).

Figure 4.40: Tree map analysis



The NVivo findings of the male participants of the 360-degree video version showed two themes under visual-based inference maker as multi-cultural symbols, and behavioural

engagement. According to the query results, it is evident that male participants under 360-degree video viewing conditions used this information in the advertisement when making their buying decision.

Table 4.30: Thematic classification based on the tree map analysis and node cluster diagram

Themes	Concepts derived from node cluster diagram	Concepts derived from tree map analysis
Multi-cultural symbols	Japan, Sakura, China, architecture, European, Asian	European, Japan, Sakura, Asian, architecture, lanterns
Behavioural engagement	Relax, feel, excited, curious, know, saw	Calming, feel, curious

The next section further explores the major themes based on the query results (Di Gregorio, 2000; Dollah et al., 2017). According to the query results, it is clear that male participants under 360-degree video viewing conditions used information in the advertisement regarding multi-cultural symbols and behavioural engagement. The NVivo QSR analysis on word frequency query results is as follows.

Major themes related to males who viewed 360-degree video version

The main themes indicate some information of multi-cultural symbols such as Sakura trees which represent Japan, the architecture of the buildings, and terms such as Asian, Western and European. Moreover, terms depicting behavioural engagement includes immersive, feel, curious and excited. Some of the NVivo findings on this theme are as follows.

Table 4.31: NVivo query findings on inference maker among male participants

Theme	Codes	NVivo QSR query results
Multi-cultural symbols	Architecture	* It is Asian architecture .. especially the walls of these buildings (P28) * Tiny floral designs in the building walls...I love that architecture (P22)
	Sakura	* I saw some Sakura trees in the garden with a red bridge (P24) * Some pink colour tree which is quite unusual and can be only seen in Japan (P22)
	China	* I saw some temples in China (P27) * There were three Chinese temples....one in the front and the other two in two corners ...(P25)
	European	* It is a European style house with a nice couch and a fireplace (P21)
	Japan	* Some pink colour tree which is quite unusual and can be only seen in Japan (P22) * Well tea leaves diffusing in water with algae and water makes you feel like you are in Japan (P29)
	Western	* Advertisement did not make a difference. I will select Lipton as it's a well-known brand. Since this is a western setting advertisement, I would share one advertisement in our country. I use to remember one advertisement in our language, I will try to translate it. Husband comes and asks wife I need tea. She asks which tea? Husband says the only tasty one is Lipton so I would have Lipton I watched this advertisement when I was a teenager and still, I remember this advertisement. I still remember they were sitting in the garden and the house everything. It is in my long-term memory so when it comes to Lipton, I will not think twice....(P24) * Unlike the western countries, we consume a lot of oily food, so we use green tea to burn our fat (P27)

Behavioural engagement	Immersive	* It is like these tea leaves took me to a different world. Some hypnotising effect...yes, it is immersive. Indeed (P27) * I do listen to relaxation masterpieces....so this is a quite immersive and more engaging type of advertisement... especially we have to find the logo of the product by ourselves (P24) * I came to the surface on top of the tea surface (P25) * I realized that I was looking the wrong place as the lady was in here, but I missed it...(P26)
	Curious	* I was curious as I felt like diving in the water at the beginning.....I have this experience of drowning in the water...when I was 8 years old my mum took me to a swimming pool and without knowing how to swim I just jumped to the deep end of that swimming pool and drowned... Luckily someone saved me....So I was so curious when I saw these water visuals in the beginning....It reminds me, how I drowned on that day.....which is scary....(P21)
	Excited	* I will say that it is an exciting moment, where you do not know what will happen next with all these green liquids covered over your face (P22)
	Feel	* I got a feeling like I was coming out of the cup at some point in the living room....I am referring to the last visual (P26) * Yeah, I got a feeling as if I came out of the teacup in the very last visual (P22) * First there was a park full of trees then there were some locations....you will see some floating lanterns ...some kind of feeling as if you inside a green lake and a cup of tea...(P29) * Some small leaves were coming out of the water...(P27)

A word frequency analysis in NVivo QSR for the male participants who viewed the 360-degree video version was conducted under the visual inference-maker category. Based on the word cloud NVivo QSR analysis, the above theme can be further justified as follows.

Figure 4.41: NVivo QSR word cloud analysis -360-degree video version (male participants)



Therefore, based on the above thematic analysis, under standard video viewing conditions, participants were not having any behavioural engagement as was the case with the 360-degree video viewing condition. However, this did not vary based on gender, as both females and males in the standard video viewing condition did not have any behavioural engagement as was evident with the participants in the 360-degree video viewing condition.

4.7.5 Cross-case analysis using matrix coding queries to validate themes

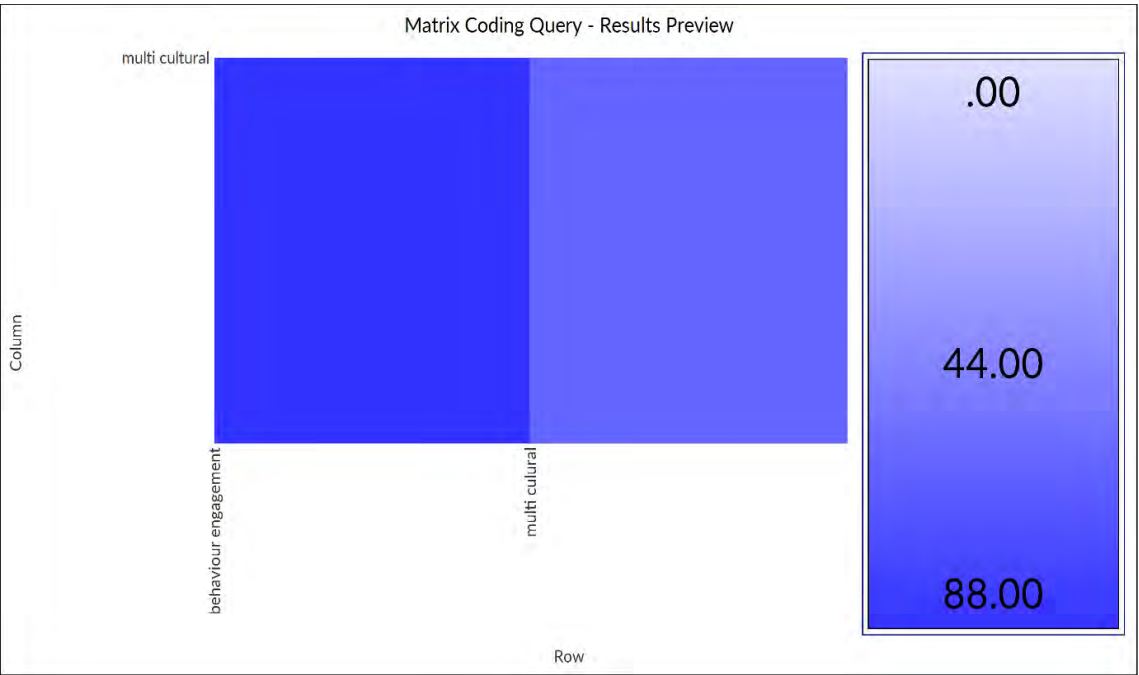
A matrix-coding query is a method for conceptual and theoretical development and is used to validate the themes derived from the qualitative analysis (Bytheway, 2013; Hutchison et al., 2010; O'Neill, 2013). Researchers can utilize the matrix-coding query function to look for information directly from the perspective of the research question (Hutchison et al., 2010). Furthermore, it is useful in identifying the multidimensional aspects and subcategories of a research study (Hutchison et al., 2010). In this research study, matrix-coding analysis was conducted to check the validity of the derived themes and the inter-relationships between the queries in terms of 360-degree and standard video advertisements.

Table 4.32: Matrix-coding query analysis for 360-degree and standard video advertisements under visual inference maker

		A : multi cultural
1 : behaviour engagement		88
2 : multi cultural		63

Based on the above Table 4.32; the comparison query results produced two nodes on behavioural engagement and multi-cultural symbols. These three nodes represented 60 to 85 frequently occurring words in-between the transcripts further showing the validity of the derived themes based on the cross-case matrix analysis (Hutchison et al., 2010).

Figure 4.42: Matrix-coding query: Results preview



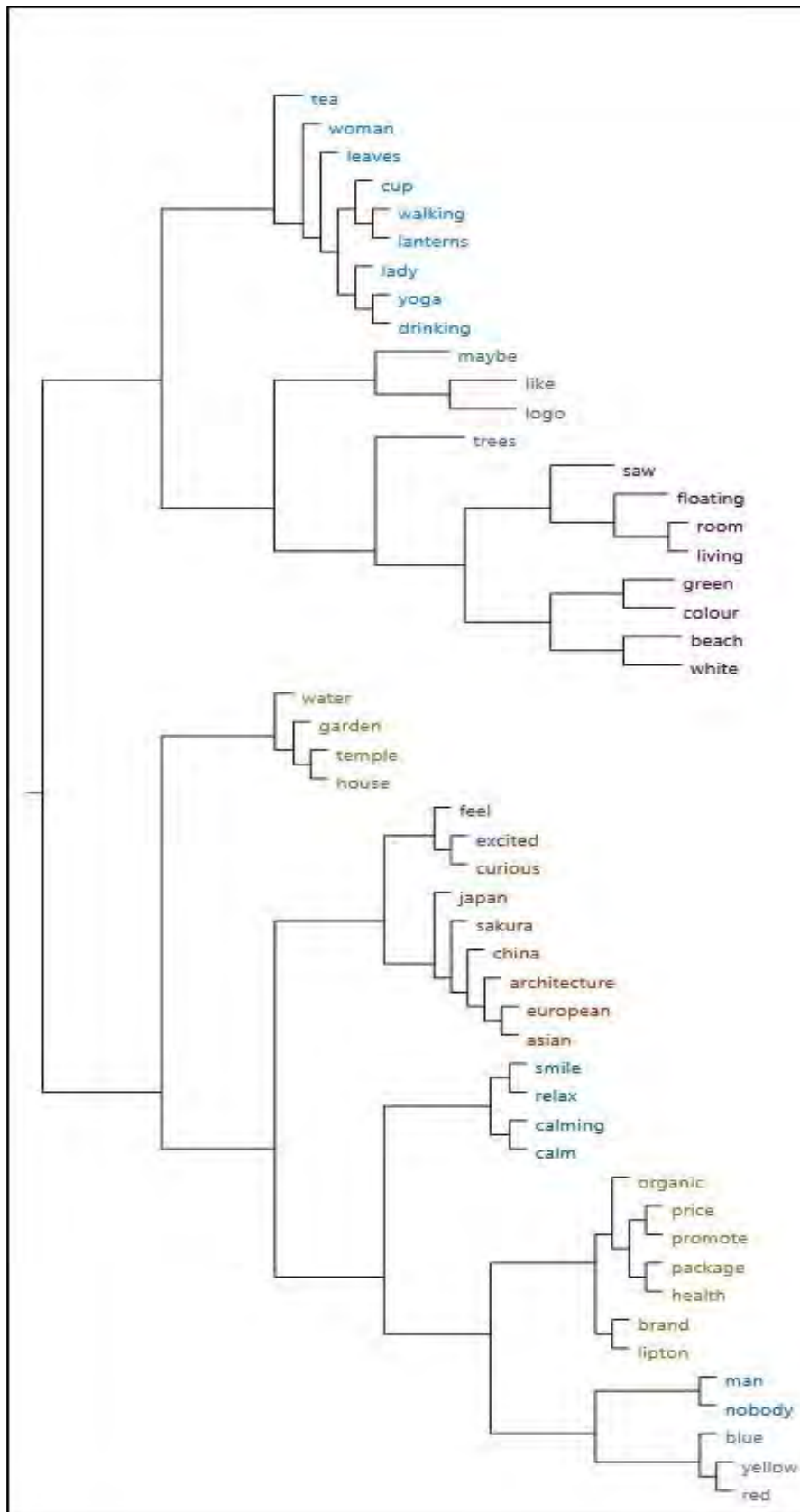
4.8 NVivo analysis for visual response selector

The NVivo findings of the analysis are divided into four parts of the workspace unit namely, visual comprehension, visual encoding, visual inference making and visual response selecting. This section illustrates the NVivo analysis of the visual-based response selection of the workspace unit.

4.8.1 NVivo analysis for visual response selection -female participants of the standard video version

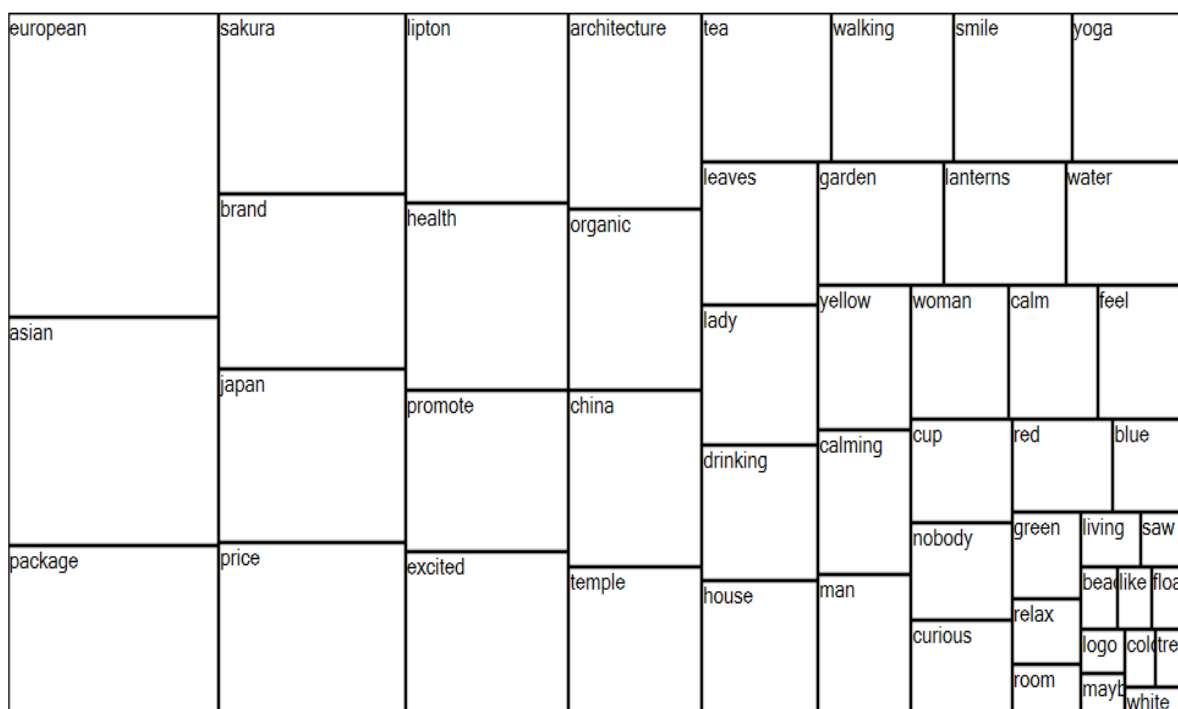
The NVivo findings of the female participants of the standard video version showed two themes—visual memory for brand details and product details. According to the query results, it is clear that female participants under standard video viewing conditions remembered visual details regarding brand details and product details within the visuals. For this research study, initial themes were developed from the node cluster diagram as follows. Figure 4.43 illustrates the node cluster diagram using the word similarity approach (Di Gregorio, 2000; Dollah et al., 2017; Hutchison et al., 2010; O'Neill, 2013).

Figure 4.43: The node cluster diagram



The NVivo findings of the female participants of the standard video version showed the theme product details and brand details. According to the query results, it is evident that female participants under standard video viewing conditions remembered visual details regarding brand details and product details within the visuals. Based on the above node cluster diagram, the coding in-between the concepts can be further illustrated as below. For example, the concepts including “organic”, “price”, “health” can be classified separately as one main theme of product details. Based on tree map analysis the density of each concept was checked to label the theme accurately. A tree map is a visual representation of hierarchical data displayed as a series of nested rectangles of varying sizes. To compare the number of coding references, the researcher created a tree map of the nodes (Di Gregorio, 2000; Dollah et al., 2017). Therefore, the tree map analysis conducted through NVivo further showed the effect of each selected node (based on the rectangle size) towards the concepts generating the main themes. Figure 4.44 illustrates the tree map analysis as follows (Di Gregorio, 2000; Dollah et al., 2017).

Figure 4.44: Tree map analysis



The NVivo findings of the female participants of the standard video version showed two themes under visual-based response selection as product and brand details. According to the

query results, it is further clear that female participants under standard video viewing conditions used this information in the advertisement when deciding their buying decision.

Table 4.33: Thematic classification based on the tree map analysis and node cluster diagram

Themes	Concepts derived from node cluster diagram	Concepts derived from tree map analysis
Product details	Organic, health, price	Organic, health, price
Brand details	Lipton; brand; promote, package, logo	Package, brand, logo

Therefore, the next section further explores the major themes based on the query results (Di Gregorio, 2000; Dollah et al., 2017). According to the query results, it is further clear that female participants under standard video viewing conditions used information in the advertisement regarding product and brand details. The NVivo QSR analysis on word frequency query results is as follows. Therefore, this section illustrates the NVivo analysis of visual response selection of the workspace unit.

Major themes related to females who viewed standard video version

The main themes indicate some information of product and brand details. Moreover, terms depicting product details includes Lipton, price, organic and health. The brand details include Lipton, logo and Matcha. Some of the NVivo findings on this theme is as follows. The main themes indicate some information related to brand details and product details. Some of the NVivo findings on this theme is as follows.

Table 4.34: NVivo query findings on response selector among female participants

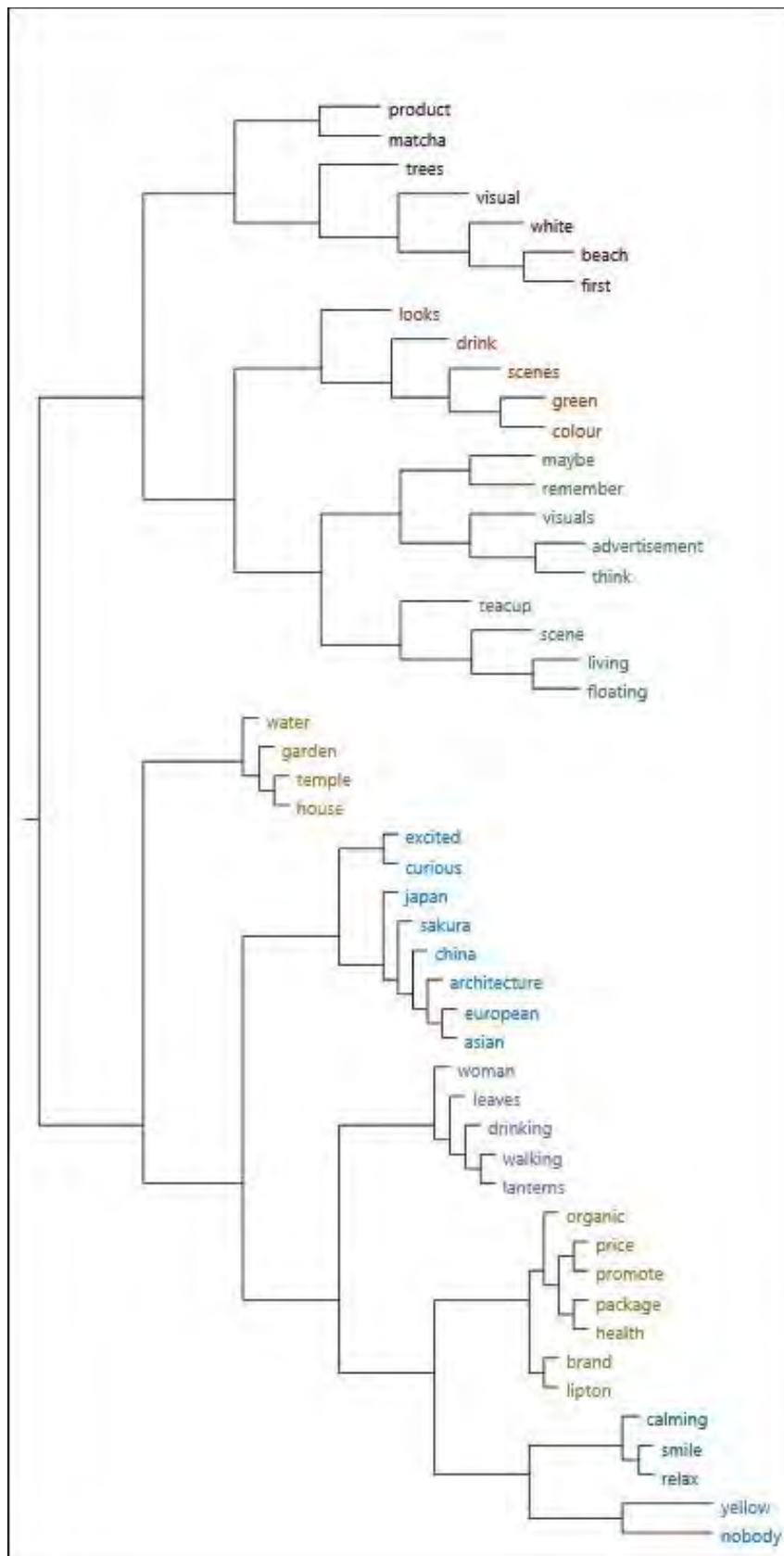
Theme	Codes	NVivo QSR query results
Brand details	Lipton	* Lipton is a very reputed brand....so no doubt about it (P11) * Lipton is easily available in any country (P13) * I noticed the Lipton brand name thrice...Two times during the very first scene and then once in the final scene (P20)
	Promote	* I would look at the word-of-mouth promotion before buying a tea product (P12)

	Place	* Lipton is easily available in any country (P13) * You can buy Lipton green tea from ALDI, COLES or Woolworths and it is easily available anywhere within Australia (P15) * I do not think I have to put any effort to find Matcha green tea in Australia (P16)
	Pricing	* Price was not there in the package (P16) * I drink coffee more than tea.... so, I am not interested in buying it. Price is my thing. The visually appealing things are not my thing.... certain things appeal to me in a product...for example, word of mouth promotion....it means that other people should recommend me the product for me to try (P15)
	Logo	* I noticed the logo in the packaging (P16) * The logo was there in the teabox (P18) * It is the red background and white colour letter (P17)
	Tea	* I initially thought it is just a tea advertisement after viewing the final visual I realized it is a green tea one. The logo made me think it is a tea advertisement finally when a girl drinking tea that same logo reminded me that it is a green tea advertisement based on the product package...(P19) * Leaves looked very messy....I thought it is tea but did not know what kind of tea it is....(P11)
Product details	Teabox	* The logo was there in the teabox (P18) * Some tiny leaves were there in the four sides of the teabox (P17)
	Green	* I initially thought it is just a tea advertisement after viewing the final visual I realized it is a green tea one....(P19) * The logo made me think it is a tea advertisement finally when girl drinking tea that same logo reminded me that it is green tea advertisement based on the product package...(P19) * I like the colours I like greenery scenes and middle there was pink scenes and mostly green until we reach the end visual on house... (P19)

4.8.2 NVivo analysis for visual response selection -male participants of the standard video version

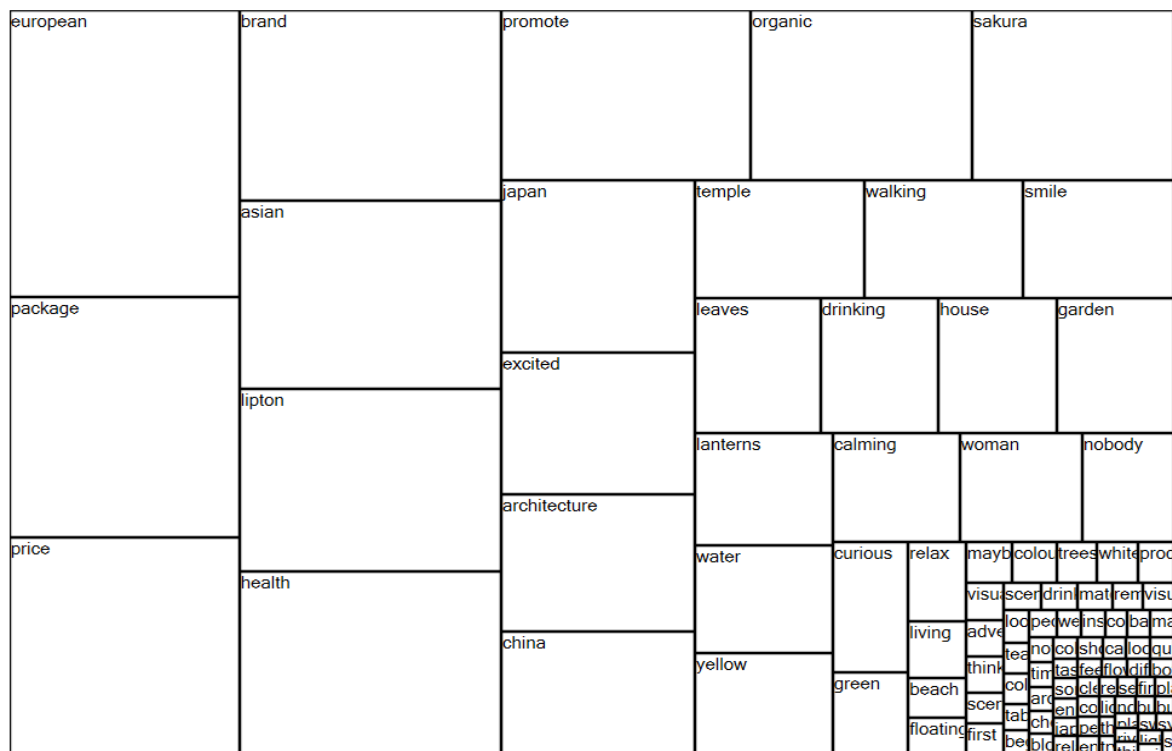
The NVivo findings of the male participants of the standard video version showed two themes — visual memory for brand details and product details. According to the query results, it is clear that male participants under standard video viewing conditions remembered visual details regarding brand details and product details within the visuals similar to female participants. For this research study, initial themes were developed from the node cluster diagram as follows. Figure 4.46 illustrates the node cluster diagram using the word similarity approach (Di Gregorio, 2000; Dollah et al., 2017; Hutchison et al., 2010; O'Neill, 2013).

Figure 4.46: The node cluster diagram



The NVivo findings of the male participants of the standard video version showed the theme product details and brand details. According to the query results, it is clear that male participants under standard video viewing conditions remembered visual details regarding brand details and product details within the visuals. Based on the above node cluster diagram, the coding in-between the concepts can be further illustrated as below. For example, the concepts including “price”, “health” and “organic” can be classified separately as one main theme of product details. Based on tree map analysis, the density of each concept was checked to label the theme accurately. A tree map is a visual representation of hierarchical data displayed as a series of nested rectangles of varying sizes. To compare the number of coding references, the researcher created a tree map of the nodes (Di Gregorio, 2000; Dollah et al., 2017). Therefore, the tree map analysis conducted through NVivo further showed the effect of each selected node (based on the rectangle size) towards the concepts generating the main themes. Figure 4.47 illustrates the tree map analysis as follows (Di Gregorio, 2000; Dollah et al., 2017).

Figure 4.47: Tree map analysis



The NVivo findings of the male participants of the standard video version showed two themes under visual-based response selection—product and brand details. According to the query results, it is clear that female participants under standard video viewing conditions used this information in the advertisement when making their purchase decision.

Table 4.35: Thematic classification based on the tree map analysis and node cluster diagram

Themes	Concepts derived from node cluster diagram	Concepts derived from tree map analysis
Product details	Organic, health, product	Price, organic, health
Brand details	Lipton; brand; promote, package, logo, Matcha	Package, brand, promote

The next section explores the major themes based on the query results (Di Gregorio, 2000; Dollah et al., 2017). According to the query results, it is clear that male participants under standard video viewing conditions used information in the advertisement regarding product and brand details. The NVivo QSR analysis on word frequency query results is as follows. Consequently, this section illustrates the NVivo analysis of the visual response selection of the workspace unit.

Major themes related to males who viewed standard video version

The main themes indicate some information related to brand details and product details. Some of the NVivo findings on this theme are as follows.

Table 4.36: NVivo query findings on response selector among male participants

Theme	Codes	NVivo QSR query results
Brand details	Tea	* The hidden message is that to sell this tea brand as well as to send the message that if someone takes this tea, they will reduce fat and can feel fresh.(P4) * When I was a student, I take this tea and sometimes we friends sit in a particular place, and we drink this tea. This was the most available tea, and we like the taste. We did not have any preference, but we sometimes use this brand...(P4) * It is green tea. No doubt about it....they gave us a clue in the beginning, right? The green colour water with swirling tea leaves (P10)

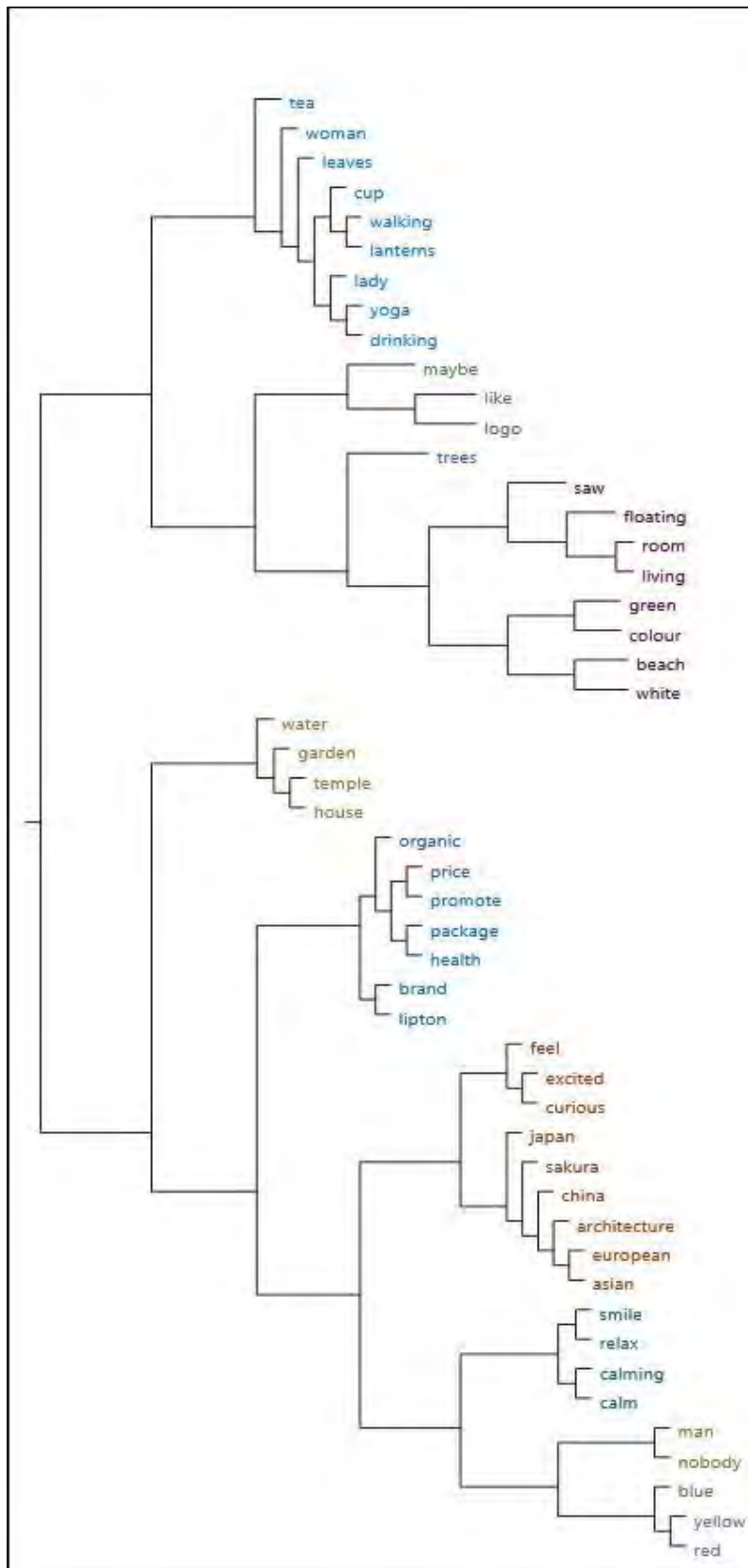
		* The word Lipton and the logo was there in the tea box (P9) * The tea box had green and yellow colours in the white background....(P8)
	Logo	* If any company wants to attract people, then they need to present the brand name and logo visuals. Also, they should keep with these colours...(P6) * The graphics were good. Noticeable and memorable as well. But my suggestion is that the size of the logo is too small (P7)
	Matcha	* The name of this product is Matcha...I saw the name within this advertisement about three to four times (P7)
	Lipton	* The word Lipton and the logo was there in the teabox (P9)
	Brand	* If any company wants to attract people, then they need to present the brand name and logo visuals. Also, they should keep with these colours...(P6) * Yes, the brand name is important as well as the cost... sometimes the unavailability could happen in the selected brand, so the brand name is important to remember...(P2) * The hidden message is that to sell this tea brand as well as to send the message that if someone takes this tea, they will reduce fat and can feel fresh.(P4) * When I was a student, I take this tea and sometimes we friends sit in a particular place, and we drink this tea. This was the most available tea, and we like the taste. We did not have any preference, but we sometimes use this brand...(P4)
Product details	Green	* It is green tea. No doubt about it....they gave us a clue in the beginning, right? The green colour water with swirling tea leaves (P10)
	Package	* I saw the product package...but I did not see any price tag(P2) * You know that when we buy something we should check whether it is biodegradable or not. Especially the tea bags....so I couldn't find that information within the package...I mean visuals moved too fast....(P4)
	Tea box	* The word Lipton and the logo was there in the tea box (P9) * The tea box had green and yellow colours in the white background....(P8)
	Product	* I saw the product package...but I did not see any price tag (P2)

A word frequency analysis in NVivo QSR for the male participants who viewed the standard video version was conducted under the visual response selection category. Based on the word cloud NVivo QSR analysis, the above themes can be justified as follows.



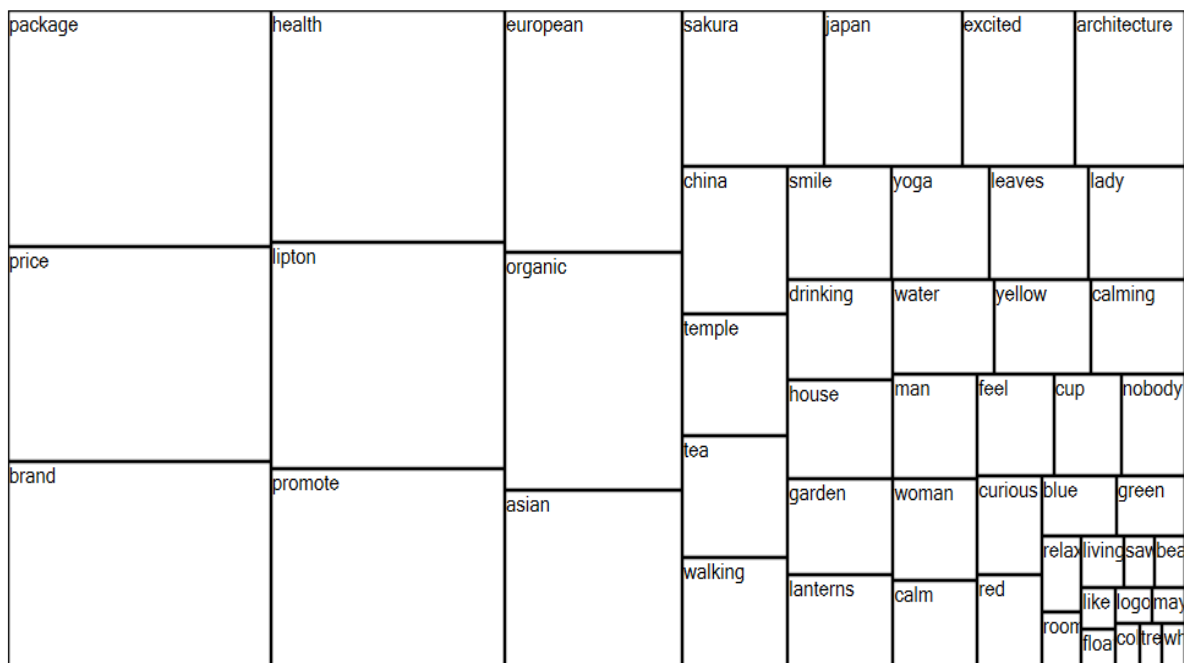
4.8.3 NVivo analysis for visual response selection -female participants of the 360-degree video version

Figure 4.49: The node cluster diagram



The NVivo findings of the female participants of the 360-degree video version showed the themes product details and brand details. According to the query results, it is further clear that female participants under 360-degree video viewing conditions remembered visual details regarding brand details and product details within the visuals. Based on the above node cluster diagram, the coding in-between the concepts can be further illustrated as below. For example, the concepts including “health”, “package”, “organic” and “price” can be classified separately as one main theme of product details. Based on tree map analysis, the density of each concept was checked to label the theme accurately. A tree map is a visual representation of hierarchical data displayed as a series of nested rectangles of varying sizes. To compare the number of coding references, the researcher created a tree map of the nodes (Di Gregorio, 2000; Dollah et al., 2017). Therefore, the tree map analysis conducted through NVivo further showed the effect of each selected node (based on the rectangle size) towards the concepts generating the main themes. Figure 4.50 illustrates the tree map analysis as follows (Di Gregorio, 2000; Dollah et al., 2017).

Figure 4.50: Tree map analysis



The NVivo findings of the female participants of the 360-degree video version showed two themes under visual-based response selection — product and brand details. According to the

query results, it is further evident that female participants under 360-degree video viewing conditions used this information in the advertisement when deciding their buying decision.

Table 4.37: Thematic classification based on the tree map analysis and node cluster diagram

Themes	Concepts derived from node cluster diagram	Concepts derived from tree map analysis
Product details	Organic, health, product, price	Price, package, organic, health
Brand details	Lipton; brand; promote, package, logo	brand, Lipton; promote

The next section further explores the major themes based on the query results (Di Gregorio, 2000; Dollah et al., 2017). According to the query results, it is clear that female participants under 360-degree video viewing conditions used information in the advertisement regarding product and brand details. The NVivo QSR analysis on word frequency query results follows. This section illustrates the NVivo analysis of the visual response selection of the workspace unit.

Major themes related to females who viewed 360-degree video version

The main themes indicate some information related to brand details and product details. Some of the NVivo findings on this theme are as follows.

Table 4.38: NVivo query findings on response selector among female participants

Theme	Codes	NVivo QSR query results
Brand details	Tea	* From this tea advertisement, it is clear that see that the tea is healthy and not so sweet... (P31) * Lady sitting in a room drinking some tea. On her left side, there was a Lipton matcha tea box. Before that, there was a bunch of changing visuals like your pc is like being in a cup of tea. There is a logo of Lipton at the bottom. One of the scenes had snow. The last scene is with a lady probably in a room or office. The first visual is too long, and the other scenes are changing too much... (P32) * Tea because of the tea leaves and the colour. It looks yellowy-green When you are in the cup you see green, so I am assuming it is green tea. It makes you think that it is a tea advertisement. In the middle of any tea advertisement, there is a person drinking tea and say hi. So here it is a different experience...(P33)”

* Good and happy colours and calming colours. They are like most noticeable colours for a tea as it is yellow....(P32)

Logo * Lady sitting in a room drinking some tea. On her left side, there was a Lipton matcha tea box. Before that, there was a bunch of changing visuals like your pc is like being in a cup of tea. There is a logo of Lipton at the bottom. One of the scenes had snow. The last scene is with a lady probably in a room or office. The first visual is too long and the other scenes are changing too much... (P32)

* It is not good. It is kind of unaffordable. The colour grade is not good the people will remember more if you give it. It is not clear. I recommend bright colours and natural colours. Not so many colours. In technical movies, you can see that blue. For this yellow and orange is good. The green colour is way too much. It is blurry. So, you cannot see the logo (P37)

Lipton * Lady sitting in a room drinking some tea. On her left side, there was a Lipton matcha tea box. Before that, there was a bunch of changing visuals like your pc is like being in a cup of tea. There is a logo of Lipton at the bottom. One of the scenes had snow. The last scene is with a lady probably in a room or office. The first visual is too long, and the other scenes are changing too much... (P32)

* I drink tea two times a day and I do not know the Lipton tea brand (P37)

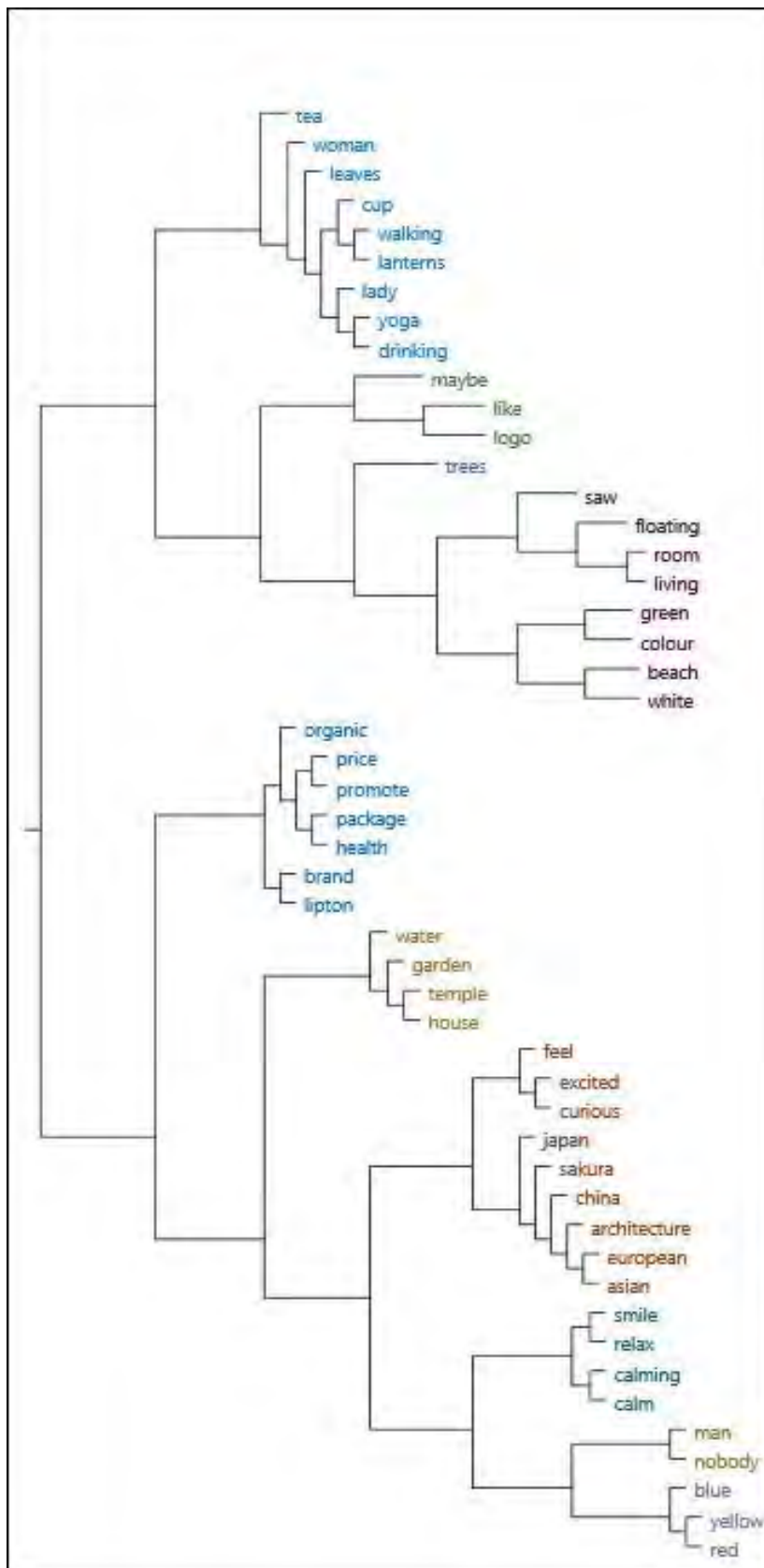
* I drink tea once in the morning. I know the Lipton tea brand (this is my favourite brand) and it is good for me...(P36)

Brand * I drink tea once. I know the Lipton tea brand, but I do not go for it. It is not my choice. I think it is an allowed quality brand. I never drink premium brands though...(P37)

Product details	Teabox	* Yes, I saw the product once, a tea box at the end ...(P40) * I think it is moderate for me to remember the visuals presented in this video version... especially the teabox (P34) * I would like to try this product after viewing this advertisement and this teabox. If the tea quantity was there mentioned in the tea box, I would love to see that. I see the bulk products when I buy them all the time. All the locations around the world hey we are not just Australia it can be bought anywhere. Availability and can find anywhere. Some brands are very specific to one country. Go around the world and looks like need to explore that place....(P33)
	Organic	* Yes, I think so because there trying to give freshness organic and pure by using green colour to give that expression .. (P38)
	Green	* The colours are good. It is matching with the product theme. For example, green tea vs green colour water...(P36)
	Package	* Refreshment, the taste, if it is green tea. I expect not too bitter and not too sweet. Just in the middle. It is objective though. The colours of the visuals helped me to get that idea...But I did not see any further details like price, organic qualities, ingredients in the package (P36)

A word frequency analysis in NVivo QSR for the female participants who viewed the 360-degree video version was conducted under the visual response selection category. Based on the word cloud NVivo QSR analysis, the above themes can be further justified as follows.

Figure 4.52: The node cluster diagram



query results, it is further clear that male participants under 360-degree video viewing conditions used this information in the advertisement when deciding their buying decision.

Table 4.39: Thematic classification based on the tree map analysis and node cluster diagram

Themes	Concepts derived from node cluster diagram	Concepts derived from tree map analysis
Product details	Organic, price; promote	Price, organic, health; promote
Brand details	Lipton; teabox; package; product	brand, Lipton; logo

The next section further explores the major themes based on the query results (Di Gregorio, 2000; Dollah et al., 2017). According to the query results, it is clear that male participants under 360-degree video viewing conditions used information in the advertisement regarding product and brand details. The NVivo QSR analysis on word frequency query results is as follows. This section illustrates the NVivo analysis of visual response selection of the workspace unit.

Major themes related to males who viewed 360-degree video version

The main themes indicate some information related to brand details and product details. Some of the NVivo findings on this theme are as follows.

