Programme content is king: how spaced product presentation influences advert reminding and advert memory

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The rise of digital streaming services and online advertising has put strain on the linear TV advertising model; yet, TV advertising has maintained its crown as the best medium for long-term brand building activities. The present thesis supports the linear advertising offering by evidencing ways to improve advert memory via proximal placement to related programme products. The reminding theory of learning was applied to understand how non-branded category related programme products can increase advert memory. Chapter Two demonstrated memory effects relating to product repetition were contingent upon the advert retrieval activity during programme viewing, with the advert detail recalled in-programme determining the memory enhancement at test. In Chapter Three, the effects of product repetition information availability at test after more passive viewing conditions and a day long delay were assessed. It was found that those who could recollect the repetition had better memory for the advert product, while those who remembered repetitions demonstrated improvements to product and brand memory. Chapter Four used a full episode of a programme and interspersed unfamiliar US adverts, some of which created product repetition; when adverts did create repetition, they were better recalled than those without an associated programme product. The thesis' paradigm also offered a method for evidencing the mechanisms behind a guerrilla marketing phenomenon; ambush marketing. In Chapter Five, participants' ability to determine programme brands after viewing repeated product adverts was assessed, finding that when evaluating brand information using heuristic evidence, brand misattributions were more likely. However, when assessing the same information using recollective details, this misattribution effect was removed; meaning brand suggestion can be overcome via cognitive effort, which has implications for how to counter ambushing. Taken together, the investigations demonstrate the utility, and at times danger, of the programme to advertisers in designing, presenting, and scheduling advertising.

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Statement of Copyright

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Chapter One – Introduction

1.0 Why Linear Television Needs Optimising

Television (TV) advertising has long been the centre piece of brand building, product promotion and behaviour change activities, with a history spanning 70 years (McDonald, & Scott, 2007). In that time, Twitchell (2000) notes some of the most important advertising campaigns have been run through the medium, which has, in some cases, changed society irrevocably. For example, TV was used to further associate undying love and the diamond engagement ring, after De Beers had spent the previous 70 years convincing men across the westernised globe to spend two to three months of their annual salary on the ring itself (Twitchell, 2000). A more insidious example was the televising of the Marlboro Man, which was highly effective at maintaining the allure of cigarettes even as the social consciousness was waking up to the dangers of smoking. Today, TV advertising is by far the most effective medium for brands, big and small (Thinkbox, 2019; Binet, & Field, 2019). For one, an investment in TV advertising demonstrates a commitment to a longer-term vision, rather than a myopic "short-termness" that has become prevalent in the age of mass advert exposure and short-lived sales activation (eMarketer Editors, 2018; Binet, & Field, 2019). For example, one recent consumer report suggested that TV can generate the most profit per medium, with the highest efficacy, and lowest associated risk (Thinkbox, 2018a). Indeed, this same report demonstrated a consistent advantage of TV over print, online video, and radio, over both the short (within 3-6 months), and longer term (3 years; Thinkbox, 2018a). In fact, the decision to add a TV strategy to a marketing campaign provides a 40% increase in its effectiveness in terms of sales and market share (Binet, & Field, 2019). While such findings portray an image of advertising's sunlit uplands in which TV marketing should never falter, the reality is starkly different. TV advertising is at a critical juncture; while still offering brands unrivalled value, the medium is at risk of deterioration (Ebiquity, 2019; Thinkbox, 2019).

TV advertising's biggest threat is the ever increasing competition it now faces from online mediums. Both the volume of adverts and how those adverts are delivered to consumers has changed considerably over the past 20 years, with streaming services and other internet-based advertising models now benefiting from significant market capture (Ebiquity, 2019). Indeed, in the United Kingdom, the recent increase in subscription video on demand (SVOD) service use, such as platforms that contain no adverts like Netflix and Amazon Prime, has shown a negative relationship with traditional linear TV viewing (Ebiquity, 2019). At the same time, individuals are spending more of their screen time online rather than in front of the TV when compared to a decade ago (Binet, & Field, 2019). Concurrently, further pressure has been exerted on the linear advertising market by digital market entrants, such as Facebook and YouTube, which have begun to amass large quantities of global advertising spend, with the promise of large-scale brand exposure, a trend that appears set to continue (eMarketer Editors, 2018). Indeed, forecasts of digital advert spend globally will reach $37 billion per year by 2022 (Juniper Research, 2018). These pressures make TV increasingly less attractive to advertisers, having a knock-on impact on broadcaster media, ultimately threatening many non-SVOD content creators and consumer choice.

At the same time, national TV viewing behaviour has seen some turbulent but not completely calamitous changes. Pre-COVID-19 lockdown, there were significant downward trends in live linear TV viewing, meaning each 30 second advert was having less impact per pound spent (Ebiquity, 2019). Even more worrisome were the demographic changes seen, with the sharpest decline in linear TV viewership among younger generations (BARB, 2018). How this will affect TV advertising efficacy over time is thus far unknown, but such viewing habit formation in today's youth should worry advertisers and broadcasters alike. While such findings are alarming, consumers still appeared to spend large quantities of time watching live TV before lockdown; for example, in the third quarter of 2018, the average viewer watched 275 hours of live and other linear TV types (BARB, 2018). Moreover, the average individual was still viewing 43 TV adverts a day with TV accounting for 95% of the total UK advert exposure (BARB, 2018). At the time of writing under lockdown, unsurprisingly these ordinary trends have been bucked as people have fewer work commitments and more free time at home. For example, the week commencing May 4th 2020 saw a 21% rise in linear TV viewing compared to the same week in the previous year, and those who self-reported being light linear TV viewers were now watching up to 51% more live TV (Thinkbox, 2020). Cumulatively, the viewing behaviour trends do forecast future dangers but also some hope that when time is available TV will not be forsaken for other modes of entertainment. Therefore, TV still has much to offer advertisers and continuing to improve its efficacy can only help its survival as a marketing channel.

This seismic shift in global advertising behaviour was predicted by Bill Gates (1996) when he wrote the now famous article “Content is King”, which outlined how the internet would be a driving disruptive force in the advertising market. Since the article was written, the title of this essay has morphed into an adage for a new form of advertising that is now proliferating throughout the internet (Gotter, 2018). Contextual advertising serves consumers adverts that relate to their chosen webpage, which has seen success in the digital market (Ciaramita, Murdock, & Plachouras, 2008; Yeun Chun, Hee Song, Hollenbeck, & Lee, 2014; Um, 2017). For TV advert efficacy to be improved easily, and most importantly, cheaply; advertisers, content creators, and advertising theorists must also look to the wealth of content that is already available to them: the programme. This opportunity to use readily available cues in TV programmes is one that should not be overlooked as a catalyst for reigniting interest in the TV advert market. While not an unexplored area of advertising research, it is by all accounts one that is yet to be finessed (Sharma, 2000; De Pelsmacker, Geuens, & Anckaert, 2002; Furnham, Bergland, & Gunter, 2002; Parker, & Furnham, 2007; Furnham, & Goh, 2014; Puccinelli, Wilcox, & Grewal, 2015). Therefore, this thesis will look to investigate ways by which the linear TV advertising model can be enhanced using the programme context as a cue via the application of learning theories to cement TV advertising attractiveness.

1.1 Programme events as advert memory cues

Traditional TV advertising has only looked to use the programme context sparingly with media buyers at most using general thematic relevance to purchase advertising space. In the applied advertising literature, using programmes as advert memory enhancers has a more recent and poorly understood history (Sharma, 2000; De Pelsmacker, Geuens, & Anckaert, 2002; Furnham, Bergland, & Gunter, 2002; Parker, & Furnham, 2007; Furnham, & Goh, 2014; Puccinelli, Wilcox, & Grewal, 2015; Kwon, King, Nyilasy, & Reid, 2019). Early studies that looked to optimise advertising via the programme content matched these media pieces on their shared themes, for example, using a love-themed advert within the context of a romantic comedy programme. Further examples are using happy advertising in a happy programme, or placing a car advert within a car programme. This form of thematic context repetition has generally lacked much specificity as to when and why such repetition might work.

The three main theoretical camps that outline programme-advert effects in terms of context congruency make markedly different predictions in how such effects are achieved (Sharma, 2000; De Pelsmacker, Geuens, & Anckaert, 2002; Parker, & Furnham, 2007; Furnham, & Goh, 2014; Puccinelli, Wilcox, & Grewal, 2015). On the one hand, there is the mood-congruency accessibility hypothesis which suggests that when adverts are congruent, TV programmes prime mood states, facilitating advert processing, and thereby aiding memory (Goldberg, & Gorn, 1987; De Pelsmacker, Geuens, & Anckaert, 2002; Furnham, 2019). In other words, seeing advertising that reflects an individual's current cognitive state created by the programme helps them retrieve advert information. The other branch of advert congruence theory focuses instead on priming and distinctiveness. Cognitive priming suggests that it is the construct availability created from the programme that increases accessibility of the repeated theme/product, and thus creates processing ease of congruously placed advertising (Sharma, 2000; Furnham, Bergland, & Gunter, 2002). After watching a love-themed advert the programme should make this information more available when congruous. Yet cognitive priming in isolation struggles to account for the myriad incongruency effects observed in the literature (Furnham, Gunter, & Richardson, 2002; Furnham, & Goh, 2014). Therefore in addition to cognitive priming, a second competing mechanism, named cognitive interference has been proposed. This suggests that congruous programme and adverts "merge" together leading to memory "meltdown" and poor recall performance (Furnham, Gunter, & Richardson, 2002; Furnham, 2019). Cognitive interference thus advocates the use of incongruous programme advert pairs, so as to have a Von Restorff-like distinctiveness effect that subsequently aids memory encoding (Restorff, 1933; Furnham, 2019). The biggest weakness in the opposing cognitive priming and interference congruency effects accounts is the lack of codified boundary conditions in which one will moderate the other, making consistent predictions difficult (see Chapter Six for a discussion). On a thematic level then, basic programme-advert congruence has not been found to have a consistent directional effect on audiences, and more importantly, cannot reliably say why one effect occurred over another.