Table 4.40: NVivo query findings on response selector among male participants

Theme	Codes	NVivo QSR query results
Brand details	Tea	* First, I saw the bottom of the teacup and the green water then I saw the lady with lantern with night visuals then a lady performing yoga and the living room/Also that lady had a tab in her hand...(P27)
	Logo	* Transparent effect in the logo as it is an unusual logo (P28)
	Brand	* I do not know why people think that an advertisement could make a difference in purchasing a product. For me it is the Lipton brand name...and I do believe that realistically it is what people go for(P26)

	Lipton	* Advertisement did not make a difference. I will select Lipton as it's a well-known brand. (P23) * For me, it is not the case... Lipton is a very old and a very good brand ...and I do believe that realistically it is what people go for (P21)
Product details	Teabox	* I saw a green teacup in the corner and also a teabox on the table (P27)
	Green	* Besides the green leaves and pot, I noticed the brand logo (P28) * First, I saw the bottom of the teacup and the green water then I saw the lady with lantern with night visuals then a lady performing yoga and the living room/Also that lady had a tab in her hand...(P27) * Beginning is greenish and then night-time with lanterns blowing to the sky and then red colour is there, so it is eye-catching (P27) * Swirling leaves in a green colour pool (P26) * The green colour provides an oriental appeal (P22) * Inside under green colour water and there were swirling leaves lighted up lanterns floating from bottom to top (P24) * I saw a green teacup in the corner and a teabox on the table (P25)
	Package	* I did not see any information about quality standards or pricing in the packaging...I missed so many details, as I put my attention only towards the package....(P26)
	Health	* It is interesting, but it will not tempt me to buy the product honestly....I go for health benefits (P28) * I consume fast food a lot...you see that we are international students and we are away from families right..... so, no home food sometimes....I am a person who is very lazy to cook....For me, green tea reminds me of healthy aspects....(P23)

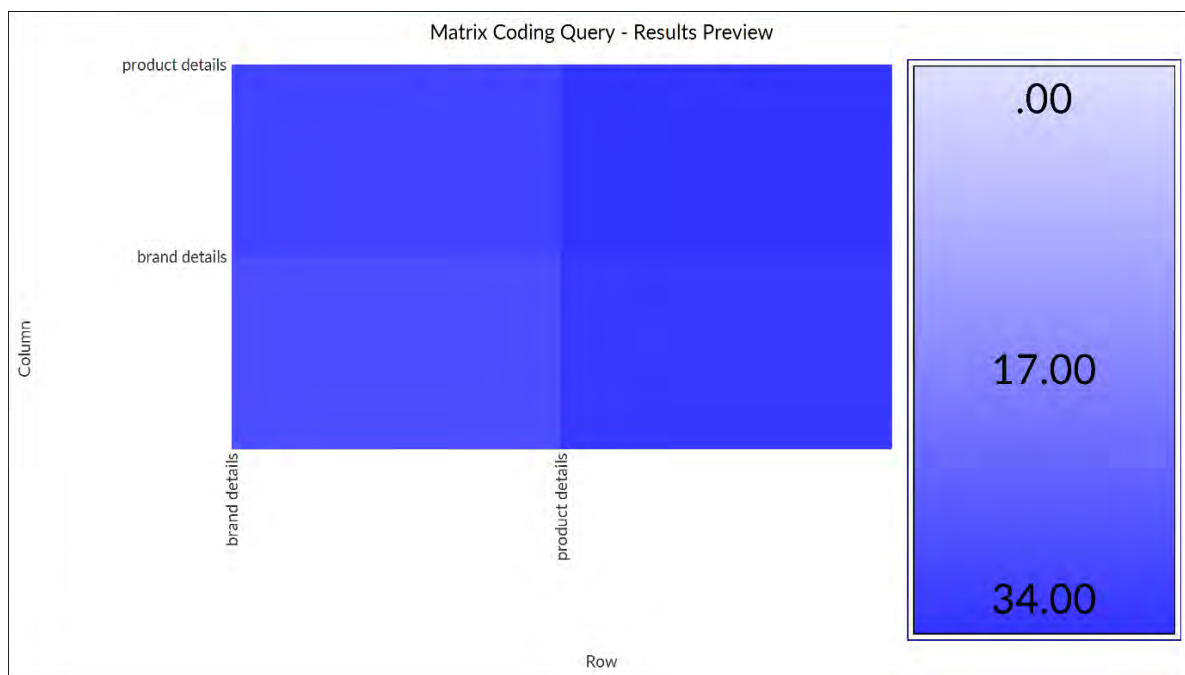
A word frequency analysis in NVivo QSR for the male participants who viewed the 360-degree video version was conducted under the visual response selection category. Based on the word cloud NVivo QSR analysis, the above themes can be further justified as follows.

Table 4.41: Matrix-coding query analysis for 360-degree and standard video advertisements under visual-based response selector

		A : brand details ▼	B : product details ▼
1 : brand details ▼		29	31
2 : product details ▼		33	34

Based on the above Table 4.41; the comparison query results produced two nodes on behavioural engagement and multi-cultural symbols. These two nodes represented 25 to 35 frequently occurring words in-between the transcripts further showing the validity of the derived themes based on the cross-case matrix analysis (Hutchison et al., 2010).

Figure 4.55: Matrix-coding query: Results preview



The next section discusses the summary of the results as follows.

4.9 Summary of the findings

In this experiment, the visual working memory was divided into four components as comprehension of the visuals, encoding of the visuals, inference making ability of the visuals and response selection within the visuals. Different findings were identified within standard and 360-degree video viewing conditions.

Table 4.42: Results of the participants for Experiment 1

Working memory component	Themes	Standard video version		360-degree video version	
		Key concepts among female participants	Key concepts among male participants	Key concepts among female participants	Key concepts among male participants
Comprehender	Colour detection	Green/White/Maroon/ Pink/Yellow	None	Green/Maroon/White/Blue/Pink	None
	Facial expressions	None	Calm/Relaxing/Smiling	None	Calm/Smiling
	Visual memory on locations	Temple/Garden/Beach/Living room/Water	Garden/House/Leaves/Beach	Garden/Beach/Living room/Water	Water/Room/House/Garden/Temple
Encoder	Visual memory for objects	Tea/Lanterns/Leaves	Tea/Water/Leaves/Cup/Trees	Tea/Teacup/Leaves/Forgot	Leaves/Water/Cup/Lanterns/Table

	Visual memory for people	Woman/Lady	Woman/Lady	Man/Nobody/Lady/Woman	Lady/Nobody/Man/Woman
	Visual memory for actions	Yoga/Drinking/ Walking	Yoga/Drinking	Drinking/Floating	Drinking/Yoga/Floating
Inference maker	Multi-cultural symbols	Temple/Sakura/Yoga/Western/Architecture/Asian/China/European/Japanese	Sakura/Western/Temple/Yoga/Asian/European/China/White/Architecture/Japan	Temple/Architecture/Sakura/Asian/European/Western	Architecture/Sakura/China/European/Japan/Western
	Behavioural engagement	None	None	Curious/Feel/Excited	Immersive/Curious/Excited/Feel
Response selector	Visual memory for product details	Lipton/Promote/Place/Price/Logo/Tea	Green/Package/Tea box/Product	Tea box/Organic/Green/Package	Tea box/Green/Package/Health
	Visual memory for brand details	Teabox/Green/Tea/Package	Tea/Logo/Matcha/Lipton/Brand	Tea/Logo/Lipton/Brand	Tea/Logo/Brand/Lipton

4.9.1 Overall findings under standard video viewing condition

Firstly, when considering the comprehension of the visuals, female participants were able to comprehend the colours and locations of the visuals. Based on the thematic analysis, it was identified that some of the colours comprehended included green, white, maroon, pink and yellow. Some of the locations noticed were a temple, garden, beach, living room, and water scenes. In contrast, male participants comprehended facial expressions in the visuals and locations within the visuals. Based on the thematic analysis, it was shown that some of the identified facial expressions were calmness, relaxation, and happiness. Some of the locations noticed were garden, house, beach, and scenes with leaves. These findings vary based on gender as female participants comprehended colours in the visuals while male participants comprehended facial expressions within the visuals.

Secondly, when considering the encoding of the visuals, both males and females were able to encode objects, people and actions presented in the visuals. Based on the thematic analysis, some of the noted actions included drinking tea, doing yoga, and walking in the garden. Tea, lanterns, and leaves were among the highest noticed objects within the visuals. The woman sitting in the living room was either mentioned by the participants as a lady or as a woman. These findings did not vary based on gender.

The third category was inference-making ability. Here, the influence of the visuals towards the buying decision was identified. Both female and male participants had observed multi-cultural symbols within the visuals. The main themes indicated the names and information of some multi-cultural symbols such as Sakura trees which represent Japan, the architecture of the buildings, and the temple presented in the visuals. Some of the frequently used terms included “Asia”, “China”, “Japan”, “Western” and “European.” Similar to the encoding of the visuals, in this category also there was no difference identified within the genders.

Finally, the fourth category included response selection within the visuals. This category identified some of the visuals which applied to the buyer response. The two main themes identified were the visual memory for product details and visual memory for brand details. Both female and male participants noticed both visuals with product and brand details. Some of the noticed brand details included terms such as Lipton, Place or location of the product and logo and package details. Product details included terms such as teabox, package and green tea.

In standard video conditions, most of the participants mentioned that they could not see any pricing information in the product package or any quality maintenance logo. These findings did not vary based on gender, similar to the visual encoding and inference-making categories.

4.9.2 Overall findings under 360-degree video viewing condition

Firstly, when considering the comprehension of the visuals, female participants were able to comprehend the colours and locations of the visuals. Based on the thematic analysis, it was identified that some of the colours comprehended included green, maroon, pink and red. Some of the locations noticed were the garden, beach, temple, living room. In contrast, male participants comprehended facial expressions in the visuals and locations within the visuals. Based on the thematic analysis, it was identified that some of the identified facial expressions were calmness and happiness. Some of the locations noticed were water, room, house, and garden. These findings varied based on gender as female participants comprehended colours in the visuals while male participants comprehended facial expressions within the visuals, similar to standard video viewing conditions.

Secondly, when considering the encoding of the visuals, both males and females were able to encode objects, people and actions presented in the visuals; however, encoded information in the advertisement regarding actions, objects, and people was less than in standard video viewing condition and most of the participants did not notice all the presented actions, objects, and people within the visuals. Most of the answers were incorrect regarding the presented actions, objects, and people. For example, a girl doing yoga was noticed as a girl preparing for diving under 360-degree video conditions. Also, the woman presented in the visuals was recorded as a man or most of the participants mentioned that they did not see anybody due to movement aspects in the google cardboard.

These findings did not vary based on gender. The third category was inference-making ability. Here the influence of the visuals towards the buying decision was identified. Both female and male participants noticed multi-cultural symbols and had some behavioural engagement with the visuals. The main themes indicated some information of multi-cultural symbols such as Sakura trees which represent Japan, the architecture of the buildings, and terms such as Asian, Western and European. Moreover, terms depicting behavioural engagement included feeling, curious and excited. Similar to the encoding of the visuals, in this category also, there was no

difference identified within the genders. It was clear that under standard video viewing conditions, behavioural engagement was not identified. In 360-degree video conditions, most of the participants mentioned that they had to find the brand logo by themselves as it was in the bottom of the glass cup, and they felt relaxation and coldness when watching the swirling leaves in the green water. Also, several participants mentioned that they felt the transition effect of being inside the teacup when the last visual moved to the living room scene.

Finally, the fourth category included response selection within the visuals. This category identified some of the visuals which applied to the buyer response. The two main themes identified were the visual memory for product details and visual memory for brand details. Both female and male participants noticed visuals with product and brand details. Some of the noticed brand details included terms such as Lipton, Place, logo, location of the product and package details. Product details included terms such as teabox, pricing, details on green tea such as health and quality information. In 360-degree video conditions, most of the participants mentioned that they could not see any pricing information in the product package or any quality maintenance logo. This further shows that they were not able to find the information they were seeking such as price, availability of the product, health benefits of the product and details regarding quality standards. These findings did not vary based on gender, similar to the visual encoding and inference-making categories.

4.10 Conclusion

The qualitative findings of experiment 1 are explained in this chapter. This chapter begins with an overview of experiment 1, then moves on to a review of the equipment utilized in the experiment, as well as the outcomes of experiment 1 for female and male participants. As a result, the first research question (RQ1) is addressed in this section which is “What is the differential effect of 360-degree versus standard video advertisements on visual memory under single viewing conditions?”. Under single viewing conditions, the qualitative results will be compared to identify differences in themes for consumer visual memory for 360-degree and standard video advertisements.

Experiment 1 identified that when considering the comprehension of the visuals, female participants were able to comprehend the colours and locations of the visuals, while male participants comprehended facial expressions and locations within the visuals under both

viewing conditions of standard and 360-degree video versions. Both males and females were able to encode objects, people and actions presented in the visuals. However, encoded information in the 360-degree video viewing conditions regarding actions, objects, and people was less than in standard video viewing conditions and most of the participants did not notice, all the presented actions, objects, and people within the visuals. Additionally, most of the answers were incorrect regarding the presented actions, objects, and people. For example, a girl doing yoga was noticed as a girl preparing for diving under 360-degree video conditions. Also, the woman presented in the visuals was recorded as a man or most of the participants mentioned that they did not see anybody due to movement aspects in the Google Cardboard. This could also be interpreted as a weakness of 360-degree videos.

When considering the visual inference-making ability, both female and male participants noticed multi-cultural symbols and had some behavioural engagement with the visuals under 360-degree video conditions, but no behavioural engagement was identified under standard video viewing conditions. In 360-degree video conditions, most of the participants mentioned that they had to find the brand logo by themselves as it was located in the bottom of the glass cup, and they felt relaxation and coldness when watching the swirling leaves in the green water. Also, several participants mentioned that they felt the transition effect of being inside the teacup when the last visual moved to the living room scene. This could also be identified as a weakness in standard videos. Both female and male participants noticed visuals with product and brand details under the inference-making category. In both 360-degree video conditions, most of the participants mentioned that they could not see any pricing information in the product package or any quality maintenance logo in the package. This further shows that they were not able to find the information they are looking for, such as price, availability of the product, health benefits of the product and details regarding the quality standards. In both standard and 360-degree video conditions, most of the participants mentioned that they could not see any pricing information in the product package, or any quality maintenance logo as expected.

These findings further shows that they expected some information through the advertisement visuals regarding price, availability of the product, health benefits of the product and quality. Before commencing Experiment 2 of the present research, the general memory questionnaire was excluded as all the participants had a good general working memory score. Therefore, in experiment 2 the general memory questionnaire was excluded because the same 40 participants

would be recalled participating after one week. The one-week timeline was allocated to avoid the fatigue of the participants as experiment one took about two hours (2 hours) to complete. Similarly, the Group A participants will watch the 360-degree version of the Magnificent Matcha Lipton tea video advertisement and Group B participants will watch the standard version of the Magnificent Matcha Lipton tea video advertisement, under multiple viewing conditions. Since all the tasks were functioning as intended, no further changes were included in the experiment design. Results of experiment 2 will be presented in the next chapter.

Chapter 5 : Study 2- Results

“Marketing is no longer about the stuff that you make but the stories you tell”- *Seth Godin*

5.1 Introduction

The previous chapter discussed the results of experiment 1. This chapter explains the qualitative findings of experiment 2. It commences by providing an overview of experiment 2, followed by an overview of the experiment design and results of experiment 2 about female and male participants. Therefore, this section addresses research question two which is (RQ2- “What is the differential effect of 360-degree versus standard video advertisements on visual memory under repeated viewing conditions?”) The qualitative results will be compared to identify the differences in themes for consumer visual memory for 360-degree and standard video advertisements at the end of this chapter.

5.2 Experimental design overview

Experiment 2 of this study had the same design as experiment 1. The same set of participants was used to watch the same video advertisement. An SMS reminder was sent after one week to those who had shared their contact numbers, reminding them of their participation in experiment 2; however, five participants did not participate in experiment 2 and did not reply to the SMS. Therefore, responses of only thirty-five (35) participants were considered in experiment 2. A separate name tag for each participant was created by the author using multi-coloured paper to avoid the shuffle of equipment for each participant. Similarly, to recall the features shown to them, the working memory components used the same stimuli and span tasks. The main idea of the second experiment was to investigate consumer visual memory on 360-degree versus standard video advertisements under multiple viewing conditions.

The repeated exposure of a stimulus has been shown to generate a favourable effect on the stimulus (Conci et al., 2021; Melcher, 2001). Information will be remembered over multiple glances and across time to build a comprehensive representation of a visual scene (Conci et al., 2021; Melcher, 2001). However, it has been hypothesised that visual details are quickly

forgotten after they have been seen (Conci et al., 2021; Melcher, 2001). Therefore, the main purpose of this experiment was to show that cumulative memory build-up permits the same number of objects to be remembered, regardless of whether they are viewed in a series of short, distinct presentations spaced several minutes apart or as a single continuous presentation with the same duration (Bates & Jacobs, 2020; Endress, 2021; Melcher, 2001; Woolcott, 2020). The findings show the progress of the visual memory of the participants which increases when participants are allowed repeated viewings of the advertisement.

5.2.1 Visual memory and repeated viewing

Memory is the process of encoding (Levin & Cross, 2004; Rulke & Rau, 2000), storing (Shen, 2002), and retrieving information (Puntoni & Tavassoli, 2007; Shen et al., 2021) in cognitive psychology. The encoding process converts data from the outside world, which is received by the senses, into useful data that is stored in memory (Von Hippel & Trivers, 2011; Melcher, 2001; Schurgin & Flombaum, 2018). This storage allows for the long-term preservation of information, while retrieval allows for the recall of previously stored data. Remembering an experience entails a remembrance and reflexive attempt to recall and recover precise elements from the encounter. When a customer exits a store, he or she employs long-term memory rather than short-term memory to recall a specific buying experience (Flacandji & Krey, 2020). Brief-term memory entails recalling a small number of easily accessible pieces of knowledge that are only available for a short time. This short-term memory, on the other hand, did not match the recollection of a specific shopping experience measured few minutes after leaving the store. It's also crucial to distinguish between early and late long-term memory (Flacandji & Krey, 2020). Even though both are classified as long-term memory, early long-term memory refers to memories recalled shortly after encoding (a few moments after the experience is completed), and late long-term memory refers to memories recalled after a long time (Talmi, 2013).

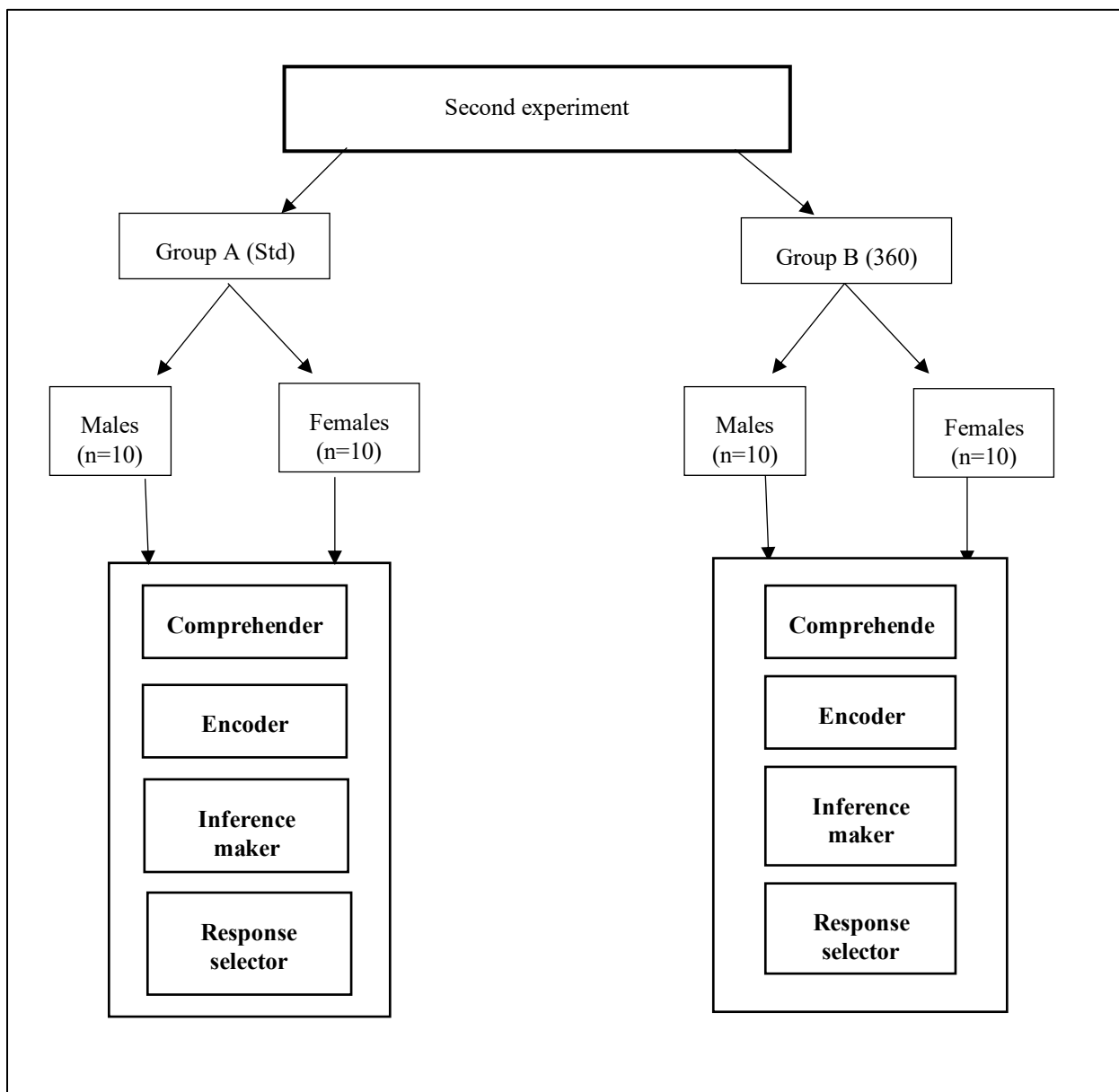
Human visual episodic memory is remarkable, and has been variously described as massive, invariant, and explicit: it can store many objects, recognize them despite changes in appearance and viewing conditions, and discriminate between objects that are different but share visual properties (Quiroga et al., 2005; Schurgin & Flombaum, 2018; Schurgin et al., 2013). The first experiment conducted on visual memory and repeated viewing was conducted in the year 1995. It was hypothesized that the intensity of people's viewing experiences when watching television

would improve commercial recall and make commercials less prone to negative attitude change after numerous exposures (Hitchon & Thorson, 1995). The impacts of two factors, ad-induced emotion, and product involvement were investigated in a study in which participants watched one hour of television with embedded commercials for four days. After the fourth session, commercials were rerun two to twelve times within this period for testing. In general, the data showed that emotional appeals and product participation had a positive impact on brand recall, attitudes, and purchase intent (Hitchon & Thorson, 1995).

Several attempts have been made to investigate the influence of repeated video viewing on visual memory. Most scientists identified that the simplest way to remember the visuals is repeated viewing (Mitchell & Zaragoza, 1996). A study using a new brain imaging technology (steady-state probe topography, or SSPT) looked at whether patterns of brain activity in the left and right frontal hemispheres could predict which frames from new TV commercials would be recognized one week later by consumers (Rossiter et al., 2001). Further, this study revealed that video scenes held on screen for 1.5 seconds or longer were better recognized and that scenes that elicited the fastest brain activity in the left frontal hemisphere were memorized better. Therefore, visual content that stimulates left-brain activity creates memorable advertising and also suggests a new method of pre-testing commercials (Rossiter et al., 2001).

Moreover, Silverman (2013) investigated the role of video on vocabulary learning in kindergarten classrooms with substantial numbers of children from low-income and dual language learning backgrounds. Findings showed that there was no difference in vocabulary learning between children in the single and repeated viewing condition on the receptive measure, but children in the repeated viewing condition showed higher gains in vocabulary on the expressive measure (Silverman, 2013). Likewise, several authors who researched both marketing and psychology found that repeated viewing of the advertisements had an impact on the visual memory of the consumers (Jiang, 2008; Konkle et al., 2010; McNeal & Ji, 2003; Xu & Saenko, 2016). Most print advertisements consist of three basic elements: a visual element (a picture), a language element (words), a brand name element (the merchandise), and the difference in metaphorical types of visual images influences consumer advertising memory (Lin & Yang, 2010).

Figure 5.1: Diagram of the data analysis phase of the second experiment



In this chapter, the qualitative results of Group A (standard version of the advertisement) and Group B (360-degree video version of the advertisement) participants for experiment 2 are as follows. Since the survey questions are divided based on the four aspects (comprehension; encoding, inference making, response selecting) of working memory, the results will be recorded based on these four aspects.

Similar to chapter 4, NVivo QSR toolkit-based analysis was undertaken with four steps of descriptive, topic, analytic and drawing conclusions (please refer section 4.3 in chapter 4).

5.3 NVivo analysis for visual comprehension

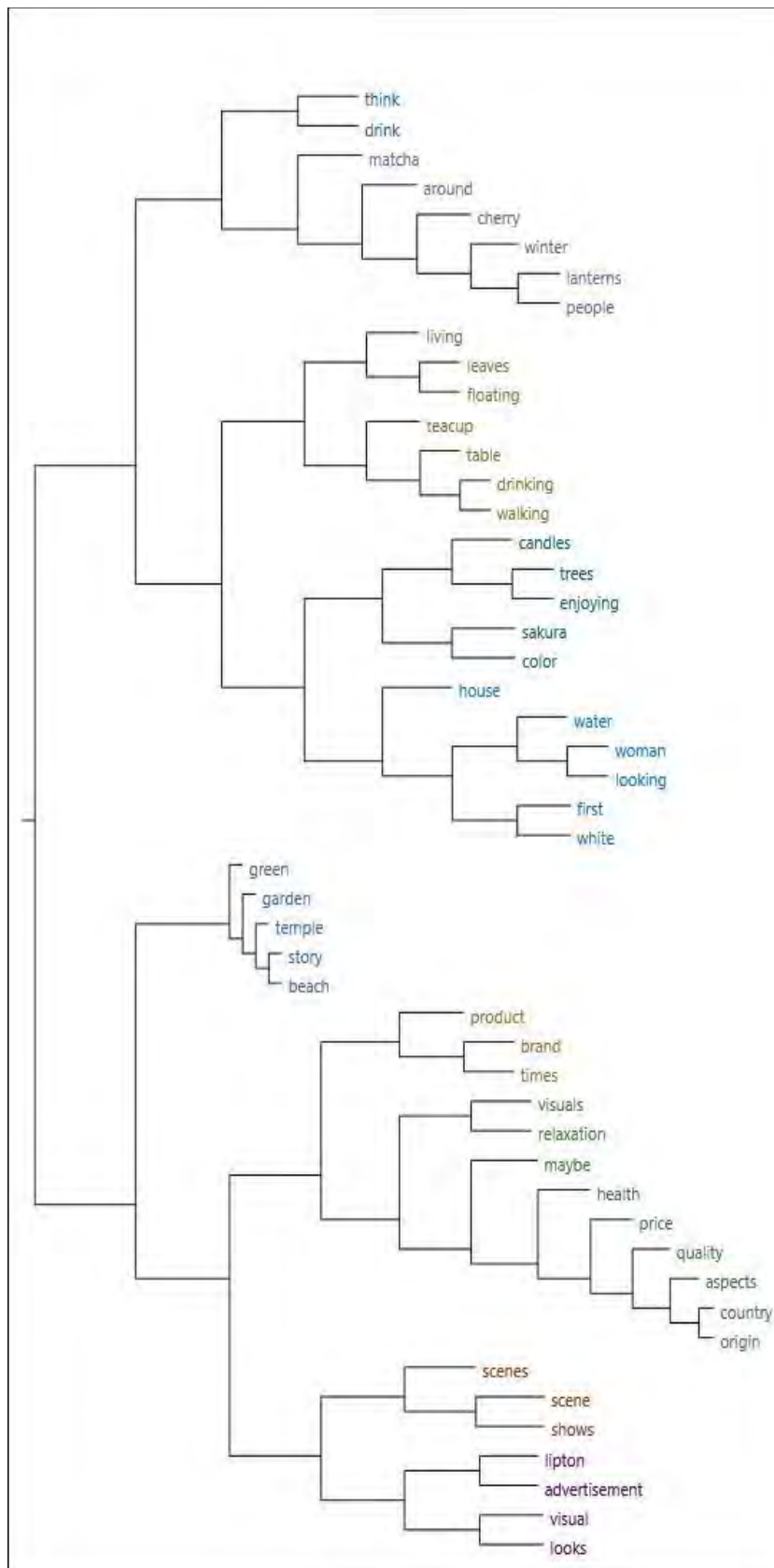
The NVivo findings of the analysis are divided into four parts of the workspace unit—visual comprehension, visual encoding, visual inference making, and visual response selecting. Therefore, the corresponding sections illustrate the NVivo analysis of these four parts as follows.

5.3.1 NVivo analysis for visual comprehension—female participants of the standard video version

Thematic technique is an approach used to identify, analyse, and summarise the patterns within the data which was done through NVivo software (O'Neill, 2013). It is argued that NVivo is useful in organising the unstructured information for example, interviews and reports to extract themes (Di Gregorio, 2000; Dollah et al., 2017; Hutchison et al., 2010; O'Neill, 2013). The use of NVivo makes the analysis less time consuming in terms of identifying the themes through concepts (Di Gregorio, 2000; Dollah et al., 2017; Hutchison et al., 2010; O'Neill, 2013). As the software interprets and explore the meanings of the textual data, the four stages of NVivo QSR toolkit-based analysis were used in this thesis (O'Neill, 2013).

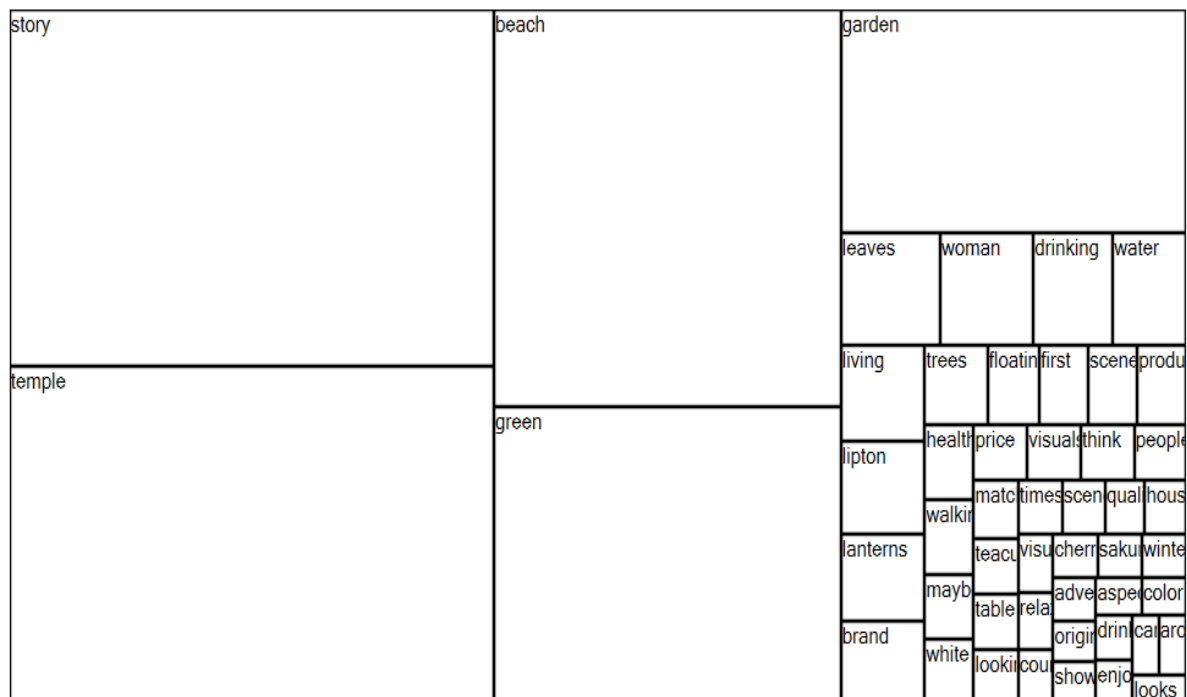
As mentioned in the four stages above, development of the themes from the transcripts includes coding interview material and grouping-related concepts under a single heading, referred to as a "node" for later analysis. NVivo assists the user in highlighting selected text and giving a particular colour to coding stripes following the coding process (Di Gregorio, 2000; Dollah et al., 2017; Hutchison et al., 2010; O'Neill, 2013). Coding stripes are used to provide a visual representation of how nodes might relate to each other and also, to display emerging concepts (Di Gregorio, 2000; Dollah et al., 2017; Hutchison et al., 2010; O'Neill, 2013). For this research study, initial themes were developed from the node cluster diagram as follows. Figure 5.2 illustrates the node cluster diagram using the word similarity approach (Di Gregorio, 2000; Dollah et al., 2017; Hutchison et al., 2010; O'Neill, 2013).

Figure 5.2: Node cluster diagram using word similarity approach



Based on the above node cluster diagram, the coding in-between the concepts can be further illustrated as below. For example, the concepts including “garden”, “temple”, “beach”, can be classified separately as one main theme of locations. Based on tree map analysis the density of each concept was checked to label the theme accurately. A tree map is a visual representation of hierarchical data displayed as a series of nested rectangles of varying sizes. To compare the number of coding references, the researcher created a tree map of the nodes (Di Gregorio, 2000; Dollah et al., 2017). Therefore, the tree map analysis conducted through NVivo further showed the effect of each selected node (based on the rectangle size) towards the concepts generating the main themes. Figure 5.3 illustrates the tree map analysis as follows (Di Gregorio, 2000; Dollah et al., 2017).

Figure 5.3: Tree map analysis



The concepts of ‘story’, ‘temple’ and ‘beach’ showed that in the second viewing, participants were able to understand the story of the advertisement better and they also noticed lot of locations such as temple, beach, and a garden. Based on tree map analysis and node cluster diagram, the themes have been identified as follows.

Table 5.1: Thematic classification based on the tree map analysis and node cluster diagram

Themes	Concepts derived from node cluster diagram	Concepts derived from tree map analysis
Colour detection	Green; white; colour; blue	Green, scenes, white, colour
Visual memory on locations	Living, garden. Beach, temple	Temple, beach, garden, living
The plot or storytelling	Story; scenes, visuals, advertisement	Story, visuals

Therefore, the next section further explores the major themes based on the query results (Di Gregorio, 2000; Dollah et al., 2017). The NVivo findings of the female participants of the standard video version showed two major themes under visual comprehension. These are visual memory for locations, colour detection and the story of the advertisement based on the cluster analysis of coded material using word similarity. According to the query results, it is further clear that female participants under standard video viewing conditions comprehended information in the advertisement regarding colours, locations, and the story.

Major themes related to females who viewed standard video version

The main themes indicate the names of some colours including blue, white, and green. Some of the locations noticed were the temple, garden, beach, and house. The plot or the storytelling techniques included the words such as plot and story. Some of the NVivo findings on these themes are as follows.

Table 5.2: NVivo query findings among female participants

Theme	Codes	NVivo QSR query results
Visual content with locations	Temple	* Both daytime and night. Japanese temple view is evening kind of..... (P15) * A lady at the front of a Japanese temple (there was snow indicating that it is winter) (P16) * Lanterns were orange rising with iconic temple or tower (P14)

Colour detection		* Temple covered with snow (P17) * I saw a Lion statue in front of the temple and in-between the stairs (P18) * Japanese temple view is evening kind of view even the beach is evening and then the girl goes to room and drink tea and it was bright and morning with sun light...(P19)	
	Garden	* There was a garden with some Sakura trees (P18) * A garden with Sakura flowers (P17) * A nice garden was there and beside it, there was a red colour bridge....some Sakura trees were also there (P13)	
	Room	* And then the girl goes to room and drink tea (P13) *A lady drinking tea from a clear cup in a lounge room places it on a plate next to the Lipton tea box (P11) * In living room woman drinking tea on the couch (P11) *Drinking tea in the living room (P20) * A big house with a nicely furnished living room (P19)	
	Beach	* Yoga scene at the beach on wooden hut (P12) *A lady doing yoga at the beach.... (P19)	
	House	* A big house with a nicely furnished living room (P19)	
	Blue	* A sunny beach with clear clouds in the blue sky... I like the colours they used here they have started with more natural blue and green colours. They also showed the beach night-time and morning time. I feel like you can drink tea anytime and anywhere. If I am designing a brand I would think about the accessibility of all people like if you are colour blind, then some cannot see it. I will think of it as well. How colour-blind people like me can also view this...(P12)	
	White	*And a girl was there with red and white shirt (P13) *The sky was blue and small clouds were appearing in the yoga hut inside a yoga girl grey colour wood and some white curtains folded (P12)	

	Green	* It started with green water and then there was a box (P20) * I remember the girl was standing in a nice green environment with nice trees (P18) * It started with Lipton logo with transparent water and gradually increasing colour of the water to very dark green with leaves then the Sakura Garden girl was enjoying earlier it was daytime and then moved to night-time with lanterns felt like you can drink tea both daytime and night (P15) * First, I saw the green water with Match brand name on it... (P11) * Green tea advertisement (P13) * Green water and tiny leaves (P12) * It is nice but the green is too much the usage of leaves is too much. (P13)
Storytelling techniques	Plot	* Opening scene Lipton logo with 'find your focus' quote fades into a liquid with tea leaves... (P12) * Yes, I got it the second time... It shows the tea leaf journey (P16)
	Story	* First, I saw the green water with Match brand name on it...(P11)

A word frequency analysis in NVivo QSR for the female participants who viewed the standard video version was conducted under the visual comprehension category. Based on the word cloud NVivo QSR analysis, the above themes can be further justified.

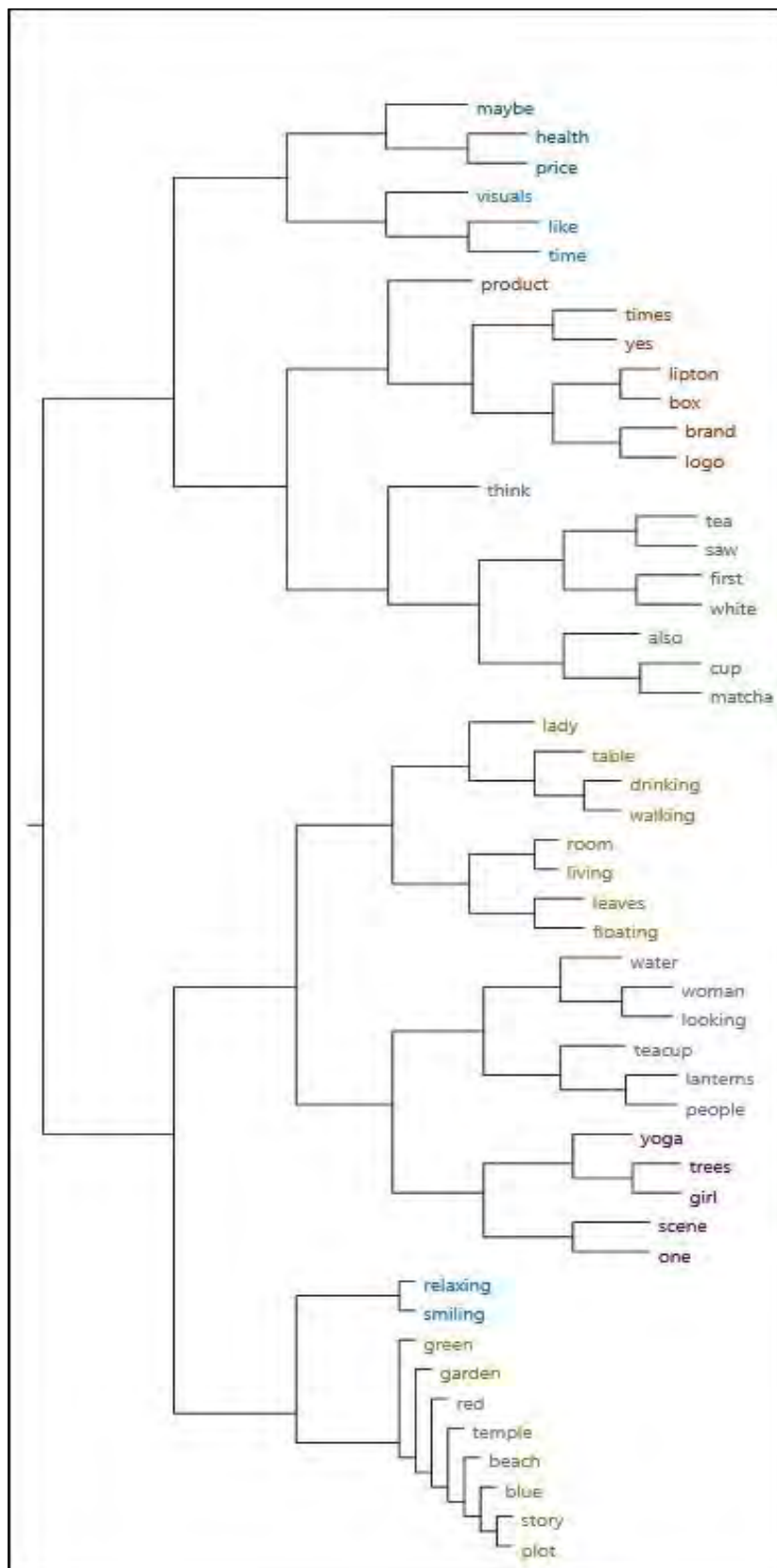
Figure 5.4: NVivo QSR word cloud analysis -standard video version (female participants)



5.3.2 NVivo analysis for visual comprehension—male participants of the standard video version

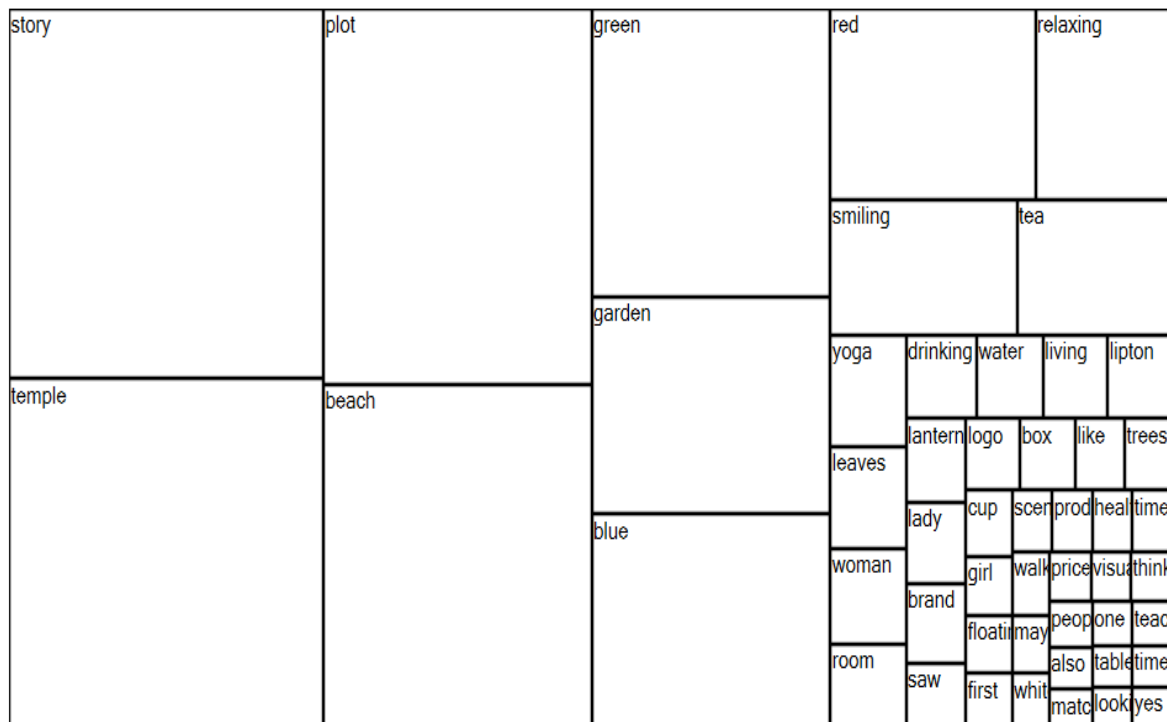
The NVivo findings of the male participants of the standard video version showed three major themes under visual comprehension. These themes are visual memory for locations, facial expressions, plot or storyline memory. Initial themes were developed from the node cluster diagram as follows. Figure 5.5 illustrates the node cluster diagram using the word similarity approach (Di Gregorio, 2000; Dollah et al., 2017; Hutchison et al., 2010; O'Neill, 2013).

Figure 5.5: Node cluster diagram using word similarity approach



Based on the above node cluster diagram, the coding in-between the concepts can be further illustrated as below. For example, the concepts including “room”, “living”, “garden”, “temple”, “beach”, can be classified separately as one main theme of locations. Based on tree map analysis, the density of each concept was checked to label the theme accurately. A tree map is a visual representation of hierarchical data displayed as a series of nested rectangles of varying sizes. To compare the number of coding references, the researcher created a tree map of the nodes (Di Gregorio, 2000; Dollah et al., 2017). Therefore, the tree map analysis conducted through NVivo further showed the effect of each selected node (based on the rectangle size) towards the concepts generating the main themes. Figure 5.6 illustrates the tree map analysis as follows (Di Gregorio, 2000; Dollah et al., 2017).

Figure 5.6: Tree map analysis



The concepts of ‘story’, ‘temple’ and ‘beach’ and “plot” showed that in the second viewing, participants were able to understand the story of the advertisement better and they also noticed many locations, such as temple, beach, and a garden. Based on tree map analysis and node cluster diagram, the themes have been identified as follows.

Table 5.3: Thematic classification based on the tree map analysis and node cluster diagram

Themes	Concepts derived from node cluster diagram	Concepts derived from tree map analysis
Facial expressions	Relaxing, smiling	Smiling, relaxing
Visual memory on locations	Beach, garden, living room, beach, temple	Temple, beach, garden, living
The plot or storytelling	Story, plot, journey	Plot, visuals

The section further explores the major themes based on the query results (Di Gregorio, 2000; Dollah et al., 2017). The NVivo findings of the male participants of the standard video version showed three major themes under visual comprehension. These are visual memory for locations, facial expressions and the story of the advertisement based on the cluster analysis of coded material using word similarity. According to the query results, it is further clear that male participants under standard video viewing conditions comprehended information in the advertisement regarding facial expressions, locations, and the story. The NVivo QSR analysis on word frequency query results is as follows.

Major themes related to males who viewed standard video version

The main themes indicated the names of the locations noticed such as temple, garden, beach, and house. Some facial expressions included smiling and relaxing. The plot or the storytelling techniques included words such as plot and story. The query results indicated that in the second viewing, participants got the idea of the tea leaf journey and noticed the “find your focus” quote within the visuals. Some of the NVivo findings on these themes are as follows.

Table 5.4: NVivo query findings among male participants

Theme	Codes	NVivo QSR query results
Visual content with locations	Temple	* So, first was a woman standing beside the templeP9) *Woman standing in front of a Japanese temple and a staircase right next to it. Two temples one is close to girl other is far behind her. The closer temple had a red beam and a gold colour line (P1)

	Beach	*A woman doing yoga on the beach (P7) *Wave sound hitting the beach sandy beach grass and beach floor looks brownish. (P1)
	Garden	*The garden view with lots of Sakura trees and a bridge in the back with a fence a woman looking up wearing a black top (P5) *I saw the Lipton logo and the water then the leaves changed to purple trees and a garden I cannot remember there was a bridge cannot remember then the lanterns and temple scenes it looks crowded in the lantern scene then the snow was there with a cultural symbol (P1)
	House	*She was inside a house (P2) *She was relaxing in her house (P4)
	Room	*Book rack with some books in the living room and another rack or stand metal looking equipment first I thought it was a kettle, but it is not (P1) *The woman at the end in the living room after drinking tea changes her attention to the tablet device (P7)
	Water	*The lanterns and two buildings with night lanterns floating from bottom to top and disappeared in a big bubble of water (P8) *Yoga girl next with the ocean with small tides I hear the water sound (P6)
	Facial expressions	
	Relaxing	*She looks relaxed and enjoying the cup of tea(P2) *She was relaxing in her house (P4) *The first impression is it is about the Lipton tea brand promoting relaxation. (P5) *The first impression is that it is calming and there is a bridge where you can just enjoy the view.... cherry blossoms look relaxing, calming, and healing (P9) *Also, the temple is an Asian one, so the Asian symbols have been used to indicate relaxation and inner peace. (P10)
	Smiling	*Last visual the woman drinking tea this time I saw something I did not notice before the woman was smiling with tea it was more than a smile, she appeared to have enjoyed the sip of the tea she took then I could see some jewellery she is wearing in the stool one side tea box and pair of cup and saucers and small black board with a tea bag in it. (P5)
	Storytelling techniques	
	Story	*The first impression of the story was not clear as it is difficult to understand it is tea. For me, it is like cosmetics or fancy products maybe tourism or sports

	So first I saw a tea box and then right next to that the visual of the Lipton brand in the middle so surrounded by the lemons I initially thought it is not a piece of lemon this time it is leaves in the logo below the logo there was a text saying find your focus something like that. (P2)
Journey	*Yes, ... It shows the tea leaf journey. I realized it in the second viewing (P2) *It did not change from the last time it is the same I knew it was tea and something with matcha. No difference for me (P6)

A word frequency analysis in NVivo QSR for the male participants who viewed the standard video version was conducted under the visual comprehension category. Based on the word cloud NVivo QSR analysis, the above themes can be further justified.