More recent applied advertising studies have looked to specify this effect further, albeit using these congruency theoretical frameworks, via the repetition of products, scenes, and actors between the advert and the programme, rather than simple themes (Furnham, Bergland, & Gunter, 2002; Myers, Royne, & Deitz, 2014; Davtyan, Stewart, & Cunningham, 2016). For example, one study had participants view a programme containing a non-brand pint of beer in the programme after viewing a John Smith's beer advert in the previous advert break (Furnham, Bergland, & Gunter, 2002). As a mechanism, this has potential beyond more general thematic congruency, as it mirrors repetition paradigms used in learning research (Hintzman, 2004; Wahlheim, Maddox, & Jacoby, 2014). Learning theories postulate that it is possible to improve memory for identical or category words and items when these events are repeated (Martin, 1968; Hintzman, Summers, & Block, 1975; Thios, & D'Agostino, 1976; Greene, 1989; Janiszewski, Noel, & Sawyer, 2003; Raaijmakers, 2003; Hintzman, 2004; 2010; Tullis, Benjamin, & Ross, 2014; McKinley, Ross, & Benjamin 2019). This repetition or spaced learning effect is predicated on an autonomous learning mechanism known as reminding (see Introduction section 3.2 for a discussion; Hintzman, 2004; 2010). From an advertiser's perspective, the prospect of a consumer improving their advert memory while viewing their favourite programme is an enticing prospect. Using programme events to enhance a viewer's advert memory when adverts are seen in an adjacent advert break is a technique that is currently little understood, but, most importantly, such a mechanism would have the most utility for the linear advertising viewing structure given the need for proximal advertising placement. In effect this would help protect some advertising funding from streaming services, which do not offer linear advertising space. As such, the main aim of the thesis is to understand whether product category repetition can improve advert memory (see Chapters Two, Three, & Four).

While repetition of items is understood to facilitate memory, certain conditions can sometimes have unintended consequences for how events are recognised (Lindsay, & Johnson, 1989a; Lindsay, & Johnson, 1991; Jacoby, Wahlheim, & Kelley, 2015; Negley, Kelley, & Jacoby, 2018). Research has shown that when incorrect suggestions about an event's occurrence are encountered after viewing, accurate reporting is known to decrease (Belli, 1989; Loftus, 2005; Hellenthal, Howe, & Knott, 2016). In fact, in industry, such a tactic is now commonly used to associate brands with events they have no relation to. Ambush marketing is the practice of using suggestion, proximal placement, and associated but unregulated words/imagery to link a brand with an event, relying on false memory as a source of marketing (Sandler, & Shani, 1989). Given repetition paradigms can enable memory facilitation they also create opportunities for item interference, with such effects being determined by factors that occur during learning, thus understanding how interference will arise will be critical (Putnam, Wahlheim, & Jacoby, 2014; Putnam, Sungkhasettee, & Roediger III, 2017; Negley, Kelley, & Jacoby, 2018). Therefore, alongside repetition-induced advert memory facilitation, this thesis will also explore how specious brand misinformation can occur for consumers, and how this misinformation inception can lead to wider failings in sponsorship recall (see Chapter Five).

2.0 The Present Thesis

The thesis will thus look to understand the consequences of product repetition across the two media contexts seen during TV viewing: the advertising and programmes. Indeed, facilitation and interference paradigms from the cognitive science literature will be modified and applied to the TV viewing context to understand their divergent effects. The following introduction sections will first outline repetition learning theory (Sections 3.0; 3.1; 3.2), and factors that influence learning over distinct episodes (3.3). Section 4 will summarise the literature regarding advert-programme reminding (4.0). Section 5 will outline how interference can result from repetition and how memories can be biased toward false alternatives (5.0; 5.1). Section 6 will summarise how adverts may be a source of programme interference (6.0). Finally, section 7 shall outline the thesis chapters (7.0).

3.0 Remindings, Advertising and Memory Facilitation

It was once believed that a consumer could learn all that was needed about an advert in three exposures, and any viewing beyond this magic number three was a waste in advertising spend (Krugman, 1972). Intervening advertising research and advances in cognitive psychology have demonstrably quelled this notion, showing that both the schedule of the repetition and other factors such as advert length and retention interval are important for learning (Janiszewski, Noel, & Sawyer, 2003; Schmidt, & Eisend, 2015; Burton, Gollins, McNeely, & Walls, 2019). In the pursuit of optimising the linear TV format, advertising research must again look to established theories of learning to advance marketing goals, and again make linear TV an attractive prospect for brand managers.

Indeed, on a basic level, learning requires the repetition of information over time to change the availability and accessibility at the point of retrieval (Dempster, 1989; Maddox, 2016). This retrieval process is understood to be the same for stimuli as simple as words as well as more complex TV adverts (Janiszewski, Noel, & Sawyer, 2003; Noel, & Vallen, 2009). To apply learning theories to the advert-programme environment, empirical work must be outlined to understand the boundary conditions and mechanistic underpinnings that will aid in the creation of a better advertising product. The spacing effect describes how repetition can improve memory, but the underlying theory has been somewhat contested (Thios, & D'Agostino, 1976; Hintzman, 2004; 2010; Maddox, 2016). Initially, the spacing effect will be outlined, then theories that account for this effect will be discussed, before factors influencing the effect will be assessed.

3.1 The Spacing Effect

The repetition of information having influence on its later recall is one of the most established findings in psychology, with studies dating back to the 1900s providing evidence for this phenomenon (Ebbinghaus, 1885; Thios, & D'Agostino, 1976; Maddox, 2016). This finding is known in the literature as the spacing effect or distributed practice effect. A typical spaced learning paradigm presents an item at two or more points in time; presentation 1 (P1) and presentation 2 (P2), before a retention interval between P2 and the final memory test. The research typically splits presentation format into two categories; massed and spaced (Tsao, 1948a; 1948b; Cepeda, Pashler, Vul, Wixted, & Rohrer, 2006; Bradley, et al., 2015). Massed presentation displays the same stimulus over a longer duration without breaks resulting in a contiguous block. That is, simply the individual is given more exposure to the same stimulus, without a break. For spaced presentation, the same item is presented at two points in time with a definitive break or “lag” between them in which the stimulus is not present. For example, in a viewing task one might see brand logo A at minute one (P1) and then again at minute five (P2), with the four-minute gap acting as the lag between P1 and P2. At test then, research has demonstrated that memory performance is consistently superior when items are spaced rather than massed, giving rise to the effect’s term (Ebbinghaus, 1885; Cepeda, Pashler, Vul, Wixted, & Rohrer, 2006; Kornell, Castel, Eich, & Bjork, 2010; Zulkiply, McLean, Burt, & Bath, 2012; Maddox, 2016). Paradoxically, when asked to interpret their own learning rates, individuals subjectively perceive massed items as more effective for learning than spaced items (Peterson, Hillner, & Saltzman,1962; Tauber, Dunlosky, Rawson, Wahlheim, & Jacoby, 2013). Spreading out learning events appears to potentiate memory in a way that simply studying items for longer cannot, and most interestingly individuals appear not to always have awareness of why or how their own memory is improved.

To investigate a learning effect in video viewing, it is important to modify established paradigms in the empirical literature. One of the most prolific methods for investigating spaced learning has been the paired associates paradigm (Hintzman 1975; Hintzman, 2011; Maddox, 2016; Negley, Kelley, & Jacoby, 2018; Maddox, Pyc, Kauffman, Gatewood, & Schonhoff, 2018). In the paradigm, exact or changed word pairs are shown multiple times to assess for alterations in memory performance. For example, the paradigm may be set up thus; firstly, a word pair (A-B) is seen in word list one (P1). After a delay, in list two, a second word pair will then be encountered, either as an exact repetition (A-B), or a changed pair (A-D; P2). Typically, when items are repeated, memory for the word pair (A-B) is improved at test (Wahlheim, Maddox, & Jacoby, 2014; Negley, Kelley, & Jacoby, 2018). Although video stimuli will be encountered throughout the thesis, the principle of the paired-associates paradigm will be modified to enable assessment of repetition effects on advert memory with the product acting as word A and the advert and programme acting as B and D words respectively, similar to other advert repetition studies (e.g. see Appleton-Knapp, Bjork, & Wickens, 2005 for an example using static advertising).

What is it about repeated information that makes it effective for learning? While repeating information creates the conditions for improving memory, research has highlighted the need for individuals to detect items as repetitions for spaced learning benefits to be seen, with P1 and P2 trace dependence being integral for performance enhancement (Melton, 1967; Madigan, 1969; Hintzman, 1975; Wahlheim, & Jacoby, 2013; Wahlheim, Maddox, & Jacoby, 2014; Negley, Kelley, & Jacoby, 2018; See Chapter Two). This means, that via directed or spontaneous conscious detection, individuals must note the relation between P1 and P2 for there to be a recall improvement, especially when items undergo pair change, such as is the case in the changed version of paired associates paradigm (list 1: A-B, list 2 A-D; Negley, Kelley, & Jacoby, 2018). Without this conscious detection, the events are considered separate and would be encoded as distinct events that can later interfere with one another (Hintzman, 2004; Wahlheim, & Jacoby, 2013; Putnam, Wahlheim, & Jacoby, 2014; Jacoby, Wahlheim, & Kelley, 2015).

Another key feature in the spaced learning literature is the relationship between lag and recall performance. A consistent finding when assessing the spacing effect is that the interval between P1 and P2 influences later recall, with this relationship best described as a non-monotonic performance function (Glenberg, 1976; Greene, 1989; Russo et al., 1998, see Figure 1.0 below). At first, increasing the time between P1 and P2 leads to greater memory performance; this outlines the initial increasing portion of the function below (Hintzman, Summers, & Block, 1975). However, once a certain temporal interval is reached, this inflection point reflects the optimum lag for the current learning conditions. After the inflection point, performance decreases as the time between P1 and P2 increases. This function has been demonstrated for both word and static advert stimuli (Appleton-Knapp, Bjork, & Wickens, 2005; Benjamin, & Tullis, 2010; Maddox, 2016).

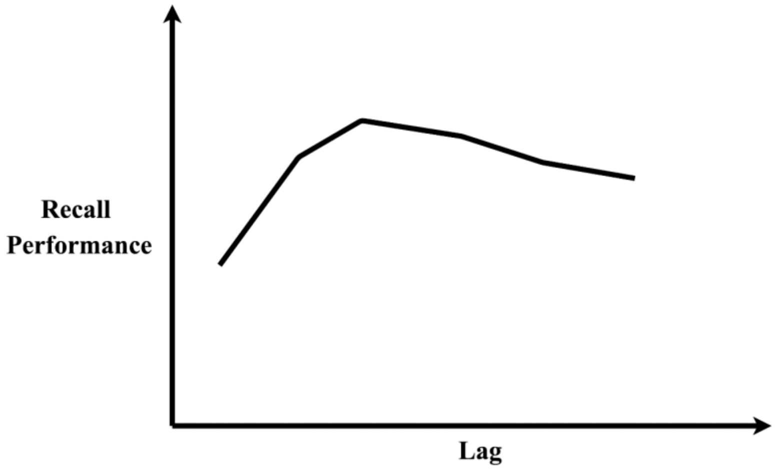

Figure 1.0. Represents an example of the non-monotonic performance function in response to changing the time between P1 and P2.

When assessing the following theories of spaced learning then, it is important to consider these two crucial features that any account must accurately incorporate into its model of spaced learning.

3.2 Theories of the Distributed Practice Effect

Over the previous seven decades several theories have emerged to account for spaced learning, focusing on how context change or the repetition item itself acts as the basis for memory alterations (Estes, 1955; Melton, 1967; Thios, & D'Agostino, 1976; Hintzman, 2004). For example, one early theory, encoding variability, suggested that the differing contexts experienced at P1 and P2 allowed for greater access to the trace as the repeated item is now associated with both P1 and P2 stimuli (Martin, 1968; Glenberg, 1976; 1979). Historically, encoding variability was a vogue explanation for the spacing effects in advertising (Unnava, & Burnkrant, 1991; Singh, et al., 1994; Unnava, & Sirdeshmukh, 1994; Janiszewski, Noel, & Sawyer, 2003; Appleton-Knapp, Bjork, & Wickens, 2005). While such an assumption has explanatory value, alone it is unable to account for the full range of spaced learning effects (Verkoeijen, Rikers, & Schmidt, 2004; Benjamin, & Tullis, 2010). Thus, the theories discussed in this introduction will focus more on the encoding benefits associated with the repeated item itself. Therefore, study-phase reminding (Hintzman, Summers, & Block, 1975; Thios, & D'Agostino, 1976; Hintzman, 2004; 2010), and dual study-phase reminding and encoding variability mechanisms will be outlined (Greene 1989; Raaijmakers, 2003). An understanding of these theories will help to guide the use of programme events to optimally improve advert memory via repetition; especially given the widespread confusion as to their application in the advertising literature (Janiszewski, Noel, & Sawyer, 2003; Noel, & Vallen, 2009).

3.2.0 Study-phase retrieval & Remindings

Instead of focusing on the context around a repeated item then, study-phase retrieval focuses on attention to the repetition, encoding, and retrieval of the item as the source of memory improvement. Accounts of study-phase retrieval propose that when studying a repeated item, P2 will generate spontaneous retrieval of recently presented identical or related information from P1 (Hintzman, & Block, 1973; Thios, & D'Agostino, 1976; Tzeng, & Cotton, 1980; Winograd, & Soloway, 1985; See Chapter Two). The underlying assertion is that an individual is intentionally or spontaneously associating and retrieving information related to their current task. As trace reactivation of P1 occurs at P2, P1 is encoded a second time and is subsequently remembered better; thus, the model highlights the consolidation of a dependent representation containing information about both P1 and P2 as a mechanism for increasing memory (Greene, 1989). In a way, this form of spontaneous retrieval acts as a means of automatically testing and practicing learnt information in response to currently presented and related cues (Roediger III, & Karpicke, 2006). Thus in traditional advertising repetition studies, each time the advert is encountered this encoding benefit is repeated, with this concurrent encoding and retrieval process strengthening trace acuity over time (Appleton-Knapp, et al., 2005).

An updated form of study-phase retrieval is that of reminding, postulated by Hintzman (2004; 2010; 2011), which added more subjective qualities to spontaneous remembering. Like study-phase retrieval, reminding assumes spontaneous retrieval resulting from repetition detection between P1 and P2 is the source of the memory benefit. Hintzman (2004) suggested that these remindings, as he termed them, become cumulative, with repetitions building and adding to one another in a fashion that enables accurate judgements of item frequency and recency. That is, remindings result in the encoding of other episodic details at each instantiation that can help guide future pattern recollection (Hintzman, 2011). This cumulative episodic encoding results in a recursive representation or trace. This detailed recursive representation is what affords an individual a method frequency assessment, meaning P1 and P2's representations become dependent (Hintzman, 2004; Jacoby, & Wahlheim, 2013; Putnam, Wahlheim, & Jacoby, 2014; See Chapter Three).

The recursive representation holds P1 and P2 information, the reminding event, as well as other contextual details that afford individuals additional retrieval means. In the case of the current thesis, an advert (A-B) will occupy P1, and a related programme product event (A-D) will occupy P2. It is postulated that the P2 programme product information (A-D) may trigger the retrieval of P1 advert product information (A-B) during the viewing of the P2 programme event, if the two events are sufficiently similar in terms of product category and perceptual features. In turn, this should lead to a facilitation of (A-B) advert information. In other words, is it possible that seeing an overt beer event in a programme can lead to the retrieval of an earlier seen beer advertisement culminating in an improving is advert memory at test. Additionally, individuals may not have direct access to the recursive trace when initially engaging in retrieval but instead remember that they were reminded, which guides further search to the recursive representation containing P1 and P2 for example (Wahlheim, Maddox, & Jacoby, 2014; Negley, Kelley, & Jacoby, 2018; See Chapter Three). In the paired associates paradigm, the individual may also access the recursive trace directly, which contains information about each of the changed repeated items, rather than retrieving the items individually (Jacoby, Wahlheim, & Yonelinas, 2013).

3.2.1 Evidence for study-phase retrieval & Reminding

What makes reminding a robust model of the spacing effect is its inbuilt assumption of repetition detection (Madigan, 1969; Hintzman, 1975; Wahlheim, & Jacoby, 2013; Wahlheim, Maddox, & Jacoby, 2014; Negley, Kelley, & Jacoby, 2018; see Chapter Two). Indeed, early evidence showed that spacing effects were contingent upon retrieval of P1 at P2, which helped to spark the establishment of this theoretical framework (Thios, & D'Agostino, 1976). Without such identification during viewing, individuals appear not to retrieve the prior information and instead P2 is encoded as a separate representation. Additionally, if the items are predicated on category information, interference with P1 memory is equally possible (Hintzman, 2004: Wahlheim, & Jacoby, 2013; Putnam, Wahlheim, & Jacoby, 2014; Jacoby, Wahlheim, & Kelley, 2015). Inherently then, as P1 is detected and retrieved at P2 for there to be a spacing effect, study-phase retrieval predicts trace dependency. Some of the strongest evidence for the theory comes from manipulations of repetition/change detection. Given that study-phase retrieval during P2 is the driver for the memory enhancement, bringing this process under conscious control should lead to performance greater than when no explicit goal of detection is required. As predicted, this is what is consistently found (Jacoby, Wahlheim, & Yonelinas, 2013; Bui, Maddox, Zou, & Hale, 2014; Wahlheim, Maddox, & Jacoby, 2014; Negley, Kelley, & Jacoby, 2018). Equally, reminding theory would suggest that more enhancement would result from identical item repetition rather than item category repetitions, as the latter increases repetition detection difficulty, a finding that is consistently demonstrated in the literature (Hintzman, 1975; Appleton-Knapp, Bjork, & Wickens, 2005; Tullis, Benjamin, & Ross, 2014).