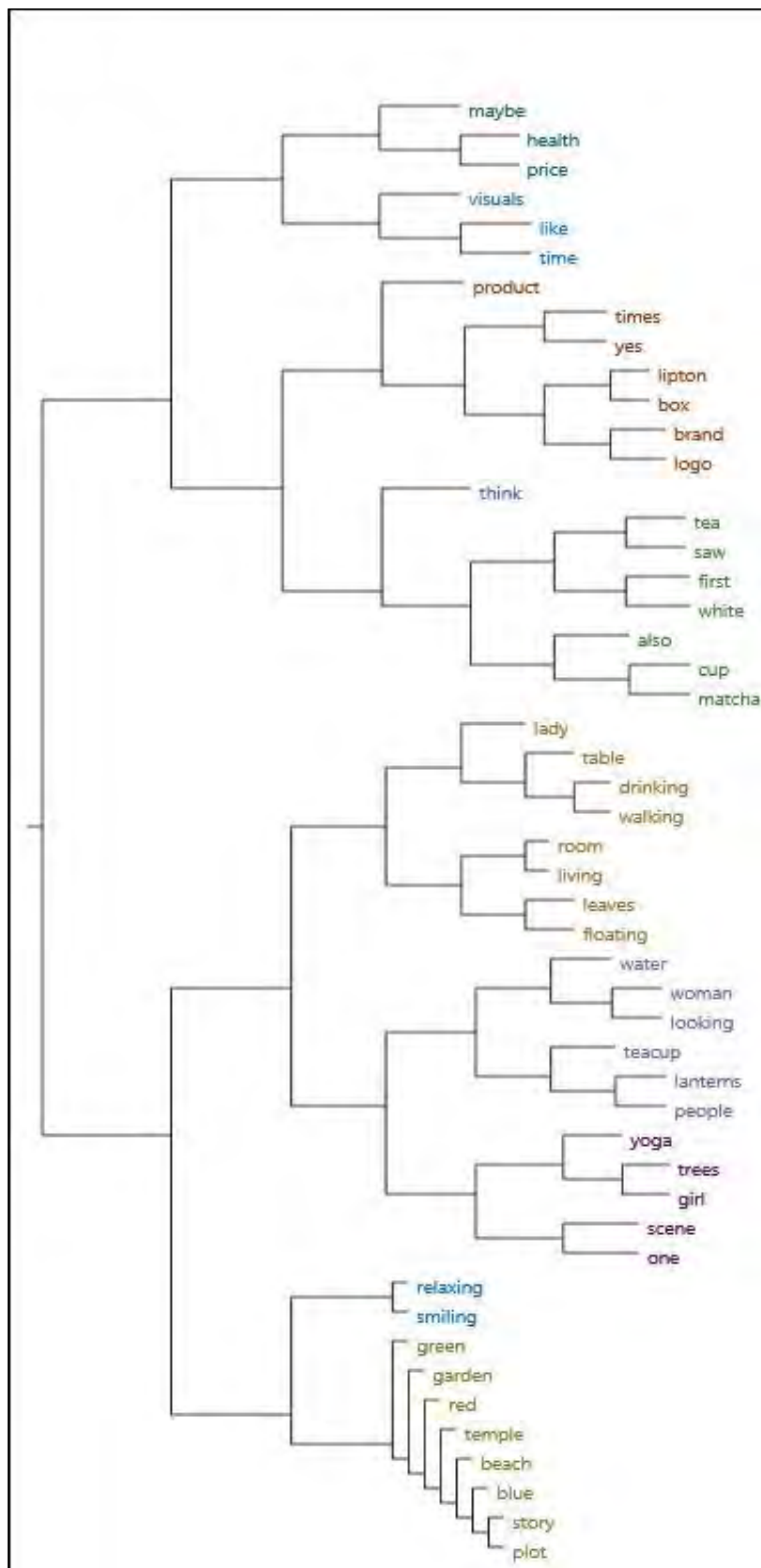
Figure 5.7: NVivo QSR word cloud analysis-standard video version (male participants)



5.3.3 NVivo analysis for visual comprehension–female participants of the 360-degree video version

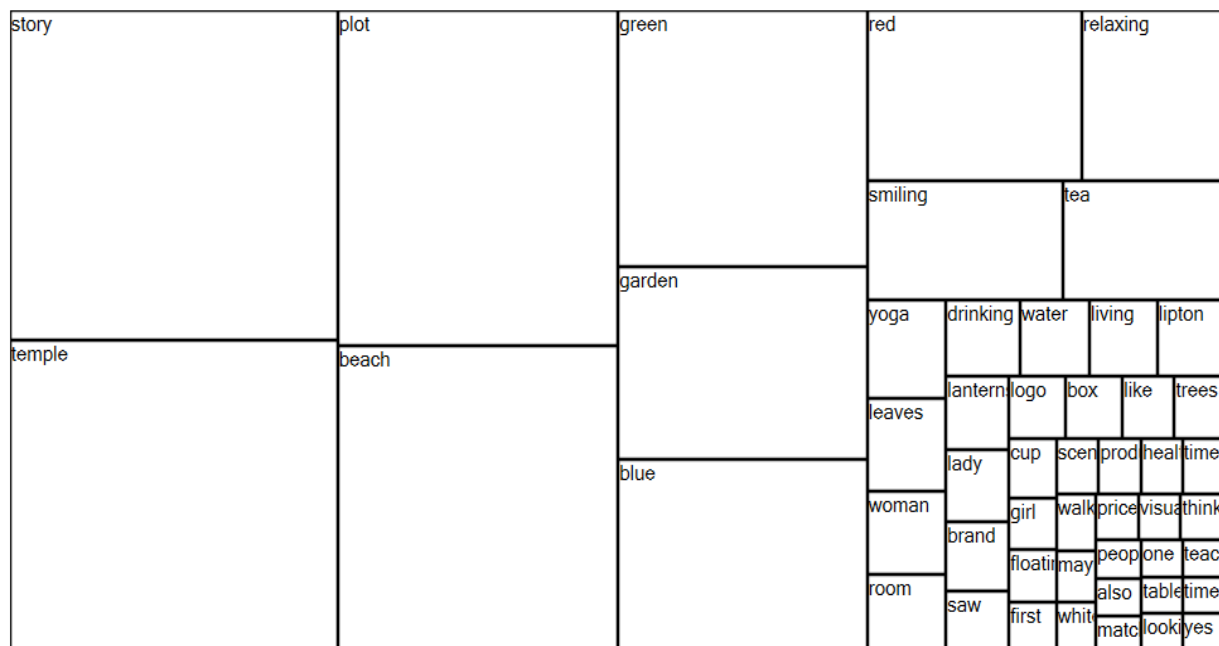
The NVivo findings of the male participants of the 360-degree video version showed three major themes under visual comprehension. These themes were visual memory for locations, colour detection, plot, or storyline memory. Initial themes were developed from the node cluster diagram as follows. Figure 5.8 illustrates the node cluster diagram using the word similarity approach (Di Gregorio, 2000; Dollah et al., 2017; Hutchison et al., 2010; O'Neill, 2013).

Figure 5.8: Node cluster diagram using word similarity approach



Based on the above node cluster diagram, the coding in-between the concepts can be further illustrated as below. For example, the concepts including “room”, “living”, “water”, “temple”, “beach” and “garden” can be classified separately as one main theme of locations. Based on tree map analysis, the density of each concept was checked to label the theme accurately. A tree map is a visual representation of hierarchical data displayed as a series of nested rectangles of varying sizes. To compare the number of coding references, the researcher created a tree map of the nodes (Di Gregorio, 2000; Dollah et al., 2017). Therefore, the tree map analysis conducted through NVivo further showed the effect of each selected node (based on the rectangle size) towards the concepts generating the main themes. Figure 5.9 illustrates the tree map analysis as follows (Di Gregorio, 2000; Dollah et al., 2017).

Figure 5.9: Tree map analysis



The concepts of ‘story’, and “plot” as well as “garden”, “beach” , “temple”, “room” showed that in the second viewing, participants were able to understand the story of the advertisement better and they noticed a lot of locations such as temple, beach, and a garden. Based on tree map analysis and node cluster diagram, the themes have been identified as follows.

Table 5.5: Thematic classification based on the tree map analysis and node cluster diagram

Themes	Concepts derived from node cluster diagram	Concepts derived from tree map analysis
Colour detection	Visuals, white, green, red, blue	Green, blue, red, white
Visual memory on locations	Garden, temple, beach, living, room	Temple, beach, garden
The plot or storytelling	Story, plot, scene	Story, plot

The next section further explores the major themes based on the query results (Di Gregorio, 2000; Dollah et al., 2017). The NVivo findings of the female participants of the 360-degree video version showed three major themes under visual comprehension. These were visual memory for locations , colour detection and the story of the advertisement based on the cluster analysis of coded material using word similarity. According to the query results, it is further clear that female participants under 360-degree video viewing conditions comprehended information in the advertisement regarding colours, locations, and the story. The NVivo QSR analysis on word frequency query results is as follows.

Major themes related to females who viewed 360-degree video version

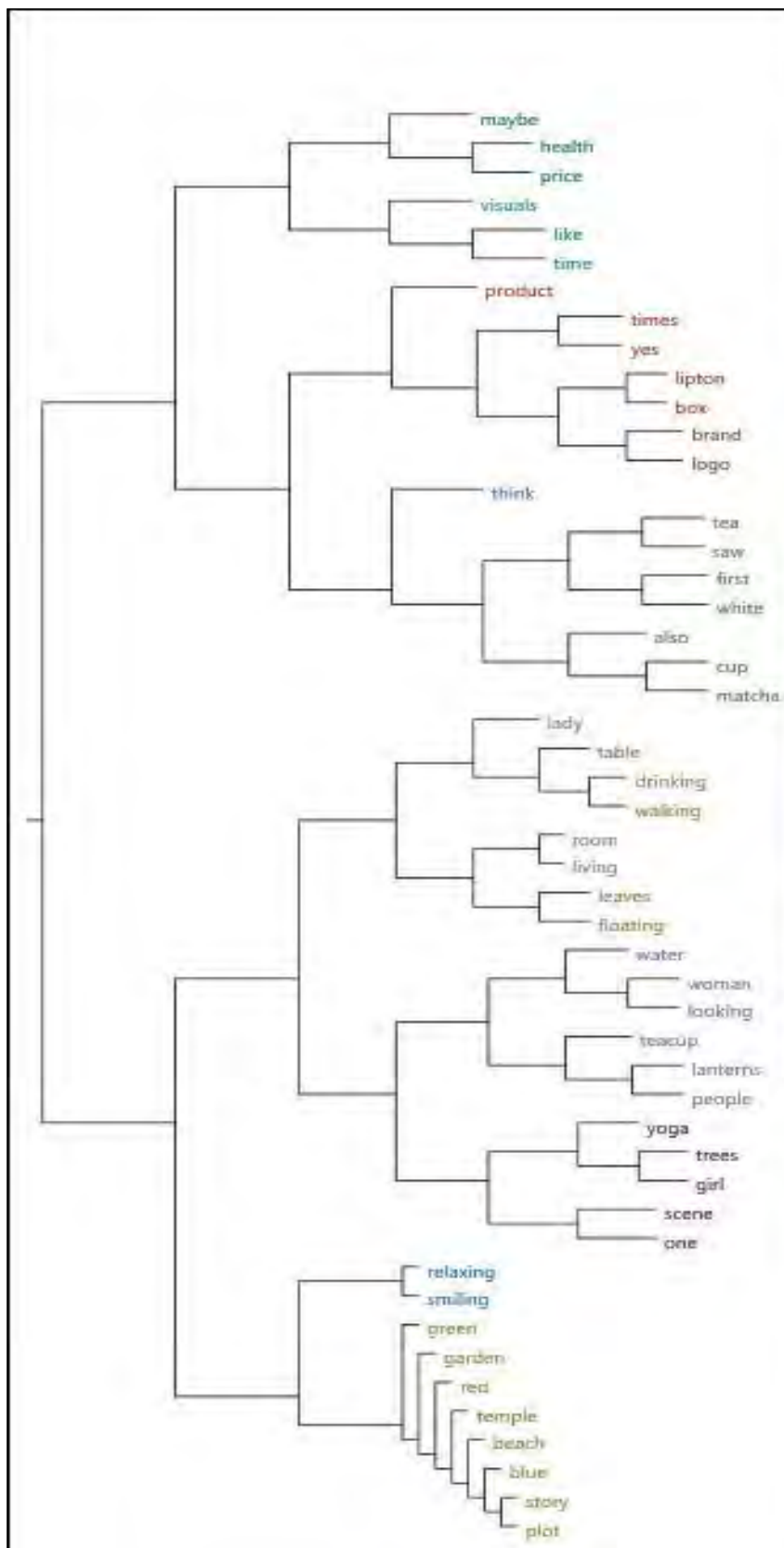
The main themes indicated the names of some colours including white, maroon, and green. Some of the locations noticed were the temple, garden, beach, and room. The plot or the storytelling techniques included the words such as plot, story, tea leaf journey. Some of the NVivo findings on these themes are as follows.

Table 5.6: NVivo query findings among female participants

Theme	Codes	NVivo QSR query results
Visual content with locations	Room	Beginning I saw that I was inside the tea itself then it transited to different scenes of nature garden the lanterns and the living room. (P31)
	Beach	* A girl doing yoga on beach represents the purpose of why people drink...it is mainly for energy and relaxation...for me, it is completely the energy aspect.....I drink tea three to four times a day, when I need some boost....specially when I have so many

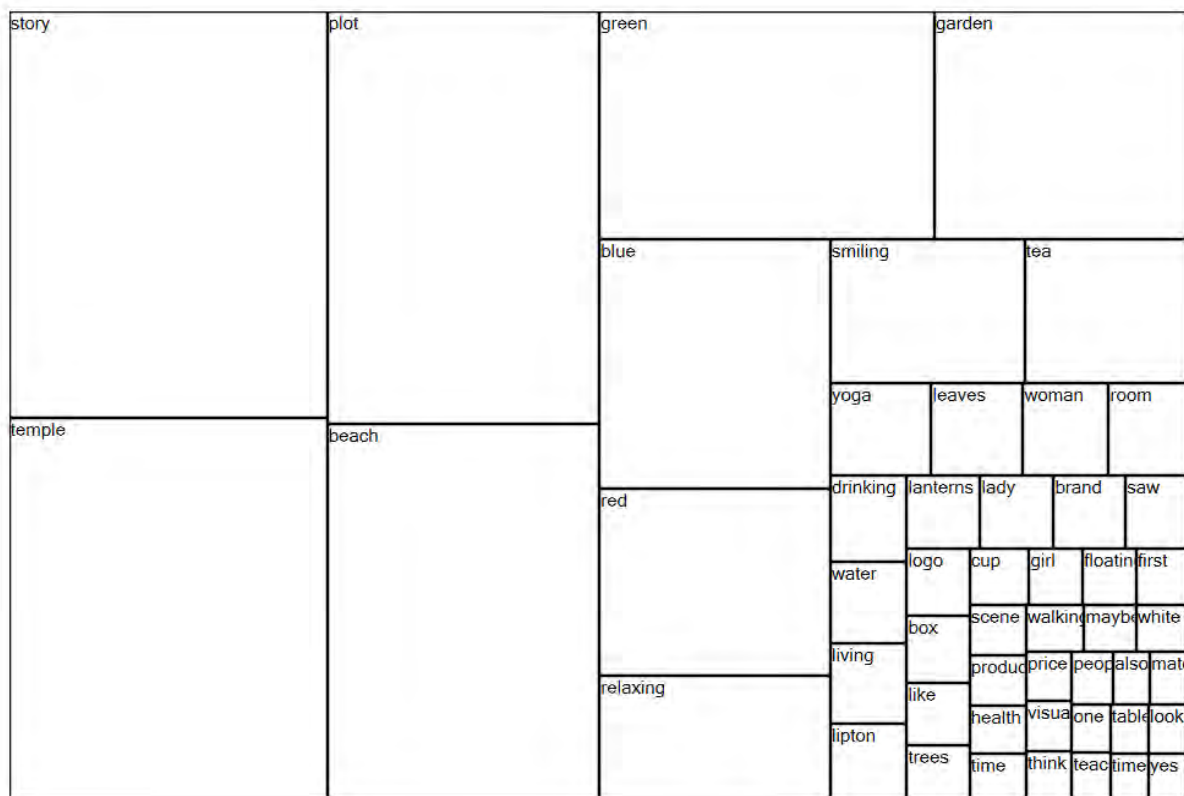
		assignments in line with some sleepless nights...When I was working in my country, I may have tea around five times per day in my office, if I feel like that I am behind my working schedules....this is something I do until I cover up my missing work... (P37)
	Garden	* Beginning water leaves and garden with a bridge and a lake (P38) *I think the ad is about promoting Lipton matcha tea creating a notion that it is natural and organic with a woman in the garden and the liquid with green leaves to indicate nature. (P39)
	Living	* They drink tea so they can relax in the living room, living room looks ancient and modern with a fireplace and modern furniture.... (P40)
	Temple	*Someone in the temple... I think the symbol on the temple makes me think that the brand is coming from ancient times. The brand must be popular, old, and long-lasting.... Must be having a good reputation until now...(P36)
Colour detection	Green	*In the first visual some are not noticeable. The same advertisement. Is this the same one? The matcha box was not there in the first one. I did not look around and down. I saw the LIPTON logo and the empty cup and some green water (P34) *I drink coffee, so until I see this for the second time, I did not realize that the green colour indicates green tea. (P34)
	Maroon	*She was wearing a maroon colour top with black colour pants (P40) *She was nice... and beautiful... I think she was there in every scene.... She was wearing the same maroon colour top in every scene... (P37)
	Yellow	*I saw a yellow colour sleeping bag (P40) *Some yellow and green colour leaves floating in the water (P35)
	White	*Some white curtains folded in the wooden hut (P32) *Some white colour curtains in the living room (P31)
Storytelling techniques	Leaves	*Green leaves floating... I think I got it this time...so this indicates the tea leaf journey. How the tea which we normally drink comes to our teacup? Is that correct? *Ok ok, I got it now, I think. So, this shows the starting point of the tea-making process up to the end, right? (P39)

Figure 5.11: Node cluster diagram using word similarity approach



Based on the above node cluster diagram, the coding in-between the concepts can be further illustrated as below. For example, the concepts including “garden”, “temple”, “beach”, “room” can be classified separately as one main theme of locations. Based on tree map analysis, the density of each concept was checked to label the theme accurately. A tree map is a visual representation of hierarchical data displayed as a series of nested rectangles of varying sizes. To compare the number of coding references, the researcher created a tree map of the nodes (Di Gregorio, 2000; Dollah et al., 2017). Therefore, the tree map analysis conducted through NVivo further showed the effect of each selected node (based on the rectangle size) towards the concepts generating the main themes. Figure 5.12 illustrates the tree map analysis as follows (Di Gregorio, 2000; Dollah et al., 2017).

Figure 5.12: Tree map analysis



The concepts of ‘story’, and “plot” as well as “beach”, “temple”, “garden” showed that in the second viewing, participants were able to understand the story of the advertisement better and they also noticed many locations such as temple, beach, and a garden. Based on tree map analysis and the node cluster diagram, the themes have been identified as follows.

Table 5.7: Thematic classification based on the tree map analysis and node cluster diagram

Themes	Concepts derived from node cluster diagram	Concepts derived from tree map analysis
Facial expressions	Relaxing, smiling, looking	Smiling, relaxing
Visual memory on locations	Room, living, temple, garden, beach	Temple , beach, garden, room
The plot or storytelling	Story, plot, scene	Story, plot

Therefore, the next section further explores the major themes based on the query results (Di Gregorio, 2000; Dollah et al., 2017). The NVivo findings of the female participants of the 360-degree video version showed three major themes under visual comprehension. These were visual memory for locations, colour detection and the story of the advertisement based on the cluster analysis of coded material using word similarity. According to the query results, it is further clear that female participants under 360-degree video viewing conditions comprehended information in the advertisement regarding colours, locations, and the story. The NVivo QSR analysis on word frequency query results is as follows.

Major themes related to males who viewed 360-degree video version

The main themes indicated the names of some facial expressions such as smiling and relaxing. Some of the locations noticed were the temple, garden, and living room. The plot or the storytelling techniques included the words such as plot, story, tea leaf journey. Some of the NVivo findings on these themes are as follows.

Table 5.8: NVivo query findings among male participants

Theme	Codes	NVivo QSR query results
Visual content with locations	Room	It was a room I do not know whether it is a living room or not. (P23)
	Beach	There was a beach and a wooden hut. I did not see it properly as that scene was very quick (P21)
		Blue sky and sunny time on the beach (P26)
		First, I saw green water and some tea parts that looks like tea leaves. So the colour theme of green is relevant

		to the advertisement, The buildings are irrelevant for me, The yoga lady on the beach communicates the benefits of consuming tea (P25)
	Garden	I saw some Sakura flowers in the garden (P26) There was a red colour long bridge in the garden scene Some birds were flying and some it is like a park (P29)
	Temple	I saw some flying lanterns in the temple. I am not sure whether it is two scenes or one. The transition was very quick (P28) transition to lighted floating lanterns and a temple (P26)
Facial expressions	Smiling	She was smiling ...looks like she had a good day (P21)
	Relaxing	The green leaves and the pot and then the brand logo mixed all things up which makes a relaxing atmosphere (P22)
		I think they put a woman doing yoga in the middle of this advertisement to establish relaxation (P24)
Storytelling techniques	Story	Yes, the story is very clear this time. So, it is about tea production (P27) It is changing. I think I was in the wrong direction before. (P29)
	Leaf	Maybe the tea leaf indicates the tea production to tea packaging process (P29) After the garden view, I saw everything floating upwards. Some text appearing right below the logo had the term focus on it. Second visual, I think. I can recall it now in my second attempt (P30)

A word frequency analysis in NVivo QSR for the male participants who viewed the 360-degree video version was conducted under the visual comprehension category. Based on the word cloud NVivo QSR analysis, the above themes can be further justified.

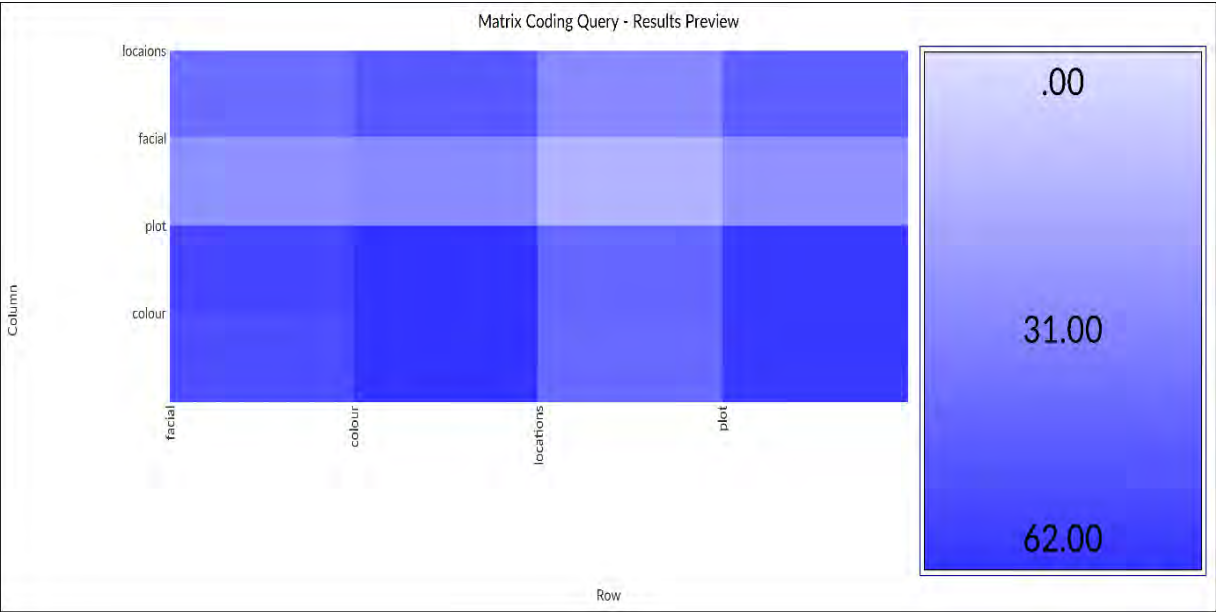
[illegible]

A matrix-coding query is a method for conceptual and theoretical development and is used to validate the themes derived from the qualitative analysis (Bytheway, 2013; Hutchison et al., 2010; O'Neill, 2013). Researchers can utilize the matrix-coding query function to look for information directly from the perspective of the research question (Hutchison et al., 2010). Furthermore, it is useful in identifying the multidimensional aspects and subcategories of a research study (Hutchison et al., 2010). In this research study, matrix-coding analysis was conducted to check the validity of the derived themes and the inter-relationships between the queries in terms of 360-degree and standard video advertisements.

	A : colour ▾	B : plot ▾	C : facial ▾	D : locations ▾
1 : facial ▾	53	56	29	42
2 : colour ▾	62	62	31	49
3 : locations ▾	43	44	17	32
4 : plot ▾	60	60	29	47

Based on the above Table 5.9; the comparison query results produced four nodes on colour detection, visuals on locations, facial expressions and plot, thus indicating four themes. These four nodes represented 10 to 65 frequently occurring words in-between the transcripts further showing the validity of the derived themes based on the cross-case matrix analysis (Hutchison et al., 2010).

Figure 5.14: Matrix-coding query: Results preview



5.4 NVivo analysis for visual encoding

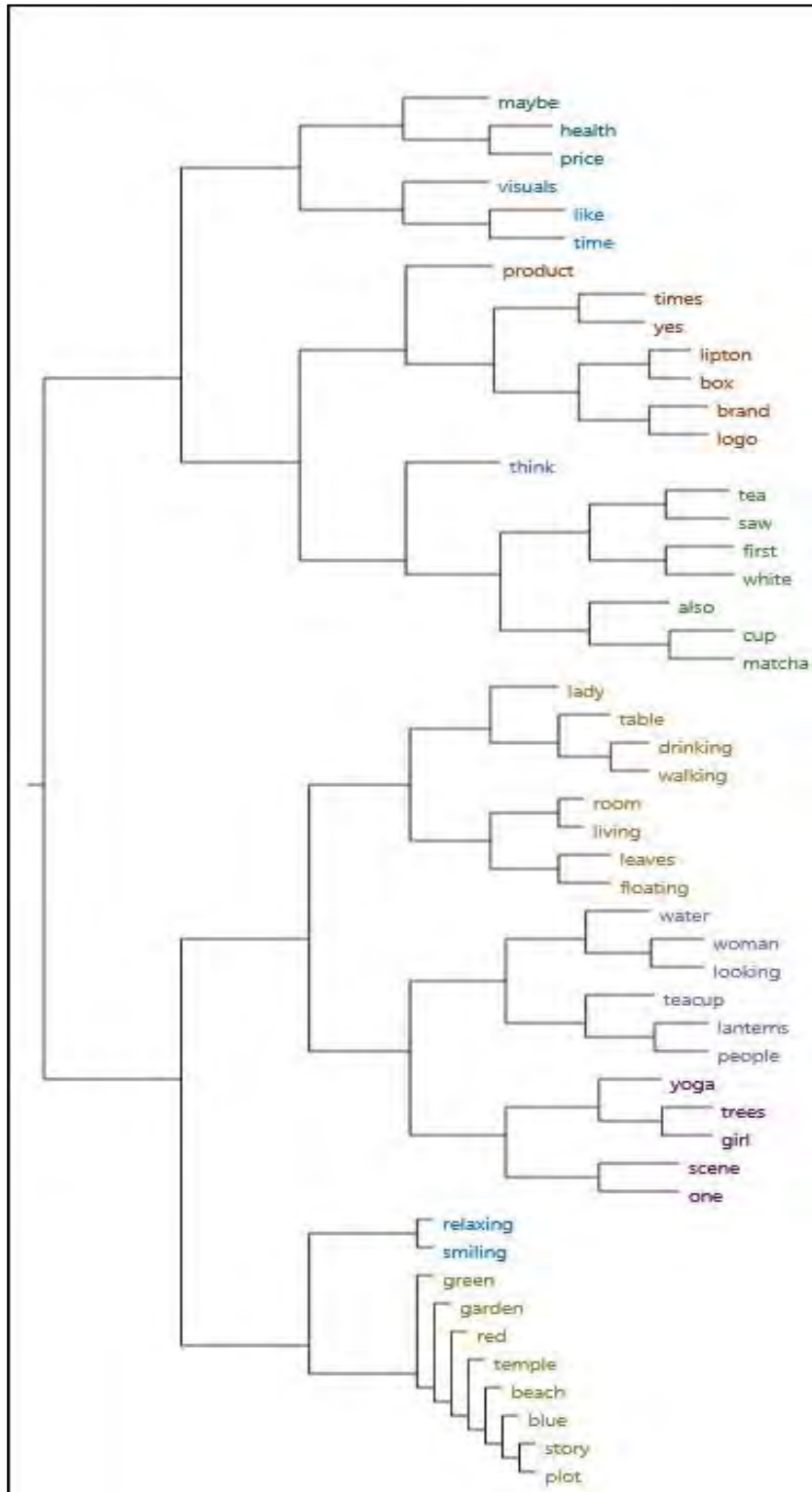
The NVivo findings of the analysis are divided into four parts of the workspace unit—visual comprehension, visual encoding, visual inference making, and visual response selecting. Therefore, the corresponding sections illustrate the NVivo analysis of these four parts as follows.

5.4.1 NVivo analysis for visual encoding -female participants of the standard video version

The NVivo findings of the female participants of the standard video version showed three major themes under visual encoding. These themes are visual memory for objects, people, and actions. According to the query results, it is further clear that female participants under standard video viewing conditions encoded information in the advertisement regarding objects, people, and actions. For this research study, initial themes were developed from the node cluster

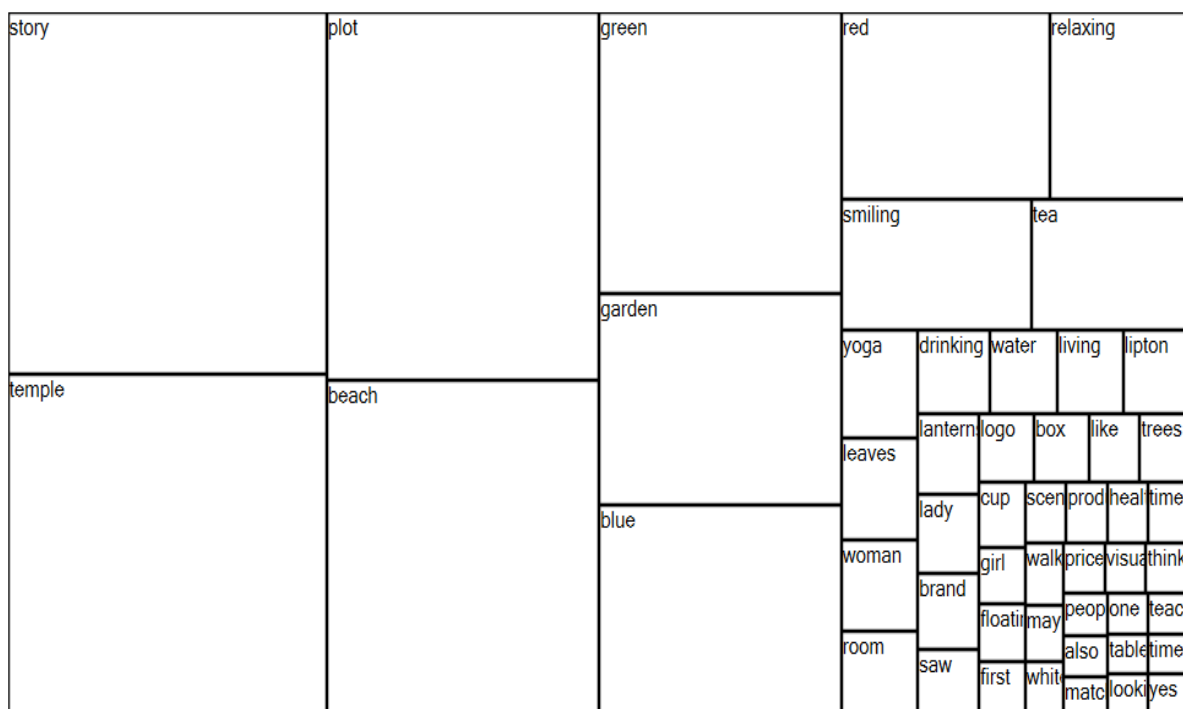
diagram as follows. Figure 5.15 illustrates the node cluster diagram using the word similarity approach (Di Gregorio, 2000; Dollah et al., 2017; Hutchison et al., 2010; O'Neill, 2013).

Figure 5.15: The node cluster diagram using the word similarity approach



Based on the above node cluster diagram, the coding in-between the concepts can be further illustrated as below. For example, the concepts including “lady” and “woman” indicates people, “leaves”, “trees”, “box” and “table” can be classified separately as one main theme of objects. Furthermore, “relaxing”, “drinking” and “walking” demonstrate actions. Based on tree map analysis, the density of each concept was checked to label the theme accurately. A tree map is a visual representation of hierarchical data displayed as a series of nested rectangles of varying sizes. To compare the number of coding references, the researcher created a tree map of the nodes (Di Gregorio, 2000; Dollah et al., 2017). Therefore, the tree map analysis conducted through NVivo further showed the effect of each selected node (based on the rectangle size) towards the concepts generating the main themes. Figure 5.16 illustrates the tree map analysis (Di Gregorio, 2000; Dollah et al., 2017).

Figure 5.16: Tree map analysis



Based on tree map analysis and the node cluster diagram, the themes have been identified as follows.

Table 5.10: Thematic classification based on the tree map analysis and node cluster diagram

Themes	Concepts derived from node cluster diagram	Concepts derived from tree map analysis
Objects	Box, trees, leaves, lanterns, table, cup	Garden, leaves, lanterns, logo, box, trees
People	Woman, girl, lady	Woman, lady
Actions	Relaxing, smiling, drinking, walking	Relaxing, smiling, drinking, floating

Therefore, the next section further explores the major themes based on the query results (Di Gregorio, 2000; Dollah et al., 2017). The NVivo findings of the female participants of the standard video version showed three major themes under visual encoder. These were visual memory for actions, objects and people advertisement based on the cluster analysis of coded material using word similarity. According to the query results, it is further clear that female participants under standard video viewing conditions encoded information in the advertisement regarding actions, objects, and people. The NVivo QSR analysis on the word frequency query results is as follows.

Major themes related to females who viewed standard video version

The main themes indicated the names of some actions shown in the visuals, objects, and people. This further demonstrates that the female participants noticed quite a lot of actions within the visuals besides than people and objects, under a second viewing. Some of the NVivo findings on these themes are as follows.

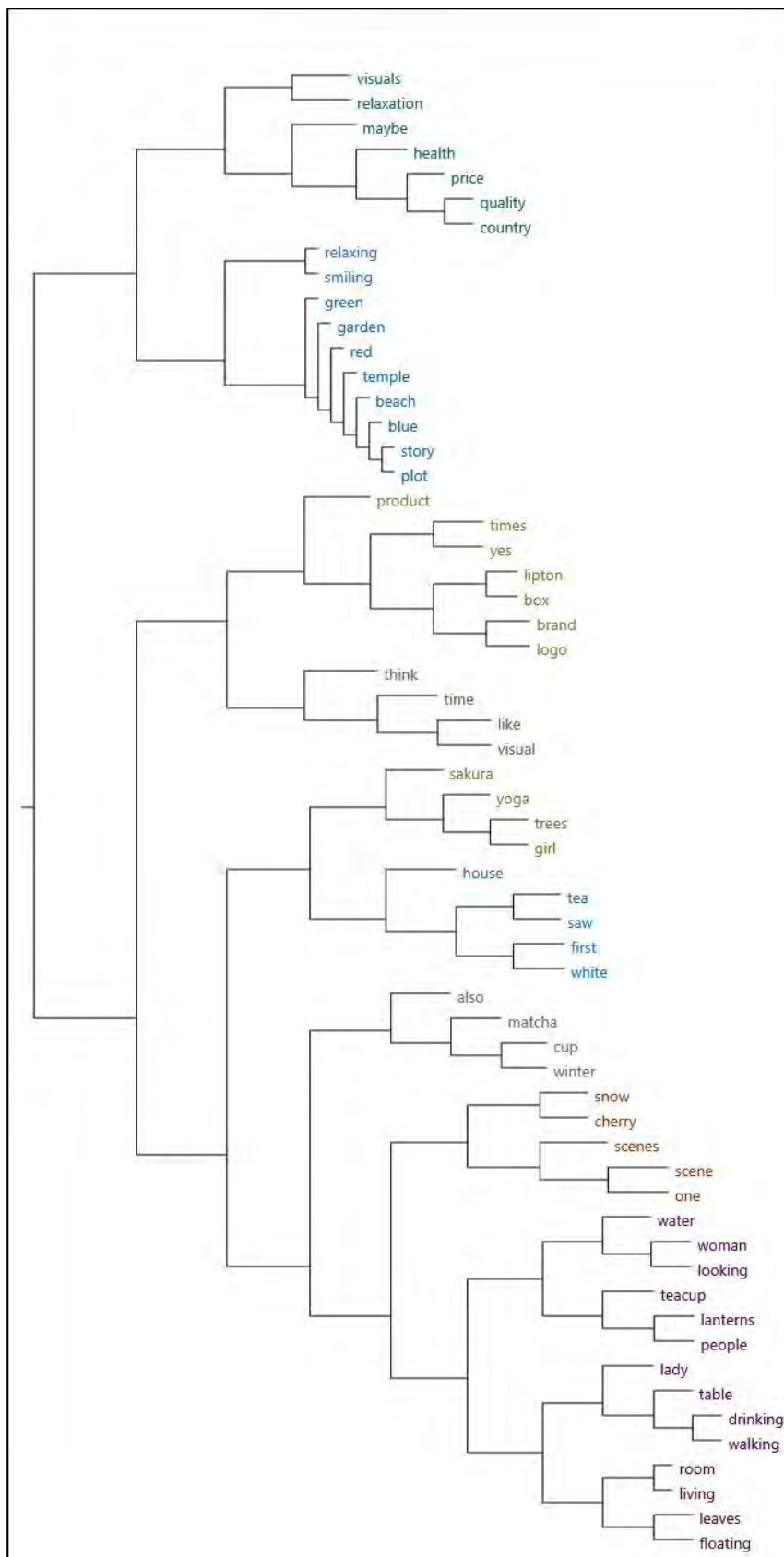
Table 5.11: NVivo query findings among female participants

Theme	Codes	NVivo QSR query results
Objects	Trees	*A woman under cherry blossoms tree (P11) *The objects which I saw include windows, white curtains, lamp, lanterns, pictures on the wall, a sofa, trees (pink trees), a red colour bridge, candles, a yoga hut, teacup and table, a temple, winter trees, and a statue of a lion. (P12)

	Lanterns	*The objects which I saw include windows, white curtains, lamp, lanterns, pictures on the wall, a sofa, trees (pink trees), a red colour bridge, candles, a yoga hut, teacup and table, a temple, winter trees, and a statue of a lion. *Green water and tiny leaves and then the scene with floating lanterns (P13)
	Temple	*It was a Japanese temple (P17) *I remember the temple (P18)
Actions	Drinking	*Walking, looking around having rest on the couch, and drinking tea (P17) *A girl drinking tea(P18)
	Walking	Walking, looking around having rest on the couch, and drinking tea (P17) Lady drinking tea (P20) lady walking in the garden (P19)
	Enjoying	*She is enjoying a cup of tea in her living room (P19)
	Looking	*Walking, looking around having rest on the couch, and drinking tea (P17)
	Yoga	*The girl is trying to do a yoga pose (P19) *The girl on the beach doing yoga (P20)
People	Girl	*A girl drinking tea (P18)
	Woman	*I saw a woman drinking tea and she was wearing two gold bangles (P19)
	Lady	*Lady drinking tea (P20) *Lady walking in the garden (P19)

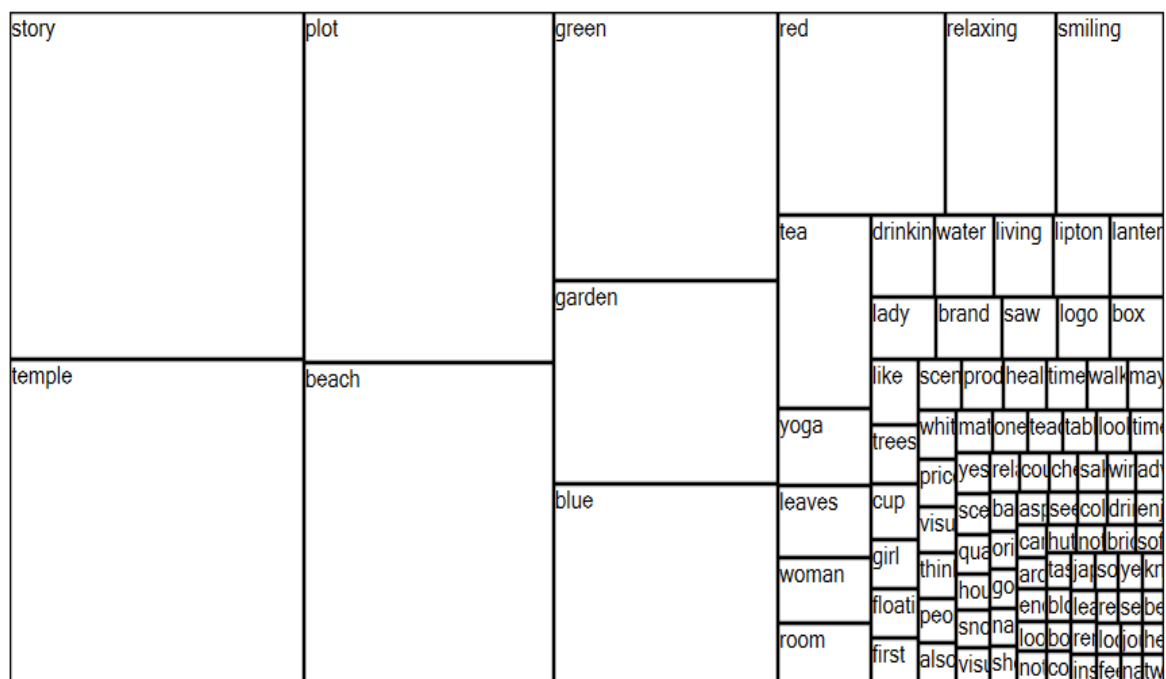
A word frequency analysis in NVivo QSR for the female participants who viewed the standard video version was conducted under the visual encoding category. Based on the word cloud NVivo QSR analysis, the above themes can be further justified.

Figure 5.18: The node cluster diagram using word similarity approach



Based on the above node cluster diagram, the coding in-between the concepts can be further illustrated as below. For example, the concepts including “lady”, “girl” and “woman” indicate people, “trees”, “leaves” and “Sakura”, while “cup” can be classified separately as one main theme of objects. Further “looking”, “drinking” and “walking” demonstrate actions. Based on tree map analysis, the density of each concept was checked to label the theme accurately. A tree map is a visual representation of hierarchical data displayed as a series of nested rectangles of varying sizes. To compare the number of coding references, the researcher created a tree map of the nodes (Di Gregorio, 2000; Dollah et al., 2017). Therefore, the tree map analysis conducted through NVivo further showed the effect of each selected node (based on the rectangle size) towards the concepts generating the main themes. Figure 5.19 illustrates the tree map analysis as follows (Di Gregorio, 2000; Dollah et al., 2017).

Figure 5.19: Tree map analysis



The NVivo findings of the male participants of the standard video version showed three major themes under visual encoding. These themes were visual memory for objects, people, and actions. According to the query results, it is further clear that male participants under standard video viewing conditions encoded information in the advertisement regarding objects, people, and actions.

Major themes related to males who viewed standard video version

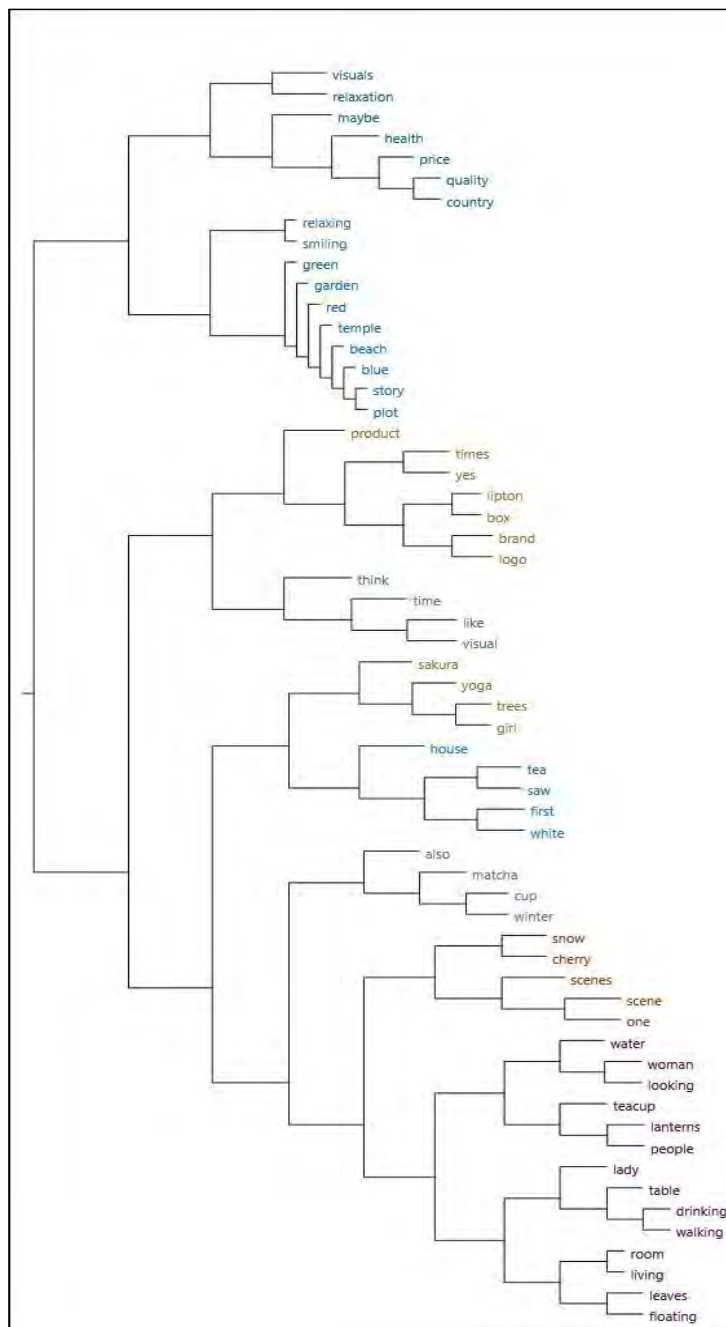
The main themes indicate the names of some actions shown in the visuals, objects, and people.

Some of the NVivo findings on these themes is as follows.

Table 5.12: NVivo query findings among male participants

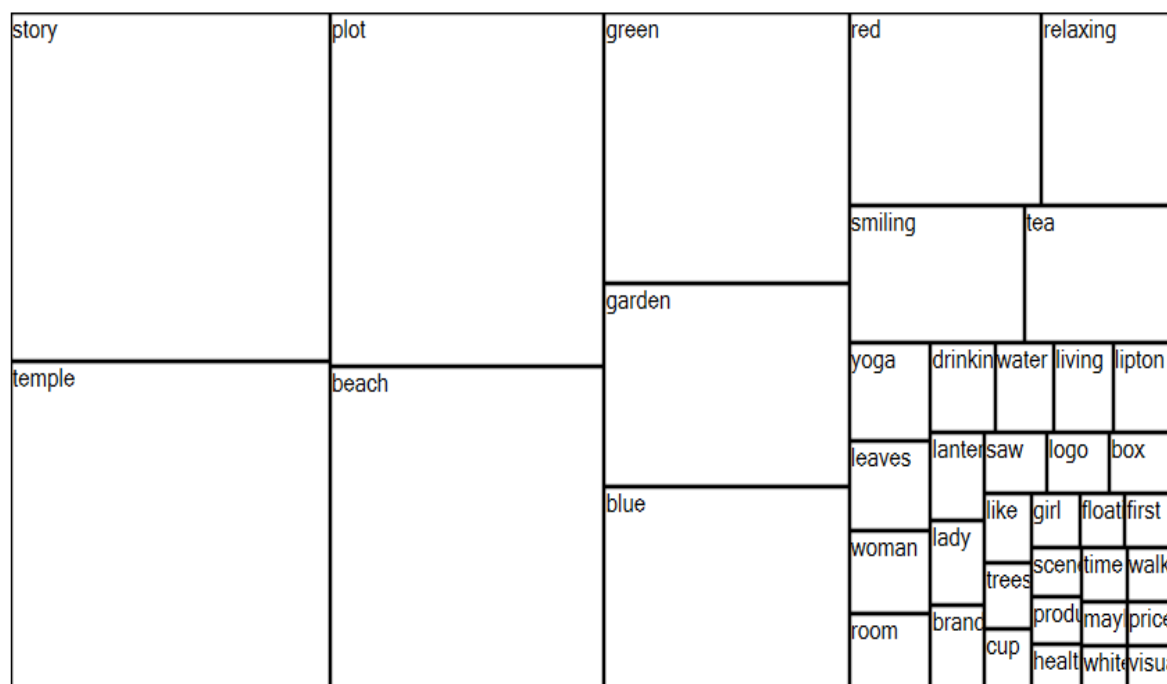
Theme	Codes	NVivo QSR query results
Objects	Water	*Some watery scenes and I remember some flock of birds around (P1)
	Temple	*First thing is that the woman was under water, and it was white. She was looking at the Chinese temple. (P2) *Woman looking at the temple focused on the temple view (P4)
	Leaves	*Tea leaves floating around under water (P7)
	Trees	*Enjoying the view of Sakura trees (P7) *The main colour is green as it is green tea promotion now when I look at the colours it was not as bad as when I saw it first, I thought it is good to have less green not completely displeasing it is good. I like the middle visuals sandy beach garden lanterns snowy views I like the colours in these visuals not the transitioning visuals with green (P1)
	Lanterns	*The woman looked up at the water bubble and some lanterns were going up (P5)
People	Woman	*There was a woman, she is drinking tea and there was a river in the garden scene (P9) *First thing is that the woman was under water, and it was white. She was looking at the Chinese temple (P8) Several sequences were there, firstly I observed a woman underwater looking at a China temple and when looking around some tea leaves were there in the water and the white woman was doing yoga beside the beach (P3) *I saw a woman looking at the garden and inside the house (P5)
Actions	Drinking	*I saw her smile when the woman drinking the cup of tea (P1)

However, in the 360-degree video version, these results were less than the standard video version, as most of the participants did not notice all the presented actions, objects, and people within the visuals. Also, most of the answers were incorrect regarding the presented actions, objects, and people. For this research study, initial themes were developed from the node cluster diagram as follows. Figure 5.21 illustrates the node cluster diagram using the word similarity approach (Di Gregorio, 2000; Dollah et al., 2017; Hutchison et al., 2010; O'Neill, 2013). Figure 5.21: The node cluster diagram using word similarity approach



Based on the above node cluster diagram, the coding in-between the concepts can be further illustrated as below. For example, the concepts including “girl”, “lady” and “woman” indicates people, “temple”, “leaves” and “trees”, “cup” can be classified separately as one main theme of objects. Further, “relaxing”, “smiling”, “drinking” and “walking” demonstrate actions. Based on tree map analysis, the density of each concept was checked to label the theme accurately. A tree map is a visual representation of hierarchical data displayed as a series of nested rectangles of varying sizes. To compare the number of coding references, the researcher created a tree map of the nodes (Di Gregorio, 2000; Dollah et al., 2017). Therefore, the tree map analysis conducted through NVivo further showed the effect of each selected node (based on the rectangle size) towards the concepts generating the main themes. Figure 5.22 illustrates the tree map analysis as follows (Di Gregorio, 2000; Dollah et al., 2017).