A second strength of the theory is its ability to model the decreasing portion of the non-monotonic lag function (Maddox, 2016; see Chapter Two). Over longer durations, memory facilitation diminishes as the likelihood of successful P1 retrieval at P2 decreases; this is because detection becomes harder due to trace decay, items passing out of short-term memory, or forgetting (Benjamin, & Tullis, 2010). It makes sense then that items that are more similar should offset the point at which reminding retrieval fails, and indeed, this is again the case (Appleton-Knapp, Bjork, & Wickens, 2005; Tullis, Benjamin, & Ross, 2014; Jacoby, & Wahlheim, 2013). It is therefore reminding retrieval failure that predicts this diminishing benefit of spaced repetitions over long lags.

As a mechanism, it has also been supported by the neuroimaging literature, with posterior parietal activity at encoding suggested as being the neural study-phase activity marker (Xue, et al., 2010, Bradley, et al, 2015; Li, & Yang, 2020). Indeed, neuroimaging research has shown that the consistency in retrieved neural activation patterns at P2 or P3 is highly predictive of performance at test in line with predictions made by the study-phase retrieval account (Xue, et al., 2010; 2012). Simply put, the greater the neural pattern similarity across repetitions, the greater the effects of reminding seen at test.

Yet, the theory is not without its deficiencies. The theory fails to account for the initial increase in memory performance as the duration between P1 and P2 increases (Glenberg, 1976; Greene, 1989; Russo, et al., 1998; Wahlheim, Maddox, & Jacoby, 2014; Maddox, Pyc, Kauffman, Gatewood, & Schnoff, 2018). Similarly, the theory cannot account for the interaction between lag and the retention interval on performance which shows better performance for massed items over shorter intervals and spaced items over longer intervals (Pyc, Balota, McDermott, Tully, & Roediger, 2014). This form of non-monotonic memory performance as a function of lag is difficult to reconcile with reminding as it would suggest a linearly decreasing function as retrieval difficulty is increased by lag. As such, as a stand-alone mechanism, reminding may be inadequate to fully capture the spaced learning phenomenon (Wahlheim, Maddox, & Jacoby, 2014).

3.2.2 Two factor theories

Reminding appears to struggle to account for the full array of spaced learning characteristics; yet the increasing portion of the non-monotonic function can be satisfied if the additional assumption of encoding variability is adopted (Maddox, 2016). Indeed, two factor theories that combine reminding with encoding variability suggest that both these mechanisms act to moderate the other (Greene, 1989; Raaijmakers, 2003; Polyn, Norman, & Kahana, 2009; Siegel, & Kahana, 2014). Firstly, encoding variability will be outlined. Central to this account is that memory is facilitated by the variation in context as lag increases between P1 and P2, generating easier access to the trace via the increased number of associated retrieval cues. Simply, as the contexts at P1 and P2 become increasingly diverse, the more unique retrieval cues are associated with the trace. Equally, the theory suggests that contextual variation occurs across contextual (physical or visual space), structural (inter-item associations), and descriptive (semantic meaning) components of an event; so alterations in each component can help the individual later retrieve the repeated item's trace (Glenberg, 1979). Thus, two factor models postulate that encoding variability initially has a positive influence over trace accessibility, meaning that as lag increases, the quantity and type of retrieval cues differ, with this cue difference increasing the potency of the repetition as a memory cue (Raaijmakers, 2003; Polyn, Norman, & Kahana, 2009).

However, two-factor theories suggest that this encoding variability benefit is contingent upon successful reminding, and therefore will only improve memory while repetition detection is successful (Raaijmakers, 2003). Thus, the optimum point of the non-monotonic function, represents the largest lag at which reminding will reliably occur, while retaining the most diverse number of retrieval cues from the varied encoding contexts (Maddox, 2016). Past this optimum point, the likelihood of reminding decreases as the difference in context fails to trigger reminding, meaning the benefits of both mechanisms are lost and the spaced learning benefit removed (see Chapter Two). In other words, when reminding is successful and contextual information is distinct, the variation in contextual encoding and the secondary encoding experience drive the memory enhancement (Wahlheim, Maddox, & Jacoby, 2014). As the dependent recursive trace holds rich recollective details about both instances, the higher diversity in contextual information aids later retrieval. But when P1 and P2 contexts becomes too divergent, reminding will fail along with the spaced learning advantage.

3.2.3 Evidence for two factor theories

The first strength of the model is that it can account for both the increasing and decreasing portions of the non-monotonic function, with encoding variability describing the initial rise, and reminding demarcating how spaced learning will fail (Cepeda, et al., 2006). Meta-analysis work has shown that, initially, increasing lag leads to an increase in word memory performance, yet once an inflection point is reached, the lag effect on memory is then reversed, with lag increases contributing to a drop in performance (Cepeda, et al., 2006). Equally, as the model assumes the traces at P1 and P2 are dependent, it also outlines the existence of trace superadditivity, or how viewing both traces together increase recall beyond what would be predicted from viewing two independent items in the same lag positions (Benjamin, & Tullis, 2010; See Chapters Two, & Three). Together, two-factor models outline how both trace dependence and repetition detection occur, as well as how this phenomenon is moderated via context similarity. As lag increases, repetition detection is more likely when contextual overlap of P1 and P2 is high thus increasing the ease of the process, leading to successful spontaneous reminding (Appleton-Knapp, Bjork, & Wickens, 2005). This has been demonstrated in advertising message executions and word lists where high levels of variability at longer lags can fail to initiate P1 retrieval in line with the prediction that decreased stimulus variability between presentations is important as lag length increases (Appleton-Knapp, Bjork, & Wickens, 2005; Verkoeijen, Rikers, & Schmidt, 2005). As an account, it also outlines how greater contextual variation will have differential effects on how reminding is moderated by intentional and incidental encoding conditions (Verkoeijen, Rikers, & Schmidt, 2004; Verkoeijen, Rikers, & Schmidt, 2005). For example, under intentional encoding, the non-monotonic function’s inflection point should shift rightward as heightened attention and encoding strategies should result in more robust P1 trace creation, making repetition detection and P1 retrieval easier (see Chapter Two). In contrast, when incidentally encoding, the optimal lag between presentations will be reduced as the rate of forgetting will mean that successful reminding has a shorter window in which it can occur (see Chapter Three).

As a framework for the spacing effect, two factor theories provide the strongest explanation of the available evidence (Maddox, 2016). The literature therefore suggests that repetition detection could be considered as a behavioural marker which can then be used by advertisers and broadcasters to satisfy their desire to detect, test, and confirm whether spaced learning has occurred.

3.3 Factors Influencing the Spacing Effect

3.3.0 Retention interval

While a spacing effect of several minutes is theoretically significant, understanding if product repetitions can impact upon advert memory over the longer term will be of interest to advertisers. Empirical research has shown that optimal lag function also interacts with how long an individual is required to remember the repeated item (Pyc, Balota, McDermott, Tully, & Roediger, 2014). For repetitions to influence memory after days or weeks, larger lags are needed to observe optimal memory performance (Glenberg, 1976; Cepeda, Vul, Rohrer, Wixted, & Pashler, 2008). When the lag is short, the memory trace is consolidated soon after trace creation leaving a longer duration for forgetting to occur before test, whereas over longer lag durations, it is P1 reactivation closer to test that offsets forgetting (Maddox, 2016). In other words, when the interval between P2 and test is reduced, the point of P1 reminding is closer to test, making recall easier. Advertisers will be interested in identifying the possible intervals between advert and programme product placement, for improving memory over long retention intervals. As such, the current study will investigate advert memory performance when the testing delay is altered between immediate, ten minutes, and 24-hours post viewing (see Chapters Two, Three, & Four).

3.3.1 Incidental and intentional encoding

Unsurprisingly, individuals watch TV to switch off from the rigmarole of quotidian life (Thinkbox, 2018b). Indeed, viewers certainly do not exclusively pay attention to programmes in search of product repetitions. However, it will be of interest to advertisers how individuals perform when intentionally encoding repetition information for the purposes of developing a product repetition mechanism and confirming product pairing viability (Barwise, Bellman, & Beal, 2019). Additionally, for the wider implementation to home viewing, how individuals perform when incidentally encoding such information also requires investigation as ultimately this will be a closer approximation of real world viewing. Word learning studies have shown that intentional encoding of information provides larger benefits to memory over longer lags, while incidental presentation of a recursive word can also effectively improve memory, albeit at shorter lags (Janiszewski, Noel, & Sawyer, 2003; Verkoeijen, Rikers, & Schmidt, 2005; Bui, Maddox, Zou, & Hale, 2014; Aue, Criss, & Novak, 2017). Spacing effects have been found while incidentally encoding words as have more complex face stimuli implicating passive viewing as an adequate trigger for remembering an event given that other factors remain sympathetic (Russo, Parkin, Taylor, & Wilks, 1998; Janiszewski, Noel, & Sawyer, 2003; Verkoeijen, Rikers, & Schmidt, 2005).

It is unsurprising that intentional encoding improves spacing effects beyond passive viewing given that it is the repetition detection that drives the advantage (Greene, 1989; Raaijmakers, 2003; Polyn, Norman, & Kahana, 2009; Siegel, & Kahana, 2014). Presumably, when given the endogenous goal of remembering items, individuals are more inclined to rely on pattern detection-like reminding strategies, and have a greater propensity to detect repetitions. Some evidence for this has been seen in neuroimaging research, which has shown that when fronto-parietal activity (associated with attentional control) is higher during repetition encoding, there is greater stability in neural pattern similarity across repetition, which determines superior memory performance (Xue, et al., 2012). Essentially, when paying more attention to P1, a more stable trace is created making it easier to retrieve. During regular TV viewing, the individual's motivations, second screen use and other distractions will all factor into how much an individual is engaging in the visual narrative (Nee, & Dozier, 2017). Therefore, evidencing reminding under both forms of viewing condition will be a critical goal for the present thesis (see Chapters Two, & Three).

3.3.2 Repetition detection in exact and changing repetitions

Although extensively laboured thus far, the importance of repetition detection, during intentional or incidental encoding cannot be understated (Wahlheim, & Jacoby, 2013; Wahlheim, Maddox, & Jacoby, 2014; Negley, Kelley, & Jacoby, 2018). Indeed, to understand repetition effects, advertisers need techniques by which to capture participant repetition knowledge, both during and after viewing. Empirical work has shown that individuals need to acknowledge a repetition, with research showing that bringing repetition or change detection under control, increases memory for both P1 and P2 traces (Jacoby, Wahlheim, & Yonelinas, 2013; Bui, Maddox, Zou, & Hale, 2014). From the interference and facilitation literature, change detection and recollection are known to insulate memories from interference across presentations while facilitating memory for both traces (Wahlheim, & Jacoby, 2013; Jacoby, Wahlheim, & Kelley, 2015; Wahlheim, Smith, & Delaney, 2019). Equally, when detections are missed, competition between P1 and P2 ensues resulting in interference (Wahlheim, & Jacoby, 2013; Putnam, Wahlheim, & Jacoby, 2014; Jacoby, Wahlheim, & Kelley, 2015). For example, applied work has shown that while watching successive political debates, individuals who detected changes in candidates' stated positions were more likely to be reminded of their previous stance on an issue as well showing an overall memory enhancement for the juxtaposing positions (Putnam, Wahlheim, & Jacoby, 2014). Such findings show that events that differ in their contents can still enhance memory, but when this information is not associated during study, a potential pit fall in any repetition mechanism is highlighted. It will be important to determine whether the detection of product repetition, and the retrieval of both P1 and P2, can be used to predict memory facilitation of wider advert characteristics, e.g. the brand and context, not just product memory (see Chapters Two, & Three).

3.3.3 P2 detection time

How long a product is on screen, like many factors involved in TV viewing, is variable. As such, the amount of time viewers will have available to make detections should also dramatically differ, but of interest is how this will affect spaced learning. Word memory research has shown that the time available to detect, encode, and store repetitions is also important for the spacing effect (Negley, Kelley, & Jacoby, 2018; McKinley, Ross, & Benjamin, 2019). For example, increasing the time available to encode each of the presentations increases the likelihood that later memory will be facilitated (Negley, Kelley, & Jacoby, 2018). Also, concurrent measures of study time during self-paced learning predict later memory performance for words; that is, the longer items are studied for, the more likely they are to be later recalled (McKinley, Ross, & Benjamin, 2019). Research into spontaneous explicit memories has shown that when information is automatically retrieved based on bottom-up cues presented to an individual, this process is fast (Berntsen, Staugaard, & Sørensen, 2013). Hence, while the individual may not need several seconds for spontaneous repetition to occur, the increase in screen time provides more opportunity for on-screen events to direct attention toward the product itself. An understanding of whether programme screen duration is critical for predicting detection and advert memory facilitation will therefore be key (see Chapters Two, & Three).

4.0 Advert-Programme Reminding

For advertisers, the literature implies that viewing adverts in close temporal proximity to programme events that contain the same product may have the potential to enhance advert memory without any further financial investment in marketing activities. However, the literature indicates that it is event similarity that will determine when the repetition effects will cease because of failed reminding. Given the variability in advert and programme similarity will be large, the thesis will focus on repetition detection as a method for delineating the limits of the advert-programme reminding effect. Of equal importance will be understanding what effect variable retention intervals, viewing conditions, and product presentation times have on the mechanism as well. Ultimately, the thesis will look to develop and guide techniques to harness product repetition effects that help practitioners get the best from their advertising on the linear TV platform (see Chapters Two, Three, & Four).

5.0 Source misattribution, Advertising, and Memory Interference

Situations that give rise to facilitation rely on repetition of the same or similar events to enhance encoding through spontaneous practice of the recursive item (Jacoby, Wahlheim, & Kelley, 2015). Yet, as noted in the previous section, when there is no repetition/change detection between A-B and A-D, word pair interference is seen for P1 or P2 memory (Wahlheim, & Jacoby, 2013; Jacoby, Wahlheim, & Kelley, 2015). Furthermore, not all interference results in just simple retrieval difficulty for one of these events, more significantly, repeated items can bias recall and recognition in favour of a false alternative. This is known as the misinformation effect (Loftus, & Palmer, 1974; Loftus, Miller, & Burns, 1978; Loftus, 2005; Putnam, Sungkhasettee, & Roediger III, 2017). With the phenomenon's close ties to the paired-associates paradigm as well as false memories currently being used in marketing activities, brand memory misattribution shall also be explored.

The misinformation effect is a memory phenomenon whereby an individual's memory for an event can be disrupted by the introduction of new additive or contradictory information (Loftus, 2005). This literature highlights a consistent deficit in retrieval, a finding that has had wide ranging implication for eye-witness testimony, public health information, the proliferation of fake news, and advertising (Loftus, & Palmer, 1974; Schwarz, Sanna, Skurnik, & Yoon, 2007; Lewandowsky, Ecker, Seifert, Schwarz, & Cook, 2012). Indeed, implicitly or knowingly, advertisers now use misinformation to disrupt consumer recall of their competitors and hijack their marketing efforts (Cornwell, & Humphreys, 2013). Currently underexplored in the literature is how consumers can misattribute brands using heuristic and systematic memory processing after regular TV exposure. Given the relation of advertising to media misinformation; A second aim of the thesis is to use a TV viewing paradigm to understand how media misinformation can take hold as well as how a brand managers might seek to overcome attempts to induce branded misinformation (see Chapter Five). Therefore, while the first three chapters will focus on how repeating product information between the advert and programme can improve advert memory; Chapter Five will instead investigate how this same form of product repetition may lead to advert products being misremembered as programme content. Thus, it is of interest whether brand information (B) can be misrecognised from the advert product (A-B) as the programme product (A-D), culminating in recognition of the advert product (A-B) as programme content.

Between product placement and event sponsorship deals, brands spend large sums of money to associate themselves with consumers' interests. On a basic level, sponsorship works via stimulus conditioning; the brand (stimulus) aligns itself with the positive media context (reinforcer), so that even once the media context is removed, the positive behavioural or attitudinal outcome remains (Sweldens, Van Osselaer, & Janiszewski, 2010). One example of such activity comes from Heineken, whose product placement in Skyfall along with an accompanying advert campaign allegedly cost the beer brand $45 million (Barber, 2015). To associate with a sports event, multi-million pound deals are brokered such as Adidas spending at least $60 million securing the sponsorship rights to the 2012 London Olympic Games, although some report this figure to be as high as $156 million (Passikoff, 2012; Lee Yohn, 2016). More recently, brands sponsoring the 2016 Rio Olympic Games collectively paid $2 billion (Becker, 2016). While this is often money well spent, for example, sponsorship can lead to changes in brand recognition, product favourability as well as favourable product perception changes, these outcomes rely on adequate encoding and, more importantly, correct retrieval (Herrmann, Walliser, & Kacha, 2011; ThinkBox, 2017). This reliance on consumer recall offers an opportunity to brands who may be less willing or unable to secure sponsorship deals. For a business's bottom-line, why pay for a deal when as good, if not better results can be achieved through disrupting memory?

To avoid these price tags, certain brands have taken to using a different form of marketing that "piggy backs" off the official sponsor to attain the favourable behavioural outcomes. The misinformation effect is now used as a guerrilla marketing tactic, a practice known as ambusher marketing, in which a brand attempts to use proximal placement, associated imagery or wording, concurrent social media interaction, and/or suggestion to associate itself with an event by inducing false memory for event sponsorship without agreeing any a formal sponsorship deal (Sandler, & Shani, 1989; Cornwell, & Humphreys, 2013). A classic ambushing advert created by the Australian price comparison site, iSelect, ran during the 2012 London Olympic Games. The advert portrayed an actor Jason Geary (yep, no idea either) performing various Olympic events in an office, with the strap-line mocking its competitor's marketing efforts; "Every four years it's the same story. Companies that have nothing to do with the Games jumping on the bandwagon" (Delaney, 2012). The advert was run during the opening ceremony in its native country. Another more pertinent example coming was Nike’s now infamous ambush advertising campaign “Find your greatness”, in which they looked to disrupt sportswear sponsorship recall through adverts proximally placed throughout TV coverage of the 2012 Games. These adverts aim to associate their brand with a target event in the place of their competitors, without the cost of a legitimate deal (held in this case by Adidas). As such, understanding brand misinformation at its inception, along with how misattribution can be challenged, will be of great interest to any currently ambushed brands (see Chapter Five).