Figure 5.22: Tree map analysis



The NVivo findings of the female participants of the 360-degree video version showed three major themes under visual encoder. These three themes were visual memory for objects, people and actions. According to the query results, it is further clear that female participants under 360-degree video viewing conditions encoded information in the advertisement regarding objects and actions than the theme people.

Table 5.13: Thematic classification based on the tree map analysis and node cluster diagram

Themes	Concepts derived from node cluster diagram	Concepts derived from tree map analysis
Objects	Trees, teacup, table, product, Sakura, trees	Temple, leaves, lanterns, trees
People	Girl, woman, lady	woman, lady
Actions	drinking, walking, relaxing, floating, looking	smiling, drinking, relaxing

The next section further explores the major themes based on the query results (Di Gregorio, 2000; Dollah et al., 2017). The NVivo findings of the female participants of the 360-degree video version showed three major themes under visual encoder. According to the query results, female participants under 360-degree video viewing conditions encoded information in the advertisement regarding objects and actions more than the theme, “people” similar to above condition under standard video version.

Major themes related to females who viewed 360-degree video version

The main themes indicate the names of some actions shown in the visuals, objects, and people.

Some of the NVivo findings on these themes are as follows.

Table 5.14: NVivo query findings among female participants

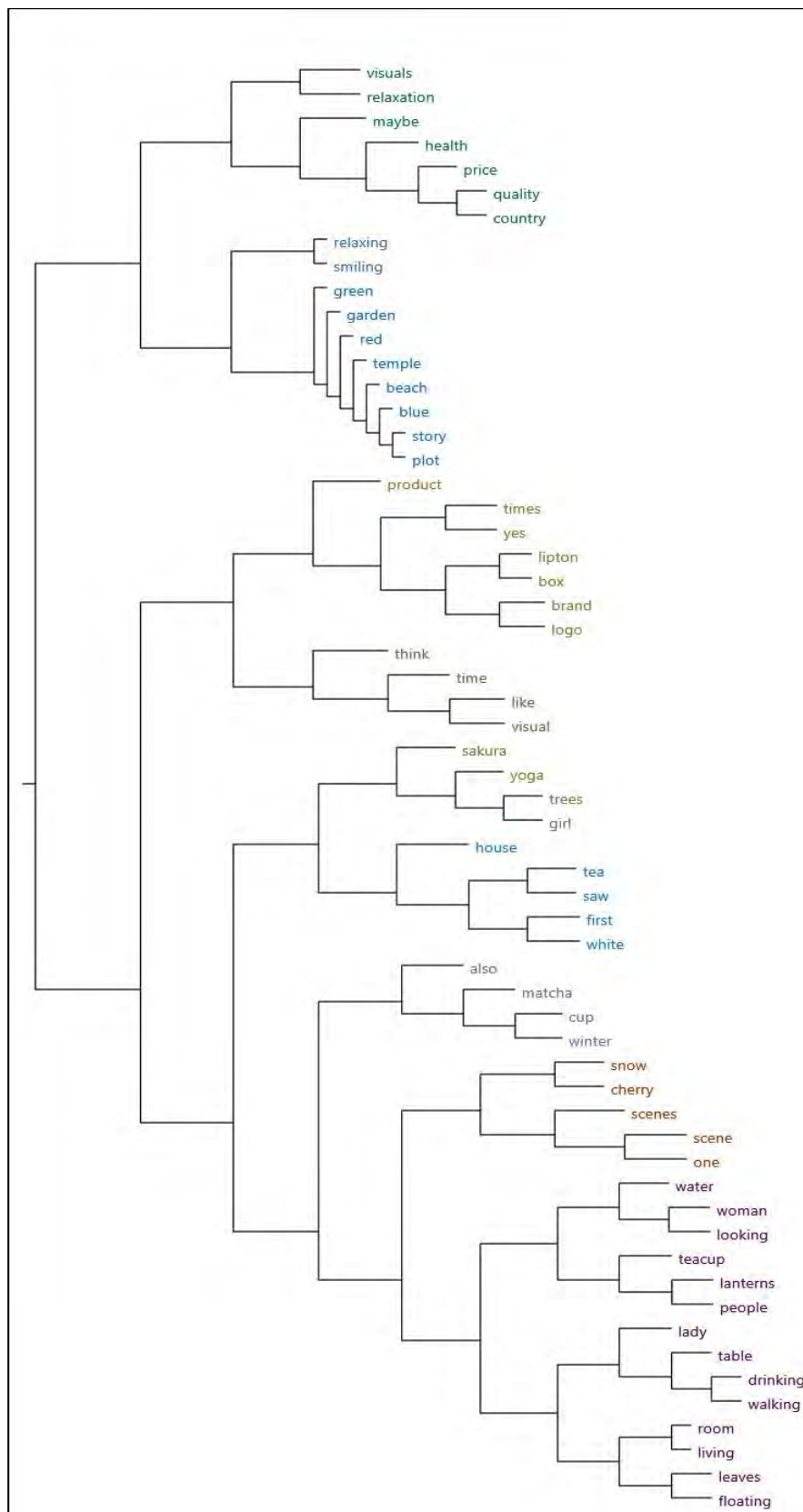
Theme	Codes	NVivo QSR query results
Objects	Leaves	*Green leaves were there...I mean inside the water scene (P32) *Yes, these colours are good it is green and brown mixed with tea leaves. The cherry blossoms make fresh. The waves make fresh, but the matcha box stands out with white background as green is a more natural and fresher darker colour with lanterns awake cosiness. Yellowish and winter pale colour is matching which says that oh yeah it is winter, and I should drink a cup of tea (P33) Winter with snow and no leaves in the trees (P40)

	Lanterns	*Now I know it is lanterns (P34) *Some lanterns appearing from the bottom of the water and then floating to the sky (upwards) (P39)
	Temple	*I missed something in the temple scene. no communication scenes were noticed as there was a woman in the garden, I saw maybe she was walking along the river looking at trees. The second one is woman again near a temple or a pavilion. It is very quick. I do not know. (P40)
	Cup	*A Lipton glass cup (P37) *Green leaves were there...I mean inside the water scene (P35) *Yes, these colours are good it is green and brown mixed with tea leaves. The cherry blossoms make fresh. The waves make fresh, but the matcha box stands out with white background as green is a more natural and fresher darker colour with lanterns awake cosiness. Yellowish and winter pale colour is matching which says that oh yeah it is winter, and I should drink a cup of tea (P33)
	Table	*She put her cup on the table (P32)
People	Woman	*So, the people are women drinking tea, the lady doing stretching on the beach inside a hut. Also, people partying, and some lanterns were floating in the sky. Two times people walking, spring and winter around the oriental pavilion (P34) *Woman drinking tea at the end (P35) *Woman walking towards the garden (P36)
	Lady	*So, the people are women drinking tea, the lady doing stretching on the beach inside a hut. Also, people partying, and some lanterns were floating in the sky. *Two times people walking, spring and winter around the oriental pavilion (P37) *Then I saw the seaside then the pavilion under which lady was doing exercise (P34) *I feel like it is the same person I did not look all around and maybe I missed some scenes (P40)

5.4.4 NVivo analysis for visual encoding -male participants of the 360-degree video version

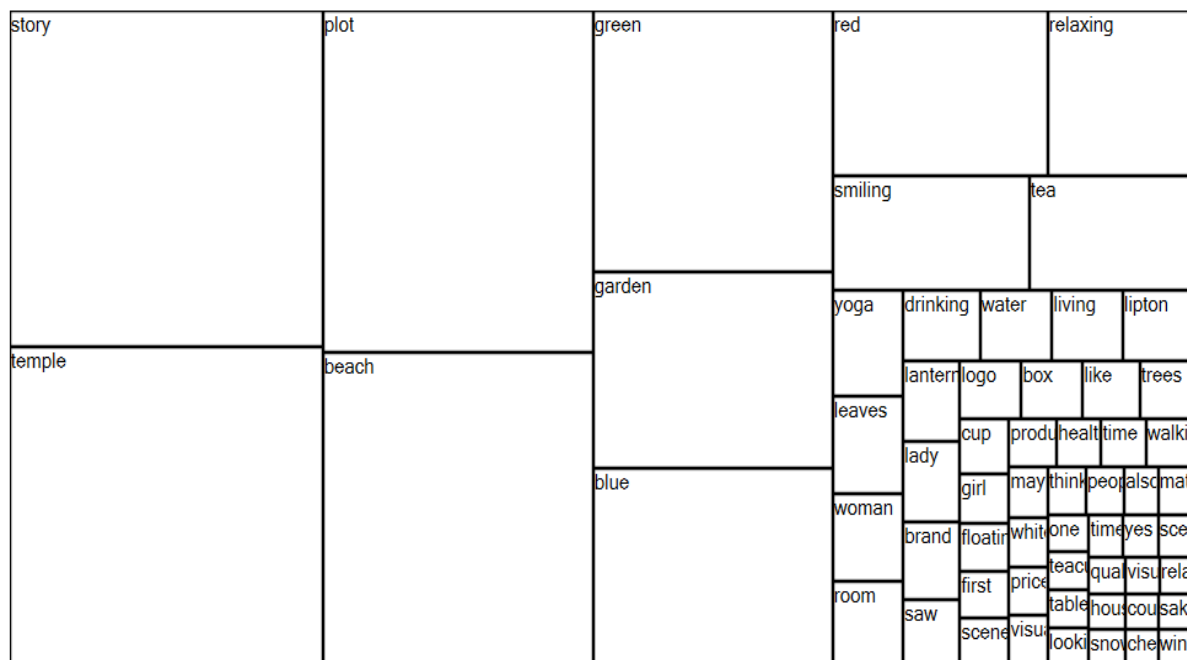
The NVivo findings of the male participants of the 360-degree video version showed the three themes—actions, objects, and people—presented within the visuals. According to the query results, it is further clear that male participants under 360-degree video viewing conditions encoded information in the advertisement regarding actions, objects, and people. However, in the 360-degree video version, these results were less than the standard video version, as most of the participants did not notice all of the presented actions, objects, and people within the visuals. Additionally, most of the answers were incorrect regarding the presented actions, objects, and people. For this research study, initial themes were developed from the node cluster diagram as follows. Figure 5.24 illustrates the node cluster diagram using word similarity approach (Di Gregorio, 2000; Dollah et al., 2017; Hutchison et al., 2010; O'Neill, 2013).

Figure 5.24: The node cluster diagram using word similarity approach



Based on the above node cluster diagram, the coding in-between the concepts can be further illustrated as below. For example, the concepts including “trees”, “cup”, “leaves” can be classified separately as one main theme of objects. Based on tree map analysis, the density of each concept was checked to label the theme accurately. A tree map is a visual representation of hierarchical data displayed as a series of nested rectangles of varying sizes. To compare the number of coding references, the researcher created a tree map of the nodes (Di Gregorio, 2000; Dollah et al., 2017). Therefore, the tree map analysis conducted through NVivo further showed the effect of each selected node (based on the rectangle size) towards the concepts generating the main themes. Figure 5.25 illustrates the tree map analysis as follows (Di Gregorio, 2000; Dollah et al., 2017).

Figure 5.25: Tree map analysis



The NVivo findings of the male participants of the 360-degree video version showed three major themes under visual encoder. These three themes were visual memory for objects, people and actions. According to the query results, it is further clear that male participants under 360-degree video viewing conditions encoded information in the advertisement regarding objects and actions more than the theme “people”.

Table 5.15: Thematic classification based on the tree map analysis and node cluster diagram

Themes	Concepts derived from node cluster diagram	Concepts derived from tree map analysis
Objects	Box, visuals, trees, Sakura, cup, snow, leaves, cherry	Temple, tea, leaves, lanterns, water
People	Girl, lady, woman	Woman, lady
Actions	Relaxing, smiling, drinking, walking, looking, floating	Smiling, relaxing, living, drinking, walking

The next section further explores the major themes based on the query results (Di Gregorio, 2000; Dollah et al., 2017). According to the query results, it is evident that female participants under 360-degree video viewing conditions encoded information in the advertisement regarding objects and actions more than the theme “people”, similar to above condition under the standard video version.

Major themes related to males who viewed 360-degree video version

The main themes indicate the names of some actions shown in the visuals, objects, and people. Some of the NVivo findings on these themes are as follows.

Table 5.16: NVivo query findings among male participants

Theme	Codes	NVivo QSR query results
Objects	Leaves	*First, I saw the water and then the leaves. Then the glass pot. I looked at the brand then in-between the visuals it was there in the bottom of that glass. I do not know what it is it was not written straight some flipped spellings. Then I saw the product. And then a lady performing yoga (P22) *Green leaves go really with the product, and they are promoting tea and it is vibrant also yoga girl gives some good energetic feeling (P22) *Swirling leaves in the water (P23) *Underwater swirling green tea leaves (P25)
	Temple	*It is a temple. I got it this time.... (P29)

	Lanterns	*It is very confusing. It starts with water and green and then orange and yellow and red lanterns and then the flower was purple, and the snow is white the building was red (temple) brownish a sunny day suddenly a sunny beach and the living room looks white. Very confusing (P29)
People	Lady	*Three ladies. One in the garden scene and temple scene Finally another one in the ending scene drinking tea and relaxing in her house (P26)
	Woman	*Women drinking tea with calm and happy mood (P27)
Actions	Yoga	*First, I saw the water and then the leaves. Then the glass pot. I looked at the brand then in-between the visuals it was there in the bottom of that glass. I do not know what it is it was not written straight some flipped spellings. Then I saw the product. And then a lady performing yoga. Green leaves go really with the product, and they are promoting tea and it is vibrant also yoga girl gives some good energetic feeling (P22)
	Drinking	*Finally, another one in the ending scene drinking tea and relaxing in her house (P28) *The product was there in the packaging. Living room table furniture towards the end and lady sitting and drinking tea (P23) *The visuals give an oriental feeling or health-related feeling a vibe of relaxation by drinking something healthy (P26) *Women drinking tea with calm and happy mood (P23)
	Walking	*She was in-between the trees in the garden. Maybe it is her garden (P24)
	Floating	*Some floating lanterns in the third scene (P25)

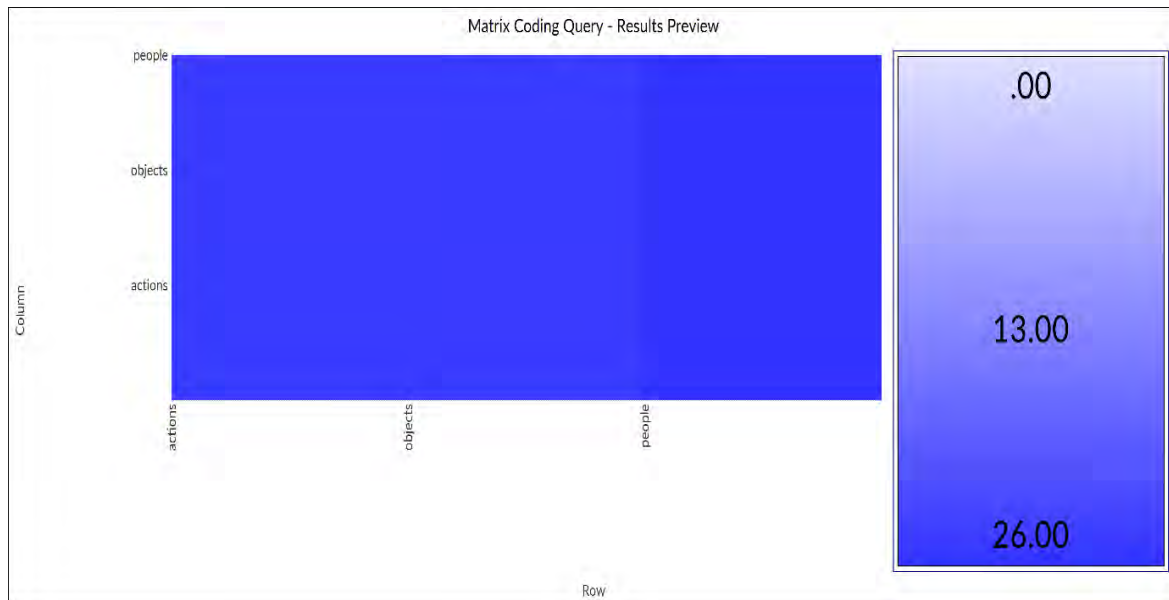
A word frequency analysis in NVivo QSR for the male participants who viewed the 360-degree video version was conducted under the visual encoding category. Based on the word cloud NVivo QSR analysis, the above themes can be further justified.

Table 5.17: Matrix-coding query analysis for 360-degree and standard video advertisements under visual encoder

		A : actions ▼	B : objects ▼	C : people ▼
1 : actions ▼	▼	25	25	25
2 : objects ▼	▼	25	25	25
3 : people ▼	▼	26	26	26

Based on the above Table 5.17, the comparison query results produced three nodes on objects, actions and people, indicating the three themes. These three nodes represented 25 to 30 frequently occurring words in-between the transcripts, further showing the validity of the derived themes based on the cross-case matrix analysis (Hutchison et al., 2010).

Figure 5.27: Matrix-coding query: Results preview



5.5 NVivo analysis for visual inference making

The NVivo findings of the analysis are divided into four parts of the workspace unit namely, visual comprehension, visual encoding, visual inference making, and visual response selecting. Therefore, the corresponding sections illustrate the NVivo analysis of these four parts as follows.

5.5.1 NVivo analysis for visual inference making—female participants of the standard video version

The NVivo findings of the female participants of the standard video version showed one major theme under visual-based inference maker—emotional engagement. For this research study, initial themes were developed from the node cluster diagram as follows. Figure 5.28 illustrates the node cluster diagram using the word similarity approach (Di Gregorio, 2000; Dollah et al., 2017; Hutchison et al., 2010; O'Neill, 2013).

Figure 5.28: The node cluster diagram

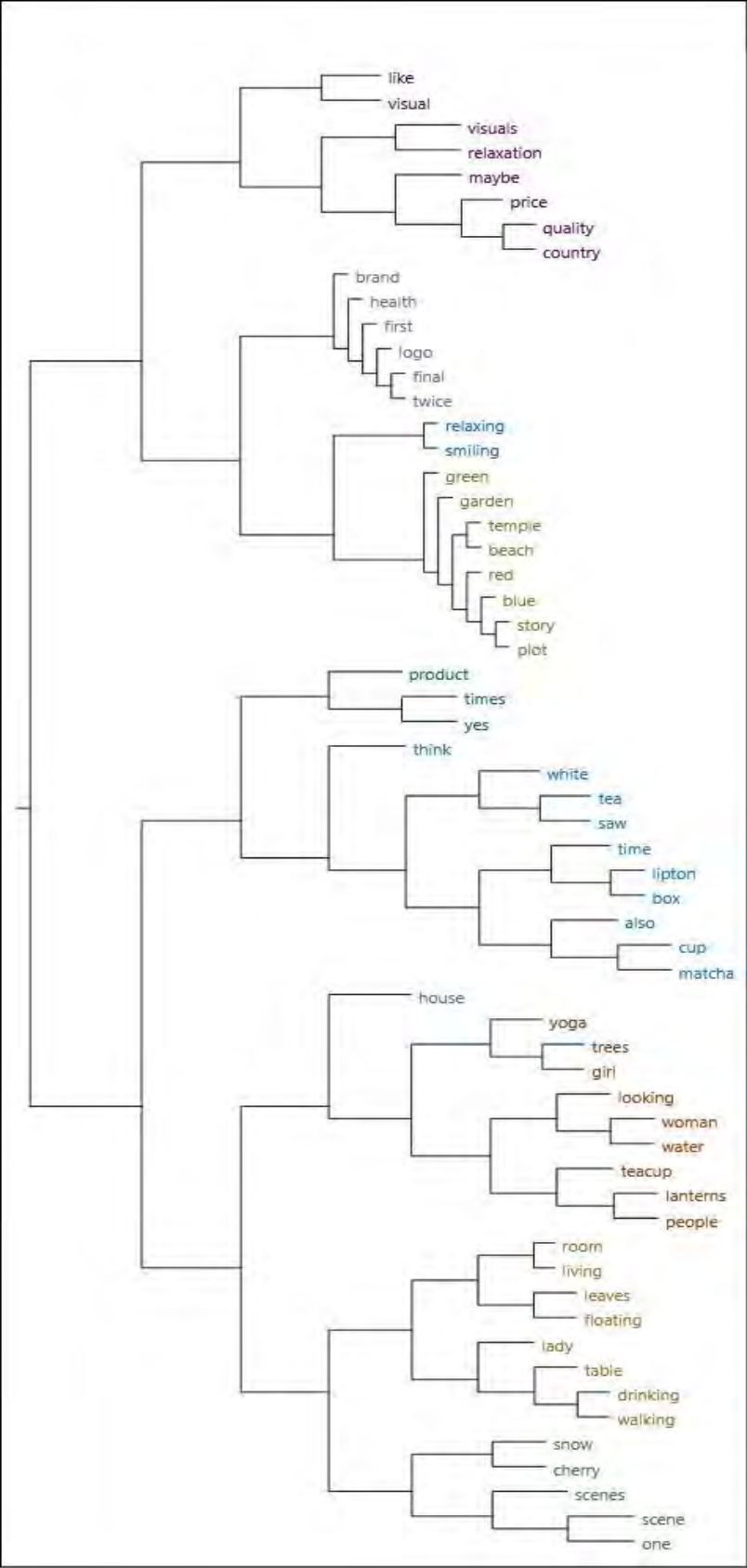


Table 5.18: Thematic classification based on the tree map analysis and node cluster diagram

Themes	Concepts derived from node cluster diagram	Concepts derived from tree map analysis
Emotional engagement	Final, First, Twice, Health, Brand, Logo	Logo, first, final, twice

The next section further explores the major themes based on the query results (Di Gregorio, 2000; Dollah et al., 2017). According to the query results, it is clear that female participants under standard video viewing conditions used information in the advertisement regarding emotional engagement. The NVivo QSR analysis on word frequency query results are as follows.

Major themes related to females who viewed standard video version

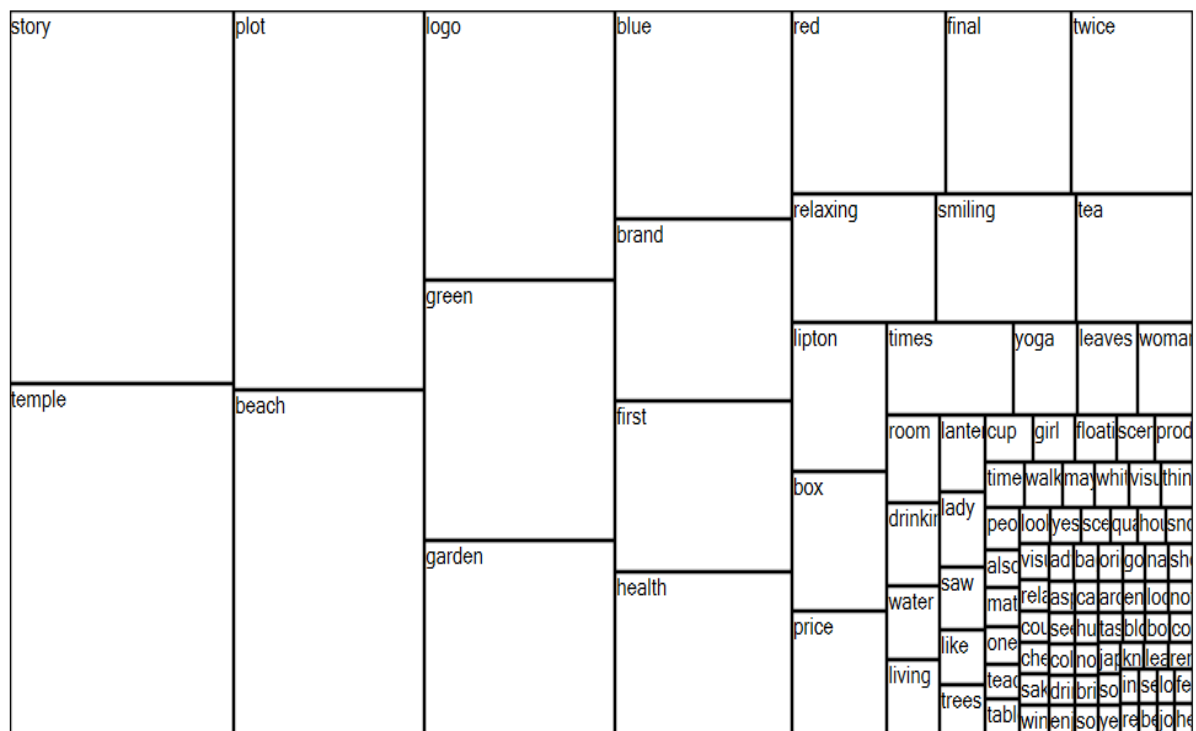
The main themes indicated some terms related to emotional engagement among female participants. Some of the NVivo findings on this theme are as follows.

Table 5.19: NVivo query findings among female participants

Theme	Codes	NVivo QSR query results
Emotional engagement	Final	* I feel like I saw the brand logo in the first and final scenes (P11)
	First	* I feel like I saw the brand logo in the first and final scenes (P11)
	Twice	* For the second time, I noticed the girl doing yoga, so it means something like maybe you can get skinny if you drink green tea...yes the benefits of the product (P12)
	Health	* Maybe health because of these pictures like yoga girl and a lady in the couch (P13)
	Brand	* I noticed the brand logo, but I drink coffee more than tea. So, I am not interested in buying it. (P11) * I think that Lipton is a quality tea brand (P14) * I have been drinking this tea for the past 25 years and will not be changing it because it is an old brand (P12) Maybe the brand Matcha makes you feel foreign if consumed ..something like that ..maybe... (P11)

Based on the above node cluster diagram, the coding in-between the concepts can be further illustrated as below. For example, the concepts including “brand”, “times”, “price”, “Lipton”, “Health” and “Box” can be classified separately as one main theme of emotional engagement based on the advertisement story. Based on tree map analysis, the density of each concept was checked to label the theme accurately. A tree map is a visual representation of hierarchical data displayed as a series of nested rectangles of varying sizes. To compare the number of coding references, the researcher created a tree map of the nodes (Di Gregorio, 2000; Dollah et al., 2017). The tree map analysis conducted through NVivo showed the effect of each selected node (based on the rectangle size) towards the concepts generating the main themes. Figure 5.32 illustrates the tree map analysis as follows (Di Gregorio, 2000; Dollah et al., 2017).

Figure 5.32: Tree map analysis



The NVivo findings of the male participants of the standard video version showed one theme under visual-based inference maker as emotional engagement. According to the query results, it is apparent that male participants under standard video viewing conditions used this information in the advertisement when deciding their buying decision.

Table 5.20: Thematic classification based on the tree map analysis and node cluster diagram

Themes	Concepts derived from node cluster diagram	Concepts derived from tree map analysis
Emotional engagement	Brand, times, price, Lipton, health, bag	Logo, brand, first, box, final, twice

The next section further explores the major themes based on the query results (Di Gregorio, 2000; Dollah et al., 2017). According to the query results, it is clear that male participants under standard video viewing conditions used information in the advertisement regarding emotional engagement. The NVivo QSR analysis on word frequency query results is as follows.

Major themes related to males who viewed standard video version

The main themes indicate some terms related to emotional engagement among male participants. Some of the NVivo findings on this theme are as follows.

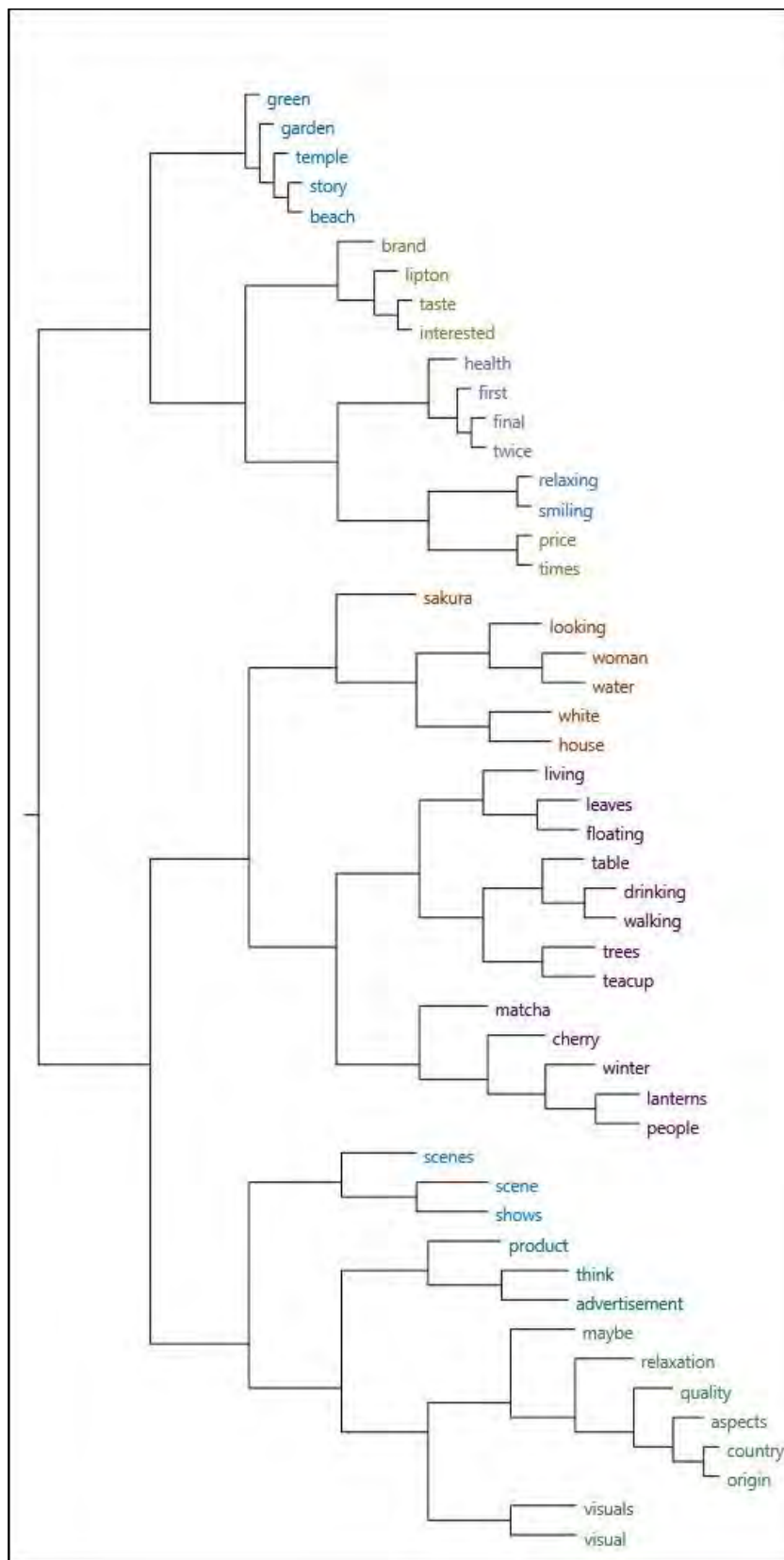
Table 5.21: NVivo query findings among male participants

Theme	Codes	NVivo QSR query results
Emotional engagement	Brand	* I feel these visuals were well presented to emphasize the core values of marketing a brand in an attractive way * It reminds me of Japan and travel-related memories. * The visuals especially the last one in the living room show the relaxation after a big day. After all the moving visuals the last one was put to relax too... (P1)
	Times	* Yes, sure there was an image like Lipton tea bag and a tea box. Product image was shown, and it was coming through the water. I saw it three or four times (P4) * Three times. Start of the product end of the product and in the bottom right of the package (P3) - I feel like the second time it is easy to notice the visuals. (P8) - It reminds me of my childhood times like the celebration of the Vesak festival when I was a child. (P5)

Price	* I feel like people will buy things based on the price. So, price of the product plays a main role (P2)
Lipton	* I did not see the writing of the word Lipton but in the advertisement, I think there was something about green tea with leaves and green colour (P7) * Yes, sure there was an image like Lipton tea bag and a tea box. Product image was shown, and it was coming through the water. I saw it three or four times (P4) * Lipton logo was there, and the matcha green tea box visual was there with matcha green tea label also I noticed the tea bag (P8)
Health	* Yes, of course, it is healthy for me. What is the point if we consume junk food and get ourselves ill? (P2)
Box	I think the tea box was what I wanted to see here. It is noticeable because, normally you drink tea, either to get energy or to relax... (P9)

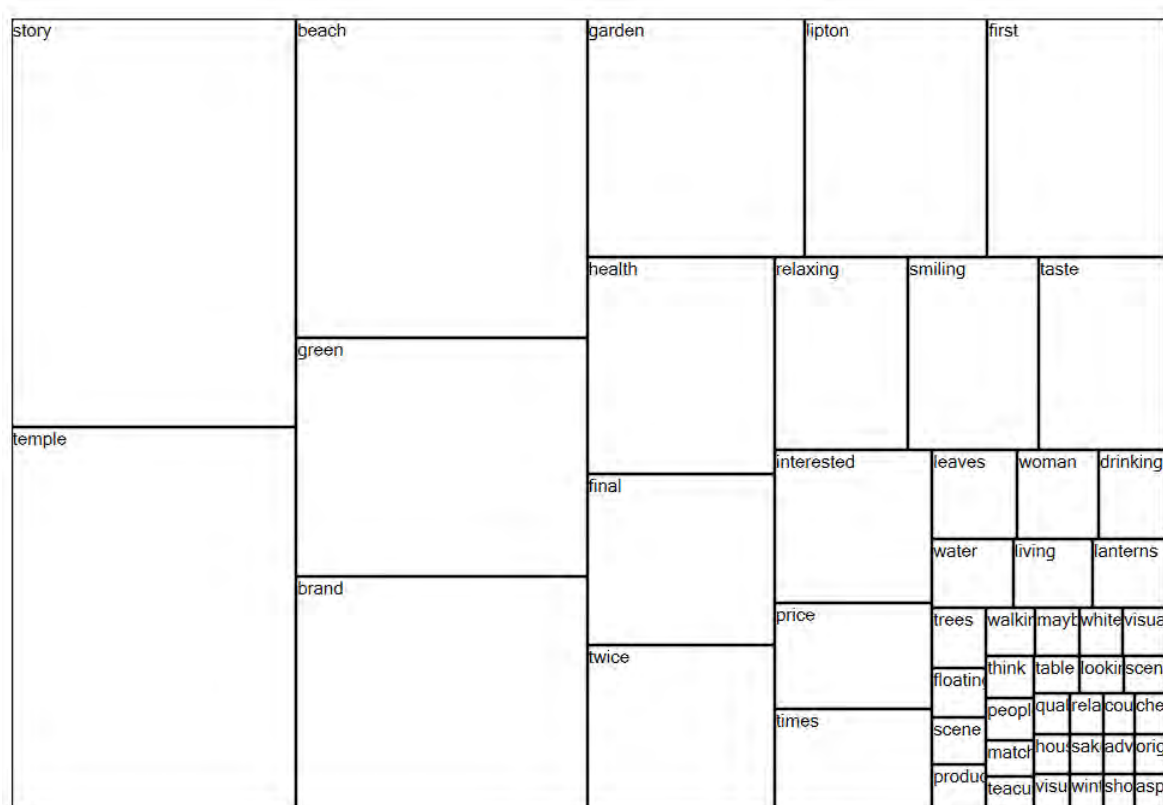
A word frequency analysis in NVivo QSR for the male participants who viewed the standard video version was conducted under the visual inference-maker category. Based on the word cloud NVivo QSR analysis, the above themes can be further justified.

Figure 5.34: The node cluster diagram



Based on the above node cluster diagram, the coding in-between the concepts can be further illustrated as below. For example, the concepts including “Lipton”, “box”, “logo”, “brand”, “taste” and “interested” can be classified separately as one main theme of behavioural engagement based on the advertisement story. Based on tree map analysis, the density of each concept was checked to label the theme accurately. A tree map is a visual representation of hierarchical data displayed as a series of nested rectangles of varying sizes. To compare the number of coding references, the researcher created a tree map of the nodes (Di Gregorio, 2000; Dollah et al., 2017). Therefore, the tree map analysis conducted through NVivo further showed the effect of each selected node (based on the rectangle size) towards the concepts generating the main themes. Figure 5.35 illustrates the tree map analysis as follows (Di Gregorio, 2000; Dollah et al., 2017).

Figure 5.35: Tree map analysis



The NVivo findings of the female participants of the 360-degree video version showed one theme under visual-based inference maker as behavioural engagement. According to the query results, it is clear that female participants under the 360-degree video viewing conditions used this information in the advertisement when form their buying decision.

Table 5.22: Thematic classification based on the tree map analysis and node cluster diagram

Themes	Concepts derived from node cluster diagram	Concepts derived from tree map analysis
Behavioural engagement	Lipton, Box, Logo, Brand, Taste, Interested	Brand, health, twice, final, first, interested , times

The next section further explores the major themes based on the query results (Di Gregorio, 2000; Dollah et al., 2017). According to the query results, it is manifest that female participants under 360-degree video viewing conditions used information in the advertisement regarding behavioural engagement. The NVivo QSR analysis on word frequency query results is as follows.

Major themes related to females who viewed 360-degree video version

The main themes indicate some terms related to behavioural engagement among female participants. Some of the NVivo findings on this theme are as follows.

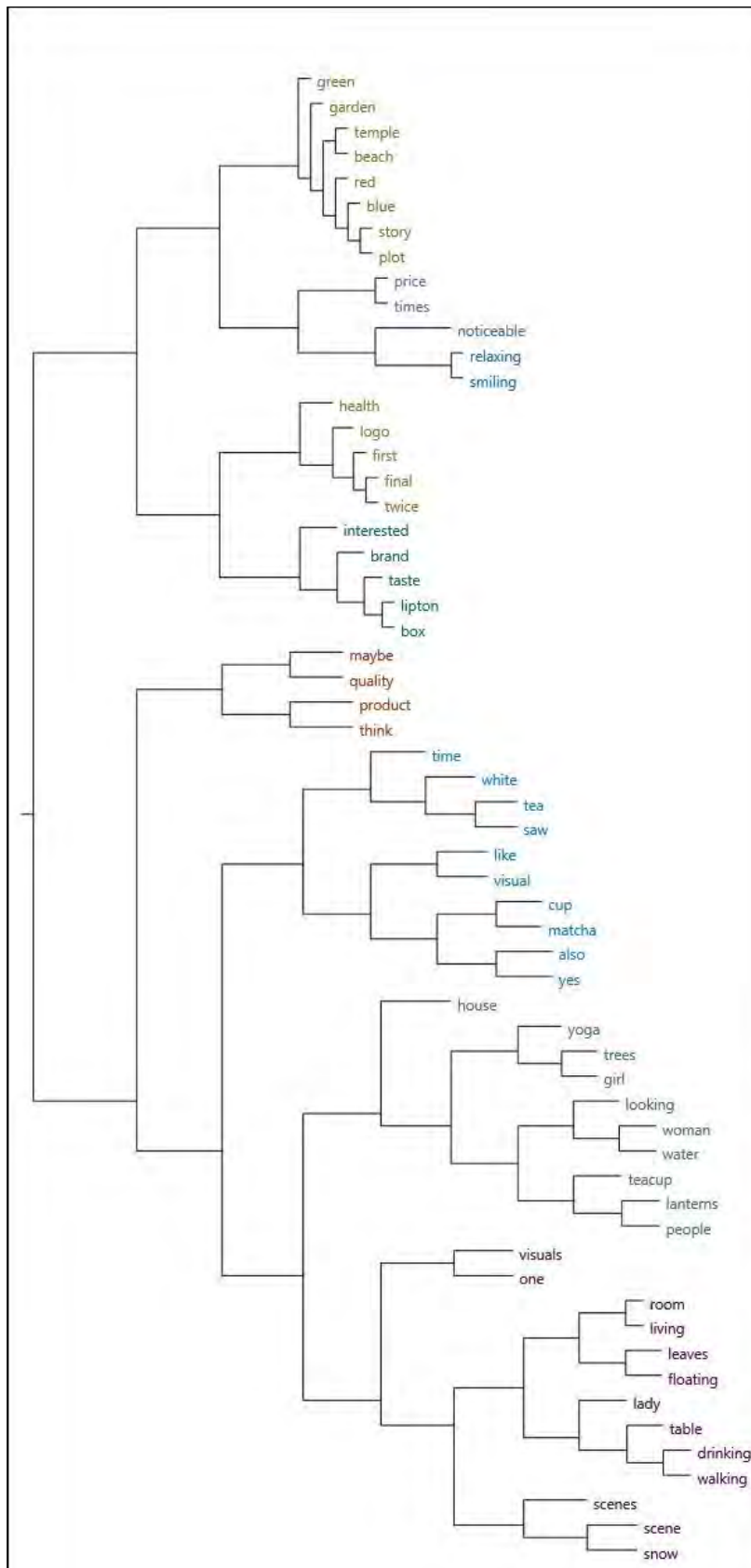
Table 5.23: NVivo query findings among female participants

Theme	Codes	NVivo QSR query results
Behavioural engagement	Lipton	*I saw the Lipton logo two times. Once it appeared beneath the water and then in the bottom of the glass bottle (P31) *The Lipton symbol is there from the very start and stays the whole time. It changes from a cup engraving of Lipton to the Lipton tea box, but Lipton is always present throughout this advertisement (P32) *Yes, it is interactive because we must find the logo by ourselves (P33)
	Box	*When I moved around the living room, I saw this tea box on the table (P35) *Yes, I saw a box and I had to move around that thing in my hands to see it. So, it is quite uncomfortable (P38)
	Logo	*I saw this logo two times and I do not remember whether it was there or not all the time (P40)

Brand	*I think yes, it is an old and popular brand, so no doubt that it should be a quality product, otherwise they cannot survive for such a long time (P37)
Taste	*I like the taste of the tea and the colour is also simple, and eye-catching (P40) Some green tea has a very strong taste (P39) *I expect the taste not to be too strong, not bitter and sweet. Tea without sugar is better (P34)
Interested	*I am interested of course because lanterns stood out to me with orange and yellow conform and maybe warmth through the fireplace. I think the expressions of the woman seems relaxed and calm with some feelings pushing that image forward (P34) *The living room looks interesting with a calm and relaxed atmosphere. I felt a bit thirst also at that time, so I wanted to be like that (to sit on a comfortable couch and to drink tea) (P38) *Yeah, I like the pavilion the oriental exploring feelings, old building and travelling experience (P34)

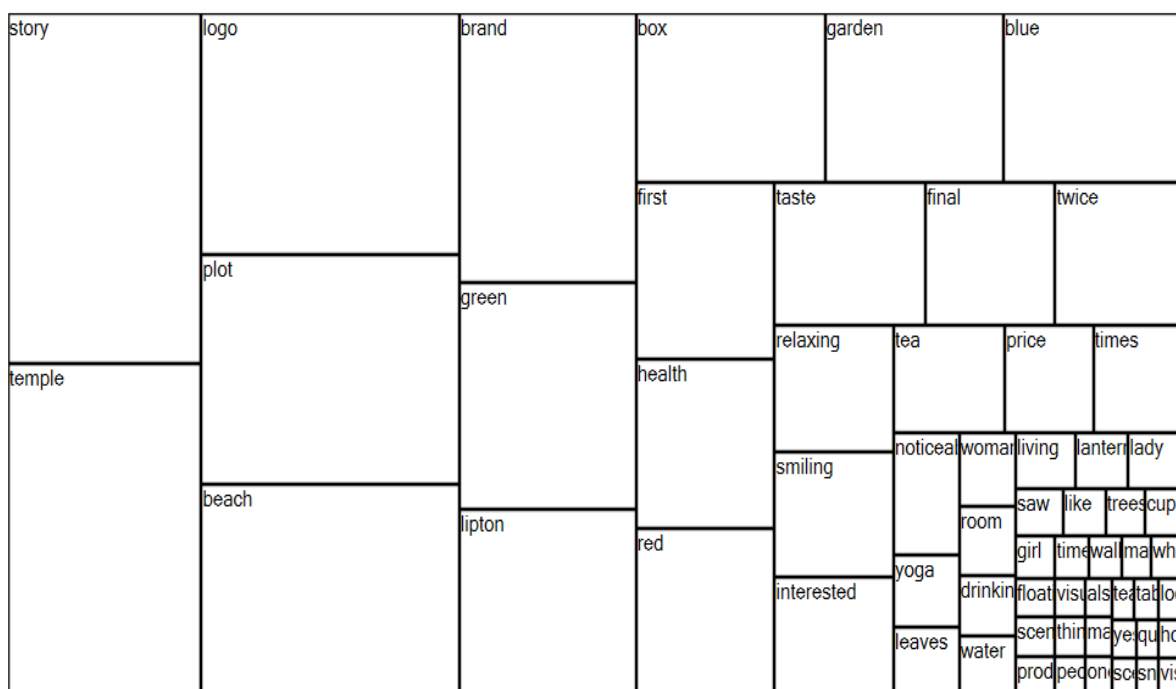
A word frequency analysis in NVivo QSR for the female participants who viewed the 360-degree video version was conducted under the visual inference-maker category. Based on the word cloud NVivo QSR analysis, the above themes can be justified.

Figure 5.37: The node cluster diagram



Based on the above node cluster diagram, the coding in-between the concepts can be further illustrated as below. For example, the concepts including “Logo”, “brand”, “Lipton”, “noticeable”, “taste” and “box” can be classified separately as one main theme of behavioural engagement based on the advertisement story. Based on tree map analysis, the density of each concept was checked to label the theme accurately. A tree map is a visual representation of hierarchical data displayed as a series of nested rectangles of varying sizes. To compare the number of coding references, the researcher created a tree map of the nodes (Di Gregorio, 2000; Dollah et al., 2017). Therefore, the tree map analysis conducted through NVivo further showed the effect of each selected node (based on the rectangle size) towards the concepts generating the main themes. Figure 5.38 illustrates the tree map analysis as follows (Di Gregorio, 2000; Dollah et al., 2017).

Figure 5.38: Tree map analysis



The NVivo findings of the male participants of the 360-degree video version showed one theme under visual-based inference maker as behavioural engagement. According to the query results, it is further clear that male participants under 360-degree video viewing conditions used this information in the advertisement when deciding their buying decision.

Table 5.24: Thematic classification based on the tree map analysis and node cluster diagram

Themes	Concepts derived from node cluster diagram	Concepts derived from tree map analysis
Behavioural engagement	Logo, Brand, Lipton, Noticeable, taste, box	Logo, brand, box, first, taste, health, interested

The next section further explores the major themes based on the query results (Di Gregorio, 2000; Dollah et al., 2017). According to the query results, it is evident that male participants under 360-degree video viewing conditions used information in the advertisement regarding behavioural engagement. The NVivo QSR analysis on word frequency query results is as follows.

Major themes related to males who viewed 360-degree video version

The main themes indicate some terms related to behavioural engagement among male participants. Some of the NVivo findings on this theme is as follows.