5.1 The misinformation effect

To investigate how brands can be misattributed in a TV viewing context, the misinformation literature must first be discussed, theories outlined, and methods modified. Some of the earliest research into the misinformation phenomenon, conducted by Loftus, Miller and Burns (1978), created a technique with which to study false memory. This method, known as the misinformation paradigm, has three stages. Firstly, the participant views an event either in video or slide form which is called the original information or event. After a duration, a post-event narrative about the original event is provided for the participant to watch, read, or listen; this narrative contains the additive or contradicting misinformation that is false. Finally, after a retention interval, memory is tested. Since the 1970’s there have been a plethora of studies investigating the misinformation phenomenon, with many of these research pieces focusing on eye witness testimony (e.g., Loftus, & Palmer, 1974; McCloskey, & Zaragoza, 1985; Belli, 1989; Lindsay, & Johnson, 1989a; 1989b; Tversky, & Tuchin, 1989; Zhu, et al., 2012). Typically, these studies demonstrate that changing objects, colours, street signs, and brands, in the post-event narrative has a negative impact on original event recall (Loftus, & Palmer, 1974; Loftus, 1977; Loftus, Miller, & Burns,1978; Belli 1989). For example, if a can of 7-Up was seen during the slides, the post-event narratives might suggest Coca-Cola was viewed instead. On a later recognition test, this mismatch between the original information and the misinformation results in lower levels of accurate recall for 7-Up, while increasing the likelihood of Coca-Cola being incorrectly reported as present in the original viewing portion. The change event in many of these experiments is often subtle, with a target object or brand being altered (McCloskey, & Zaragoza, 1985; Belli 1989; Allen, & Lindsay, 1998). It is a modified misinformation task that will be employed in the current thesis to investigate the fate of programme memory.

Unsurprisingly, adverts are not created to be actively associated with specific programme events, instead as a medium they more generally promote brands and their products. It is key then, that events that do not directly relate to one another can still influence how the other is reported. The wider misinformation literature suggests proximal placement and shared event features, rather than specific retelling of the original event, can still lead to misattribution (Allen, & Lindsay, 1998; Chandler, Gargano, & Holt, 2001; Mitchell, & Zaragoza, 2001; Lindsay, Allen, Chan, & Dahl, 2004). For example, Allen, and Lindsay, (1998) demonstrated that participants misreported cola brands after viewing and then reading about similar but discrete events. Here the researchers focused on a cross modality error, with information being given to the participants both visually and auditorily in a sequential fashion. In the study, participants first viewed an event in an office containing Coke. They then read a story about a similar event in a classroom that involved Pepsi. The researchers showed that the newer Pepsi information was often reported when participants were questioned about what they had seen in the office. While this finding was a cross modality memory error, auditory information disrupting visual information's retrieval, the principle of distinct events influencing one another lends weight to how ambushers may use proximal placement to alter retrieval.

Misinformation work has been inextricably linked with legal cases and eye-witness testimony; however, how false memories can benefit brands has also been a focus since the turn of the century (Braun, 1999; Braun, Ellis, & Loftus, 2002; Braun-LaTour, LaTour, Pickrell, & Loftus, 2004; Cowley, & Janus, 2004; Lakshmanan, & Krishnan, 2009; Hellenthal, Howe, & Knott, 2016). While studies have not focused on using TV programmes to investigate ambush marketing, they have demonstrated advertising's pernicious utility in altering an individual's remembered experience. For example in one study, individuals rated a previously tasted juice drink more favourably after viewing advertising that promoted the product's taste, with this effect having the most impact on those with minimal product experience (Cowley, & Janus, 2004). Indeed, this study highlights how individuals often fail to notice the context of information regarding an experience, especially under conditions of uncertainty, and that adverts readily provide materials for misattribution.

Another set of advertising misinformation studies demonstrated not just a change in taste perception but an actual creation of a childhood experience through suggestion (Braun, Ellis, & Loftus, 2002). One now seminal study used advertising to induce memories of meeting Bugs Bunny during a childhood trip to Disneyland, which was entirely fabricated and impossible due to Warner Brothers' ownership of the character (Braun-LaTour, LaTour, Pickrell, & Loftus, 2004). In general, memories that were experienced in the distant past are vulnerable to misinformation due to their long-term decay, but this study also relied on the integration of true schematic information, participants had previously visited the theme park; this reduced source discriminability and increased schematic plausibility of the newly presented information (Johnson, Foley, Suengas, & Raye, 1988; Hyman Jr, Husband, & Billings, 1995). A further finding from Braun-LaTour et al.'s (2004) study was that when the discrepancy between Buggs and Disney was detected the advertisement had no effect on prior memory. This is in accordance with the wider interference literature (Putnam, Wahlheim, & Jacoby, 2014; Butler, & Loftus, 2018). Clearly, the integration of true with false information makes misinformation from adverts more likely, but detection of the repetition and change has a protective quality. Nonetheless, this collection of studies, suggest that advertising can generate acceptance of extreme alterations of life events through relatively short exposure to recent misinformation.

5.2 Recognition memory

Before discussing accounts of the misinformation effect, it is important to understand how events are recognised as past events. As such, the dual-process theory of recognition shall briefly be discussed, after which how episodic retrieval occurs during recognition shall be outlined.

5.2.0 Dual-process theory of recognition memory

Recognising an event as old, or previously seen, appears to be supported by two processes; recollection and familiarity. Recollection is characterised by its attentional demands, delayed availability, and increased subjective insight into an episode (Jacoby, 1991; Rajaram, 1993). Recollection provides conscious insight based on trace reactivation, with the individual being able to describe the object and its context that were present in a recognised episode (Jacoby, 1991; Dobbins, Khoe, Yonelinas & Kroll, 2000). Information about a stimulus' spatio-temporal context is also combined with how an individual felt and what they thought during the learnt episode (Dewhurst, & Conway, 1994; Perfect, 1996). As contextual information is available this allows individuals not only to suggest they have seen an item or scene before, but also state where they saw it; e.g. deciding whether a film was seen at the cinema or at home. (Johnson, Hashtroudi & Lindsay, 1993; see Source Monitoring section 5.2.2). Without rehearsal, recollective based information is highly vulnerable to distortion and forgetting when the binding between an episode's object and the context is not practised. Over time this reduces memory acuity while increasing the likelihood of memory interference (Dudukovic, & Knowlton, 2006; Frost, 2002). Good recollection is therefore understandably key for avoiding misinformation and providing accurate recognition performance over time.

Often individuals fail to create stable traces that can be recalled and instead must rely on more autonomous memory mechanisms. The second recognition process, familiarity, is a signal strength mechanism with recognition potential increasing due to repetition-induced stimulus fluency (Zajonc, 1968; Jacoby & Dallas, 1981; Rajaram, & Geraci, 2000; Yonelinas, 2002; Curran, 2004). That is, as an event or object is encountered more over time, the stimulus is consequently processed more easily, with this feeling giving rise to a sense of knowing or familiarity. Familiarity related information is available to an individual rapidly and can be used as a recognition criterion even under heavy attentional load (Jacoby, Woloshyn, & Kelley, 1989; Gardiner, & Parkin, 1990; Jacoby, 1991; Hintzman, Caulton, & Levin, 1998; Curran, 2004). Familiarity can occur not just for perceptual objects but for conceptual information (Rajaram, 1993; Gregg, & Gardiner, 1994; Wang, Ranganath, & Yonelinas, 2014), statement truthfulness (Dechêne, Stahl, Hansen, & Wänke, 2010), and advertising (Schmidt, & Eisend, 2015). Typically, fluency increases are linearly associated with familiarity, liking, and truthfulness ratings (Zajonc 1968; Dechêne, Stahl, Hansen, & Wänke, 2010), with these two latter judgements individuals are though to substitute a psychometrically complex question for the more available information on how easily a stimulus is processed (Jacoby, Woloshyn, & Kelley, 1989). This is thought to be the mechanism behind improvements in attitudes towards adverts across repetitions for example, individuals tend to like adverts more, the more they initially see them (Schmidt, & Eisend, 2015). Given familiarity does not distinguish between events, rather it merely indicates prior experience, familiarity can often be the source of misattribution errors.

What evidence is there for a dissociated system of recognition? Firstly, the theory is supported by substantial neuroimaging evidence indicating a formal substrate dissociation between the two remembering states (Simons, Peers, Mazuz, Berryhill, & Olson, 2009). Behaviourally, evidence from retrieval studies under divided attention helps to separate the influence of each process (Jacoby, & Dallas, 1981; Jacoby, 1991). Under conditions of divided attention, recollection, which requires cognitive control, is impaired resulting in participants being less able to retrieve information. Under the same conditions, familiarity, which occurs in the absence of cognitive control, is unaffected, with fluency of processing still increasing (Rajaram, 1993). This automaticity is why familiarity is known as heuristic evidence in recognition decisions (Chaiken, 1987; see Source Monitoring section below). Similarly, time course analysis also helps to differentiate the two, with familiarity information becoming available much earlier than recollected information (McElree, Dolan, & Jacoby, 1999). Generally, both processes are characterised via their contribution to memory performance across a range of factors and conditions, but when recollection fails, there will be a greater reliance on familiarity (Yonelinas, 2002). Such findings generally support the idea that even when a consumer is not paying full attention to marketing communications, these efforts may still impact later consideration set decisions via familiarity.

5.2.1 Remember/Know Paradigm

Of interest across the thesis will be the relative contributions of familiarity and recollection. To subjectively capture recognition that results via each route, researchers have developed a technique, known as the “Remember/Know” paradigm (Tulving, 1985; Rajaram, 1993; Yonelinas, & Jacoby, 1995; Gardiner, Java, & Richardson-Klavehn, 1996; Yonelinas, 2001b; Migo, Mayes, & Montaldi, 2012). This meta-memory task asks participants to consciously evaluate the remembrance process and then parse out the two types of recognition memory; with a “remember” response referencing recollection and a “know” response corresponding to a familiarity judgement. When using the paradigm, participants are encouraged to report a remember response only when they can visualise the episode with the target scene/object in their mind's eye, as well as when these memories are supported by other thoughts and prior memories. Participants are told to report a "know" response when a target scene/object feels familiar but they are unable to access any further episodic information about the stimulus. Performance comparisons have shown that the Remember/Know paradigm is functionally dissociated from simple confidence judgements, suggesting a separation in measurement (Rajaram, 1993; Yonelinas, 2001a; Geraci, McCabe, & Guillory, 2009). Neuroimaging research also shows that this subjective reporting, via separate neural activation, is associated with either fluency increases or context retrieval (Yonelinas, 2001b; Wheeler, & Buckner, 2004; Wolk, Dunfee, Dickerson, Aizenstein, & DeKosky, 2011). This measure has seen little use in advertising research, yet having insight into how consumers make recognition decisions can help tailor adverts for advertisers' desired form of recognition; e.g. familiarity-based recognition for supermarket shopping and recollection for online shopping. In the current thesis, the paradigm will be used in the investigation of both facilitation and interference mechanisms (see Chapters Four, & Five).

5.2.2 Source monitoring framework

Whether recollection or familiarity-based retrieval processes are recruited to identifying an episode's source is known as source monitoring with this process occurring whenever episodic information is retrieved (Mitchell, & Johnson, 2009). First and foremost, source monitoring suggests recognition is determined by three factors. They are, the trace information availability, the retrieval context, and the motivation to engage in effortful cognition (Johnson, Hashtroudi, & Lindsay, 1993). During recognition or recall, information availability is based upon the qualitative characteristics available, enabling the individual to decide if an event occurred, and potentially, where it took place. Such characteristics are the average input from perceptual information, contextual (temporal and spatial) information, semantic information, affective state, and cognitive operations, as well as the concurrent mood states, agendas, schemas, and plausibility that pertain to the situation (Johnson, Hashtroudi, & Lindsay, 1993). Individuals unconsciously make source judgements in everyday life (Johnson, Hashtroudi, & Lindsay, 1993). This process therefore dictates how accurately information is recalled based on the information readily available to the individual at test or during real world recall.

Deciding on the existence of an event is also determined by the situation and motivation to engage in effortful cognition (Johnson, Hashtroudi, & Lindsay, 1993). Indeed, deciding if one previously saw an advert would require less involvement than scrutinising a claim seen in a newspaper. To account for these situational differences, the source monitoring framework assimilated the concept of heuristic and systematic processing based on Chaiken's (1987) pertinent Heuristic-Systematic Model (HSM) of persuasion. Both the source monitoring framework and the HSM posit that individuals generally adhere to the principle of least effort and use heuristics to make decisions, which require minimal cognition and can be used with or without cognitive control. Indeed, the principle of least effort predicts that individuals will not typically engage in more effortful, deliberative, and conscious systematic thinking unless it is necessary. Heuristics are superficial cues that do not always have bearing on actual validity of a message or memory, but instead are used are mental short cuts that negate effortful cognition. Typical heuristics would be length or number of arguments, the source likability, and the familiarity or retrieval fluency. During familiarity-based recognition then, when there is a paucity of recollected information available, as well as the trace's context being undeterminable, instead unitary fluency evidence enables the more rudimentary decision of seen/unseen to be made quickly.

Evidence for such a distinction is quite clear in terms of the speed at which information is available. This is well evidenced in the dual theories that state recollection is not as fast acting as familiarity (Gardiner, & Parkin, 1990; Jacoby, 1991; Hintzman, & Caulton, 1997). For example, when individuals are told to read more slowly, they can engage more deeply with information meaning, enabling a more conservative criterion to be employed and inconsistencies to be more apparent when assessing misinformation (Tousignant, Hall, & Loftus, 1986). Indeed, the levels of processing model suitably supports that greater semantic engagement with a text will lead to better memory, albeit being more effortful (Craik, & Lockhart, 1972). In tandem, both heuristic and systematic processes moderate the influence of the other, reducing errors in source judgement. As a theory, it has much use for how advertisers should consider and target their target consumers' retrieval processes, but the theory also provides a platform for understanding misattribution errors.

5.2.3 The source monitoring paradigm

While advert recollection and familiarity are both important for the current investigation, it is critical that certain measures also allow for the isolation of an advert's contextual/content information and reduce the influence of heuristic processing. Experimentally, this can be done using the source monitoring paradigm (Lindsay, & Johnson, 1989b). Source monitoring paradigms do not ask directly if an item appeared during an event, but instead asks whether the individual can identify within an event where an item occurred or if it even appeared at all. In this way, the individual bases their recognition decision on recollective characteristics of the event that can distinguish source A from source B, forcing them to discount the familiarity experienced for the item (Okado, & Stark, 2005). For example, the source monitoring task would ask individuals to identify whether they saw a product appear in the original event, the post-event narrative, both the original event and the post-event narrative, or neither. The paradigm is known to be a more robust recollection test and can moderate memory phenomenon like the misinformation effect that arise based on familiarity misattribution alone (Lindsay, & Johnson, 1989a).

Source monitoring paradigms are typically used in the assessment of misinformation from the same or across modalities (Johnson, Foley, Suengas, & Raye, 1988; Okado, & Stark, 2005). As such, a source monitoring paradigm will be used as a robust assessment of the misinformation effect in the final experimental chapter (see Chapter Five).

5.3 Source monitoring account of the misinformation effect

As outlined in the source monitoring section (see section 5.2.2), the assumptions of this theory predict that it is the encoding conditions, question framing, cognitive engagement, and wider context that will determine retrieval success (Johnson, Hashtroudi, & Lindsay, 1993). Thus, the source monitoring framework predicts that it is an error in the monitoring process that is the source of the misinformation effect (Frost, Ingraham, & Wilson, 2002). If a memory measure asks an individual about what they saw, then perceptual details of a memory are taken as preferential evidence above, say, cognitive or affective processes that occurred during the episode (Mitchell, & Zaragoza, 2001; Lyle, & Johnson, 2007). Therefore, misattribution likelihood increases when events occur in the same modality, have similar characteristics (semantic content), have related contextual information (during TV viewing), and when events share supporting memories (Johnson, Foley, Suengas, & Raye, 1988). The greater the overlap in source characteristics, the harder source monitoring becomes, requiring more effortful engagement for the individual to have accurate recall (Hashtroudi, Johnson, & Chrosniak, 1990; Lindsay, Johnson, & Kwon, 1991; Lyle, & Johnson, 2006; Lyle, & Johnson, 2007). The set of cue characteristics retrieved is further aided via top-down judgments of event plausibility, with these evaluations being highly sensitive to the similarity between events (Lindsay, 1990; Allen, & Lindsay, 1998; Pérez-Mata, & Diges, 2007). For example, remembering a Coca-Cola can instead of 7-UP is plausible, remembering a cat in the place of the Coca-Cola can is far less likely. Thus, the misinformation effect is underpinned by this separation in storage, allowing for events and objects to be remembered but not their source.

An example of an external source monitoring error, an error in which an individual mistakenly believes external event B happened in place of event A, would be recalling that one had spaghetti Bolognese rather than lasagne for dinner on Saturday evening. A source misattribution error is likely to occur if perceptual qualities of the two events are similar, there is plausibility that both events could happen, and the surrounding contextual information remains the same. In this case, if Bolognese was had on Monday evening instead, the individual may fail to correctly attribute this dish to the right evening meal, and given their plausibility and category similarity, such a situation may result in a retrieval error.

Such errors occur every day of their own volition but certain events at the point of retrieval increase their likelihood. For example, the criteria set by the questioning itself can have a large influence over the rates of misinformation (Lindsay, & Johnson, 1989a). Most frequently, individuals engage in simple binary decisions as to whether an event occurred, with this questioning format being highly prevalent in research (Lindsay, & Johnson, 1989a). As there is no minimal requirement to differentiate between sources, the least effort principle means there is a reliance on familiarity-based decision making, which can increase misinformation suggestibility (Zaragoza, & Lane, 1994). Using binary decisions when encountering misinformation will bias individuals to respond in a liberal fashion; as the information will feel instantly familiar and rejection then requires further recollection, which the questioning does not require (Gallo, Weiss, & Schacter, 2004). Understanding recognition performance under these conditions will be key for applying the misinformation effect to programme viewing, and informing when the two process might be used in the real world.

However, individuals do not always use simple heuristics to make decisions, either through their own high personal motivation to be correct or via the question presentation

(Johnson, Hashtroudi, & Lindsay, 1993). During recognition, individuals can be encouraged to use recollection by employing a source monitoring paradigm, which encourages a more conservative response by directly asking them to choose a source (Mitchell, & Johnson, 2009). That is, individuals can retrieve perceptual, or contextual episodic detail to aid in their decision making and allow for source differentiated judgments to be made. Research investigating the contribution of dual process theories of recognition has compared yes/no recognition with source monitoring paradigms (Lindsay, & Johnson, 1989a). When the same information is questioned using these opposing paradigms, performance is markedly different; with false endorsement rates being much higher in the yes/no condition than using the source monitoring paradigm (Lindsay, & Johnson, 1989a; Lindsay, & Johnson, 1991; Zaragoza, & Lane, 1994).

From the source monitoring framework of misinformation, understanding how altering participants' cognitive conditions while assessing programme information has pertinence as to how individuals assess false alternatives in the real world; e.g. Nike or iSelect during the 2012 Olympic Games (see Chapter Five & Six for a discussion).

6.0 Media Misinformation Effect

Given the large price tag for sponsorship and the legal grey area in which ambushers operate, it is important to provide evidence how the programme cues can also be leveraged for pernicious means. The thesis will also look at how promoting either heuristic or systematic processing allows for ambush marketers to prevail or be prohibited.