Table 5.25: NVivo query findings among male participants

Theme	Codes	NVivo QSR query results
Behavioural engagement	Logo	*So, the brand logo specifically has to be found by yourself as it is hidden under water (P22) *For me, the brand logo seems noticeable at the start and not in the middle (P21) *The logo is not noticeable, it is at the top of the main visual (P40) *Could not see the box as it is far from the brand logo and the name is not visible. The second time it worked because I moved around, and I know exactly where to look at (P38)
	Brand	*I drink coffee but I know this brand. So, when I moved around, I saw the logo coming up from the water and then it faded (P35) *For me, the brand logo seems noticeable at the start and not in the middle (P21) *Could not see the box as it is far from the brand logo and the name is not visible. The second time it worked because I moved around, and I know exactly where to look at (P38)

Lipton	I do not know what Lipton means. The logo is not quite noticeable. *Too tiny (P36)
Noticeable	*Yes, it depends on the product I am buying and the category I am looking for, if it is for entertainment purposes, I will look at some features which like product case. If it is for health, then the health benefits. I do not know how likely these visuals on ladies performing yoga, herbal green leaves and living room scenes apply to me. Besides these visuals, one main visual showing family time in the living room with a cup of tea in the hand and watching movies will spread the message faster (P36) *Health-related benefits such as scenes with wellness and activities with the lady are quite noticeable (P34) *This is a complementary product to start a day, especially during winter. I have belly fat and green tea is good to reduce belly fat. There is a lady doing yoga, so this advertisement communicates to me the healthy aspects so for me yoga lady is quite noticeable from that point of view (P39) *For me, the brand logo seems noticeable at the start and not in the middle (P21) *Additionally, I think visual memory is influenced by colours. Whatever the visual you add colours will decide whether to remember it or not (P40)
Taste	*I like the green tea taste and especially the colour of the teacup (P35) *Underwater part I felt like green tea is boiling and then the girl doing yoga feels like she can get fit. Also, the girl travelling to Japan with Sakura trees and temple shows that maybe the tea is coming from Japan. End visual with the girl drinking tea means you can have tea in the morning and any time of the day (P33) *Tea leaves diffusing on water shows how you make tea (P35)
Box	*I saw a white box on the table (P32) *Could not see the box as it is far from the brand logo and the name is not visible. The second time it worked because I moved around, and I know exactly where to look at (P38) *Yes, I saw the tea box maybe some cosiness when I see the living room (P32)

A word frequency analysis in NVivo QSR for the male participants who viewed the 360-degree video version was conducted under the visual inference-maker category. Based on the word cloud NVivo QSR analysis, the above themes can be further justified.

Figure 5.39: NVivo QSR word cloud analysis – 360-degree video version (male participants)



5.5.5 Cross-case analysis using matrix coding queries to validate themes

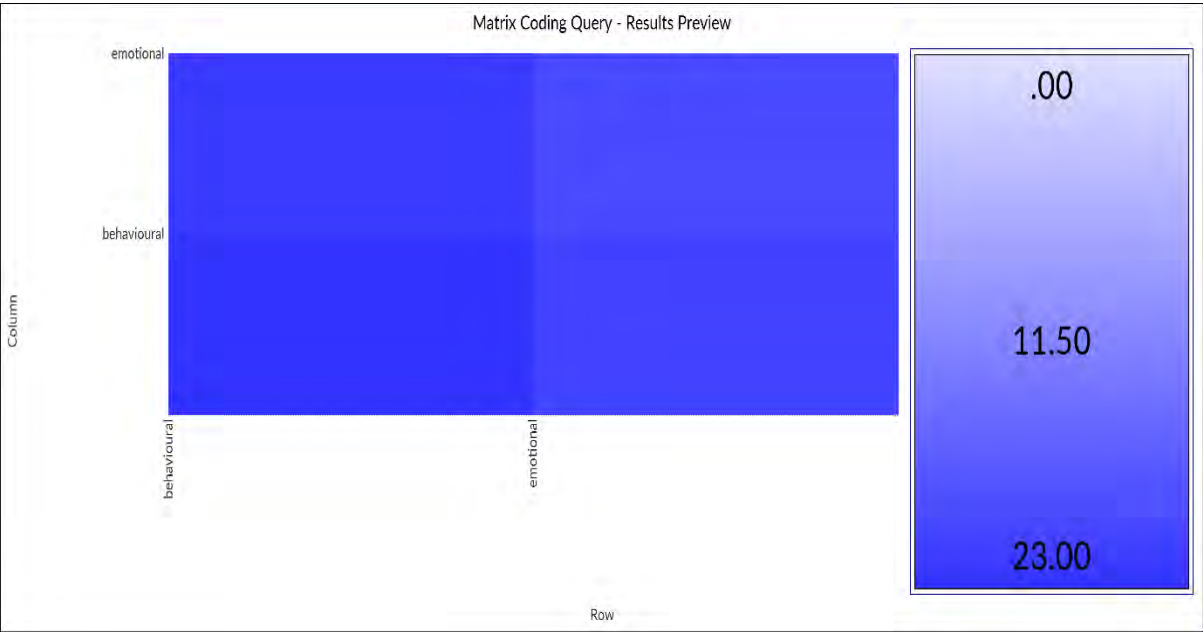
A matrix-coding query is a method for conceptual and theoretical development and to validate the themes derived from the qualitative analysis (Bytheway, 2013; Hutchison et al., 2010; O'Neill, 2013). Researchers can utilize the matrix-coding query function to look for information directly from the perspective of the research question (Hutchison et al., 2010). Furthermore, it is useful in identifying the multidimensional aspects and subcategories of a research study (Hutchison et al., 2010). In this research study, matrix-coding analysis was conducted to check the validity of the derived themes and the inter-relationships between the queries in terms of 360-degree and standard video advertisements.

Table 5.26: Matrix-coding query analysis for 360-degree and standard video advertisements under visual inference maker

		A : behavioural ▼	B : emotional ▼
1 : behavioural ▼	▼	23	22
2 : emotional ▼	▼	21	20

Based on the above Table 5.26; the comparison query results produced two nodes on behavioural engagement and emotional engagement. These two nodes represented 60 to 85 frequently occurring words in-between the transcripts, further showing the validity of the derived themes based on the cross-case matrix analysis (Hutchison et al., 2010).

Figure 5.40: : Matrix-coding query: Results preview



5.6 NVivo analysis for response selector

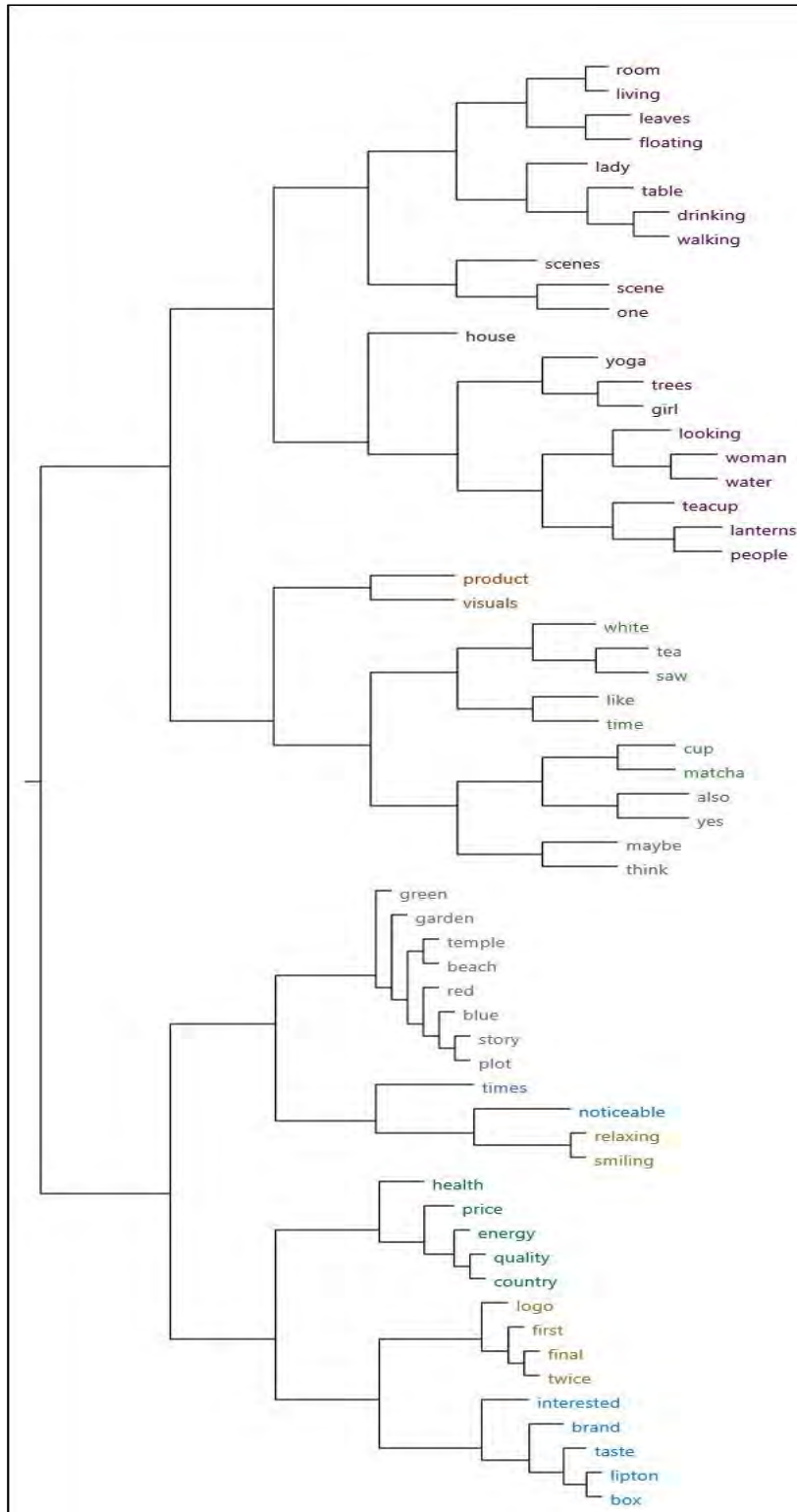
The NVivo findings of the analysis are divided into four parts of the workspace unit—visual comprehension, visual encoding, visual inference making, and visual response selecting. The corresponding sections illustrate the NVivo analysis of these four parts as follows.

5.6.1 NVivo analysis for response selector - female participants of the standard video version

The NVivo findings of the female participants of the standard video version showed two themes under visual response selector — information in the visuals regarding the product details and product benefits. According to the query results, it is clear that information in the visuals regarding the product details and product-specific benefits is the key information applicable for female participants under the second viewing condition. For this research study, initial themes were developed from the node cluster diagram as follows. Figure 5.41 illustrates

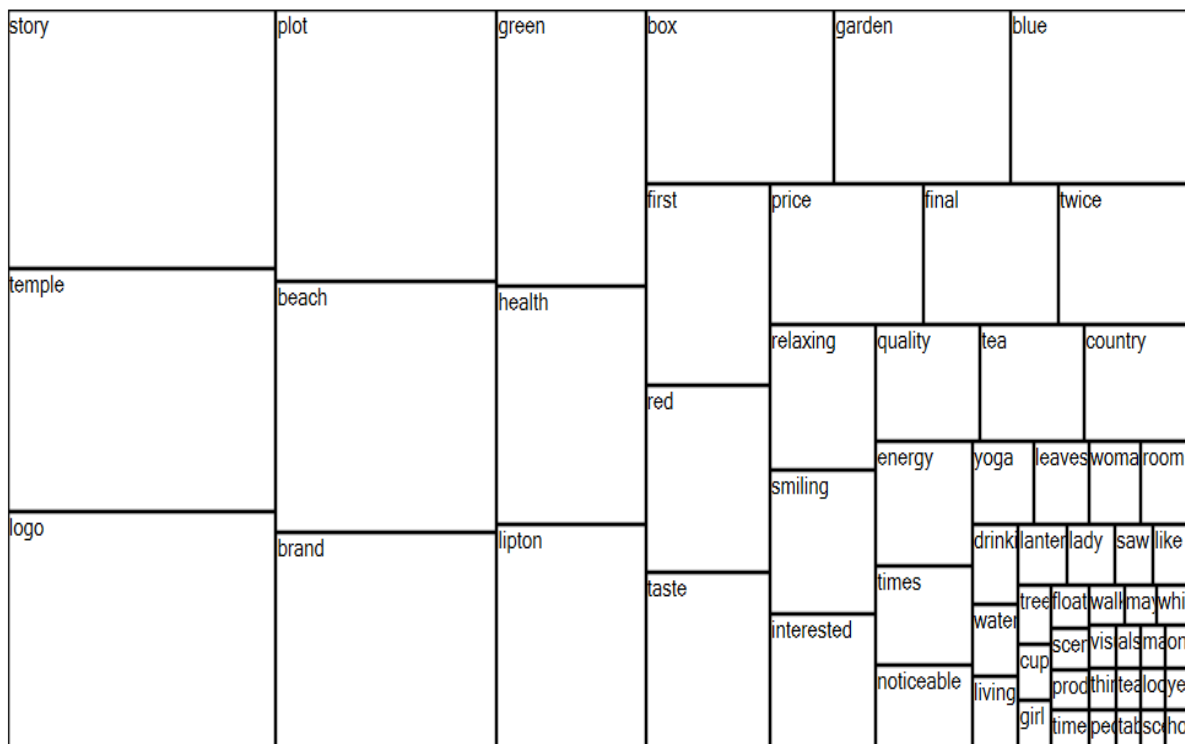
the node cluster diagram using the word similarity approach (Di Gregorio, 2000; Dollah et al., 2017; Hutchison et al., 2010; O'Neill, 2013).

Figure 5.41: The node cluster diagram



Based on the above node cluster diagram, the coding in-between the concepts can be further illustrated as below. For example, concepts including “price”, “quality”, “country”, “health” and “energy” can be classified separately under the two themes of product details and product benefits. Based on tree map analysis, the density of each concept was checked to label the theme accurately. A tree map is a visual representation of hierarchical data displayed as a series of nested rectangles of varying sizes. To compare the number of coding references, the researcher created a tree map of the nodes (Di Gregorio, 2000; Dollah et al., 2017). Therefore, the tree map analysis conducted through NVivo further showed the effect of each selected node (based on the rectangle size) towards the concepts generating the main themes. Figure 5.42 illustrates the tree map analysis as follows (Di Gregorio, 2000; Dollah et al., 2017).

Figure 5.42: Tree map analysis



The NVivo findings of the female participants of the standard video version showed two themes under visual-based response selection namely, product details and product benefits. According to the query results, it is patent that female participants under standard video viewing conditions used this information in the advertisement when choosing their buying decision.

Themes	Concepts derived from node cluster diagram	Concepts derived from tree map analysis
Product details	Price, Quality, Country	Brand, box, Lipton
Product benefits	Health, Energy	Taste, health

Table 5.27: Thematic classification based on the tree map analysis and node cluster diagram

The next section further explores the major themes based on the query results (Di Gregorio, 2000; Dollah et al., 2017). According to the query results, it is evident that female participants under standard video viewing conditions used information in the advertisement regarding product details and product benefits. The NVivo QSR analysis on word frequency query results is follows. Consequently, this section illustrates the NVivo analysis of the visual response selection of the workspace unit.

Major themes related to females who viewed standard video version

The main themes indicated that some terms related to information on product and product-specific benefits. Some of the NVivo findings on this theme are as follows.

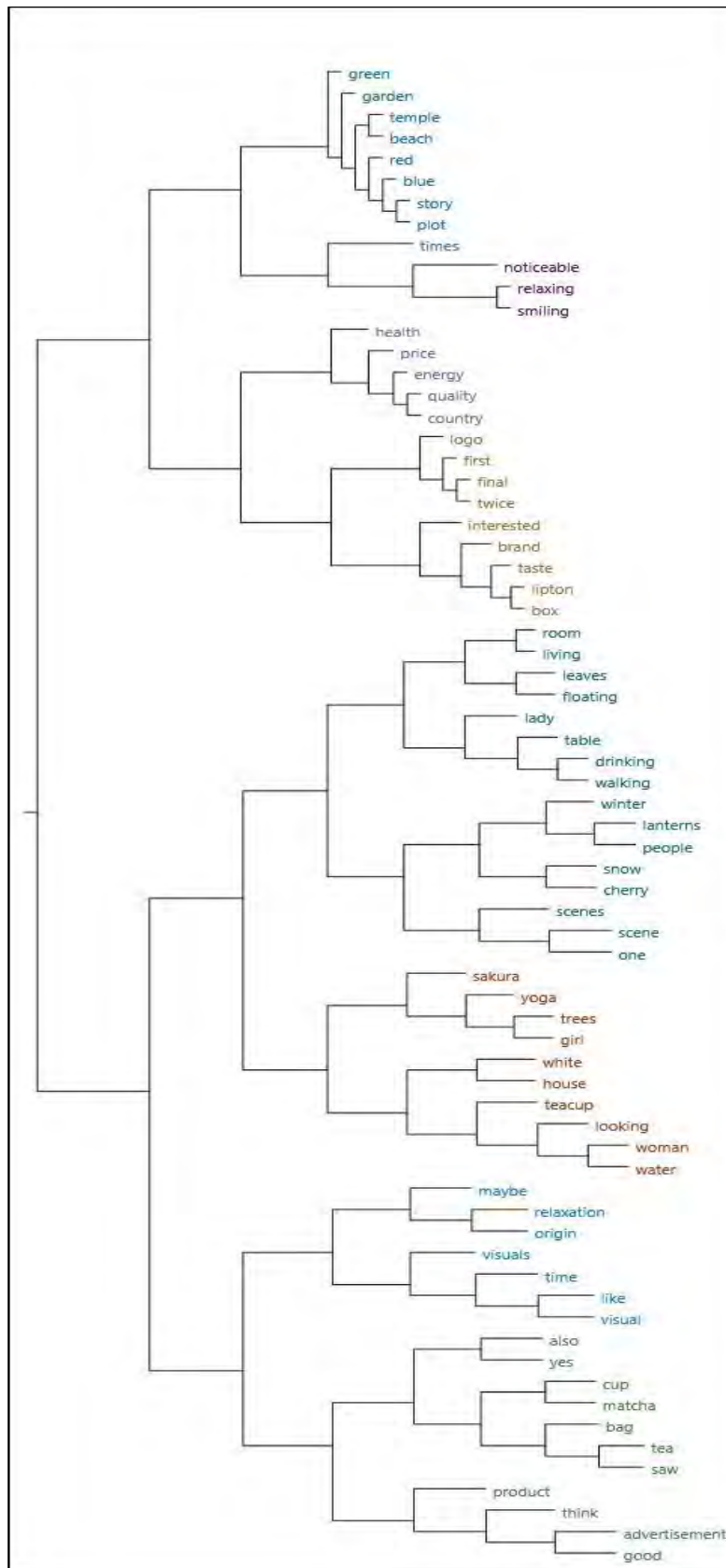
Table 5.28: NVivo query findings among female participants

Theme	Codes	NVivo QSR query results
Product details	Price	*So, it is the price which I will look for because they are trying to market a product you can drink any time a day, so you can drink anytime like night, morning, and afternoon (P11) *For me, it is the price because I am still a student. *Maybe after getting a job, I might change some brands....but not so sure whether it is for food or clothes... (P14) *My first choice is price and then the quality for any product(P19)
	Quality	* It is quality for me. So, I will rather check whether the price I pay to match with quality or not.... (P20) * Yes, I check the logo on the package with quality standards like the star scale in soup products (P17)

5.6.2 NVivo analysis for response selector -male participants of the standard video version

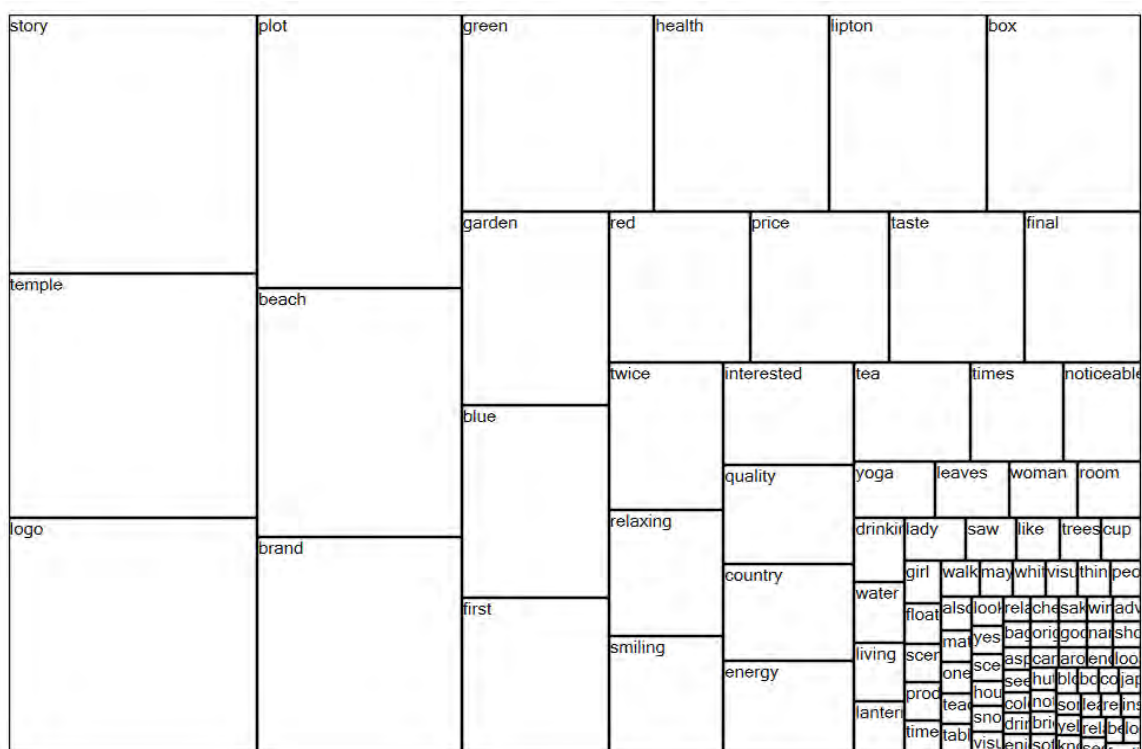
The NVivo findings of the male participants of the standard video version showed two themes—visual memory for product details and product benefits. According to the query results, it is further clear that male participants under standard video viewing conditions remembered visual details regarding product details and product benefits within the visuals, similar to female participants. For this research study, initial themes were developed from the node cluster diagram as follows. Figure 5.44 illustrates the node cluster diagram using the word similarity approach (Di Gregorio, 2000; Dollah et al., 2017; Hutchison et al., 2010; O'Neill, 2013).

Figure 5.44: The node cluster diagram



The NVivo findings of the male participants of the standard video version showed the theme product details and product benefits. According to the query results, it is further clear that male participants under standard video viewing conditions remembered visual details regarding product details and product benefits within the visuals. Based on the above node cluster diagram, the coding in-between the concepts can be further illustrated as below. For example, the concepts including “price”, “quality”, “country” and “brand” can be considered as product details and “health” or “energy” can be considered as product benefits. Based on tree map analysis the density of each concept was checked to label the theme accurately. A tree map is a visual representation of hierarchical data displayed as a series of nested rectangles of varying sizes. To compare the number of coding references, the researcher created a tree map of the nodes (Di Gregorio, 2000; Dollah et al., 2017). Therefore, the tree map analysis conducted through NVivo further showed the effect of each selected node (based on the rectangle size) towards the concepts generating the main themes. Figure 5.45 illustrates the tree map analysis as follows (Di Gregorio, 2000; Dollah et al., 2017).

Figure 5.45: Tree map analysis



The NVivo findings of the male participants of the standard video version showed two themes under visual-based response selection—product details and product benefits. According to the query results, it is further clear that male participants under standard video viewing conditions used this information in the advertisement when making their buying decision.

Table 5.29: Thematic classification based on the tree map analysis and node cluster diagram

Themes	Concepts derived from node cluster diagram	Concepts derived from tree map analysis
Product details	Price, quality, country, brand	Logo, Lipton, box
Product benefits	Health, energy	Health, taste

The next section further explores the major themes based on the query results (Di Gregorio, 2000; Dollah et al., 2017). According to the query results, it is further clear that male participants under standard video viewing conditions used information in the advertisement regarding product and brand details. The NVivo QSR analysis on word frequency query results is as follows. Therefore, this section illustrates the NVivo analysis of visual response selection of the workspace unit.

Major themes related to males who viewed standard video version

The main themes indicate some terms related to information on product and product-specific benefits. Some of the NVivo findings on this theme are as follows.

Table 5.30: NVivo query findings among female participants

Theme	Codes	NVivo QSR query results
Product details	Price	*I will look at the price first (P1) *So, I will look for price to check whether it is affordable or not (P5) *For me, it is the price details before the brand name or logo (P2)
	Quality	*For any product, I will look at the quality first (P3) *Quality is my thing for food and beverages (P6) *Certain countries export tea as a major product. So, I think it is good to check those countries if you are looking for a quality product (P4)

	Country	*From these visuals, I think it can be some Asian country *Country of origin is very important for me (P7) *Certain countries export tea as a major product. So I think it is good to check those countries if you are looking for a quality product (P4)
	Brand	*When you drink matcha tea brand you can enjoy life. (P2) *They try to say when you drink this tea you can recall holidays and your happy times... So, it is about the brand I guess(P4) *In this brand, I think the last visual appeals to me which is the lady enjoying tea.... *They use winter summer and autumn time to emphasize that this brand is suitable for any weather condition and to any occasion (P9)
Product-specific benefits	Health	*Green tea can reduce our weight (P10) *I tried several times to consume green tea and dropped it and tried again to lose weight. I could not continue (P7) *Some interlinks are there. Because they are showing yoga women trying to reduce weight to show the energy and health aspects (P10) *I am not depending on the advertisement to decide what I want. Maybe yoga woman and tea box will help me to some extent when thinking about health and wellness *Healthy lifestyle by yoga girl (P8)

A word frequency analysis in NVivo QSR for the male participants who viewed **standard video version** under visual **response selector** category. Based on the word cloud NVivo QSR analysis above themes be further justified.

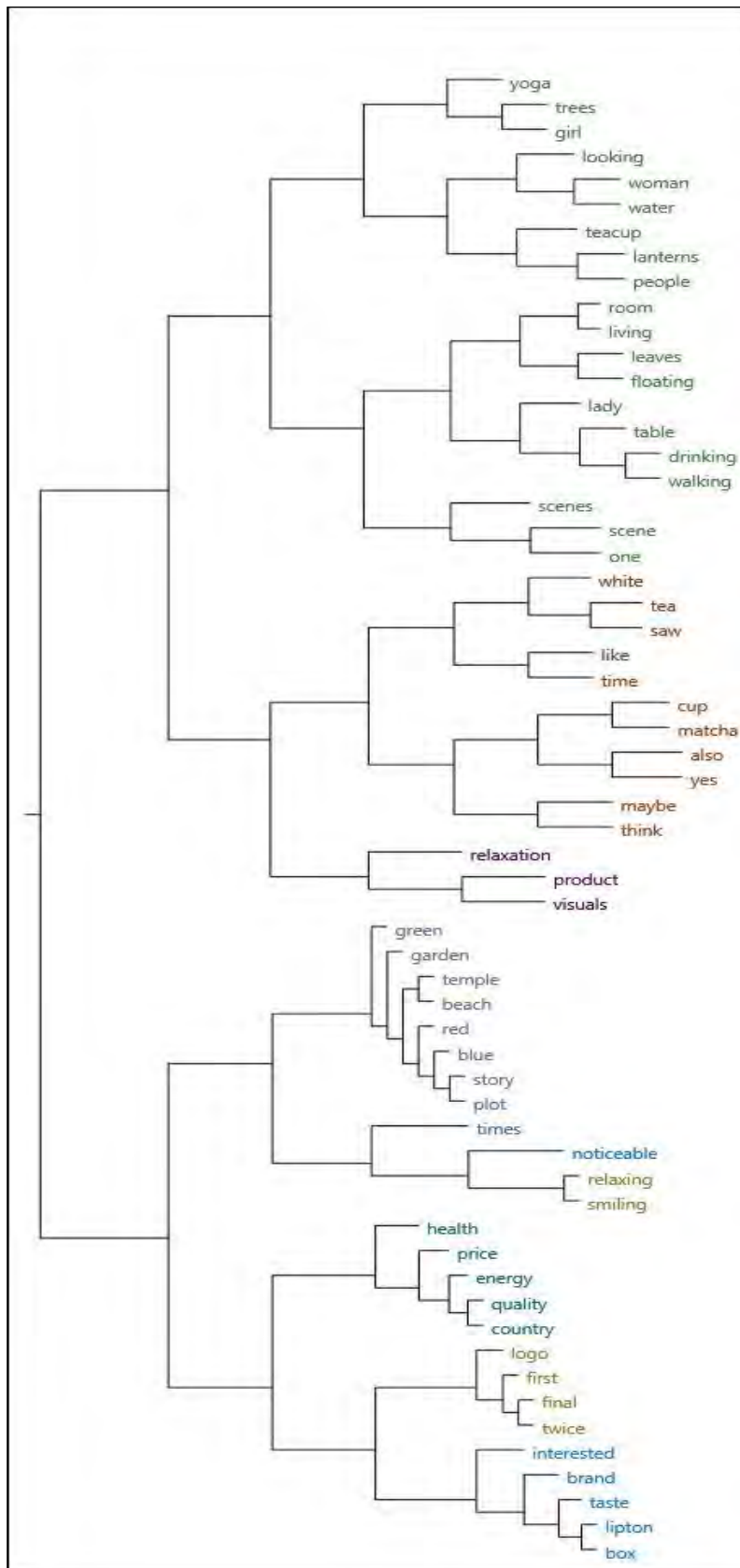
Figure 5.46: NVivo QSR word cloud analysis–Standard video version (male participants)



5.6.3 NVivo analysis for response selector-female participants of the 360-degree video version

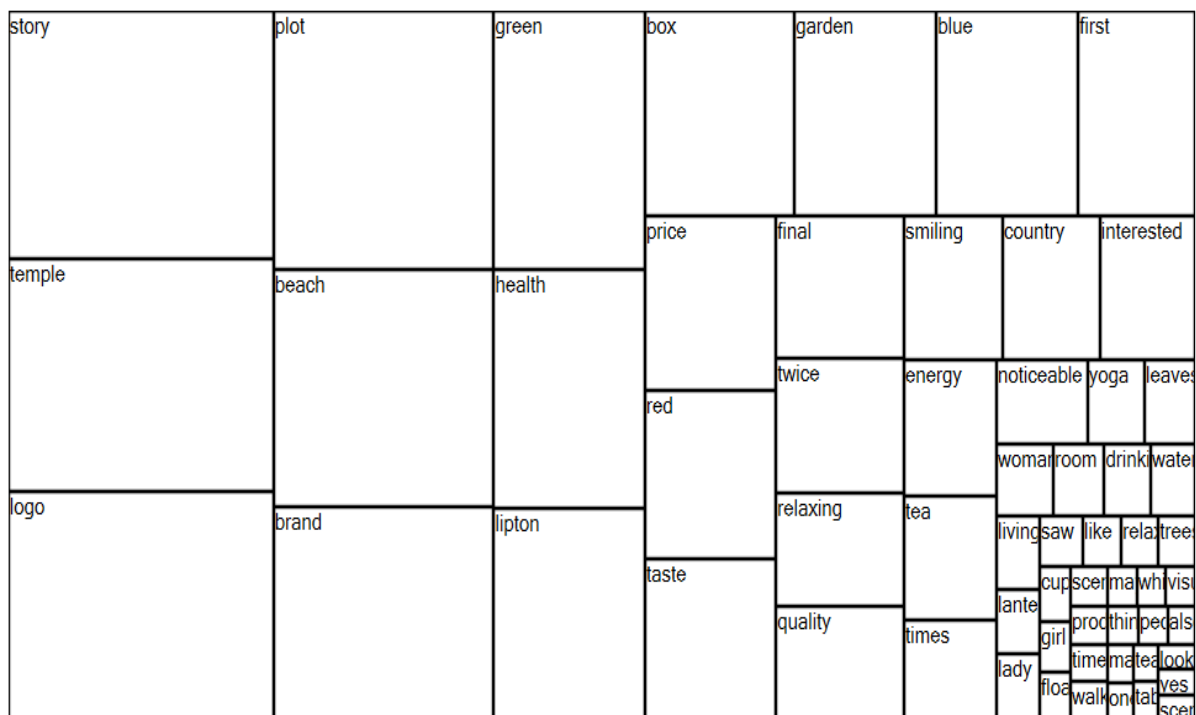
The NVivo findings of the female participants of the 360-degree video version showed two themes as visual memory for product details and product benefits. These findings are similar to the findings under standard video viewing conditions. According to the query results, it is further clear that female participants under 360-degree video viewing conditions remembered visual details regarding product details and products within the visuals. This finding is similar to the findings under standard video viewing conditions. Figure 5.47 illustrates the node cluster diagram using the word similarity approach (Di Gregorio, 2000; Dollah et al., 2017; Hutchison et al., 2010; O'Neill, 2013).

Figure 5.47: The node cluster diagram



The NVivo findings of the female participants of the 360-degree video version showed the theme, product details and product benefits. Based on the above node cluster diagram, the coding in-between the concepts can be further illustrated as below. For example, the concepts including “price”, “quality” and “country” can be considered as product details and “health”, “energy” and “relaxation” can be considered as product benefits. Based on tree map analysis, the density of each concept was checked to label the theme accurately. A tree map is a visual representation of hierarchical data displayed as a series of nested rectangles of varying sizes. To compare the number of coding references, the researcher created a tree map of the nodes (Di Gregorio, 2000; Dollah et al., 2017). Therefore, the tree map analysis conducted through NVivo further showed the effect of each selected node (based on the rectangle size) towards the concepts generating the main themes. Figure 5.48 illustrates the tree map analysis as follows (Di Gregorio, 2000; Dollah et al., 2017).

Figure 5.48: Tree map analysis



The NVivo findings of the female participants of the 360-degree video version showed two themes under visual-based response selection namely, product details and product benefits. According to the query results, it is further clear that female participants under 360-degree

video viewing conditions used this information in the advertisement when making their buying decision.

Table 5.31: Thematic classification based on the tree map analysis and node cluster diagram

Themes	Concepts derived from node cluster diagram	Concepts derived from tree map analysis
Product details	Price, quality, country	Logo, brand, price
Product benefits	Health, relaxation, energy	Health, taste

Therefore, the next section further explores the major themes based on the query results (Di Gregorio, 2000; Dollah et al., 2017). According to the query results, it is further clear that female participants under 360-degree video viewing conditions used information in the advertisement regarding product and brand details. The NVivo QSR analysis on word frequency query results is as follows.

Major themes related to females who viewed 360-degree video version

The main themes indicate some terms related to information on product and product-specific benefits. Some of the NVivo findings on this theme are as follows.

Table 5.32: NVivo query findings among female participants

Theme	Codes	NVivo QSR query results
Product details	Price	*I am interested in the visuals, but it will influence only a little on my buying decision. I will look at other factors like country of origin, brand, quality, and price (P33) *I am a person who admires happiness and living a content life. So, first of all, it is price and then I might look at the brand reputation also. But this varies ...for food, I might say yes..... (P40)

	Quality	*For me, the first choice is quality (P39) *I am interested in the advertisement, but these visuals are not strong enough to influence my buying decision. (P34) *For me it is quality....I do not want to waste my money (P37) *I am interested in the visuals, but it will influence only a little on my buying decision. I will look at other factors like country of origin, brand, quality, and price (P33)
	Country	*I am interested in the visuals, but it will influence only a little on my buying decision. I will look at other factors like country of origin, brand, quality, and price (P33)
	Brand	*I saw the tea box of Matcha on the table (P34) I think green leaves and the matcha name visuals are quite appealing for me (P38) *The purpose is to try to sell the product matcha specifically the first time it was not clear what the brand was. I saw in the first visual, an empty cup and I did not notice the brand name, or about which brand the advertisement is going to be (P40) *I am interested in the visuals, but it will influence only a little on my buying decision. (P33) I will look at other factors like country of origin, brand, quality, and price *Sometimes we can't find it. If you like Lipton, it should be available everywhere (P32) *Being in the Lipton teacup and coming out of the teacup makes me feel good but that doesn't mean I will buy it..... (P34)
Product-specific benefits	Health	*The connection with nature shows that the product is organic and maybe it shows that the product is healthy too (P33) *Yoga woman doing some yoga movements appeals to me (P35) *The goal is to promote green tea and its properties (products) such as organic qualities (P33) *Energy by yoga steps and relaxing through a teacup inside your house (P32)

Relaxation	*Maybe they are trying to promote relaxation through these products (P39) *The various natural landscapes were natural, and they employed several gardens, snow, and lanterns to reinforce the same natural and organic feelings (P33) *Add extra sound effects like waves and water to make you feel like you're within the tea (P32) *Tea leaves and lanterns indicate happiness and inner peace (P31) *Some childhood memories with my sister, my father, and my mother enjoying tea in the living room (P38)

A word frequency analysis in NVivo QSR for the female participants who viewed 360-degree video version under the visual response selector category. Based on the word cloud NVivo QSR analysis, the above themes can be further justified.

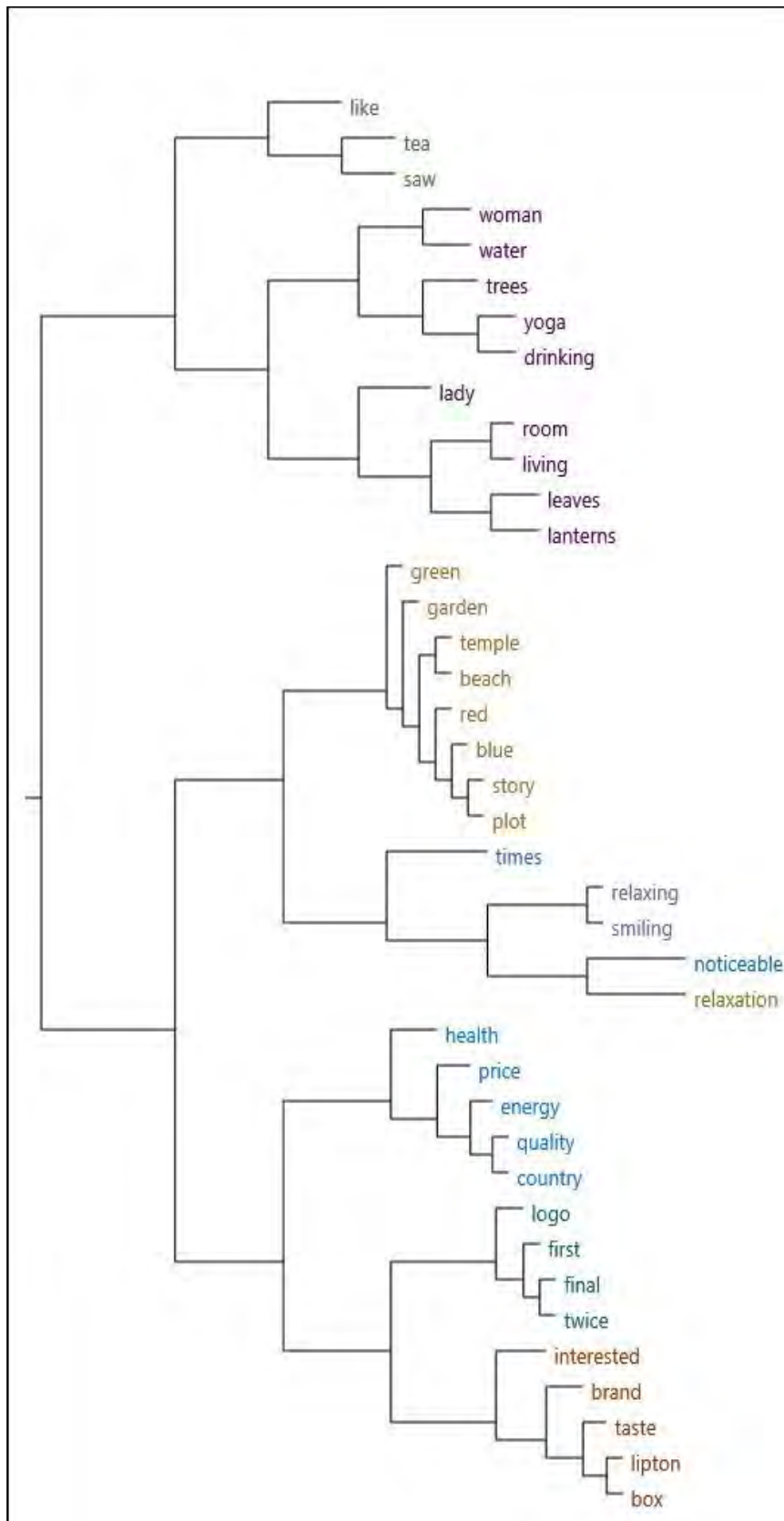
Figure 5.49: NVivo QSR word cloud analysis–360-degree video version (female participants)



5.6.4 NVivo analysis for response selector–male participants of the 360-degree video version

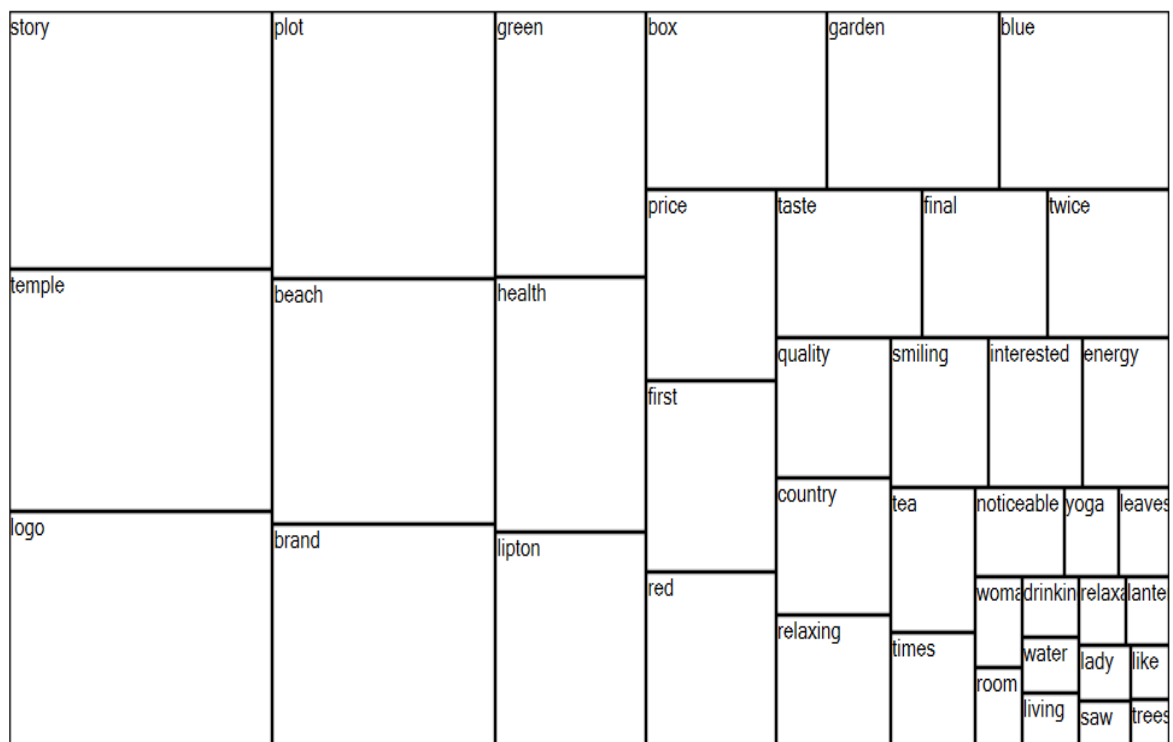
The NVivo findings of the male participants of the 360-degree video version showed two themes—visual memory for brand details and product details. These findings are similar to the findings under standard video viewing conditions. According to the query results, it is further clear that male participants under 360-degree video viewing conditions remembered visual details regarding product details and product benefits within the visuals. This finding is similar to the findings under standard video viewing conditions. Figure 5.50 illustrates the node cluster diagram using the word similarity approach (Di Gregorio, 2000; Dollah et al., 2017; Hutchison et al., 2010; O’Neill, 2013).

Figure 5.50: The node cluster diagram



The NVivo findings of the male participants of the 360-degree video version showed the themes, product details and product benefits. Based on the above node cluster diagram, the coding in-between the concepts can be further illustrated as below. For example, the concepts including “price”, “quality” and “country” can be considered as product details and “health” and “taste” can be considered as product benefits. Based on tree map analysis, the density of each concept was checked to label the theme accurately. A tree map is a visual representation of hierarchical data displayed as a series of nested rectangles of varying sizes. To compare the number of coding references, the researcher created a tree map of the nodes (Di Gregorio, 2000; Dollah et al., 2017). Therefore, the tree map analysis conducted through NVivo further showed the effect of each selected node (based on the rectangle size) towards the concepts generating the main themes. Figure 5.51 illustrates the tree map analysis as follows (Di Gregorio, 2000; Dollah et al., 2017).

Figure 5.51: Tree map analysis



The NVivo findings of the male participants of the 360-degree video version showed two themes under visual-based response selection namely, product details and product benefits. According to the query results, it is clear that female participants under 360-degree video

viewing conditions used this information in the advertisement when making their buying decision.

Table 5.33: Thematic classification based on the tree map analysis and node cluster diagram

Themes	Concepts derived from node cluster diagram	Concepts derived from tree map analysis
Product details	Price, quality, country	Logo, brand, box
Product benefits	Health, energy, relaxation	Health, quality

The next section further explores the major themes based on the query results (Di Gregorio, 2000; Dollah et al., 2017). According to the query results, it is clear that male participants under 360-degree video viewing conditions used information in the advertisement regarding product and brand details. The NVivo QSR analysis on word frequency query results is as follows.

Major themes related to males who viewed 360-degree video version

The main themes indicated some terms related to information on product and product-specific benefits. Some of the NVivo findings on this theme are as follows.

Table 5.34: NVivo query findings among female participants

Theme	Codes	NVivo QSR query results
Product details	Price	*For me, it is price, country of origin, brand image or reputation, the mother company, and flavour. If I hear something bad about the brand, any rumours like people saying things bad consistently or specially any incidents on child abuse or anything, then I will stop buying that product without any second thought....(P24)
	Quality	*I think they are trying to promote good healthy living to encourage people to go out and exercise. Also, they encourage to meditate, to enjoy some quality time with family and friends (P25)
	Country	*I will check the country of origin. If it is from India, then I will not buy it because they do not have any specialized equipment or technology. If it is from Bangladesh, Sri Lanka, or Pakistan, then I will try it (P27) *For me, it is price, country of origin, brand image or reputation, the mother company, and flavour. If I hear something bad about the brand, any rumours like people saying things bad consistently or specially any incidents

Product-specific benefits	Health	on child abuse or anything, then I will stop buying that product without any second thought.... (P24)
		*It let us travel to oriental places in Japan. To travel you must be healthy (P22)
		*For me, it is health-related as green tea is good to reduce belly fat (P23)
		*Lady drinking tea on her sofa looks healthy (P26)

A word frequency analysis in NVivo QSR for the male participants who viewed the 360-degree video version under the visual response selector category is depicted in Figure 5.52. Based on the word cloud NVivo QSR analysis, the above themes can be further justified.

Figure 5.52: NVivo QSR word cloud analysis—360-degree video version (male participants)



5.6.5 Cross-case analysis using matrix coding queries to validate themes

A matrix-coding query is a method for conceptual and theoretical development and is used to validate the themes derived from the qualitative analysis (Bytheway, 2013; Hutchison et al., 2010; O'Neill, 2013). Researchers can utilize the matrix-coding query function to look for information directly from the perspective of the research question (Hutchison et al., 2010).

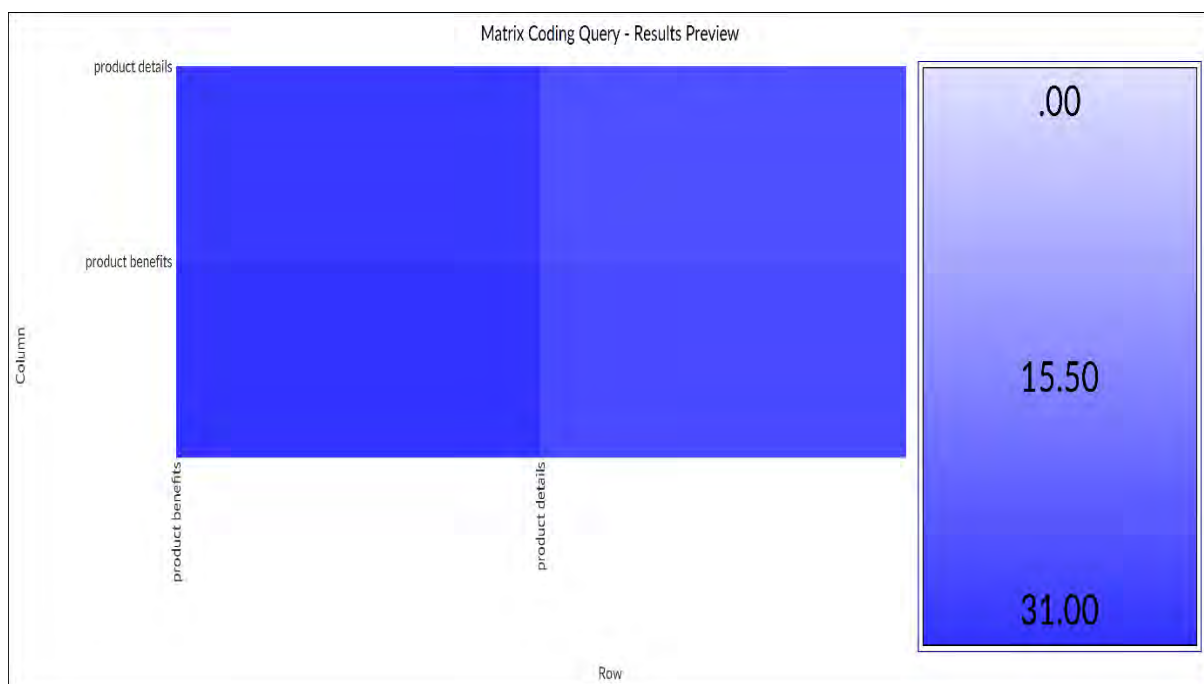
Furthermore, it is useful in identifying the multidimensional aspects and subcategories of a research study (Hutchison et al., 2010). In this research study, matrix-coding analysis was conducted to check the validity of the derived themes and the inter-relationships between the queries in terms of 360-degree and standard video advertisements.

Table 5.35: Matrix-coding query analysis for 360-degree and standard video advertisements under visual-based response selector

		A : product benefits ▼	B : product details ▼
1 : product benefits ▼	▼	31	30
2 : product details ▼	▼	27	26

Based on the above Table 5.35, the comparison query results produced two nodes on product benefits and product details. These two nodes represented 25 to 35 frequently occurring words in the transcripts further showing the validity of the derived themes based on the cross-case matrix analysis (Hutchison et al., 2010).

Figure 5.53: Matrix-coding query: Results preview



The next section discusses the summary of the results as follows:

5.7 Summary of the findings

In this experiment, the visual working memory was divided into four components—comprehension of the visuals, encoding of the visuals, the inference-making ability of the visuals, and response selection within the visuals. Different findings were identified within standard and 360-degree video viewing conditions under the second viewing.

Table 5.36: Results of the participants for Experiment 2

Working memory component	Themes	Standard video version		360-degree video version	
		Key concepts among female participants	Key concepts among male participants	Key concepts among female participants	Key concepts among male participants
Comprehender	Colour detection	Blue/ White/ Green	None	Green/ Maroon/ Yellow/ White	None
	Facial expressions	None	Relaxing/Smiling	None	Smiling/ Relaxing
	The plot or storytelling	Plot/ Story	Story/ Journey	Leaves/ Story	Story/ Leaf
	Visual memory on locations	Temple/ Garden/ Room/ Beach/ House	Temple/ Beach/ Garden/ House/ Room/ Water	Room/ Beach/ Garden/ Living/ Temple	Room/ Beach/ Garden/ Temple

Encoder	Visual memory for objects	Trees/ Lanterns/ Temple	Water/ Temple/ Leaves/ Trees/ Lanterns	Leaves/ Lanterns/ Temple/ Cup/ Table	Leaves/ Temple/ Lanterns
	Visual memory for people	Girl/ Woman/ Lady	Woman	Woman/ Lady	Lady/ Woman
	Visual memory for actions	Drinking/ Walking/ Enjoying/ Looking/ Yoga	Drinking/ Looking/ Yoga	Drinking/ Yoga/ Walking	Yoga/ Drinking/ Walking/ Floating
Inference maker	Emotional engagement	Final/ First/ Twice/ Health/ Brand/ Logo	Brand/ Times/ Price/ Lipton/ Health/ Box	None	None
	Behavioural engagement	None	None	Lipton/ Box/ Logo/ Brand/ Taste/ Interested	Logo/ Brand/ Lipton/ Noticeable/ Taste/ Box
Response selector	Visual memory for product details	Price/ Quality/ Country	Price/ Quality/ Country/ Brand	Price/ Quality/ Country/ Brand	Price/ Quality/ Country
	Visual memory for product benefits	Health/ Energy	Health	Health/ Relaxation	Health

5.7.1 Findings under standard video viewing, under multiple viewing conditions

Firstly, when considering the comprehension of the visuals, female participants were able to comprehend visual content with locations, colour, and visuals depicting the story of the advertisement. Based on the thematic analysis, it was identified that some of the colours comprehended included blue, white, and green. Some of the locations noticed were the temple, garden, living room, and beach. Under the second viewing, both genders were able to identify the plot of the advertisement. Some of the words they frequently used included storyline, plot, and tea leaf journey. In contrast, male participants comprehended facial expressions in the visuals but did not comprehend colours. Based on the thematic analysis, it was identified that some of the identified facial expressions were relaxation and happiness. These findings vary based on gender, as female participants comprehended colours in the visuals while male participants comprehended facial expressions within the visuals, similar to the results of the first experiment. Under the second viewing condition, the new theme identified was the storyline or plot which demonstrated that the participants were able to better understand the story of the advertisement after the second viewing.

Secondly, when considering the encoding of the visuals, both males and females were able to encode objects, people, and actions presented in the visuals. Based on the thematic analysis, some of the noted actions included drinking tea, doing yoga, and walking in the garden. Under the second viewing condition, they were able to notice more actions, such as floating tea leaves, looking around, and enjoying tea. Some of the objects included water, trees, and lanterns. The woman sitting in the living room was either mentioned by the participants as a lady or as a woman. These findings did not vary based on gender.

The third category was inference-making ability. Under second viewing conditions, participants had behavioural engagement-related aspects, for example, counting the number of visuals by stating the number of times the logo appeared. Further, connecting the purpose of the visuals with the previous purchasing experience was another aspect observed, for example, buying the product based on the previous experience regarding brand and quality. Similarly, encoding of the visuals; also in this category, no difference was identified within the genders.

Finally, the fourth category included response selection within the visuals. This category identified some of the visuals which apply to the buyer response. The two main themes identified were the visual memory for product benefits and product details. Both female and male participants noticed both visuals with product benefits and product details. Some of the noticed product details included price, quality, country of origin, and brand. Product-specific benefits included health aspects as most of the participants identified green tea as an organic product that lowers cholesterol and sugar. These findings did not vary based on gender, similar to visual encoding and inference-making categories.

5.7.2 Findings under 360-degree video viewing under multiple viewing conditions

Firstly, when considering the comprehension of the visuals, female participants were able to comprehend the colours, locations. They also understood the plot of the advertisement better after viewing the advertisement for the second time. Based on the thematic analysis, it was identified that some of the colours comprehended were green, maroon, yellow, and white. Under second viewing conditions, participants were able to notice more locations, such as temple, beach, garden, house, and water. In contrast, male participants comprehended facial expressions in the visuals while female participants comprehended colours within the visuals.

Based on the thematic analysis, it was ascertained that some of the identified facial expressions were happiness and relaxation. Under the second viewing condition, both male and female participants were able to comprehend the story of the advertisement better. These findings varied based on gender as female participants comprehended colours in the visuals while male participants comprehended facial expressions within the visuals, similar to standard video viewing conditions.

Secondly, when considering the encoding of the visuals, both males and females were able to encode objects, people, and actions presented in the visuals; however, encoded information in the advertisement regarding actions, objects, and people was less than in the standard video viewing condition and most of the participants did not notice all the presented actions, objects, and people within the visuals. The noticed objects, people, and actions were comparatively low in 360-degree video viewing than in standard video viewing. Also, most of the answers were correct regarding the presented actions, objects, and people. For example, under first viewing, a girl doing yoga was noticed as a girl preparing for diving under the 360-degree video

condition. Also, the woman presented in the visuals was recorded as a man or most of the participants mentioned that they did not see anybody due to movement aspects in the Google Cardboard. Under second viewing conditions, all the participants answered correctly, which shows that after multiple viewings, they were able to comprehend the visuals correctly. These findings did not vary based on gender.

The third category was inference-making ability. This major theme indicated behavioural engagement. Participants frequently mentioned that the 360-degree video was immersive as they had to engage with it, for example, finding the product logo by themselves as it was in the bottom of the glass cup. Another example was that they felt relaxation and coldness when watching the swirling leaves in the green water. These findings did not vary based on gender. It was clear that under standard video viewing conditions, behavioural engagement was not identified. Also, several participants mentioned that they felt the transition effect of being inside the teacup when the last visual moved to the living room scene.

Finally, the fourth category included response selection within the visuals. This category identified some of the visuals which apply to the buyer response. The two main themes identified were visual memory for product details and product-specific benefits. Both female and male participants noticed visuals indicating the product details and product-specific benefits.

Some of the noticed product details included terms such as price, brand, quality, and country of origin. Product-specific benefits included the health benefits of consuming green tea such as lowering cholesterol and sugar levels. In 360-degree video conditions, most of the participants mentioned that they could not see any pricing information in the product package or any quality maintenance logo. This further shows that they were not able to find the information they were looking, for such as price, availability of the product, health benefits of the product, and details regarding the quality standards. These findings did not vary based on gender.

5.8 Conclusion

The qualitative findings of experiment 2 are explained in this chapter. This chapter begins with an overview of experiment 2, then moves on to the results of experiment 2 for female and male participants. As a result, the second research question (RQ2) is addressed in this section—RQ2: What is the differential effect of 360-degree versus standard video advertisements on visual memory under repeated viewing conditions? Under multiple viewing conditions, the qualitative results will be compared to identify differences in themes for consumer visual memory for 360-degree and standard video advertisements.

Experiment 2 identified that when considering the comprehension of the visuals, female participants were able to comprehend the colours within the visuals while male participants comprehended facial expressions under both viewing conditions of standard and 360-degree video versions. Both males and females were able to encode objects, people, and actions presented in the visuals. However, encoded information in the 360-degree video viewing conditions regarding actions, objects, and people was less than in standard video viewing conditions and most of the participants did not notice all the presented actions, objects, and people within the visuals in 360-degree video condition even after viewing it for the second time. This was likely owing to the movement aspects in the Google Cardboard. This could also identify as a weakness of 360-degree videos.

When considering the visual inference-making ability, emotional engagement was identified during standard video viewing conditions as participants counted the number of times the logo appeared on the screen and connected the purpose of the visuals with the previous buying experience. Under 360-degree video viewing conditions, both female and male participants had some behavioural engagement. In 360-degree video conditions, most of the participants mentioned that they had to find the brand logo by themselves as it was in the bottom of the glass cup, and they felt relaxation and coldness when watching the swirling leaves in the green water. Also, several participants mentioned that they felt the transition effect of being inside the teacup when the last visual moved to the living room scene.

Both female and male participants focused on visuals with the product and product-specific benefits under the inference-making category. In both 360-degree video conditions, most of the participants mentioned that they could not see any pricing information in the product

package or any quality maintenance logo, country of origin details in the product package. They focused more on the health benefits under product-specific benefits. In both standard and 360-degree video conditions, most of the participants mentioned that after viewing a second time, they were able to see pricing information in the product package, or the quality maintenance logo as expected. This is because in the second viewing, they knew where to look.

Before commencing Experiment 2 of the present research, the general memory questionnaire was excluded as all the participants had a good general working memory score. Therefore, in experiment 2, the general memory questionnaire was excluded as the same 40 participants were recalled to participate after one week. The one-week timeline was allocated to avoid the fatigue of the participants as experiment one took about two hours (2 hours) to complete. Similarly, Group A participants watched the 360-degree version of the Magnificent Matcha Lipton tea video advertisement, and Group B participants viewed the standard version of the Magnificent Matcha Lipton tea video advertisement under multiple viewing conditions. Since all the tasks were functioning as intended, no further changes were included to the experiment design. The results of the experiment one and two will be further discussed in next chapter.

Chapter 6 : Discussion and Conclusion

“One day you will tell your story of how you overcame what you went through, and it will be someone else’s survival guide” – *Brene Brown*

6.1 Introduction

The previous chapter provided an overview of the results of the second experiment. The purpose of this chapter is to provide a detailed discussion of the results of the overall research investigation including the exploratory qualitative stages. This chapter explains the results of the two experiments as visual arrangement strategies for standard and 360-degree video advertisements. The main scope of this study is to explore consumer visual memory of 360-degree and standard video advertisements using the four theoretical assumptions of the ‘workspace’ unit (visual memory) presented in the theory of social information processing by Wyer (2003). This chapter discusses the key themes and findings in relation to the main research questions of: “What are the differential effects on consumer visual memory for 360-degree and standard video advertisements under single viewing conditions?” and “What are the differential effects on consumer visual memory for 360-degree and standard video advertisements under repeated viewing conditions?” Additionally, this section demonstrates how advertising companies, marketing agents, salespeople can design effective advertisements using standard and 360-degree video versions in a way that appeals to consumer visual memory.

In addressing the two research questions, two studies were conducted as study 1 and study 2, which are presented in chapter 4 and 5 respectively. The first research question aimed to identify the differential effects of 360-degree and standard video advertisements on consumer visual memory under single viewing conditions which led to the formation of the research question RQ1: “What is the differential effect of 360-degree versus standard video advertisements on visual memory under single viewing conditions?” The second research question aimed to identify the differential effects of 360-degree and standard video advertisements on consumer visual memory under repeated viewing conditions, which led to the formation of the research question RQ2: “What is the differential effect of 360-degree versus standard video advertisements on visual memory under repeated viewing conditions?”

These research questions were addressed qualitatively as justified in section 3.2.5. This approach is summarised in Table 6.1.

Table 6.1: The manner in which research questions are addressed in the dissertation

Research Question	The manner in which research questions are addressed
RQ1: What is the differential effect of 360-degree versus standard video advertisements on visual memory under single viewing conditions	Theoretical reasoning is discussed in chapter 2 (literature review). The formation of the study 1 is discussed in chapter 3 (methodology). The thematic data analysis is discussed in chapter 4 (experiment 1: results)
RQ2: What is the differential effect of 360-degree versus standard video advertisements on visual memory under repeated viewing conditions?	Theoretical reasoning is discussed in chapter 2 (literature review). The formation of the study 2 is discussed in chapter 3 (methodology). The thematic data analysis is discussed in chapter 5 (experiment 2: results)

There is a detailed discussion regarding the findings presented in this chapter on how the findings from the qualitative analysis in study 1 and study 2 have addressed each of these two research questions, (outlined in Section 6.2 and section 6.3 respectively). In the next section, visual arrangement under the four segments of comprehension, encoding, inference maker and response selector for standard and 360-degree video advertisements is discussed in detail.

6.2 Research question 1: What is the differential effect of 360-degree versus standard video advertisements on visual memory under single viewing conditions?

Study 1 addressed this research problem. A total of 10 main themes were identified under the four categories of visual comprehension, encoding, inference making and response selection. These were colour detection, facial expressions, visuals on locations, visuals on objects, visuals on people, visuals on actions, multi-cultural symbols, behavioural engagement, visuals on product details and visuals on brand details.

Based on study 1 results, under both viewing conditions of 360-degree and standard video advertisements, female participants were able to comprehend the colours while male participants were able to comprehend the facial expressions. Both male and female participants were able to comprehend visuals on locations within the visuals. In addition, both males and females were able to encode objects, people, and actions in the visuals. Under the inference-making category, both female and male participants noticed the multi-cultural symbols within the visuals. However, behavioural engagement was only noticed under 360-degree video viewing conditions. Under the response selection category, participants noticed product and brand details separately in both the viewing conditions of 360-degree and standard video advertisements. The results of the study 1 are summarised in Table 6.2.

Table 6.2: Summary of the findings under single viewing conditions

Themes	Standard video advertisement	360-degree video advertisement
Color detection	Green / White/ Maroon/ Pink/ Yellow	Green/ Maroon/ White/ Blue/ Pink
Facial expressions	Calm/ Relaxing/ Smiling	Calm/ Smiling
Visuals on locations	Temple/ Garden/ Beach/ Living room/ Water	Garden/ Beach/ Living room/ Water/ Temple

Visuals on objects	Tea/ Water/ Leaves/ Cup/ Trees/ Lanterns	Tea/ Teacup/ Leaves/ Forgot/ Water/ Cup/ Lanterns/ Table
Visuals on people	Woman/ Lady	Man/ Nobody/ Lady/ Woman
Visuals on actions	Yoga/ Drinking/ Walking	Drinking/ Yoga/ Floating
Multi-cultural symbols	Sakura/ Western/ Temple/ Yoga/ Asian/ European/ China/ White/ Architecture/ Japan	Temple/ Architecture/ Sakura/ Asian/ European/ Western/ China/ Japan/ Western
Behavioural engagement	None	Immersive/ Curious/ Excited/ Feel
Visuals on product details	Lipton/ Promote/ Place/ Price/ Logo/ Tea/ Green/ Package/ Tea box/ Product	Tea box/ Organic/ Green/ Package/ Health
Visuals on brand details	Tea box/ Green/ Package/ Tea/ Logo/ Matcha/ Lipton/ Brand	Tea/ Logo/ Lipton/ Brand

6.3 Research question 2: What is the differential effect of 360-degree versus standard video advertisements on visual memory under repeated viewing conditions?

Study 2 addressed this research problem. A total of 11 main themes were identified under the four categories of visual comprehension, encoding, inference making and response selection. These were colour detection, facial expressions, plot or storytelling, visuals on locations, visuals on objects, visuals on people, visuals on actions, emotional engagement, behavioural engagement, visuals on product details and product benefits.

Based on study 2 results, under both viewing conditions of 360-degree and standard video advertisements, female participants were able to comprehend the colours while male participants were able to comprehend the facial expressions. Both male and female participants were able to comprehend visuals on locations within the visuals. In the second viewing, both male and female participants were able to comprehend the story of the advertisement better. In addition, both males and females were able to encode objects, people, and actions in the visuals. Under the inference-making category, both female and male participants did not notice the multi-cultural symbols the first time. Also, behavioural engagement was only noticed under 360-degree video viewing conditions and emotional engagement was identified under standard video viewing conditions only. Under the response selection category, participants noticed product details and product benefits separately in both viewing conditions of 360-degree and standard video advertisements. The results of the study 2 are summarised as follows in Table 6.3.

Table 6. 3: Summary of the findings under repeated viewing conditions

Themes	Standard video advertisement	360-degree video advertisement
Color detection	Blue/ White/ Green	Green/ Maroon/ Yellow/ White
Facial expressions	Relaxing/ Smiling	Relaxing/ Smiling

Visuals on locations	Temple/ Garden/ Room/ Beach/ House/ Wate	Room/ Beach/ Garden/ Living/ Temple
Plot or storytelling techniques	Plot/ Story/ Journey	Leaf/ Story
Visuals on objects	Trees/ Lanterns/ Temple/ Water/ Leaves	Leaves/ Lanterns/ Temple/ Cup/ Table
Visuals on people	Girl/ Woman/ Lady	Lady/ Woman
Visuals on actions	Drinking/ Looking/ Yoga/ Walking	Yoga/ Drinking/ Walking/ Floating
Emotional engagement	Final/ First/ Twice/ Health/ Brand/ Logo / Times/ Price/ Lipton/ Box	None
Behavioural engagement	None	Box/ Taste/ Interested/ Logo/ Brand/ Lipton/ Noticeable
Visuals on product details	Price/ Quality/ Country/ Brand	Price/ Quality/ Country/ Brand
Visuals on brand details	Health/ Energy	Health/ Relaxation

Under the second viewing condition, it was identified that participants were able to understand the story of the video advertisement better than under the first viewing condition. Further, a new theme of emotional engagement was identified under the repeated viewing conditions in the standard video advertisement. Additionally, in the second viewing, participants focused more on the visuals on product benefits other than product details and brand details. The next

section discusses the thematic findings based on the four categories of encoder, comprehender, inference maker and response selector separately.

6.4 Visual arrangement strategies for standard video advertisements

Visual and verbal information are integrated in the consumer world today. It has been argued that the ability to remember product information and the ability to purchase the products based on the memory of an advertisement are closely related (Lee et al., 2021; Onișor & Ioniță, 2021; Rana et al., 2020). This is further supported through this theoretical construct based on the social information-processing theory of Wyer (2003) by examining whether individual differences in dimensions that have been shown to affect memory for advertisement visuals similarly influence buying behaviour. The findings of this thesis further support advertising agencies by identifying visual arrangement strategies which are suitable for selling products through different video advertisement formats, including 3D, 360-degree, and traditional format (Lee et al., 2021; Onișor & Ioniță, 2021; Potts & Swisher, 1998). The visual arrangement strategies for standard video advertisements are of four types: visual comprehension, visual encoder, visual-based inference maker and visual-based response selector. The factors that influence the consumer visual memory are investigated by considering gender differences (Ali, 2021; Demsar et al., 2022; Hoch & Ha, 1986). The phenomenal visual arrangement characteristics associated with remembering, such as colours, facial expressions and the valence of the events have major effects on the ability to remember things (Ali, 2021; Demsar et al., 2022; Hoch & Ha, 1986).

6.4.1 Visual comprehension strategies for standard video advertisements

In experiment 1 and 2, it was identified that colour detection, facial expressions, visual memory on locations and plot of the advertisement were the main thematic findings.

Colour detection in visuals

When considering colour detection, it was identified that female participants noticed more colours in the visuals than male participants. Advertising is crucial since it is the element of marketing that consumers are most exposed to (Seimiene & Kamarauskaite, 2014). When creating marketing strategies, gender should be considered since men and women behave differently as consumers (Seimiene & Kamarauskaite, 2014). Colour has been found to

influence performance and activate senses in the learning environment, causing positive or negative behaviour such as avoidance or withdrawal (Jalil et al., 2013; LoBue & DeLoache, 2011). It has been discovered that visual stimulation improves attention span, enhances cognitive capacities, and refreshes one's sense on environment; however, results vary depending on gender and background (Jalil et al., 2013; LoBue & DeLoache, 2011).

Marketers believe that men and women behave differently as customers, buying various items, watching different TV shows, and reacting to advertising in different ways (Kiper & Ulema, 2021). As a result, when segmenting customers, marketers frequently consider gender (Kiper & Ulema, 2021). This indicates that a product may be advertised differently based on gender, for example, by portraying it with a feminine or masculine image (Kiper & Ulema, 2021; LoBue & DeLoache, 2011). Colour is another crucial aspect utilized to draw the target audience's attention, as colours, in images, convey realism, establish moods, and construct brand identities (Anatasia et al., 2016; Hingorani, 2008). In advertisements, the visuals with colours has two main components. According to Moriarty (1987), literal visuals include identification (e.g., package, brand, logo), description (e.g., what it looks like, parts, attributes), comparison (e.g., between competitors, before and after), and demonstration (e.g., how to use, apply), whereas symbolic visuals include visuals of association (e.g., lifestyle, typical person, situation), association using a character (e.g., how to use, apply) and aesthetics (e.g., details become art, pattern, abstraction). The use of colour in corporate and marketing communications is vital (Aslam, 2006; Koller, 2008; Lichtlé, 2007). It affects people's feelings and emotions, shapes their perceptions and behaviour, and helps businesses position themselves or stand out from the competitors (Aslam, 2006; Bilal, Asghar, Nawaz, & MahmoodZaman, 2021; Koller, 2008). Therefore, the theme 'colour detection' demonstrates the concepts identified through symbolic and literal visuals among the participants (Anatasia et al., 2016; Hingorani, 2008).

In designing the advertisements, to promote products for women, the selection of colour codes is important as females have an ability to detect more colours in the visuals (Abramov et al., 2012). This finding can be further justified based on the previous literature as follows. An experiment conducted by Abramov et al., (2009) found that females thrive in discriminating between colours, while men excel at tracking fast-moving objects and discerning detail from a distance, similar to the evolutionary traits in hunter-gatherer history. Hue, saturation, and brightness are three different variables that can be used to define colour experiences (Abramov

et al., 2012). The term “hue” refers to the shade of a colour, such as red, yellow, or green. Saturation refers to the deepness of the experience, such as the difference between a fire-engine red and a pastel red (pink) as the former is extremely saturated, while the latter is less saturated; white is completely desaturated (Abramov et al., 2012). The term “brightness” has a common meaning: stimuli ranging from black to grey to white vary in brightness (Abramov et al., 2012).

Abramov et al. (2012) investigated whether there were any gender variations in the colour appearance of monochromatic lights across the visible spectrum. Men and women tended to assign different shades to identical items in colour trials (Abramov et al., 2009; Abramov et al., 2012). Males require a somewhat longer wavelength than females to perceive the same colour throughout much of the visible spectrum (Abramov et al., 2009). Since longer wavelengths are linked with “warmer” colours, a man may see an orange as reddish more so than a woman. Similarly, the grass is usually always greener for women than for males, who see green items as somewhat yellower (Abramov et al., 2009; Deng et al., 2010). There were slight but substantial variations in the colour sensations generated by practically the full spectrum between males and females. Males, on average, required a slightly longer wavelength than females to perceive the same colour (Abramov et al., 2009; Abramov et al., 2012; Deng et al., 2010; Mogi et al., 2021). Therefore, as a major finding, it is suggested that to promote products for women, advertisement designers should select colour codes with shorter wavelengths across a visible spectrum. These colours include red, yellow, green, blue, alone or in combination with the visuals (Abramov et al., 2009; Abramov et al., 2012; Deng et al., 2010; Mogi et al., 2021). These findings are in line with the previous works by Jalil et al. (2013); Kiper & Ulema, (2021); LoBue & DeLoache, (2011); and Seimiene and Kamarauskaite, (2014) as discussed above.

Facial expressions in visuals

When considering the facial expressions in visuals, it was identified that in advertisements, emotional appeal is prevalent (Zhou et al., 2021). In advertisements, displaying emotions arouses more attention and generates better marketing outcomes (Higgins & Lauzon, 2003). Consumers’ attitudes and buying habits are influenced by their emotions (Higgins & Lauzon, 2003; Menon & Kahn, 2001). Young and Hugenberg (2010) found that facial expressions not

only express the subject's inner feelings but also provoke and influence the emotional state of the observer of the facial expression. People associate a wide range of expressions with diverse feelings, including amusement, wonder, pleasure, curiosity, pain, and triumph, according to empirical studies led by computational techniques (Cordaro et al., 2018; Cowen & Keltner, 2020). Beneficial emotional expressions displayed on the face can transmit positive information (Mueser et al., 1984). Employees in the service business, for example, frequently exaggerate their positive emotional responses to improve the customer experience (Barger & Grandey, 2006; Hadinejad et al., 2019). However, with video commercials, this may not always work (Wang et al., 2017). For example, Wang et al. (2017) found that smiles in commercials are not always effective.

Consequently, the theme of facial expressions was categorized by the authors based on the key concepts of calm, relax and smile and creating positive emotional engagement among consumers, for example, charity advertisements, and advertisements for public welfare projects stimulate the compassion of the audience and promote people's response to prosocial behaviour (Small & Verrochi, 2009; Zhou et al., 2021). As per the Perception-Action Model of Empathy, individuals' representations of others' states are triggered by their perceptions of others' states, and a series of responses will ensue, for example, unconsciously following others' laughter during parties (Preston & De Waal, 2002). Some other examples in the academic literature include the ability of positive emotional expressions to enhance the consumer experience (Mueser et al., 1984). For example, they highlighted that when employees in the service industry want to improve the consumer's experience, they may exaggerate their positive emotional expressions (Barger & Grandey, 2006). Similar findings were identified by Pugh (2001), who examined the causes and consequences of displayed emotion in organizations. Findings indicated that the display of positive emotions by employees has a positive influence on the customers' positive feeling following service encounters and their evaluation of the quality of the service provided (Pugh, 2001). Emotional expression by employees is predicted by transaction business and employee emotional expressiveness (Pugh, 2001). As a major finding, it was identified that male participants noticed facial expressions in the visuals during multiple viewing times, hence, as a major finding it is suggested that to promote products for men, it is highly recommended to add some facial expressions in the visuals to get the attention of the audience. These findings are in line with the previous works of Barger & Grandey,

(2006); Mueser et al., (1984); Preston and De Waal, (2002); Pugh, (2001); and Small & Verrochi, (2009) as discussed above.

Visual memory on locations

Advertisements are often based on locations to provide different atmospheres to customers from different countries (Banerjee & Dholakia, 2012). As a major visual comprehension strategy, it was found that larger visuals accompanying 2/3 of the screen have the capacity to get noticed more (Banerjee & Dholakia, 2012; Kurtz, Wirtz, & Langer, 2021). In Asian advertisements, for example, traditional buildings are used to illustrate the difference in culture. Non-Asians viewed this aspect as an attractive feature because they are not familiar with the locations, and the ability to view a different setting makes them curious (Morris, 2014). As a result, advertising designers used different locations to advertise products in order to gain a competitive advantage by taking advantage of consumers' curiosity (Clawson, 1974; Hudson & Tung, 2010). The spatial memory theory states that when people learn the locations of objects in a new environment, they interpret the spatial structure of the environment in terms of a spatial reference system (McNamara, 2002). Similarly, findings illustrated that in both viewing conditions, both female and male participants noticed several locations and no gender difference was observed, further showing that usage of different locations to advertise products arouse curiosity among consumers is a competitive advantage. These findings are in line with previous works of Banerjee and Dholakia, (2012); Clawson, (1974); Kurtz et al., (2021); and McNamara, (2002).

Storytelling or plot of the advertisement

Storytelling is also known as narrative advertising, and as Escalas and Stern (2003) pointed out, people prefer to think in narratives rather than in arguments, thus it can have a positive impact on how buyers think and perceive a brand or product (Woodside et al., 2008). Storytelling advertising allows businesses to set themselves apart from their competition while also assisting in the development of new or existing relationships with potential or existing clients (Bloom & Liljenberg, 2018). The theme regarding the plot was identified as a result of the second experiment in which consumers were able to understand the tea leaf journey of this

advertisement better after viewing it for the second time. As a major visual encoding strategy, it was identified that when arranging visuals for the advertisements, it is necessary to arrange the visuals considering the order of the story. For example, the first scene can be about the product, the second scene can be about the benefits of the product, and the third scene can be about the product information such as brand logo, price, and quality. Therefore, when arranging visuals, it is required to arrange them according to the plot of the advertisement as consumers will understand the story of the advertisement better when viewing it multiple times (Bushman & Phillips, 2001; Wedel & Pieters, 2000). These findings are in line with previous works by Feng, (2018); and Feng, Xie, & Lou, (2019).

6.4.2 Visual encoding strategies for standard video advertisements

In experiment 1 and 2, it was found that visual memory for objects, people, and actions of the advertisement were the main thematic findings.

Visual memory for objects

Video captioning traditionally asks for a comprehensive description of the video, although detailed descriptions of individual objects are not commonly included (Zhu et al., 2020). Most methods employ frame-level intertwined features among objects while training, which makes detecting vision-language relationships difficult (Zhu et al., 2020). Without identifying the classes and locations of distinct objects nor determining the transition paths among them, these data-driven image-based video captioning methods simply cannot explain the activities based on visual features alone (Zhu et al., 2020). The objects in a visual are placed to serve a variety of functions, such as drawing the viewer's attention to a certain place or establishing a visual flow from top to bottom (Collado et al., 2021; Zhu et al., 2020). Since the background objects are noticeable in an advertisement, organizing the objects properly throughout the scenes is important (Feng, Xie, & Lou, 2019; Zhu et al., 2020). The major findings indicated that although participants were able to encode large objects (such as buildings, furniture, walls, garden, trees) with a size of more than a quarter of the visual, smaller objects were not noticed during the viewing, such as the floating brand logo, the floating brand quota or the brand name. This was due to the abstract view in standard videos and the panorama view in 360-degree videos. Thus, standard videos were found to be ineffective in viewing smaller objects occupying less than 2/3 of the screen.

These findings can be further justified based on recent studies. Researchers have applied the detection of small moving objects to monitor flying insects, study their foraging behaviour, use insect pollinators to track the flowering process and the pollination of crops, and monitor honeybee colonies and track their movements (Stojnić et al., 2021). In light of the lack of distinguishing shape and texture details on small objects, the direct application of modern object detection methods based on convolutional neural networks has considerably lower performance (Stojnić et al., 2021). Developing an effective system for detecting small moving objects poses a number of challenges, for example, a non-invasive detection method for honeybees must not interfere with their flight during recording (Stojnić et al., 2021). Yoshihashi et al. (2021) showed the difficulty of detecting tiny objects in a high-resolution video as the visual information is scarce and unreliable. In particular, Yoshihashi et al. (2021) identified the challenge as the low resolution of the objects. Li et al. (2005) developed a novel method for detecting baseball video scenes for the purpose of inserting commercial advertisements. It was found that adding virtual advertisements in sports videos was more effective than physical billboard advertisements and video advertisements during commercial breaks as the objects in the video may confuse the original physical billboard. Also, the advertisements on the billboard may not be correctly focussed (Li et al., 2005). Hence, the advertisements in virtual billboards are always clear and visible (Li et al., 2005).

Therefore, when arranging visuals for standard video advertisements, it is not necessary to spend more time in designing small objects within the visuals. Due to the abstract view of the standard video advertisements, participants will not remember all the details regarding the small objects in the visuals. These findings are in line with previous works by Stojnić et al., (2021); and Yoshihashi et al., (2021).

Visual memory for people

To advertise products that are suited to certain age groups, advertisement designers should use the appropriate age range of people (Peterson & Kerin, 1977; Zipporah & Mberia, 2014). People are utilized in advertisements in the same way as colours are used in advertisements (Lannon & Cooper, 1983), for instance, cosmetic products marketed to young women and energy drinks marketed to young males (Lannon & Cooper, 1983). As the commercial becomes more dynamic, the use of people becomes more important (Peterson & Kerin, 1977; Zipporah

& Mberia, 2014). When arranging visuals with people, advertisement designers need to consider two main factors. Firstly, the applicability of the person based on the product or brand type; for example, the use of well-known energetic people (sports stars or cricket players) to sell energy drinks, and secondly, adding fewer numbers of people per visual.

Congruence between brand and the person

Consistent with earlier studies (Djafarova & Rushworth, 2017; Fleck et al., 2012; Peterson & Kerin, 1977; Spry et al., 2011; Tan et al., 2021), the applicability of the person based on the product or brand type is highlighted many times in the findings of these studies; for example, use of well-known energetic people (sports stars or celebrities) to sell energy drinks and the use of celebrities for beauty products.

Table 6. 4:Thematic findings on visual memory for people

	Thematic Findings
People	* I highly suggest adding a family instead of one lady to give that atmosphere of drinking tea in the living room * The yoga lady is a perfect match for an energetic tea type like Lipton * There were some visuals which match with the purpose of the advertisement such as yoga lady, living room scene with a lady drinking tea after a busy day * The first few scenes were confusing as it was like you are going underwater for some time and it does not match for a tea advertisement. Specially to promote tea, you can add few scenes indicating family time or maybe a workplace where some busy people tasting tea and energising themselves

As per study findings, it was highly suggested for advertisement designers to consider the applicability of the person based on the product or brand type. According to Bower and Landreth (2001), finding a suitable person (e.g., a celebrity) and a product enhances the effectiveness of ads not necessarily by eliciting arguments about the product from the celebrity appearance, but by improving perceptions of the celebrity's expertise about the product. Similarly, Peterson and Kerin (1977) found similar results by identifying the need for female celebrities to know the product information before appearing for the advertisement. There is some evidence that the match-up between the product type and the celebrity's beauty may be more important than the celebrity's beauty alone, and that an attractive celebrity may

sometimes be more effective than one who is not normally attractive (Bower & Landreth, 2001; Fleck et al., 2012).

The main problem of advertising designers is to understand the applicability of the celebrities or sports stars to the advertisement. Previous findings suggested several factors to consider when selecting people for advertisement visuals. Devilliers (2004) revealed that consumers are influenced by celebrities especially in the cosmetics and perfume industry. Jacques Helleu, the artistic director of Chanel explained that this is the only way to leave a strong impression on consumers' minds so that they will make a purchase when they are in a retail outlet later on (Devilliers, 2004). Some other factors include effectiveness of the message based on the perceived level of expertise and trustworthiness (Spry et al., 2011) and how the selected celebrities transmit an extensive set of associations to brands they endorse (Djafarova & Rushworth, 2017; Spry et al., 2011). Therefore, when arranging visuals for standard video advertisements, it is necessary to decide the congruence between brand and the person when arranging visuals about people.

Fewer people per visual

Consistent with earlier studies (Bezjian-Avery et al., 1998; Onișor & Ioniță, 2021; Welch Cline & Young, 2004), the major findings of this research indicated the importance of having fewer people per visual. In interactive advertising, presenting several people per visual is not effective as it is not possible to remember the details of all the people within a small interval as a standard advertisement usually takes around 3 to 5 minutes (Bezjian-Avery et al., 1998; Onișor & Ioniță, 2021; Welch Cline & Young, 2004). It was found that in short- and long-term memory, information is stored in pieces. Pairing concepts with images is one of the best ways to ensure that information is retained in long-term memory. Hence, Xu et al. (2021) compared the effectiveness of visual memory involving a crowded image and a single person image. Further, it was identified that having lot of information or details in one image or scene makes it difficult to remember in both the short and long run. Therefore, when arranging visuals, it is required to arrange the visuals comprising people by considering the two aspects of congruence between brand and the person and adding fewer people per visual. These findings are in line with previous works by Bower & Landreth, (2001); Fleck et al., (2012); and Xu et al., (2021).

Visual memory for actions

The major findings indicated that participants noticed the actions throughout the visuals and that these visuals were able to evoke the motivation to purchase the product. While it is well established that informational appeals are ineffective in changing social views and behaviours, the literature is divided on whether appeal (positive, negative, or both) is most effective in modifying social behaviour (Yousef et al., 2021). For example, if the advertisement focuses on promoting an energy drink, the applicable actions, such as running and exercising will evoke the motivation to purchase the product among the consumers (Al-Shibly et al., 2019; Berger & Alford, 2009; Decker et al., 1996).

Table 6. 5: Thematic findings on fewer people per visual

Actions	Thematic Findings
	*The woman doing yoga in the beach shows energy *I would like to try this product...I think it is that visual with a lady doing yoga which appeals a lot to me here *I think the woman drinking tea, shows that she must be having some rest after a long day at work

As per study findings, it is highly suggested for advertisement designers to consider the applicability of actions based on the product or brand type. In an advertisement promoting an energy drink, the actions that are associated with the product, such as running and exercising, may evoke motivation in the consumers to purchase the product (Al-Shibly et al., 2019; Berger & Alford, 2009; Decker et al., 1996). Advertisement designers need to understand the applicability between brand benefits and the actions. The literature has recently introduced a new advertising appeal that has persuasive advantages. Nike and Adidas commercials, for example, often associate their products with a sense of adventure, risk taking, courage, or exceptional boldness (Hetsroni & Asya, 2002). Co-active marketing is a relatively new concept wherein a message utilizes both positive and negative emotions to engage an audience in a journey that highlights both negative and positive elements. In social marketing communications such as anti-cyberbullying advertisements (Alhabash et al., 2019) and promoting sun-safety behaviours (Mukherjee & Dubé, 2012), mixed appeals are more effective than negative appeals. Therefore, when arranging visuals, it is important to arrange the visuals

with actions that evoke the motivation to purchase the product. Hence, advertisement designers can decide this based on the product benefits; for example, energy drink promotions by running visuals. These findings are in line with previous works by Mukherjee & Dubé, (2012); and Siegenthaler et al., (2021).

6.4.3 Visual inference maker strategies for standard video advertisements

In experiment 1 and 2, it was identified that visual memory for multi-cultural symbols and emotional engagement were the main thematic findings.

Multi-cultural symbols

Marketing mix elements can be considered as the most visible activity within a company, and these are heavily influenced by cultures, which are widely recognized as important factors in economic development, demographic behaviour, and general business policies around the world. They direct how people interpret the messages they receive (Sani et al., 2018). According to recent research, the use of multi-cultural symbols can increase the likelihood of engagement and enthusiasm for advertising (Johnson & Grier, 2011; Morris, 2014; Poole et al., 2021). The theme, multi-cultural symbols was identified based on the key concepts of terms such as Japanese, Chinese, Indian, Architecture, Asian and Western. Through these experiments, it was found that standard video advertisements were successful in displaying the multi-cultural symbols within the visuals. The locations with cultural symbols (for example: temple and fireplace in the western type living room) in advertisements played a vital role due to the different atmospheres presented to customers from different countries (Kurtz et al., 2021). For example, Asian advertisements use traditional buildings which shows the unique cultural architecture. This aspect was found to be an attractive attribute for non-Asians as they are not familiar with the locations and the ability to look at a different place makes them curious to watch the visuals (Johnson & Grier, 2011; Poole et al., 2021). Consequently, several researchers, (e.g., Johnson & Grier, (2011); Martínez-Gibson, (1998); & Poole et al., (2021)) showed that advertising designers can use multicultural symbols to improve curiosity, interest and engagement among viewers.

For example, the earliest study that has assessed cultural proficiency and the use of videos showed that participants were able to recognize the cultural content of commercials when they

were combined with cultural discussion activities before and after viewing the video (Martínez-Gibson, 1998). Martinez-Gibson (1998) stated that the visual aspect of television commercials contributes to the understanding and awareness of cultural information by participants. Similarly, Agarwala et al., (2021) found that businesses strive to accommodate their target audiences by adapting their messages according to their culture, as part of intercultural communication. As a result, they use many different aspects of cultural symbols to become more similar to and gain the approval of their intended audience (Agarwala et al., 2021). Zeybek and Ekin (2012) showed the importance for brand managers to use cultural symbols in selling global food products. As a secondary finding, they showed the ability of cultural symbols in developing brand trust. When arranging visuals for advertisements, it is required to arrange the visuals with multi-cultural symbols as it could improve brand trust levels. In this research however, in the second viewing this was not noticed by participants in both 360-degree and standard video viewing conditions meaning that it is not necessary to put a lot of effort into placing multi-cultural symbols when designing the advertisement visuals.

Emotional engagement

Emotional engagement refers to the involvement with enthusiasm towards the activities in the video (Hamby & Jones, 2021). Most of the recent research examining the influence of story-based advertisements on persuasion is based on theories of narrative and character involvement (Hamby & Jones, 2021). Furthermore, these theories suggest that stories are persuasive due to the emotional investment ensuing (Hamby & Jones, 2021). Advertising and communication industries recognize the importance of stories as persuasive and memorable (Kim et al., 2020). Nevertheless, stories can vary in terms of the emotions they evoke (t al., 2019). In video advertising, eliciting favourable emotional responses is considered a powerful method of engaging customers (Hamby & Jones, 2021; Feng, Xie, & Lou, 2019). The possibility of achieving desirable downstream communication outcomes increases when viewers are emotionally engaged (Hamby & Jones, 2021; Vakratsas & Ambler, 1999; Feng, Xie, & Lou, 2019). Psychology has made significant progress in understanding the consequences of unpleasant emotions similar to fear and anxiety on attention (Escalas & Stern, 2003; Hadinejad et al., 2019; Small & Verrochi, 2009). Positive emotions are also used in consumer advertising (Escalas & Stern, 2003; Hadinejad et al., 2019; Small & Verrochi, 2009). As a result, advertising research has concentrated on positive emotions such as joy and surprise to evoke

feelings among the consumers (Griskevicius et al., 2010). Through these experiments, it was identified that standard video viewing conditions had a higher emotional engagement than the 360-degree video version. Hence, it is important for standard video advertisements to demonstrate a higher emotional engagement through various visual arrangement strategies. Based on the literature, some of the visual arrangement strategies which evoke emotions can be considered as the “art infusion” effect.

Art infusion effect to improve emotional engagement

Art infusion is a phenomenon that arises from human inherent ability to recognize creativity and skill involved in artistic expression within advertisements (Naletelich & Paswan, 2018). Art infusion, according to previous studies, is not dependent on the contents of visual artworks or the popularity of their creators (Hagtvedt & Patrick, 2008). A product that incorporates artistic elements is perceived by consumers as more valuable than one that does not, even when the artists are not well known, and their creations are unknown to the general public (Peluso et al., 2017). Photographic re-creations of human emotions, such as smiling or crying faces, can improve emotional engagement through art infusion. In here the visuals should focus the human emotions through the abstract view generated through standard video advertisements. As an illustration of art infusion, Hagtvedt and Patrick (2008) created advertisements for bathroom fittings that featured either an artwork (Vermeer's *Girl with a Pearl Earring*), a photographic re-creation of the scene (which was not considered art), or no image at all. Participants rated the bathroom fittings more favourably when viewing the ad with an art image than with a non-art image or no image (Hagtvedt & Patrick, 2008).

The researchers found a similarly significant effect of art infusion on assessment of a soap dispenser regardless of whether the artwork itself was evaluated positively (Monet's *Palazzo da Mula*) or negatively (Turner's *Burning of the House of Lords and Commons*) (Hagtvedt & Patrick, 2011). Based on these prior studies, there were practical effects of art on consumers' evaluations of products. This further supports this study findings by showing the importance of adding emotions to the advertisement visuals.

6.4.4 Visual response selection strategies for standard video advertisements

In experiment 1 and 2, it was identified that the visual memory for product details, product benefits and brand details constituted the main thematic findings.

Visual memory for product details

Researchers doubt that the visual system creates and uses a composite visual representation across fixations without the ability to join visual information from one fixation to the next (Castelhano & Henderson, 2005). For example, people appreciate the look of a product based on three main design characteristics (Haase et al., 2018). These design dimensions are perceived aesthetics, utility, and symbolism in greater detail (Brunner et al., 2016; Toufani, et al., 2017). In both single and repeated viewing, participants were able to identify the product details with the visuals such as logo, product package or the teabox. However, 360-degree video advertisements have been found to be effective in demonstrating product details as most of the participants in the 360-degree video viewing condition mentioned that some of the product details including teabox, pricing, and the details of green tea such as health and quality information were noticeable (Feng, 2018; Feng, Xie, & Lou, 2019; Yaoyuneyong et al., 2016). Hence, standard videos were found to be ineffective in demonstrating the visuals based on the product details.

The results from the visuals on object information memory literature supports the contention that viewers remember the object information mainly for two reasons; firstly, the activation of the strategic memory—knowledge about the world and how it is used by the brain to perform tasks of spatial orientation can be termed strategic memory. By improving the engagement level of users, virtual reality can activate task-based spatial orientation. The 360-degree video advertisements activate the strategic memory more than the standard video advertisements were able to during the viewing of the video advertisement, due to virtual reality exposure. Hence participants pay more attention to product-specific details as a result of the strategic memory activation. Secondly, eye movement during the viewing; 360-degree video advertisements are found to have a higher eye movement rate than the standard video advertisements (Ausin-Azofra et al., 2021).

Studies have shown that eye movements are closely associated with cognitive processes such as attention, memory, and decision making. It is not only true that eye movements reflect certain aspects of brain function, revealing information about feelings and desires to others, but also, they can be actively involved (Xu et al., 2020; Zhu et al., 2018). In addition, 360-degree video advertisements activated cognitive processes such as attention, memory, and decision making, allowing the user to memorize the product details better than standard video viewing conditions. Based on these prior studies, standard video advertisements become ineffective when assigning the product details to viewer memory as they do not activate the viewer's strategic memory and eye movements. As a visual arrangement strategy, advertising designers can improve the ability to memorise more product details within the visuals in standard video advertisements by improving eye movement. Prior studies suggest have suggested that inserting more actions can enhance the eye movement of viewers (Polat, 2020). Further, strategic memory activation can be done by adding visual details of previously viewed objects, such as repeating the product information in more than one or two scenes of the advertisement (Castelhano & Henderson, 2005).

Visual memory for product benefits

The theme, product benefits, indicated aspects such as health benefits, discount, quality, and quantity benefits. Consumers frequently seek diagnostic information on specific product benefits while evaluating items or services (Goodarzi et al., 2021; Meyvis & Janiszewski, 2002). Exposure to obviously irrelevant information (information that consumers see as clearly uninformative regarding the intended benefit) is a natural result of this search for diagnostic information. Consumers' perceptions of a product's potential to deliver the desired benefit should not be shifted by the presence of unnecessary information (Meyvis & Janiszewski, 2002). Therefore, the theme, product benefits, was identified based on the positive key concepts such as health and relaxation. For example, some of the query results were, *"For me, it is health-related as green tea is good to reduce belly fat"* and *"Maybe they are trying to promote relaxation through these products."* Further, it was found that participants became interested in finding about the product benefits during the second viewing although they did not consider this during their first viewing (Goodarzi et al., 2021; Meyvis & Janiszewski, 2002). Similar to 360-degree videos, standard video advertisements were also found to be effective in demonstrating the product benefits. Hence, it is important for standard video advertisements to

demonstrate product benefits through various visual arrangement strategies. Based on prior studies, it was found that both narratives and metaphor can successfully express the benefits of a product (Coulter et al., 2001; Proctor et al., 2005).

Usage of narratives

When considering the narratives in advertisements, story-based communication is often the focus, which further illustrates the core of narrative psychology by comprehending experience (Bruner, 2004). Experience is best portrayed and conveyed through narratives (Bruner, 2004). It may be particularly effective to communicate the value of experiential services through stories (Padgett & Allen, 1997). The narrative in advertisements needs to be developed by integrating visuals to form personally relevant meanings to be used in evaluating advertising information (Mattila, 2000); for example, selling an Indian Maruti car by using visuals relating to a middle-class family since the Maruti is a popular vehicle for middle class people in India (Chattopadhyay, 2013). It is possible to convey this meaning in a compelling way through the presentation of a story in which the characters are portrayed as consuming the service (Jones & McBeth, 2010; Mattila, 2000).

Based on Escalas' (2004) findings, the organization of information in an advertising narrative might influence the consumer's decision on the most appropriate strategy for processing information. For example, consumers were more likely to give a positive assessment of vacations described by narrative as opposed to those described by attributes (Wyer et al., 2002). This advantage of narrative communication is attributed to two factors: (a) narrative's structural similarity to information acquired over time through daily life experiences, and (b) consumers' determination to match incoming information to their prior knowledge structures (Wyer et al., 2002). Accordingly, as a visual arrangement strategy, advertising designers can use the narrative visualisation strategy by integrating visuals to form personally relevant meanings to be used in evaluating advertising information.

Usage of metaphor

While portraying metaphor, advertising designers need to consider two aspects. As a result of the use of metaphors by the media, several things occur simultaneously (Kullenberg & Säljö, 2021). Firstly, the generalization of this form of understanding tends to emphasize certain

aspects of the reality while obscuring others that are inconsistent with it (Joy et al., 2009; Kullenberg & Säljö, 2021). Simply, the concept behind those words needs to be relevant for the product and it must highlight the benefits of the product. For example, “Is this a good hamburger? Let’s taste it. Is this a good car? Let’s drive it” (Joy et al., 2009), and secondly, using the fused metaphor to demonstrate the specific product benefits by combining the product's symbols or aspects of a situation with it, or objects that are somehow related to it, into one image (Joy et al., 2009; Kullenberg & Säljö, 2021). In advertising, fused metaphors are much more prevalent than pure metaphors since it is easier to illustrate a product's benefit by integrating it with something else (Joy et al., 2009; Kullenberg & Säljö, 2021). Additionally, it is more comprehensive for an observer to gain an understanding of the hidden message (Joy et al., 2009; Kullenberg & Säljö, 2021). In fusion metaphors, a product (or something associated with it, such as toothpaste and toothbrushes) is fused with another concept (a highway with cars) in order to appeal to consumers (Joy et al., 2009; Kullenberg & Säljö, 2021). This further supports this study findings by showing the importance of adding narratives and metaphor to the advertisement visuals when highlighting product benefits.

Visual memory for brand details

Brand image and advertisement were found to be vital in increasing business performance as brand image is an implied tool that can positively influence people's buying behaviours, and advertisement acts as a driving force to convey message to customers (Malik et al., 2013; Mandliya et al., 2020). The experiment’s findings indicated that both female and male participants noticed visuals with product and brand details. Some of the noticed brand details included the terms such as Lipton, Place, Logo, Location of the product and package details. Product details included terms such as teabox, pricing, and the details of green tea such as health and quality information. In this research, 360-degree video advertisements were found to be ineffective in demonstrating the brand details as most of the participants in the 360-degree video viewing condition mentioned that they missed some of the brand details including logo and brand name (Feng, Xie, & Lou, 2019; Yaoyuneyong et al., 2016). Hence, standard video advertisements were found to be more effective in demonstrating the brand details due to the abstract view of the videos (McQuarrie & Phillips, 2016). Based on prior studies, it was found that visual memory for brand details can be further improved through visual branding strategies. Visual branding refers to the ability of the advertisement to visually convey a

company's values and personality (McQuarrie & Phillips, 2016). The purpose of a visual identity is to create an emotional connection between the brand and the consumer through the colours, shapes, and fonts of the company's logo design, website, and business cards (McQuarrie & Phillips, 2016; Sharma & Varki, 2018).

Research into consumer behaviour has largely ignored product-relevant information stored in visual memory (McNeal & Ji, 2003). A single image may be sufficient in determining product choice, independent of attitudes or beliefs retrieved from a verbal or symbolic memory (McNeal & Ji, 2003). It is possible that visual recognition latency is all that is involved in the decision-making process when children or adults encounter familiar products in a supermarket (McNeal & Ji, 2003). As a result, McNeal and Ji (2003) confirmed the existence of a rich data base in children's visual memories for cereal brands, demonstrating that children's choices may differ depending on which type of information is situationally retrieved. Additionally, they identified measurement biases favouring verbal memory in contemporary consumer research and urged more research on visual memory, both among children and adults.

However, when brands have to decide on the visual design, the product design process takes place within the context of the brand's equity (Heitmann et al., 2020). Several years are required for firms to build equity in their brands (e.g., Datta et al., 2017). As a result of its ability to drive customer lifetime value (Stahl et al., 2012), brand equity is definitely valued. A product's brand equity can be viewed as the differential preference and response to marketing efforts that a product receives as a result of its marketing efforts (Heitmann et al., 2020). When demonstrating brand details, it is necessary to identify the differential preference and response to marketing efforts with the product's brand equity (Heitmann et al., 2020; McNeal & Ji, 2003; Patrick & Hollenbeck, 2021). This supports findings further by showing the importance of adding brand details that consider the product's brand equity.

6.5 Visual arrangement strategies for 360-degree video advertisements

Several scholars argued the fact that the ability to remember product information and the ability to purchase the products based on the memory of an advertisement are closely related (Lee et al., 2021; Onișor & Ioniță, 2021). This study supports this theoretical construct based on the social information-processing theory by Wyer (2003), by examining whether individual differences in dimensions that have been shown to affect memory for advertisement visuals

similarly influence buying behaviour. Similar to the visual arrangement strategies for standard video advertisements, this section discusses the visual arrangement strategies for 360-degree video advertisements based on the four types of visual comprehension: visual encoder, visual-based inference maker and visual-based response selector. The factors that influence consumer visual memory are investigated by considering gender differences (Ali, 2021; Demsar et al., 2022; Hoch & Ha, 1986). The significant visual arrangement characteristics associated with remembering, such as colours, facial expressions and the valence of the events have major effects on the ability to remember things in human memory (Ali, 2021; Demsar et al., 2022; Hoch & Ha, 1986).

6.5.1 Visual comprehension strategies for 360-degree video advertisements

In experiment 1 and 2, it was identified that colour detection, facial expressions, visual memory on locations and plot of the advertisement were the main thematic findings.

Colour detection in visuals

When considering colour detection, it was identified that female participants noticed more colours in the visuals than male participants. Compared with the standard video version, the 360-degree video version permits participants to notice more colours within the visuals. Based on the literature, this can be justified mainly in two main aspects. Firstly, 360-degree videos have been produced by integrating visuals taken from a collection of cameras (Tenic, 2018; Feng, Xie, & Lou, 2019). When video is recorded with a 360-degree camera, the whole moment is captured. It is for this reason that extreme sports, exotic destinations, experiences of wildlife, and different kinds of concerts are popular in the 360-degree video format (Tang, Fakourfar et al., 2017). The 360-degree videos are considered as immersive or spherical videos, in which the video recordings consist of a view in every direction and photo shoots are conducted by using an omnidirectional camera or a collection of cameras (Tang et al., 2017). During playback on a normal flat display, the viewer has control of the viewing direction similar to a panorama (Tenic, 2018; Feng, Xie, & Lou, 2019). According to Chen et al., (2017) humans are only able to concentrate on a few significant objects or items of a complex scene when it comes to their visual system. This type of behaviour is known as the visual attention mechanism. In general, this leads humans to feel attracted towards colours and high contrast resolution in the videos (Tenic, 2018). Further, El-Nasr and Yan (2006) found that observers

are biased towards which objects to see when they view a scene. This is known as selective attention which allows them to extract information that is crucial from the abundant visual input viewpoint.

Based on prior research, it can be shown that 360-degree videos are created using a collection of cameras with limited scenes that lead viewers to concentrate on a few significant objects or items of a complex scene when it comes to their visual system. This type of behaviour creates a visual attention mechanism that leads humans to be attracted towards colours and high contrast resolution in the videos due to limited views in the scene. This factor is important when designing 360-degree video advertisements, as limited scenes in the viewing allow the participants to focus more on the colours and high contrast resolution in the videos (Tenic, 2018; Feng, Xie, & Lou, 2019).

Secondly, with a traditional video, the viewer has an overview of the entire video and only must follow the action with their eyes. In a 360-degree video, the audience does not have the same view (Tenic, 2018). The video begins with a specific angle of the scene and viewers are required to interact with it to move around and see everything (Tenic, 2018). This leads to viewers detecting more colours owing to higher eye movement in 360-degree videos (Tenic, 2018). As mentioned in section 6.2.4, the 360-degree video advertisements are found to have a higher eye movement rate than standard video advertisements (Ausin-Azofra et al., 2021). Studies have shown that eye movements are closely associated with cognitive processes such as attention, memory, and decision making. It is not only true that eye movements reflect certain aspects of brain function, revealing information about our feelings and desires to others, but they can also be actively involved (Xu et al., 2020; Zhu et al., 2018).

Studies demonstrate that 360-degree video advertisements activate cognitive processes, such as attention, memory, and decision making, which enable the user to retain more details about the product than standard video viewing (Xu et al., 2020; Zhu et al., 2018). Considering these previous studies, standard video advertisements are ineffective for committing product details to viewer memory because they do not activate the viewer's strategic memory and eye movements. Through improving eye movement in standard video advertisements, advertising designers can improve the ability to memorize more product details within the visuals. Prior studies suggest that inserting more actions can enhance the eye movement of viewers (Polat,

2020). Accordingly, as a visual arrangement strategy, advertising designers can enhance colour detection in visuals by integrating visuals taken from a collection of cameras and by improving eye movements when advertising products for females.

Facial expressions in visuals

When considering facial expressions in visuals, it was identified that in advertisements, emotional appeal is prevalent (Zhou et al., 2021). Consequently, the theme of facial expressions was categorized by the authors based on the key concepts of calm, relax and smile and creating positive emotional engagement among consumers; for example, charity advertisements and advertisements on public welfare projects stimulate compassion in the audience and promote people's response to prosocial behaviour (Small & Verrochi, 2009; Zhou et al., 2021). In advertisements, displaying emotions arouses more attention and generates better marketing outcomes (Higgins & Lauzon, 2003). Consumers' attitudes and buying habits are influenced by their emotions (Higgins & Lauzon, 2003; Menon & Kahn, 2001). Similar to standard video advertisements, under the 360-degree video condition, it was also identified that male participants noticed facial expressions in the visuals during multiple viewing times. It is suggested that to promote products for men, it is highly recommended to add some facial expressions in the visuals to get the attention of this audience. These findings are in line with previous works by Barger & Grandey, (2006); Mueser et al., (1984); Preston & De Waal, (2002); Pugh, (2001); and Small and Verrochi, (2009) as discussed above.

Visual memory on locations

It is common practice to advertise based on location in order to provide a variety of atmospheres for customers coming from different countries (Banerjee & Dholakia, 2012; Kurtz et al., 2021). In terms of visual comprehension strategies, it has been found that larger images occupying at least two-thirds of the screen are more likely to be noticed (Banerjee & Dholakia, 2012; Kurtz et al., 2021). As an example, in Asian advertisements, traditional buildings are used to illustrate the cultural differences. Non-Asian participants viewed this aspect as an attractive feature as they are unfamiliar with the locations and seeing a different environment makes them curious (Morris, 2014). Consequently, advertising designers have used different locations to advertise products by taking advantage of the curiosity among consumers as a competitive advantage (Clawson, 1974; Hudson & Tung, 2010). As stated in the spatial memory theory,

when people learn the location of objects in a new environment, they interpret its spatial structure in terms of a spatial reference system (McNamara, 2002). Additionally, findings revealed that both female and male participants observed several locations in both viewing conditions with no gender difference being observed. It was shown that the use of different locations to advertise products aroused the curiosity of consumers, resulting in a competitive advantage. The findings are consistent with previous findings of Banerjee & Dholakia, (2012); Clawson, (1974); Kurtz et al., (2021); and McNamara, (2002). However, compared with the standard version, comparatively a smaller number of locations were noticed by both female and male participants under the 360-degree video condition. This was identified by previous researchers as a result of interaction boundaries. With 360-degree videos, the main objective is to give the audience an immersive experience in which the viewer can explore a scene for themselves (Tang et al., 2017). This means the viewer is positioned in the centre of the action (Tang et al., 2017).

Interaction boundaries

In a traditional video, the audience has an overview of the entire video and only needs to follow the action with their eyes (Ens et al., 2019). The video is positioned so that it begins from a specific angle of the scene, and the viewer needs to interact with it to view the entire scene (Ens et al., 2019). This interaction is different from that of watching a 360-degree video. In a 360-degree video, the user can see many subjects or objects, such as during a concert or tutorial of some sort (Banerjee & Dholakia, 2012; Clawson, 1974; Kurtz et al., 2021; McNamara, 2002). By holding the camera, characters in the video can move quickly when performing an action sport such as freestyle skiing. In addition to a tripod, the camera position can be fixed, and the characters can move in front of the camera (Banerjee & Dholakia, 2012; Clawson, 1974; Kurtz et al., 2021; McNamara, 2002). It is sometimes difficult to pick up everything that is interesting in the video—it all depends on the theme. Howard and Holcombe (2010) mention quick movement as an example of something that is difficult to process. Further, the user needs to move the viewing device and put in extra effort when viewing the content of the video. This was confirmed as a major reason that viewers miss the main visuals in-between the scenes (Ens et al., 2019). Similarly, findings illustrated that in both viewing conditions, both female and male participants noticed several locations and no gender difference was observed. This further

shows that usage of different locations to advertise products arouses curiosity among consumers and is a competitive advantage.

Storytelling or plot of the advertisement

Storytelling is also known as narrative advertising (Tenic, 2018; Feng, Xie, & Lou, 2019). Storytelling advertising allows businesses to set themselves apart from their competition while also assisting in the development of new or existing relationships with potential or existing clients (Bloom & Liljenberg, 2018). The theme regarding the plot was identified as a result of the second experiment in which consumers were able to understand the tea leaf journey of this advertisement after viewing it for the second time. Compared with the standard version, the 360-degree version was found to be effective in storytelling advertising. Based on prior studies, two reasons have been identified for 360-degree video advertisements being more effective than the standard version.

Improving the interactive nature through rich imagery, and spatial sound design

Firstly, 360-degree videos are considered "the ultimate empathy machine" (Feng, Xie, & Lou, 2019) due to their interactive nature, rich imagery, and spatial sound design (e.g., the sound experience varies when viewing directional changes). Further, 360-degree videos offer new opportunities for digital brand storytelling, as these videos can be viewed on popular social media platforms such as YouTube and Facebook (Cohen & Dromi, 2018). Research indicates that 360-degree video ads receive 29% more views and higher click rates than the same videos produced in standard format (Feng, Xie, & Lou, 2019). Furthermore, when compared to traditional video ads, 360-degree video ads were found to have a 7% increase in purchase intent on smartphones and a 12% increase in the belief that a brand has a unique story to tell (Tenic, 2018; Zhu et al., 2018).

Arranging visuals for the advertisements based on the story of the advertisement

Secondly, as a major visual comprehension strategy, it was identified that when arranging visuals for the advertisements, it is necessary to arrange the visuals considering the order of the story (Tenic, 2018; Feng, Xie, & Lou, 2019; Zhu et al., 2018). For example, the first scene can be about the product, the second scene can be about the benefits of the product, while the third

scene can be about the product information such as brand logo, price, and quality (Cohen & Dromi, 2018). In spite of the increasing popularity of 360-degree video ads, designing content for such videos is challenging. While viewers tend to navigate freely through the frame, video producers often do not take the initiative to direct viewers' attention to a specific scene to better convey the plot (Cohen & Dromi, 2018). Video creators are uncertain whether viewers will pay attention to the areas they intend to highlight while viewers may become confused and frustrated in their attempts to determine the "correct" viewing path (Cohen & Dromi, 2018). Therefore, when arranging visuals, it is required to arrange them according to the plot of the advertisement as consumers will understand the story of the advertisement better when viewing it multiple times (Bushman & Phillips, 2001; Wedel & Pieters, 2000). These findings are in line with previous works by Cohen & Dromi, (2018); Feng, (2018); and Feng, Xie, & Lou, (2019).

6.5.2 Visual encoding strategies for 360-degree video advertisements

In experiment 1 and 2, it was identified that the visual memory for objects, people, and actions in the advertisement constitute the main thematic findings.

Visual memory for objects

Video captioning traditionally requires a comprehensive description of the video, although detailed descriptions of individual objects are not commonly included (Zhu et al., 2020). Most methods employ frame-level intertwined features among objects while training, which makes detecting vision-language relationships difficult (Zhu et al., 2020). Participants were able to encode large objects (such as buildings, furniture, walls, garden, and trees) with a size of more than a quarter of the visual; smaller objects were not noticed during the viewing, such as floating brand logo, floating brand quota or brand name. This was due to the abstract view in the standard video version and the panorama view in the 360-degree video version. Therefore, 360-degree videos were found to be effective in overcoming this problem through behavioural engagement and immersions. Based on prior studies, this finding on 360-degree videos can be further justified as follows. The comparison studies on 360-degree video and standard video advertisements showed that 360-degree video advertisements are more engaging than the standard video advertisements.

For example, Google partnering with Columbia Sportswear created an ad campaign around two U.S. Olympic skiers enjoying an epic season in Chile using both a 360-degree video advertisement and a standard video advertisement to find out whether spherical video ads drive more viewer engagement than standard video ads (Habig, 2016). Even though the 360-degree video advertisement had a lower retention rate than the standard advertisement, it had a higher click-through rate meaning that viewers were more interested in viewing the full-length version of the video (Habig, 2016). This experiment proved that 360-degree videos have more user engagement than standard videos. The 360-degree video technology encourages viewers to become involved in the action by controlling their perspective with a simple angle of a smartphone or through their mouse point (Habig, 2016; Feng, 2018; Feng, Xie, & Lou, 2019). These findings are useful when arranging the visuals for 360-degree video advertisements, as they can arrange interactive objects (such as flying logos) to improve the visual memory of the viewers (Habig, 2016; Feng, Xie, & Lou, 2019).

Visual memory for people

People are utilized in advertisements in the same way as colours are used in advertisements, and as the commercial becomes more dynamic, the use of people becomes more important (Lannon & Cooper, 1983). However, findings indicated that the number of noticed people were comparatively low in 360-degree video advertisements than in the standard video advertisements. Also, most of the answers were incorrect regarding the presented actions, objects, and people. For example, under the first viewing, a girl doing yoga was noticed as a girl preparing for diving under the 360-degree video condition. Also, the woman presented in the visuals was recorded as a man and most of the participants mentioned that either they did not see anybody or just saw a hand only in the visuals due to movement aspects. The number of noticed people was comparatively low and most of the answers were incorrect regarding the presented actions, objects, and people. Videos using the 360-degree format were found to be ineffective in highlighting the people compared to the standard video versions. Based on the literature it was understood that this was due to the specific angles in the scenes and the quick movement of the objects within a small timeline (Banerjee & Dholakia, 2012; Clawson, 1974; Kurtz et al., 2021; McNamara, 2002). By organising visuals for specific angles and by reducing the quick movement of the objects within a small timeline, advertising designers can improve

viewers' ability to memorize more people-oriented details within the 360-degree video advertisements.

Visual memory for actions

Background objects were noticeable in the advertisement; therefore, organizing the objects properly throughout the scenes is important. The major findings indicated that participants were able to encode large objects (such as buildings, furniture, walls, garden, and trees) with a size of more than a quarter of the visual and smaller objects were not noticed during the standard video viewing (such as floating brand logo, floating brand quota or brand name). Hence, 360-degree videos were found to be more effective than standard videos in overcoming this problem through behavioural engagement and immersiveness.

Based on prior studies, this can be further justified as follows. Participants noticed the actions throughout the visuals and these visuals were able to evoke the motivation to purchase the product. While it is well established that informational appeals are ineffective in changing social views and behaviours, the literature is divided on whether appeal (positive, negative, or both) is most effective in modifying social behaviour (Yousef et al., 2021). For example, in the advertisement focusing on promoting an energy drink, the applicable actions such as running and exercising will evoke consumers' motivation to purchase the product (Al-Shibly et al., 2019; Berger & Alford, 2009; Decker et al., 1996). As mentioned in section 6.3.2, it was found that even though the 360-degree video advertisement had a lower retention rate than the standard advertisement, it had a higher click-through rate meaning that viewers were more interested in watching the full-length version of the video (Habig, 2016). Feng, Xie, & Lou, (2019) evaluated the perceptions of novelty, presence (e.g., spatial presence, engagement, ecological validity), ad attitudes, and brand attitudes for three 360-degree video ads and three standard video ads. Their findings indicated that the advantage of 360-degree video advertising over standard video advertising occurs when the standard version possesses a moderate degree of narrative structure, while this advantage is diminished when its standard version features either a low or high degree of narrative structure (Feng, Xie, & Lou, 2019).

In the study by Feng (2018), 360-degree narrative video ads were compared to standard narrative video ads in terms of transportation, ad usefulness, emotional responses, ad attitudes, and brand attitude. In the present study, the differences in ad effectiveness between a 360-

degree narrative video and a standard narrative video appear to be significant when the effect of perceived ease of navigation is considered (Feng, 2018). The performance of a 360-degree narrative video ad is significantly higher than that of a standard narrative video ad when viewers navigate smoothly, make use of visual and/or auditory cues to enhance the viewing experience, are clear about where their point of view originates, and are able to control their viewing direction (Feng, 2018).

These findings are useful when arranging the visuals for 360-degree video advertisements, as they can arrange interactive objects (such as flying logos) in the video advertisement to improve the visual memory of the viewers (Habig, 2016; Feng, Xie, & Lou, 2019). As per study findings, it was highly recommended for advertisement designers to consider the applicability of actions based on the product or brand type as mentioned under standard video advertisements. When arranging visuals, it is necessary to arrange the visuals with actions that evoke the motivation to purchase the product. Hence, 360-degree videos were found to be more effective than standard videos to overcome this problem through behavioural engagement and immersiveness. These findings are in line with previous works by Habig, (2016); Feng, (2018); and Feng, Xie, & Lou, 2019., (2019).

6.5.3 Visual inference maker strategies for 360-degree video advertisements

In experiment 1 and 2, it was identified that the visual memory for multi-cultural symbols and behavioural engagement represented main thematic findings.

Multi-cultural symbols

Advertising that is multicultural or integrated is a method of advertising that seeks simultaneously to reach culturally diverse audiences through the exploitation of cultural representations (e.g., advertisement sources, symbols, traditions, beliefs, values, attitudes, and/or objects) from multiple cultural backgrounds (Johnson & Grier, 2011). In this context, multicultural advertising is regarded as an innovative way to reduce costs while targeting diverse consumer segments (Johnson & Grier, 2011). The 360-degree video advertisements were found to be ineffective in demonstrating the multi-cultural symbols as key concepts of terms such as Japanese, Chinese, Indian, Architecture, Asian and Western were less significant. During these experiments, it was discovered that standard video advertisements were

successful in displaying the multi-cultural symbols within the visuals. Locations with cultural symbols (for example, a temple or a fireplace in the Western-style living room) in advertisements play an important role because of the different atmospheres given to customers from different countries (Kurtz et al., 2021). Advertising in Asia, for instance, features traditional buildings that depict the unique architecture of the region. This aspect has been found to be attractive to non-Asians as they are unfamiliar with the locations and being able to observe them from a different place makes them curious about watching the visuals (Johnson & Grier, 2011; Poole et al., 2021). Therefore, several researchers (e.g., Johnson & Grier, (2011; Martínez-Gibson, (1998); and Poole et al., (2021) concluded that advertising designers can use multicultural symbols to enhance the curiosity and engagement of customers.

According to recent research, the use of multi-cultural symbols can increase the likelihood of engagement and enthusiasm for advertising (Johnson & Grier, 2011; Morris, 2014; Poole et al., 2021). Through these experiments, it was found that 360-degree video advertisements were unsuccessful in displaying the multi-cultural symbols within the visuals (Zhu et al., 2020). Participants were able to encode large objects (such as buildings, furniture, walls, garden, trees) with a size of more than a quarter of the visual, while smaller objects were not noticed during the viewing, such as floating brand logo, floating brand quota or brand name (Zhu et al., 2020). This was due to the abstract view in standard video version and the panorama view in the 360-degree video version (Zhu et al., 2020). Due to the continuing growth of ethnic minority consumers and their purchasing power, it has become increasingly important to address their unique and complex needs through accommodating marketing efforts (Farha et al., 2019, 2019).

This can be further justified based on prior studies as follows. Fazli-Salehi et al. (2021) investigated the effects of consumer self-concept clarity and materialism on consumers' self-brand connection and communal-brand connection, as well as their purchase intention in the context of ethnically matched, mismatched, or multi-ethnic advertising. Marketers and advertisers need to consider the drivers of human behaviour and how different means of communication may affect different consumer groups in different cultures (Fazli-Salehi et al., 2021). Tam et al., (2016) raised the importance of developing marketing practices which address multi-cultural people in the service sector. For instance, Skytrax's best airline award for 2018 (considered the Oscars of the aviation industry) placed Air Qatar at the top of the list,

while Air Canada was named the best airline in North America. Although these two airlines are successful service providers, they use different marketing strategies (Farha et al., 2019). Air Canada reduces overheads and other comfort features to compete for (price-conscious) passengers, while Qatar Airways strives to provide the highest levels of service (Farha et al., 2019). Air Canada's marketing exchange is primarily concerned with economic transactions to attract customers (Farha et al., 2019). Qatar Airways, on the other hand, works to establish interpersonal relationships that it continually strives to improve (Farha et al., 2019).

In academic marketing literature, it has been suggested that the marketing practices of firms operating in different cultures would be fundamentally different (Ivanova-Gongne, 2015; Tam et al., 2016). The literature has been influenced by strong conceptual arguments developed from an understanding that different cultures have different market structures, demand patterns, and buyer behaviours which has led to the assumption that marketing practices of firms in diverse cultures will also be different (Ivanova-Gongne, 2015; Tam et al., 2016). Even though 360-degree video advertisements were found to be ineffective in demonstrating the multi-cultural symbols, prior literature suggests that it is necessary to demonstrate multi-cultural symbols in a way that appeals to human memory when designing the advertisement visuals. One such strategy which was identified through prior studies to improve the visual memory of 360-degree video advertisements in demonstrating cultural symbols was to customise marketing campaigns (Ivanova-Gongne, 2015; Tam et al., 2016). With the use of 3D furniture visualization technology, Crate & Barrel offered their customizable items, such as their sofa, in a variety of fabrics and colours (Wasson, 2020). The customised marketing campaigns designed for a particular ethnic group, through 360-degree and 3D technology was found to be effective in demonstrating cultural symbols effectively (Ivanova-Gongne, 2015; Tam et al., 2016). These findings are in line with previous works by Boon & Golloub, (2021); and Naletelich and Paswan, (2018).

Behavioural engagement

Behavioural engagement refers to the participation of the consumers on several activities in the video advertisement (Feng, 2018). The 360-degree videos are an innovative video format that allows audiences to gain a deeper understanding of the content due to a variety of narrative and technical factors (Feng, Xie, & Lou, 2019). The 360-degree video marketing allows the user to

switch from a static to an interactive view for example, thus providing a different experience for customers (Feng, 2018; Feng, Xie, & Lou, 2019). The 360-degree video appears to have a stronger link with the human mind than normal video, and it enhances consumers' immersive environments (Sundar et al., 2014; Feng, Xie, & Lou, 2019). Highly interactive commercials give customers a lot of influence over what they see and how they see it, and they are supposed to increase their sense of "presence" (Lombard & Snyder-Duch, 2001). Presence is a psychological state or subjective sense of "being there" in a situation depicted through a media, referred to as "telepresence" or "virtual presence" (Barfield & Hendrix, 1995; Shen et al., 2020; Feng, 2018). Through these experiments, it was found that the 360-degree video version had a higher level of behavioural engagement than the standard video version (Feng, Xie, & Lou, 2019). These findings did not vary based on gender. It was clear that under standard video viewing conditions, behavioural engagement was not identified. Also, several participants mentioned that they felt the transition effect of being inside the teacup when the last visual moved to the living room scene.

Narrative immersion to improve user engagement

The idea of narrative immersion refers to the impact of the content and structure of a story on its audience. Researchers showed that 360-degree videos could demonstrate narrative immersion. For example, by adapting Ryan's (2015) description of narrative immersion in VR, this study was able to compare aspects of VR and 360-degree experiences. According to Ryan (2015), narrative immersion has four dimensions. First, spatial immersion examines the setting, place, and time of the story, as well as the composition of the world (Ryan, 2015). The subject of temporal immersion pertains to the plot structure which includes generating suspense, the focus of the story (character, plot, or setting), and the expectations associated with the genre. Thus, traditional storytelling structures are part of temporal immersion, such as foreshadowing upcoming events, or representing the hero's journey (Ryan, 2015).

Immersion in space and time is influenced by narrative perspective and the integration of the audience within the story (Ryan, 2015). In contrast, emotional immersion refers to the emotions that a story evokes in the recipient (Ryan, 2015). Researchers studying para-social interaction (Klimmt et al., 2006) found that a distance between characters (actors) and the viewer's character (camera), or being acknowledged by characters may increase emotional immersion

in 360-degree videos (Sheikh et al., 2016). When arranging visuals, it is required to arrange the visuals using narrative immersion. Hence, 360-degree videos were found to be more effective than standard videos in behavioural engagement. Advertising designers therefore can improve the ability to memorize more by using narrative immersion in 360-degree video advertisements.

6.5.4 Visual response selection strategies for 360-degree video advertisements

In experiment 1 and 2, it was identified that the visual memory for product details, product benefits and brand details were the main thematic findings.

Visual memory for product details

Identifying the salient areas of visual stimuli that are likely to attract viewers' attention is a challenging task due to the complex nature of cognitive behaviours in the brain (Gutiérrez et al., 2018). Researchers have made significant contributions to this field (Xu et al., 2020; Zhu et al., 2018). Computer vision, computer graphics, and multimedia processing are a few application areas that can take advantage of saliency detection since it indicates the visual importance of different areas of visual stimuli (Gutiérrez et al., 2018; Zhu et al., 2018). For 360-degree visual stimuli, images and videos should include the entire scene in a 3D world; therefore, the resolutions of panoramic images and videos are typically very high (Gutiérrez et al., 2018). However, when doing a 360-degree viewing, observers can only see part of the scene through the viewport, which is presented to the observers through the Head Mounted Display (HMD) (Gutiérrez et al., 2018). Therefore, sending the whole video or rendering the whole scene at once may lead to a waste of resources (Gutiérrez et al., 2018).

It has been argued by researchers that the visual system cannot create and use a composite representation of visual information across fixations without the ability to join visual information from one fixation to another (Castelhano & Henderson, 2005). As an example, people perceive a product's appearance based on three main design characteristics (Haase et al., 2018). This paper explores the perceived aesthetics, utility, and symbolism of design in greater detail (Brunner et al., 2016; Toufani et al., 2017). In both single and repeated viewings, participants were able to identify the product details from the visuals, including the logo, the product package, and the teabox. As a result, 360-degree video advertisements have been found to be effective in displaying product details as most participants in the 360-degree video

viewing condition commented that some product details, such as teaboxes, pricing, and health information were made (Feng, 2018; Feng, Xie, & Lou, 2019; Yaoyuneyong et al., 2016). Consequently, in this research, standard videos proved ineffective for demonstrating the visuals based on the product details.

In accordance with the findings from the visual information memory literature, the viewer remembers the object information primarily as a result of two main factors. The first is the activation of the strategic memory as mentioned above. Knowledge about the world and how it is used by the brain for spatial orientation can be considered strategic memory. By increasing the engagement level of the users using virtual reality, the task-based spatial orientation can be activated. Due to the exposure of virtual reality during the viewing of the 360-degree video advertisement, the 360-degree video ads activate the strategic memory at a much faster rate than regular video ads. Thus, as a result of this activation of strategic memory, participants pay more attention to details specific to the product. The second factor is eye movement during the viewing of the product. According to the research findings conducted by Ausin-Azofra et al. (2021), 360-degree video advertisement has a higher eye movement rate than conventional videos ads (Ausin-Azofra et al., 2021). According to a recent review, eye movements are closely associated with cognitive processes such as attention, memory, and decision making. It is not just true that these actions suggest certain aspects of our mental functioning by revealing information about our feelings and desires to others, but that these movements are actively influenced by them (Xu et al., 2020; Zhu et al., 2018). Furthermore, they show that 360-degree video advertisements activate the cognitive processes such as attention, memory, and decision making regarding the product evaluation, allowing the user to memorise the product details more than the standard video viewing (Polat, 2020).

Accordingly, these previous studies suggest that standard video advertisements are ineffective when demonstrating product details to viewers because they do not activate strategic memory and eye movements (Gutiérrez et al., 2018). Advertisement provides an immersive experience in a virtual environment through the interaction of movements of the user, and has been used in a number of fields, such as entertainment, medicine, and education (Gutiérrez et al., 2018). To ensure a quality viewing experience at the user end, it is essential to use stereoscopic panoramas that have a high frame rate and high resolution. As a result, panoramic images will contain far more information than traditional images. As opposed to traditional images and

videos, panoramic contents possess some unique characteristics, which require special processing methods (Polat, 2020). It should be noted that some panoramic images have a resolution of 18000*9000, and such a large image makes the storage and transmission of VR content difficult (Polat, 2020). As part of an eye movement strategy, advertising designers can enhance the ability to memorize more product details in standard video advertisements by improving their visual arrangement. Studies have shown that adding more actions can enhance viewers' eye movements (Polat, 2020). Further, strategic memory can be activated by adding visual details of previously viewed objects, for example, repetition of product information in more than one or two scenes of the advertisement (Castelhano & Henderson, 2005).

Visual memory for product benefits

The 360-degree video advertisements have also been found to be effective in explaining the benefits of products in the same manner as standard videos. In the theme product benefits are indicated various aspects such as health benefits, discounts, quality, and quantity benefits. Frequently, consumers seek diagnostic information about specific product benefits when evaluating items or services (Goodarzi et al., 2021; Meyvis & Janiszewski, 2002). When consumers search for diagnostic information, they are often exposed to irrelevant information (information that is not relevant to the intended benefit). Providing unnecessary information has the potential to shift consumers' perceptions of a product's ability to deliver the desired benefit (Meyvis & Janiszewski, 2002). Consequently, the theme product benefits has been identified based on positive key concepts such as health and relaxation. Standard video advertisements have also been found to be effective in explaining the benefits of products in the same manner as 360-degree videos. It is therefore essential for 360-degree video advertisements to demonstrate product benefits through a variety of visual techniques. According to prior studies, both narratives and metaphors can be effective in conveying the benefits of a product (Coulter et al., 2001; Proctor et al., 2005). This is further justified in section in 6.2.4 above.

Visual memory for brand details

Advertising and brand image were found to be important in increasing business performance since brand image is an implied tool which can positively influence people's purchasing behaviours, and advertisement serves as a means to communicate with customers (Malik et al.,

2013; Mandliya et al., 2020). According to this study, 360-degree video advertisements were not found to be effective in displaying brand details, as most of the participants in the 360-degree video viewing condition stated that they missed some of the brand details such as the logo and brand name (Feng, 2018; Feng, Xie, & Lou, 2019; Yaoyuneyong et al., 2016). As a result, standard video advertisements have been found to be more effective in conveying the details of a brand due to the abstract nature of the videos (McQuarrie & Phillips, 2016). In the experiment, both female and male participants noticed visuals containing product and brand information. A few of the participants noticed brand details including the terms Lipton, Place, logo, location of the product and package details. Product details included terms such as teabox, and pricing, as well as details regarding green tea, such as its health benefits. Based on prior studies, it has been determined that visual memory for brand details can be further enhanced by visual branding strategies. An advertisement's ability to visually portray a company's values and personality is referred to as visual branding (McQuarrie & Phillips, 2016). The objective of a visual identity is to create an emotional connection between a brand and its consumer through the colour scheme, shape, and fonts of the company's logo design, website, and business cards (McQuarrie & Phillips, 2016; Sharma & Varki, 2018).

There has been a great deal of neglect of the fact that the information stored in visual memory is relevant to consumer behaviour (McNeal & Ji, 2003). A single image may be sufficient to determine a consumer's choice of product, independent of attitudes or beliefs retrieved from a verbal or symbolic memory (McNeal & Ji, 2003). McNeal and Ji (2003) confirmed the existence of a rich database of children's visual memories for cereal brands, demonstrating that children's decisions may differ depending on the type of information retrieved. They also identified measurement biases favouring verbal memory in contemporary consumer research and advocated further study of children's visual memories (Heitmann et al., 2020). In contrast, when brands must decide on the visual design, the product design process is defined by the brand's equity (Heitmann et al., 2020). It takes firms several years to build equity in their brands (Datta et al., 2017). Brand equity is valued due to its ability to drive customer lifetime value (Stahl et al., 2012). A product's brand equity can be viewed as the differential preference and response to marketing efforts that a product receives in response to its marketing efforts (Heitmann et al., 2020). To demonstrate brand details, it is necessary to identify the differential preference and response to marketing efforts with respect to the product's brand equity

(Heitmann et al., 2020; McNeal & Ji, 2003; Patrick & Hollenbeck, 2021). It further supports findings by demonstrating the importance of adding brand details given the product's brand equity. When arranging visuals, it is required to arrange visuals by highlighting brand details in 360-degree video advertisements. As the literature suggests, this can be done through two ways: product or brand placement and by mitigating VR-related side effects.

Product placement and brand placement

It is common to measure recall and recognition of brand placements. Memory recall refers to a person's ability to retrieve a brand name correctly from memory without reference to other brands or product categories (Roettl & Terlutter, 2018). The concept of recognition refers to the consumer's capacity to remember their previous exposure to the brand and it is often measured using techniques that involve aided memory, for example, where brands are listed and the person selects the brand or brands that he/she is familiar with (Roettl & Terlutter, 2018). Consequently, placement of information about branded products and their images within non-commercial media content is considered a promising, persuasive means of promoting the product (Yim et al., 2018). Compared to conventional advertising, it tends not to interfere with viewers' viewing experiences while at the same time exposes them to the brand. It aims to contribute to the formation of positive consumer evaluations of embedded brands through the simple exposure effect (Roettl & Terlutter, 2018; Yim et al., 2018). As a result, product placement is an effective alternative to traditional advertising. In addition to this, a variety of methods are offered to embed a branded product or its name or logo in various ways to further reduce consumer aversion to commercial messages (Yim et al., 2018). Product placement has been defined as 'a paid product message that aims to influence movie (or television) audiences via the planned and unobtrusive integration of a branded product into a movie (or television program)' while brand placement means the placement of branded products or brand identifiers in mass media programming through audio or visual means (Karrh, 1998).

Brand placement was found to be effective in demonstrating sports-related advertising, as it has been found that as viewers pay more attention to a sporting event in stereoscopic 3-D display, they are less likely to remember the brands embedded in the stadium, whereas on a 2-D display, they are more likely to remember the brands embedded in the arena (Yim et al., 2018). Roettl and Terlutter (2018) analysed the experience that the players have with an

identical video game that is either played in a 2D, stereoscopic 3D, or Head-Mounted Display (HMD) VR version, and how the brands are affected by the video game (Roettl & Terlutter, 2018). The results indicated that the game-related variables analysed were presence, attitude toward the video game, and arousal while playing the video game (Roettl & Terlutter, 2018). The variables related to brand placement included attitudes towards the brands that are placed and memory (recall and recognition) of the brands that are placed (Roettl & Terlutter, 2018). Based on a Nielsen survey of sports fans, 64% of respondents indicated they would be happy to watch sports programming in stereoscopic 3-D videos (Priest, 2010). Owing to this finding, major cable providers such as DirecTV, Comcast, AT&T U-verse, and Time Warner began providing 3-D content during televised sports games (Malinowski & Yu, 2011; Priest, 2010; Srivastava et al., 2019). When arranging visuals, it is required to arrange the visuals considering the product placement and brand placement. Hence, 360-degree videos were found to be more effective than standard videos in demonstrating the brand-related details.

Mitigating VR-related side effects

In comparison to conventional 2D technology, which does not provide depth to the objects, 3D and VR technology offer better user experiences (Grassini et al., 2020; Roettl & Terlutter, 2018). These technologies enable the perception of spatial depth on the screen (Grassini et al., 2020; Roettl & Terlutter, 2018). Researchers reported experiencing more dizziness and motion sickness in the VR and 360-degree video games than in 3D or 2D (Grassini et al., 2020; Kim, Ratneshwar, & Thorson, 2017; Roettl & Terlutter, 2018). Some of the discomforts included eye fatigue, dizziness, headache, disorientation or motion-sickness (Grassini et al., 2020; Roettl & Terlutter, 2018). Physical hand-eye-coordination tasks have been found to be effective in mitigating these discomforts (Curtis et al., 2015). Using this logic, Champney et al. (2007) predicted that some of the hand-eye coordination activities, which were used to mitigate the symptoms of unusual sensory environments, such as using prism-like spectacles, operating an aircraft simulator, and experiencing weightlessness could also be useful to mitigate the symptoms caused by 360-degree environments since these contexts require some of the same sensory recalibrations as virtual environments. Further, tasks involving hand-eye coordination theoretically assist in resolving conflicts between the senses (Champney et al., 2007). It is therefore essential for 360-degree video advertisements to demonstrate brand details through a variety of visual techniques. When arranging visuals, it is required to arrange the visuals

considering the product placement and brand placement as well as the mitigation of VR-related side effects. Hence, 360-degree videos were found to be more effective than standard videos in demonstrating the brand-related details and as prior research have suggested, product and brand placement as well as mitigating VR-related side effects will enhance the viewer memory of brand details.

6.6 Theoretical Implications

The theory of social information processing by Wyer (2003) also makes several important theoretical contributions to the marketing and advertising literatures. The theoretical implications of these findings are categorised into five areas (the general use of this theory, dual process construct in consumer marketing, contribution towards sensory marketing, contribution towards eye movement research, methodological contribution) and each will be discussed individually.

6.6.1 Theoretical Contribution in General: Social Information Processing Theory

The social information processing theory provides a useful metaphorical framework for conceptualizing and integrating, the deliberate and automatic processes that occurs at various stages of cognitive functioning, including comprehension, memory storage, retrieval, inference, judgment, decision-making, and output generation (Wyer, 2003). The metaphorical framework means the specific formulations of beliefs within organization, person impression formation, dual processing, and the interplay between goal-directed and unconscious processes in terms of the cognitive operations that underlie through this theory (Lange et al., 2011). For example, social information processing models developed in extent literature lacks a proper metaphorical framework to explain the information flow of the human mindset such as information retrieval, judgement, decision making, goal stimulation, short-term and long-term memory (Lange et al., 2011; Wyer, 2003).

Numerous dual-process models have been applied to the cognitive processes involved in consumer judgment however, they are typically limited in their ability to represent processes occurring at different stages of cognitive activity and to specify how these processes interrelate (Wyer & Kardes, 2020; Wyer, 2003). Most (if not all) of the existing theories suggests that judgments and decisions are based on a combination of automatic and controlled processes (Wyer & Kardes, 2020). Thus, this theory contributes to the extent marketing research by

proposing a clear theoretical framework for integrating these processes within the consumer black box (Wyer & Kardes, 2020) and by enabling marketing researchers to investigate the consumer behaviour related social cognition stages by providing detailed theoretical assumptions for each processing units (consumer information input, product related information comprehension, product related short term and long-term memory and applicable consumer-related goals such as quality, quantity, and brand name).

Findings of this research extend 360-degree and 3D advertising literature by supporting to understand the visual memory in terms of encoding, comprehension, inference making and response selection. A concept central to the idea of memory is a cognitive resource. Pertaining literature on visual memory remains relatively unexplored in marketing research as it needs to combine with a proper conceptual framework in social psychology context (Bleize & Antheunis, 2019; Bao et al., 2017; Wedel & Pieters, 2007; Feng et al., 2019). For example, over two decades ago, Rossiter (1976) identified that consumer research has largely ignored product relevant information stored in visual memory. Even after 20 years later, Zaltman (1997) echoed this concern by reminding that most marketing research tools are verb centric and need to be enriched with techniques that accommodate non-verbal expressions of perception, learning as all these stimuli reach the brain through visual systems. However, recently Park, Jeon, and Sullivan (2015) identified that a combination of topics such as visual merchandising, social cognition, visual memory, repeated viewing of visual memory remains relatively unexplored in marketing research as it needs to combine with a proper conceptual framework in social psychology context. Hence this theory contributes to explore visual memory for 360-degree and 3D advertising literature, by supporting to understand the visual memory in terms of encoding, comprehension, inference making and response selection.

6.6.2 The Consumer Black Box in Marketing

The internal factors that influence consumer decisions are described as the "consumer black box". A judgment or a behavioral decision is reached through several stages of processing. Comprehending, organizing information in memory, inferring, integrating, and generating an overt response can be either planned or automatic (Lange et al., 2011). Firstly, from a theoretical perspective, the application of a social psychology theory for the advertising sector enables to gather more insights about the social cognition stages of the human mindset, such

as information retrieval, judgement, decision making, goal stimulation, short- and long-term memory etc. (Lange et al., 2011).

In previous research and theory, dual-process constructs have been applied to specific sets of phenomena and in another, dual-process constructs have been applied to broader sets of phenomena. As Gawronski and Bodenhausen (2011) point out, many of these models place an emphasis on the content of judgment-relevant knowledge and information rather than the processes by which judgments are made. Other conceptualizations offer more general formulations of controlled and automatic processing. This theory briefly describes five areas of social psychological research to which dual-process models have been applied. The application of these models differs in terms of their focus on (a) the role of consciousness, (b) the abstractness of the thinking involved, and (c) the content of the material being processed which is not addressed in the existing information processing models. Thereby, this theory contributes by supporting to investigate the ‘consumer black box’ within the marketing research by providing a detailed five-stage framework explaining the 1) consumer information input, 2) product related information comprehension, 3) product related 4) short term and long-term memory, 5) applicable consumer-related goals such as quality, quantity, and brand name (Wyer & Kardes, 2020).

6.6.3 The Contribution Towards Sensory Marketing

For twenty years, marketers in a variety of fields have developed expertise in reaching customers through their five senses - using cues such as the sting of mouthwash and the scratch-scratch of a Sharpie pen to increase brand awareness (Krishna, 2012; Erenkol & Merve, 2015; Bleize & Antheunis, 2019). According to new research, many more consumer products companies will utilize sense-based marketing in the future (Krishna, 2012; Erenkol & Merve, 2015; Feng et al., 2019). Overstimulating one or more of your five senses results in **sensory overload** (Bleize & Antheunis, 2019; Bao et al., 2017). For example, the sense of hearing becomes overloaded when music is too loud, or their vision may be impaired if lights are too bright (Bleize & Antheunis, 2019; Geise & Baden, 2015; Bao et al., 2017).

Similarly, the problem of sensory overload occurs in advertising as visual memory plays a significant role in advertising products (Bleize & Antheunis, 2019; Bao et al., 2017; Wedel & Pieters, 2007; Feng et al., 2019). Advertising methods such as print advertisements and

television commercials can be classified as specific types of scenes (Wedel & Pieters, 2007). Pictures could convey information more effectively than textual messages (Geise & Baden, 2015). The visuals in a product save time and effort for buyers, since they can obtain more information about the products without having to click into the details in the pages (Wu et al., 2016). Advertisers began using complex pictures to promote their products and as this advertising strategy became common, it created a serious problem of visual overload (Mazzoni, Vannucci, & Batool, 2014; Wu et al., 2016; Feng et al., 2019). It is widely acknowledged, however, that sensory marketing researchers cannot understand human cognition without considering that humans interact with the world through their senses and do their thinking within a body. However, there is less consensus about precisely what this implies and how it is best conceptualized (Bleize & Antheunis, 2019; Geise & Baden, 2015; Bao et al., 2017). Hence, this theory provides a detailed solution to sensory overload issue in advertisements through providing a five-stage framework when organizing visuals which helps to identify the effect of **different sensory cues** on behaviour of consumers (Mazzoni, Vannucci, & Batool, 2014; Wu et al., 2016; Feng et al., 2019).

6.6.4 The Contribution Towards Dynamic Visual Acuity

‘Dynamic visual acuity’ is generally defined as the ability to distinguish fine details of moving objects (Miller & Ludvigh, 1962). Historically, the term was coined by Miller and Ludvigh, who carried out several studies between 1953 and 1956 and published their findings in 1962 (Miller & Ludvigh, 1962). The theory of social information-processing contributed through dynamic visual acuity as this study enables the viewers to interact with 3D and standard objects within the visuals in the advertisement by comparing the lower level to higher level engagement of the consumers. Understanding the way in which humans perceive dynamic stimuli is largely unexplored as due to the complexity of dynamic content, it is difficult to determine which characteristics affect visual attention (Wooley, 2015; Zhang & Yuan, 2018; Fookien et al., 2021; Rayner et al., 2008; Peker et al., 2021). This process is crucial to better inform existing research on eye movements and to identify characteristics that are likely to attract visual attention during dynamic stimuli (Wooley, 2015; Zhang & Yuan, 2018). Hence the theoretical assumptions of the theory of social information processing, facilitates the marketing researchers to identify the complexity of dynamic content in standard and 360-degree video advertisements when arranging visuals within the advertisements by providing in

detailed theoretical assumptions on visual encoding, visual comprehension, visual inference making and visual based decision making. In recent years, there have also been attempts to provide models of eye movement control in scanning advertisements (Liechty et al., 2003; Reichle & Nelson, 2003; Feng et al., 2021).

With respect to viewing advertisements and more generally, eye movements are of interest since they provide fine-grained information about attention patterns (Peker et al., 2021). However, a lack of theoretical framework to investigate the process with combination to social psychology is under researched (Rayner et al., 2008; Peker et al., 2021). In doing so, this theory provides a comprehensive framework to investigate the eye-movement behaviour during reading by considering the theoretical constructs under comprehension; scene perception by considering the theoretical constructs under encoder; visual search by considering the theoretical constructs under workspace unit as each of these activities at various times involved in viewing advertisements (Rayner et al., 2008; Peker et al., 2021). This study is **among the first** to compare the effects of 360-degree video and standard video advertising, by considering the interactions between viewer and visual elements of the advertisement (i.e., dynamism of the visuals).

6.6.5 The Methodological Contribution

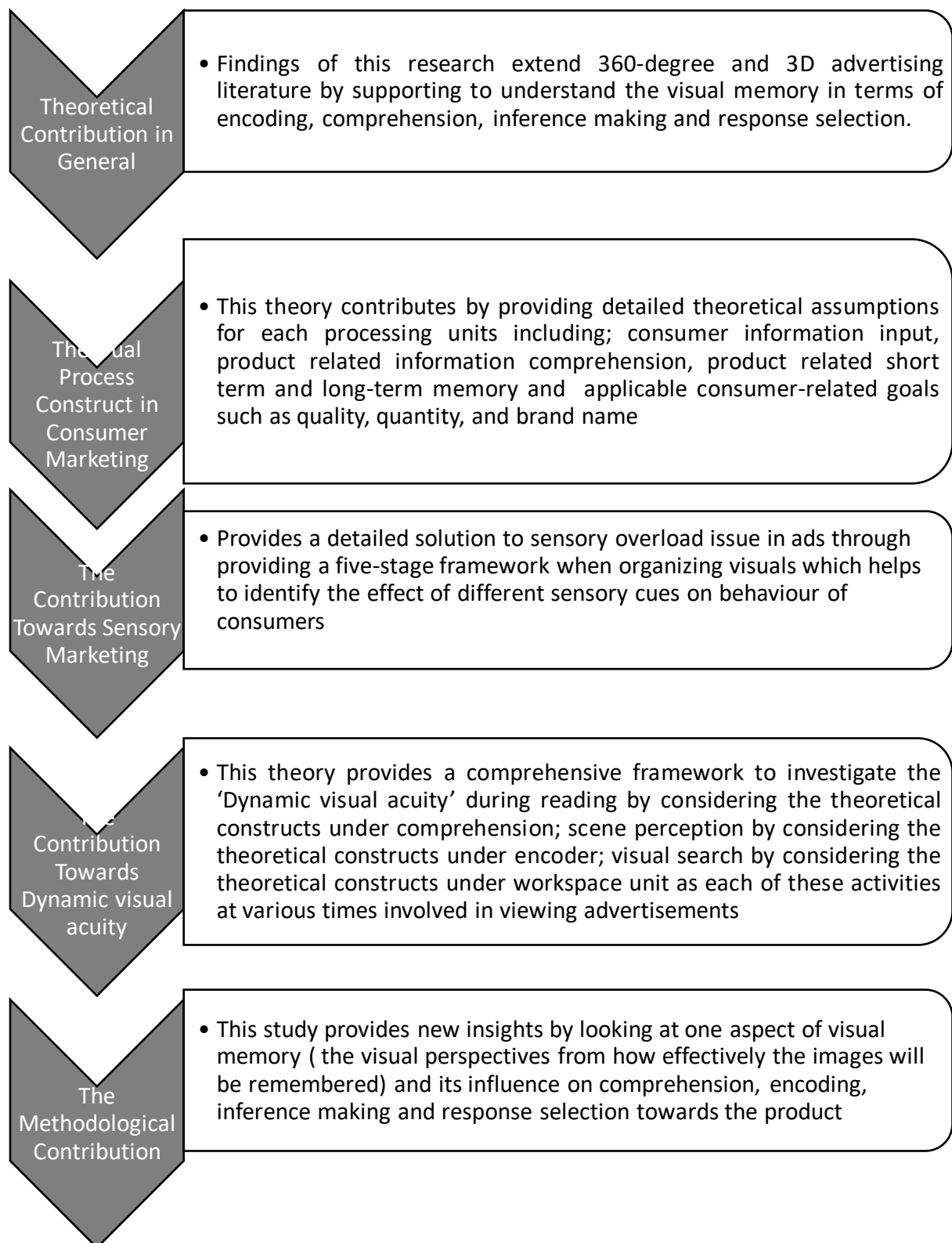
The main theoretical assumption in this theory suggests that the activities involved in this conceptualized process as unconscious activities or routines. For example, the activities in comprehender are presumably guided by processes stipulated by existing theories of knowledge accessibility (e.g., Collins & Loftus, 1975; Higgins, Bargh, & Lombardi, 1985; Wyer & Srull, 1989) and occurs without awareness. An experimental study uses some form of action, control, or intervention to collect data, whereas an empirical study involves purely observation and analysis of data (Creswell & Poth, 2016; Tracy, 2010). Experimental method is considered as more efficient than empirical research to investigate unconscious activities within the human social cognition process (Kuhfeld et al., 1994; Creswell & Poth, 2016; Kuhfeld, 2007; Duman 2021). Therefore, this study used the qualitative experimental approach to investigate the social cognition stage of visual memory for 360-degree and standard video advertisements through the theoretical assumptions of ‘workspace unit’ (short-term memory) in the theory. When considering the theoretical contribution of social information-processing

theories from 2010 to present, researchers examined the different theoretical constructs of the model including information retrieval and accumulated knowledge of the consumer (see Table 2.7).

Although, previous studies in cognitive psychology presented experimental evidence for the existence of mental imagery (Kosslyn 1976), very little effort has been made to identify the characteristics of mental images and their implications for different stages of information processing from comprehension of information towards response selection through information. This study provides new insights by looking at one aspect of visual memory (the visual perspectives from how effectively the images will be remembered) and its influence on comprehension, encoding, inference making and response selection towards the product. The application of a social psychology theory for the advertising sector enables the gathering of more insights about the social cognition stages of the human mindset, such as information retrieval, judgement, decision making, goal stimulation, and short- and long-term memory.

To date, the use of this method with the social information processing, in 360-degree video and standard video advertising context, has not been identified. This makes an important theoretical contribution as it suggested advertising firms and designers, a new avenue when arranging visuals for 360-degree and standard video advertisements in a way that appeals to consumer visual memory. Finally, this theory contributes to the extent marketing research by proposing a clear metaphorical framework to integrate consumer information input, product related information comprehension, product related short term and long-term memory and goal stimulation within the consumer mindset. Figure 6.1 further illustrates the summary of the theoretical contribution as follows.

Figure 6. 1: The summary of the Theoretical Contribution



6.7 Practical Implications when designing standard video advertisements

This thesis has several practical implications which include useful visual arrangement strategies for advertising companies, agents, and marketers to design effective advertisements using standard and 360-degree video versions (in a way that appeals to consumer memory). Several practical implications have been suggested when arranging visuals for standard video advertisements. Firstly, to promote products for women, the selection of colour codes is important as females have an ability to detect more colours in the visuals thereby suggesting that advertisement designers need to select colour codes with shorter wavelengths across a visible spectrum (Jalil et al., 2013; LoBue & DeLoache, 2011); for example, red, yellow, green, blue, alone or in combination with the visuals (Jalil et al., 2013; LoBue & DeLoache, 2011). To promote products for men, it is highly recommended to add some facial expressions in the visuals to gain the attention of the male audience (Zhou et al., 2021). Different location visuals can be used to arouse curiosity among consumers (Banerjee & Dholakia, 2012; Kurtz et al., 2021) and it is recommended for advertisement designers to arrange the visuals considering the order of the story (Feng, 2018; Feng, Xie, & Lou, 2019).

Further it was identified that when arranging object-based visuals for standard video advertisements, it is not necessary to spend more time on designing small objects in the background of the visuals (Zhu et al., 2020). Due to the abstract view of the standard video advertisements, participants will not be able remember all the details of the small objects (Peterson & Kerin, 1977; Zipporah & Mberia, 2014). However, when arranging visuals with people, advertisement designers need to consider two main factors as congruence between brand and the person, for example, the use of well-known energetic people (sports stars or cricket players) to sell energy drinks (Bower & Landreth, 2001; Fleck et al., 2012) and putting fewer people per visual to make the advertisement clearer for the audience (Bower & Landreth, 2001; Fleck et al., 2012; Xu et al., 2021)). When arranging visuals with actions, it is required to arrange the visuals with actions that evoke the motivation to purchase the product and designers of the advertisement can decide this based on the product benefits. For example, energy drink promotions can incorporate running visuals (Al-Shibly et al., 2019; Berger & Alford, 2009; Decker et al., 1996).

Multi-cultural symbols within the visuals were found to improve brand trust levels (Johnson & Grier, 2011; Morris, 2014; Poole et al., 2021). When arranging visuals for advertisements, it is important to demonstrate a higher emotional engagement (Hamby & Jones, 2021; Feng, Xie, & Lou, 2019) through “art infusion” effects (Hagtvedt & Patrick, 2008). Standard videos were found to be ineffective in demonstrating the visuals based on the product details due to inactivation of strategic memory and the lack of eye movement during the viewing. (Feng, 2018; Feng, Xie, & Lou, 2019; Yaoyuneyong et al., 2016). When arranging visuals demonstrating the brand details (Heitmann et al., 2020; McNeal & Ji, 2003; Patrick & Hollenbeck, 2021), it is important to add visuals relating to brand details considering the product's brand equity, and visuals relating to product details. For product benefits, the proper usage of narratives (Jones & McBeth, 2010; Mattila, 2000) and metaphor (Joy et al., 2009; Kullenberg & Säljö, 2021) is useful. Further, Table 6.6 shows a summary of the visual arrangement strategies for standard video advertisements.

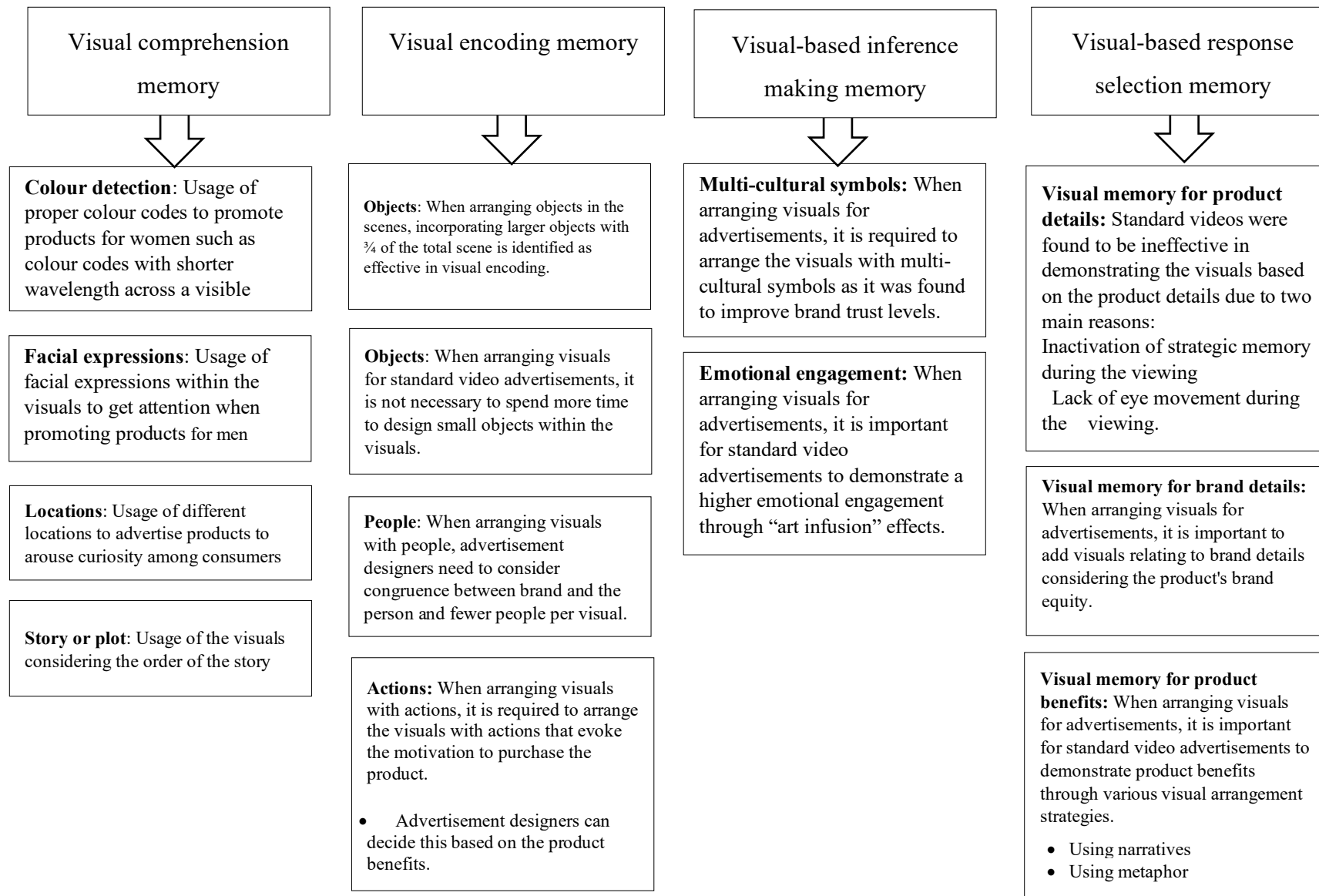
Table 6.6: Summary of the visual arrangement strategies for standard video advertisements

<i>Visual comprehension strategies for standard video advertisements</i>	
Colour detection in visuals	- To promote products for women, selection of a proper colour codes is important as females have an ability to detect more colours in the visuals - Advertisement designers can select proper colour codes with shorter wavelength across a visible spectrum. For example: red, yellow, green , blue , alone or in combination with the visuals
Facial expressions in visuals	To promote products for men, it is highly recommended to add some facial expressions in the visuals to get the attention of the audience
Visual memory on locations	Usage of different locations to advertise products to arouse the curiosity among consumers
Storytelling or plot	Usage of the visuals considering the order of the story
<i>Visual encoding strategies for standard video advertisements</i>	
Visual memory for objects	- Participants were able to encode large objects (such as buildings, furniture, walls, garden, trees) with a size of more than a quarter of the scene, smaller objects were not noticed during the viewing such as floating brand logo, floating brand quota or brand name - When arranging visuals for standard video advertisements, it is not necessary to spend more time to design small objects within the visuals. Due to the abstract view of the standard video advertisements, participants will not be able remember all the details regarding the small objects of the visuals.
Visual memory for people	- When arranging visuals with people, advertisement designers need to consider two main factors. - Congruence between brand and the person (For example, use of well-known energetic people (sports stars or cricket players) to sell energy drinks -Fewer people per visual

Visual memory for actions	• When arranging visuals with actions, it is required to arrange the visuals with actions that evoke the motivation to purchase the product. • Advertisement designers can decide this based on the product benefits. For example, energy drink promotions through running visuals.
<i>Visual inference maker strategies for standard video advertisements</i>	
Multi-cultural symbols	• When arranging visuals for advertisements, it is required to arrange the visuals with multi-cultural symbols as it was found to improve brand trust levels.
Emotional engagement	• When arranging visuals for advertisements, it is important for standard video advertisements to demonstrate a higher emotional engagement through “art infusion” effects
<i>Visual response selection strategies for standard video advertisements</i>	
Visual memory for product details	• Standard videos were found to be ineffective in demonstrating the visuals based on the product details due to two main reasons • In activation of the strategic memory during the viewing • Lack of eye movement during the viewing
Visual memory for brand details	• When arranging visuals for advertisements, it is important to add visuals relating to brand details considering the product's brand equity
Visual memory for product benefits	• When arranging visuals for advertisements, it is important for standard video advertisements to demonstrate product benefits through various visual arrangement strategies • Using narratives • Using metaphor

Therefore, based on the above findings, Figure 6.1 was constructed to help advertising designers to arrange the visuals based on the four aspects of the visual memory.

Figure 6. 2: Visual arrangement strategies for standard video advertisements based on the human memory



6.8 Practical Implications when designing 360-degree video advertisements

Several practical implications have been suggested when arranging visuals for 360-degree video advertisements. Firstly, to promote products for women, enhancing colour detection in visuals by demonstrating product details is important. Further, 360-degree view has the ability to improve the eye movements, when advertising products by adding actions within the visuals for products suitable to females (Tang et al., 2017). To promote products for men, it is highly recommended to add some facial expressions in the visuals to get the attention of the audience (Barger & Grandey, 2006; Mueser et al., 1984; Preston & De Waal, 2002; Pugh, 2001; Small & Verrochi, 2009). Usage of different locations to advertise products arouse curiosity among consumers (Banerjee & Dholakia, 2012; Kurtz et al., 2021). However, a comparatively small number of locations were noticed in 360-degree videos due to interaction boundaries (Ens et al., 2019). It is also recommended for advertisement designers to arrange the visuals considering the order of the story (Tenic, 2018; Feng, 2018; Feng, Xie, & Lou, 2019; Zhu et al., 2018) and to use interaction techniques such as rich imagery and spatial sound design systems (Tenic, 2018; Zhu et al., 2018).

Further, it was identified that when arranging object-based visuals for 360-degree video advertisements, the 360-degree video technology encourages viewers to get into the action by controlling their perspective with a simple angle of a smartphone or through their mouse point. Therefore, advertising designers arrange interactive objects (such as flying logos) in the video advertisement to improve the visual memory of the viewers (Habig, 2016; Feng, 2018; Feng, Xie, & Lou, 2019). Further, 360-degree videos were found to be ineffective in identifying people compared to the standard video version due to the specific angles in the scenes and the quick movement of the objects within a small timeline (Banerjee & Dholakia, 2012; Clawson, 1974; Kurtz et al., 2021; McNamara, 2002). By organising visuals for specific angles and by reducing the quick movement of the objects within a small timeline, advertising designers can improve the ability to memorize more people-oriented details in 360-degree video advertisements (Banerjee & Dholakia, 2012; Clawson, 1974; Kurtz et al., 2021; McNamara, 2002). When arranging visuals with actions, it is important to arrange the visuals with actions that evoke the motivation to purchase the product as 360-degree videos were found to be more effective than standard videos due to behavioural engagement and immersive aspects (Al-Shibly et al., 2019; Berger & Alford, 2009; Decker et al., 1996).

Multi-cultural symbols within the visuals were found to improve brand trust levels (Johnson & Grier, 2011; Martínez-Gibson, 1998; Poole et al., 2021). Customised 360-degree marketing campaigns designed for a particular ethnic group, through 360-degree and 3D technology were found to be effective in demonstrating cultural symbols effectively (Johnson & Grier, 2011; Poole et al., 2021). When considering behavioural engagement (Feng, 2018; Feng, Xie, & Lou, 2019) arranging the visuals using narrative immersion was found to be effective (Ryan, 2015). Videos using the 360-degree format were found to be successful in demonstrating the visuals based on the product details due to the exposure of virtual reality during the viewing of the 360-degree video advertisements as this activates the strategic memory at a much faster rate than regular video ads (Xu et al., 2020; Zhu et al., 2018). Strategic memory can be activated by adding visual details of previously viewed objects; for example, repetition of product information in more than one or two scenes of the advertisement. Advertisements created with 360-degree video have a higher eye movement rate than conventional video ads as they activate the cognitive processes in the human brain including memory capacity (Xu et al., 2020; Zhu et al., 2018).

Studies have shown that adding more actions can enhance viewers' eye movements (Xu et al., 2020; Zhu et al., 2018). The visual memory for brand details can be further enhanced by visual branding strategies such as product or brand placement or by mitigating VR-related side effects (Feng, 2018; Feng, Xie, & Lou, 2019; Yaoyuneyong et al., 2016). When considering the product benefits, it is important for 360-degree video advertisements to demonstrate product benefits (Roettl & Terlutter, 2018; Yim et al., 2018) through various visual arrangement strategies such as narratives and metaphor (Grassini et al., 2020; Roettl & Terlutter, 2018). Table 6.7 summarises the visual arrangement strategies for 360-degree video advertisements.

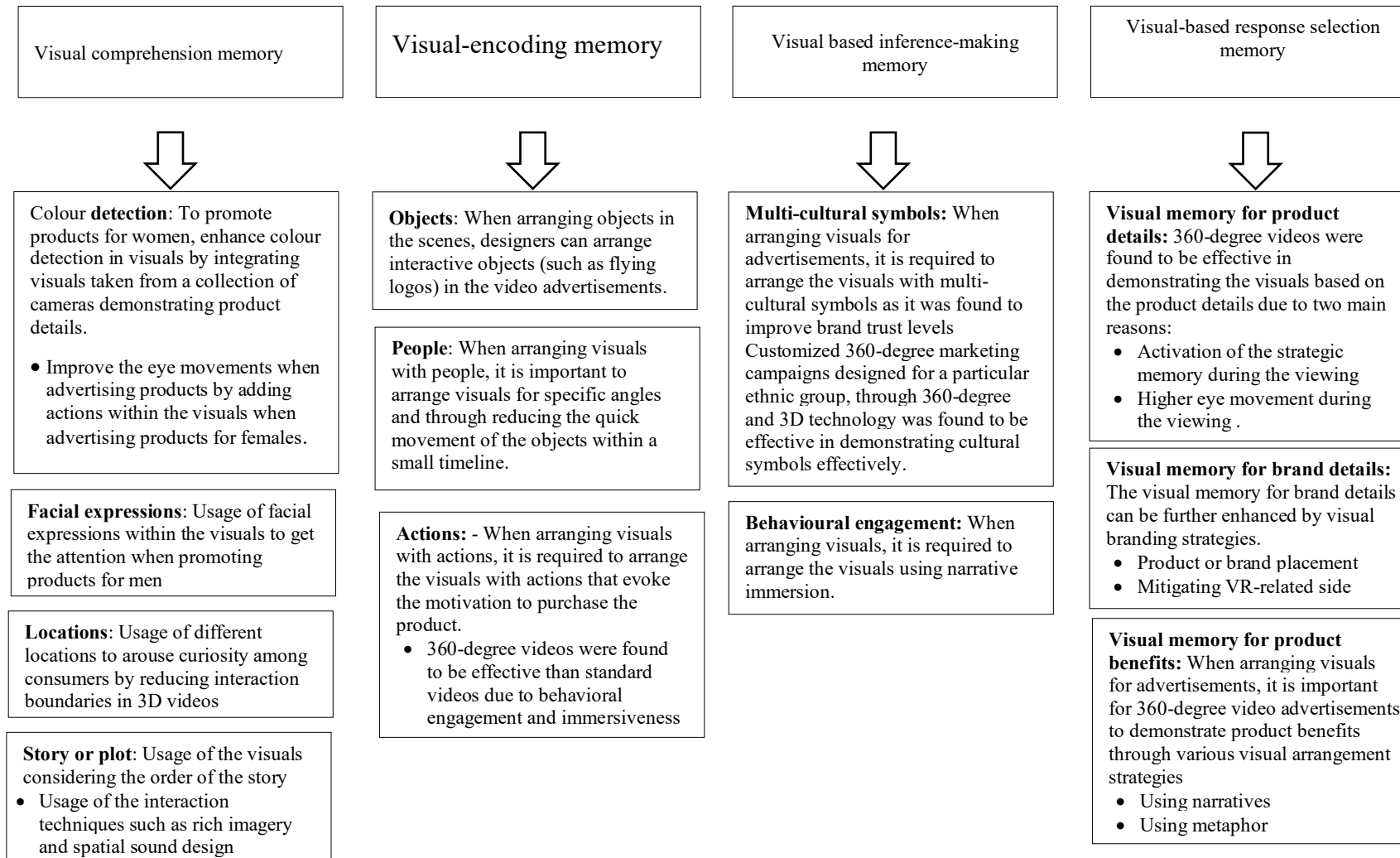
Table 6.7: Summary of the visual arrangement strategies for 360-degree video advertisements

<i>Visual comprehension strategies for 360-degree video advertisements</i>	
Colour detection in visuals	• To promote products for women, enhance colour detection in visuals by integrating visuals taken from a collection of cameras demonstrating product details • Improve the eye movements when advertising products by adding actions within the visuals when advertising products for females
Facial expressions in visuals	• To promote products for men, it is highly recommended to add some facial expressions in the visuals to get the attention of the audience
Visual memory for locations	• Usage of different locations to advertise products arouse the curiosity among consumers however, comparatively a smaller number of locations were noticed in 360-degree videos due to interaction boundaries.
Storytelling or plot	• Usage of the visuals considering the order of the story • Usage of the interaction techniques such as rich imagery and spatial sound design (e.g., the sound experience varies when viewing direction changes)
<i>Visual encoding strategies for 360-degree video advertisements</i>	
Visual memory for objects	• The 360-degree video technology encourages viewers to get into the action by controlling their perspective with a simple angle of a smartphone or through their mouse point so advertising designers arrange interactive objects (such as flying logos) in the video advertisement to improve the visual memory of the viewers.
Visual memory for people	• 360-degree videos were found to be ineffective in demonstrating the people than the standard video version due to the specific angles in the scenes and the quick movement of the objects within a small timeline. • Through organising visuals for specific angles and through reducing the quick movement of the objects within a small timeline, advertising designers can improve the ability to memorize more people-oriented details within the 360-degree video advertisements.
Visual memory for actions	• When arranging visuals with actions, it is required to arrange the visuals with actions that evoke the motivation to purchase the product.

	• 360-degree videos were found to be effective than standard videos due to behavioural engagement and immersive aspects.
<i>Visual inference maker strategies for 360-degree video advertisements</i>	
Multi-cultural symbols	• When arranging visuals for advertisements, it is required to arrange the visuals with multi-cultural symbols as it was found to improve brand trust levels. • Customised 360-degree marketing campaigns designed for a particular ethnic group, through 360-degree and 3D technology were found to be effective in demonstrating cultural symbols effectively.
Behavioural engagement	• When arranging visuals, it is required to arrange the visuals using narrative immersion.
<i>Visual response selection strategies for 360-degree video advertisements</i>	
Visual memory for product details	• Due to the exposure of virtual reality during the viewing of the 360-degree video advertisement, the 360-degree video ads activate the strategic memory at a much faster rate than regular video ads. • The strategic memory can be activated by adding visual details of previously viewed objects, for example, repetition of product information in more than one or two scenes of the advertisement • 360-degree video advertisement has a higher eye movement rate than conventional videos ads which activate the cognitive processes in the human brain including memory capacity. • Studies have shown that adding more actions can enhance viewers' eye movements
Visual memory for brand details	• The visual memory for brand details can be further enhanced by visual branding strategies. • Product or brand placement • Mitigating VR related side effects
Visual memory for product benefits	• When arranging visuals for advertisements, it is important for 360-degree video advertisements to demonstrate product benefits through various visual arrangement strategies • Using narratives • Using metaphor

Therefore, based on the above findings, Figure 6.2 was constructed to help advertising designers to arrange the visuals based on the four aspects of the visual memory.

Figure 6. 3: Visual arrangement strategies for 360-degree video advertisements based on the human memory



In summary, the key practical contributions of the thesis expand to the four aspects of visual encoding strategies, visual comprehension strategies, visual-based inference maker and visual-based response selector strategies in designing 360-degree and standard video advertisements. This study also reveals the importance of applying a social psychology theory to advertising research to correctly understand the visual arrangement strategies in designing a 360-degree and a standard video advertisement. This thesis is significant not only for advertising agencies and marketing firms but also for the most fundamental level of marketing, which is sales personnel, to understand consumer visual memory-based sales strategies in selling products through 360-degree and standard video advertisements. Furthermore, the results can be applied to video advertising formats such as television, social media platforms such as Facebook and YouTube, and Billboard advertisements which seem to have been insufficiently researched in terms of consumer visual memory.

6.9 Limitations and future research directions

There are various limitations in this thesis. This study was mainly based on the theoretical assumptions of the theory of social information processing, which was initially developed in 1980; it could be argued that the findings are out of date. However, this is mitigated by applying the latest version of this theory (which was revised in 2003) and is further justified under the chapter 2 literature review section. Due to the limited number of 360-degree video advertisements on YouTube that have paired standard versions, from the available eight video advertisements (Lipton Magnificent Matcha, Columbia Sportswear, Mercedes-Benz, Nescafé, BMW, Expedia, and Infiniti) the Lipton Matcha advertisement was selected. This advertisement for “Magnificent Matcha Tea” promoted a new tea product and had a higher number of visuals than other video advertisements, such as Columbia Sportswear, Nescafé, Expedia.com, BMW, Mercedes-Benz, Expedia, and Infiniti. Additionally, it relates to the visual memory investigation of this study (e.g., human visual memory activation is higher for novel scenes than repeated scenes due to the activation of hippocampal regions in brain (Köhler et al., 2002)). It is recommended for future researchers to replicate this study using more than one video advertisement through considering the narrative structure of the videos through using different 360-degree viewing devices such as virtual reality headsets, 3D viewing apps, head mounted displays and through different VR platforms to mitigate the weaknesses of 360-degree videos occurring as a result of the movement aspects of Google Cardboard device.

Further, this study is cross-sectional and not longitudinal. Even though a longitudinal study may enhance the understanding of trends in video advertising over time, the cross-sectional design limits the scope of this research, as this study only focuses on the phenomenon of consumer visual memory and the effects of video advertisements towards consumer visual memory. When considering future research directions, this study uses the theoretical constructs of the “workspace” unit of the theory of social information processing by Wyer (2003). While the workspace unit demonstrated short-term memory, there are other memory components namely, “goal specification box” and “permanent storage unit.” The goal specification box is a temporary repository of goal schemas or sequences of cognitive steps that are involved in the pursuit of an objective. Permanent storage unit means long-term memory. This unit is assumed as a storage and retrieval unit of information flowing from the processing units and storage units mentioned in the theory. Future researchers can replicate and extend this study through longitudinal experimental research using the theoretical constructs of the “goal specification box” and “permanent storage unit” to compare the differential effects of consumer visual memory on 360-degree and standard video advertisements, under single and multiple viewing conditions, for long-term memory and goal stimulation memory.

6.10 Conclusion

In conclusion, this thesis has investigated consumer visual memory of 360-degree and standard video advertisements using a social information-processing theory perspective. It has identified differential effects of consumer visual memory for 360-degree and standard video advertisements under single and multiple viewing conditions using an experimental approach. The four theoretical constructs of comprehender, encoder, inference maker and response selector of the ‘workspace’ unit have been used to explore the differential effects of consumer visual memory for 360-degree and standard video advertisements. The reliability of the qualitative thematic results can be further validated based on the NVivo software results (Creswell, 2011; Tracy, 2010). Lastly, this study is unique as it compares the visual memory of 360-degree and standard video advertisements by using a social psychology theory of social information processing (Wyer, 2003) which is a major theoretical contribution. Findings of this study provide a solid foundation for advertising companies, marketing agents, and sales agents for designing effective advertisements using standard and 360-degree video versions in a way that appeals to consumers’ visual memory.

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Appendices

Appendix 1A: Ethical Approval

Appendix 1A: Information Sheet



Griffith University Gold Coast
Parklands Dr Southport
QLD4222

GU Ethics Reference No: 2021/099

Investigating the consumer visual memory of 360-degree and standard video advertisements: A social information-processing theory perspective

This study is being directed by investigators from Griffith University as part of a Doctor of Philosophy study. If you are willing to participate, you will be asked to complete a semi-structured interview and a structured questionnaire. If you have any questions on this study, please contact the research team members named below.

Student Researcher	Chief Investigator
Nirma Sadamali Jayawardena Department of Marketing Email: nirma.jayawardana@griffithuni.edu.au Phone no: +61468314329	Dr Mitchell Ross Department of Marketing Email: m.ross@griffith.edu.au Phone no: +61 (0)7 5552 8269 (Work)
	Dr Sara Quach Department of Marketing Email: s.taichon@griffith.edu.au Phone no: +61 (0)7 5552 8443 (Work)

Why is the research being conducted?

The main aim of the research is to explore the consumer visual memory of standard video advertisements and 360-degree video advertisements using a theory of social information processing by Wyer (2003). A theory of social information processing is a social psychology theory that focuses on several aspects in social cognition stages of human beings. Moreover, recent research proved that 360-degree videos are a new medium that gives the viewers a sense of real engagement as they glimpse the action from all angles and directions. Majority of the professional and amateur filmmakers are actively adopting this new medium for transformative storytelling. Despite this phenomenal progress in 360-degree video creation, current understanding on users' viewing experience about these videos is limited. This further illustrates the need for research in this area based on the recent research studies. To the best of the authors knowledge, up to date none of the studies applied a theory of social information processing by Wyer (2003) to explore the consumer visual memory of 360-degree video advertisements and standard video advertisements. This study is the first to apply this theory, which is another main reason to conduct this study.

What you will be asked to do?

Participants selected for this study will be asked to complete a structured questionnaire and a semi-structured interview regarding the video advertisement visuals they have watched. The participants for this project will be both male and female students between the age group of 20 to 40 years. Their participation is voluntary. Participants do not need to answer every question in the questionnaire or in the interview unless they wish to do so. All information provided is strictly confidential and only be used for the purpose of this study. This study will take place in a meeting room at Nathan Campus and will last for 1 hour.

The basis by which participants will be selected or screened

The selection of the participants for this study involves several steps. The study population is the youth and young adults between the age group of 20 to 40 years. A total of 40 participants will be recruited for this study using non-probably sampling method of snowball sampling. The participants will be recruited through friends of friends approach. For the purpose of this study, participants will be recruited through Griffith University (Nathan) on-campus accommodation

students through using friends of friends approach. The friends, relatives and even parents of the on-campus accommodation domestic and international students will be selected under sampling procedures.

The expected benefits of the research

This study not only explore the consumer visual memory of 360-degree video advertisements and standard video advertisements but also contribute to the theory of social information processing by Wyer (2003) by being the first comparative study. From a practical perspective, findings of this study provide a solid foundation for the future advertising firms or agencies, marketers, and salespeople on how to design effective advertisements using standard video versions and 360-degree video versions in a way that appeals to consumer visual memory.

Risks to you

There will be risks from this study such as participants will be exposed to watch a 360-degree video advertisement using the VR Goggles. There could be a temporary eyestrain for some participants. If you feel eyestrains while watching the video, please feel free to remove the device anytime to avoid it. If required, researcher will provide immediate support by contacting the Griffith Nathan Campus Health and Medical Services on 3735 7299 (Nathan). Further if you feel uncomfortable by answering the questions on memory, researcher will provide immediate support by contacting the Griffith University Counselling Service by calling (0)7 3735 7299 (Nathan) or a generalist community-based service of Lifeline by calling 13 11 14.

Privacy and Confidentiality

The participation is completely voluntary. The answers of the participants regarding the video advertisement will be recorded for the purpose of the thematic analysis (qualitative analysis). This information will be treated as de-identified with higher levels of confidentiality. This information will only be used for the purpose of this study. The collected information will be stored on a password protected computer and Griffith Digital Storage Space. The access for the stored data is only for the research team for the data analysis purpose only.

Questions /further information

If participants have any inquiries or questions about this study, they can contact the research team members named above.

The ethical conduct of this research

The information sheet indicates that Griffith University conducts research in accordance with the *National Statement on Ethical Conduct in Human Research*. If potential participants have any concerns or complaints about the ethical conduct of the research project, they should contact the Manager, Research Ethics on 3735 4375 or research-ethics@griffith.edu.au

Feedback to you

The overall findings and the results of this study can be obtained from the researcher by contacting via email address: nirma.jayawardana@griffithuni.edu.au

Privacy Statement–nondisclosure

The conduct of this research involves the collection, access, storage and/or use of your identified personal information. The information collected is confidential and will not be disclosed to third parties without your consent, except to meet government, legal or other regulatory authority requirements. A de-identified copy of this data may be used for other research purposes, including publishing openly (ex. in an open access repository). However, your anonymity will always be safeguarded. For further information consult the University's Privacy Plan at <http://www.griffith.edu.au/about-griffith/plans-publications/griffith-university-privacy-plan> or telephone (07) 3735 4375.

Copyright Consent

I have read the information in this document, and I am aware of the risks and benefits involved. As this research study investigates the consumer visual memory of standard and 360-degree video advertisements, my comments will be used by the researcher only for the purpose of the data analysis of this study.

Appendix 1B: Consent Form



Griffith University Gold Coast
Parklands Dr Southport
QLD 4222

GU Ethics Reference No: 2021/099

Investigating the consumer visual memory of 360-degree and standard video advertisements: A social information-processing theory perspective

By signing below, I confirm that I have read and understood the information package and in particular:

- I understand that my involvement in this research is to view a video advertisement multiple times and to answer some questions
- I understand that there are some risks involved
- I understand that the research may include audio recording of my participation
- I have had any questions answered to my satisfaction.
- I understand that my participation in this research is voluntary.
- I understand that if I have any additional questions I can contact the research team (I understand that I can contact the Manager, Research Ethics, at Griffith University Human Research Ethics Committee on 3735 4375 (or research-ethics@griffith.edu.au) if I have any concerns about the ethical conduct of the project)
- I understand that I am free to withdraw at any time, without explanation or penalty.

- I understand that my de-identified information may be used in future publications or presentations resulting from this research
- I agree to participate in the project.
- I understand that my voice recordings will be treated as de-identified and only be used for the purpose of the data analysis of this study

The ethical conduct of this research: Griffith University conducts research in accordance with the National Statement on Ethical Conduct in Research Involving Humans. If you have any concerns or complaints about the ethical conduct of this research project, you should contact the Manager, Research Ethics on 3735 4375 or research-ethics@griffith.edu.au

For further information, consult the University's Privacy Plan at <http://www.griffith.edu.au/about-griffith/privacy-plan> or telephone (07) 3735 5585.

Name	
Signature	
Date	

If you have any questions regarding this study, please do not hesitate to contact the research team.

Student Researcher	Chief Investigator
Nirma Sadamali Jayawardena Department of Marketing Email: nirma.jayawardana@griffithuni.edu.au Phone no: +61468314329	Dr Mitchell Ross Department of Marketing Email: m.ross@griffith.edu.au Phone no: +61 (0)7 5552 8269 (Work)
	Dr Sara Quach Department of Marketing Email: s.thaichon@griffith.edu.au Phone no: +61 (0)7 5552 8443 (Work)

Appendix 1C: Ethics approval email



Your Human Ethics Protocol 2021/099 has been Fully approved

rims@griffith.edu.au <rims@griffith.edu.au>

Sun 07/03/2021 19:49

To: Sara Thaichon <s.thaichon@griffith.edu.au>; Mitchell Ross <m.ross@griffith.edu.au>; Nirma Jayawardena

<nirma.jayawardena@griffith.edu.au>

Cc: research-ethics <research-ethics@griffith.edu.au>

GRIFFITH UNIVERSITY HUMAN RESEARCH ETHICS COMMITTEE

Dear Dr Mitchell Ross

I write in relation to your application for ethical clearance for your project "NR: Investigating the consumer visual memory of 360-degree and standard video advertisements" (GU Ref No: 2021/099). The Griffith University Human Research Ethics Committee (GUHREC) resolved to grant your application a clearance status of "Fully Approved".

This is to confirm receipt of the remaining required information, assurances, or amendments to this protocol. Consequently, I reconfirm my earlier advice that you are authorized to immediately commence this research on this basis.

The standard conditions of approval attached to our previous correspondence about this protocol continue to apply.

Regards

Gynelle Murray

Appendix 2A: Design of the experimental survey and interview

Section ONE- Personal details

Please indicate your:

Name:

Age:

Gender:

Activity 1

Introduction for standard video advertisement viewers: You will watch a Lipton video advertisement and then you will be asked to respond to some questions.

Introduction for 360-degree video advertisement viewers: You will watch a Lipton video advertisement 360-version using the virtual reality goggles and then you will be asked to respond to some questions.

Q1: Do you drink tea? If so, how many times you drink tea during the day?

Q2: Do you know the Lipton tea brand? If yes, how much do you like the Lipton tea brand?

Extremely Good	Good	Moderate	Bad	Extremely Bad

Q3: Have you watched this advertisement before (please see the below image)?



Section TWO- Structured Questionnaire (Multifactorial Memory Questionnaire style)

Below are the statements about visual memory after watching the visuals of this advertisement.
Read each statement and rank your opinion.

How I feel about my memory

Q4: I am generally pleased with my memory ability

Strongly disagree	Disagree	Moderate	Agree	Strongly Agree

Q5: There is something seriously wrong with my memory

Strongly disagree	Disagree	Moderate	Agree	Strongly Agree

Q6: If something is important, I probably will remember it

Strongly disagree	Disagree	Moderate	Agree	Strongly Agree

Q7: My memory is good for my age

Strongly disagree	Disagree	Moderate	Agree	Strongly Agree

Q8: My memory is worse than most other people of my age

Strongly disagree	Disagree	Moderate	Agree	Strongly Agree

Q9: I have confidence on ability to remember things

Strongly disagree	Disagree	Moderate	Agree	Strongly Agree

Part 1- Comprehension (The Working Memory Questionnaire)

Q10: List all the visuals you have noticed throughout this advertisement?

Q11: Do you think this advertisement is trying to promote a green tea brand?

Strongly disagree	Disagree	Moderate	Agree	Strongly Agree

Q12: How difficult it is to remember the main visuals presented in this video version?

Extremely difficulty	Difficult	Moderate	Easy	Extremely Easy

Part 2- Encoding (The Working Memory Questionnaire)

Q13: List the objects you noticed in this advertisement?

Q14: List the people you noticed in this advertisement?

Q15: List the actions or behaviours you noticed in this advertisement?

Q16: List the order of the main visuals you saw in this advertisement?

Part 3- Inference making (The Working Memory Questionnaire)

Q17: Do you remember any product image? If so, how many times the product image appears in the advertisement?

Q18: Have you noticed the word Lipton in the video? If so, how many times it appeared in the advertisement?

Q19: Describe the characteristics and draw the brand name as you remember in the below provided space

Q20: After viewing this advertisement, to which extent you are interested in buying this product?

Not at all interested	A little	Moderate	Interested	Extremely interested

Q21: List the most important aspects of this product, which is applicable for you?

Part 4- Response selecting (The Working Memory Questionnaire)

Q22: To what extent do you think the images presented in this advertisement are interesting?

Not at all interested	A little	Moderate	Interested	Extremely interested

Q23: To what extent the images presented in this advertisement will influence your buying decision?

Not at all	A little	Moderately	Very	Extremely

Q24: List the information in the visuals which are applicable for your buying decision?

Q25: List the top three visuals you remember most?

Section **THREE**- Semi-Structured Interviews

Please elaborate your answers regarding the advertisement you have watched.

Q26: What do you think this advertisement is about and what are the visuals helped you get this initial idea?

Q27: Explain this video advertisement only using the main visuals you have noticed from beginning to end?

Q28: Explain more about the people, places, and objects you have noticed in this advertisement?

Q29: What is your overall opinion about the colours used throughout the advertisement?

Q30: Explain the behaviours or interpersonal activities you have noticed?

Q31: What is your opinion regarding the visuals presented with brand name and brand logo?

Q32: When buying a product, some goals in your mind will activate. For example, when you buy an ice-cream you sometimes you may buy this because of the taste. Likewise, Please elaborate what kind of goals activated from you? If so, please elaborate the visuals which helped you to activate your goals?

Q33: Explain about the information in these visuals which are applicable for your buying decision?

Q34: What kind of information or feelings comes to your memory while watching the visuals presented in this advertisement?

Q35: Based on the visuals of the video, could you tell me the purposes of the advertisement?

Q36: Please elaborate the link between the visuals you noticed and the purpose of the advertisement (or what role the visuals play in relation to the purpose of the advertisement)

Activity 2

Introduction: You will watch the same Lipton video advertisement that you watched earlier and then will be asked to the same set of questions again.

Part 1- Comprehension (The Working Memory Questionnaire)

Q10: List all the visuals you have noticed throughout this advertisement?

[illegible]

Q11: Do you think this advertisement is trying to promote a green tea brand?

Strongly disagree	Disagree	Moderate	Agree	Strongly Agree

Q12: How difficult it is to remember the main visuals presented in this video version?

Extremely difficulty	Difficult	Moderate	Easy	Extremely Easy

Part 2- Encoding (The Working Memory Questionnaire)

Q13: List the objects you noticed in this advertisement?

Q14: List the people you noticed in this advertisement?

Q15: List the actions or behaviours you noticed in this advertisement?

Q16: List the order of the main visuals you saw in this advertisement?

Part 3- Inference making (The Working Memory Questionnaire)

Q17: Do you remember any product image? If so, how many times the product image appears in the advertisement?

Q18: Have you noticed the word Lipton in the video? If so, how many times it appeared in the advertisement?

Q19: Describe the characteristics and draw the brand name as you remember in the below provided space

Q20: After viewing this advertisement, to which extent you are interested in buying this product?

Not at all interested	A little	Moderate	Interested	Extremely interested

Q21: List the most important aspects of this product, which is applicable for you?

Part 4- Response selecting (The Working Memory Questionnaire)

Q22: To what extent do you think the images presented in this advertisement are interesting?

Not at all interested	A little	Moderate	Interested	Extremely interested

Q23: To what extent the images presented in this advertisement will influence your buying decision?

Not at all	A little	Moderately	Very	Extremely

Q24: List the information in the visuals which are applicable for your buying decision?

Q25: List the top three visuals you remember most?

Section THREE- Semi-Structured Interviews

Please elaborate your answers regarding the advertisement you have watched.

Q26: What do you think this advertisement is about and what are the visuals helped you get this initial idea?

Q27: Explain this video advertisement only using the main visuals you have noticed from beginning to end?

Q28: Explain more about the people, places, and objects you have noticed in this advertisement?

Q29: What is your overall opinion about the colours used throughout the advertisement?

Q30: Explain the behaviours or interpersonal activities you have noticed?

Q31: What is your opinion regarding the visuals presented with brand name and brand logo?

Q32: When buying a product, some goals in your mind will activate. For example, when you buy an ice-cream you sometimes you may buy this because of the taste. Likewise,

Please elaborate what kind of goals activated from you? If so, please elaborate the visuals which helped you to activate your goals?

Q33: Explain about the information in these visuals which are applicable for your buying decision?

Q34: What kind of information or feelings comes to your memory while watching the visuals presented in this advertisement?

Q35: Based on the visuals of the video, could you tell me the purposes of the advertisement?

Q36: Please elaborate the link between the visuals you noticed and the purpose of the advertisement (or what role the visuals play in relation to the purpose of the advertisement)

Conclusion

The purpose of my study is to investigate the consumer visual memory of 360 degree and standard video advertisements under repeated viewing. Is there anything that you think I should consider in my study?

Thank you very much for your participation! You will be provided with a brand-new Google Cardboard as a compliment. ☺

Appendix 3A: Visual screenshots of the video advertisement



Source: Adopted from the Lipton Matcha green tea video advertisement

Appendix 3B: Equipment used in the study



Source: Photos taken by the author