7.0 Product repetition during TV viewing

Collectively, the thesis will look to combine facilitation and interference paradigms with product repetition across adverts and programmes so as to investigate their effects on memory. Not only will this help to increase the attractiveness of the linear offering, the thesis will also explore the more pernicious side of marketing activities and how they can be curtailed. The first three experimental chapters of the thesis will focus on how advert-programme product repetition can improve advert memory. Chapter Two of the thesis will look to understand if consciously retrieving advert information during programme viewing can enhance advert memory. This experiment will adapt methods used to investigate change detection, and will ask participants to actively monitor product repetitions that are viewed between previously seen adverts and currently viewed programmes (Negley, Kelley, & Jacoby, 2018). This will provide an understanding of whether it is possible for detection to occur during viewing and will form the basis for the next three studies. Chapter Three will investigate whether having repetition information available at test after passively viewing can lead to changes in advert memory. Equally, this chapter will focus on developing a method for testing product repetitions in market, by assessing participants' abilities to recollect the repetitions they saw during viewing after a 24-hour delay. After a viewing portion on day one, is advert memory improved by viewing adverts with an associated programme product event, and most importantly, is this advantage supported by having product repetition information available at test on day two? Chapter Four will use a full programme viewing scenario and a variable testing delay to understand if advert repetition can influence memory in a full viewing scenario using US adverts. In this study, participants will first view a full 30-minute TV programme with adverts interpolated at the beginning, in the middle, and at the end of viewing. Participant's advert memory will then be tested after either a 10 minute or 24-hour delay. The effects of advert and programme position will also be investigated.

Chapter Five will investigate the effects of advert product interference on programme memory. Here, participants will again watch a full 30-minute programme in a TV viewing scenario. Participants' programme event memory will then be tested under conditions of heuristic and systematic question framing. The results are applied to real world examples of how media misinformation takes hold and is maintained.

Chapter Two – The effects of in-programme advert reminding

TV advertising campaigns typically use multiple presentations of the same advert, which is understood to lead to a negative effect after ten exposures, known as the advertising wear-out effect (Schmidt, & Eisend, 2015). The current study will look at a possible alternative to direct exposure, by understanding if recursive product detection can lead to increases in advert memory without further exposure to the same advert. Several non-advertising studies have sought to bring reminding under experimenter control during word list learning tasks, with these studies demonstrating that it is repetition detection and recollection of prior instances that drives retroactive facilitation (Jacoby, Wahlheim, & Yonelinas, 2013; Wahlheim, 2014; Jacoby, Wahlheim, & Kelley, 2015; Negley, Kelley, & Jacoby, 2018). This chapter's aim then will be to **provide evidence for advert reminding during programme viewing and quantify its subsequent effect on advert memory**. In order for advertisers to use the programme context as a consistent memory cue it is important to understand whether programme events can allow for product repetition detection and reminding of recently seen advertising while the viewer is watching TV. A secondary aim is to **modify an existing paradigm that could easily be adopted and adapted for further industry investigation**. The implications for linear broadcasters would be clear, creating more attractive offerings to advertising brands with minimal extra cost.

<u>Why is the programme content important for advertisers and brand managers?</u>

A perennial aim of advertisers is for consumers to closely associate a brand with its product category while concurrently crystallising advertising messages, e.g. Coca-Cola and love, into semantic memory. One way to do this is to create multiple "study" opportunities, repeating the advert in every advert break. Given that testing, or retrieval, is a more powerful learning cue than study or exposure in the case of advert viewing, using the programme to trigger related advertising may be one way to increase advert memory while offsetting the negative affect seen for most market saturated adverts (Roediger III, & Karpicke, 2006; Schmidt, & Eisend, 2015). For broadcasters, being able to use their own programme content to passively increase advert memory could lead to increased advert space sales volume simply through the identification of programme event characteristics that makes them viable memory cues. For brand managers, being offered advertising space where advert memory can be demonstrably improved without the need for continuous repetition appears an attractive proposition, especially when a single 30 second advert during a primetime show can cost as much as £100,000 in the UK (Sweney, 2020).

<u>Role of reminding in facilitation and spaced learning.</u>

How can programme content be used as an advert memory cue? Reminding theory has been used to account for multiple findings in the spaced learning and memory interference literatures, showing the repeated items, words, and objects can improve later memory (Hintzman, 2004; 2011; See Chapter One: Introduction for an outline). Although predominately used to account for word memory, a handful of studies and reviews have implicated reminding as the basis for advert repetition effects, albeit not using TV programme stimuli (Janiszewski, Noel, & Sawyer, 2003; Schmidt, & Eisend, 2015). Appleton-Knapp, Bjork, and Wickens (2005) adapted the paired-associates paradigm to assess the spacing effect for both exact and varied advert repetitions. They used two booklets of print adverts, allowing them to repeat the adverts after several seconds or ten minutes. How the repetitions were presented was also altered. Exact repetitions showed the same advert for both P1 and P2. For the varied execution adverts, the brand and product were the same, but the advert details themselves changed across P1 and P2. From their experiments, they showed that exact repetitions generated the largest increases in advert memory across the two booklets. However, between booklet repetition did not show a spacing benefit for varied advert executions. In support of this, they found that during booklet two, individuals were much less likely to detect the repeating product when advert variation repetitions were seen in comparison to exact repetitions. Exact repetitions led to near perfect product repetition detection, in contrast the varied advert repetitions had a 50% detection level across the booklets. In this Appleton-Knapp et al. study, detecting the repeated product indicated that the participant had been reminded, and their evidence suggested the extent of the reminding event determined the improvement in advert memory.

The present study will therefore extend this existing static advert work, investigating if advert memory enhancement is again contingent upon participants' ability to detect the repetition, but rather use advert and programme stimuli in the place of varying advert executions.

Why does repetition detection aid memory?

To understand advert reminding, it is critical that a method be created that can capture what would ordinarily be a spontaneous process. Thus, examining the design of verbal learning studies should provide applicable measures for assessment during programme viewing. For simple reminding of a word or object, successfully detecting the repetition appears to enhance its memory (see Chapter One: Introduction for a discussion). For example, Wahlheim, Maddox, and Jacoby (2014) investigated the effects of spaced word repetition across two lists. In their study, participants viewed two lists of words before completing a memory test. While viewing the second list, participants were told to either look back only within the second list or to look back across both lists (n-back task) for repeated items. They found that when looking back was curtailed to within list 2, repetition detection and memory facilitation decreased. Whereas, for those in the n-back condition the reverse was found, both repetition detection and later memory performance improved. In fact, when repetition items were missed in Wahlheim, Maddox, and Jacoby's study, performance was in line with single control items again indicating the benefit to be contingent upon detection. In

Appleton-Knapp, et al (2005)'s study, product repetition detection appeared to coincide with later advert memory performance, although contextual variation across repetitions appeared to decrease repetition detection moderating the benefit. To consciously capture reminding, the individual's ability to detect P2 items as repetitions is key (Jacoby, & Wahlheim, 2013; Negley, Kelley, & Jacoby, 2018). Concurrently, this ability will depend on the degree to which the individual looks back, and how similar the events are that contain the repeated product. The current study will therefore use a similar measure of repetition detection during viewing, with viewers being told to look back for product repetitions in the adverts seen prior.

What about advert recollection?

Given the contextual differences between an advert and programme event, detecting the repeated product alone might not confer memory benefits to the advert's most important element, the brand. In the case of simple repetitions, often noticing the repetition is enough to trigger retrieval, but when the repeated item involves a degree of change, as in the interference literature, successful P1 retrieval is key (Wahlheim, Maddox, & Jacoby, 2014; Jacoby, Wahlheim, & Kelley, 2015). Negley, Kelley, and Jacoby (2018) examined the effects of changed word pairs on later P1 memory in their interference paired-associates paradigm. In their study, a P1 pair might be chair-banana, and P2 could be chair-car. When reminding occurred at P2, subsequent list one cued recall performance was at 94%. That is, retrieving A-B at the point of A-D during study, means A-B's recall is nearly at the ceiling during a test. However, if chair is detected as a repetition but cannot generate a successful retrieval of chair-*banana* during list two, significant interference occurs and list one recall falls to around 10%. The critical difference here from exact repetition is that only when additional information is retrieved during study (banana) can its later memory performance improve. Applying such findings to the current work; there will be no advert brand information available to encode during the programme unless the participant will be able to additionally retrieve the brand initially seen in the advert. Thus, advert brand memory should only be enhanced if it can be recalled while viewing the programme.

To retain external validity, the programme clips used in the following study will not be lab created, meaning the heterogeneity in the programme's product presentation will likely influence how successful later memory is. Research from the misinformation literature has shown that when individuals are given longer to study and detect for inconsistencies, participants become more resistant to the misinformation itself (Tousignant, Hall, & Loftus, 1986). Similarly, Negley, Kelley, and Jacoby (2018) looked at the effects of increasing the time available for change detection and reminding in the paired-associates paradigm. They found that when study time of list two was increased, there was an increase in change detection, reminding and subsequent improvement in P1 memory. The increased time available at list two allowed for individuals to spend longer in search for P1 at P2. Programme clip duration, and thus length of product exposure, will therefore be included as a covariate in each analysis to understand whether longer programme clips similarly improve memory performance.

Current experiment

In this first experiment, the study will provide the initial evidence for programme events acting as reminding cues by modifying the paired associates paradigm, and using a looking back procedure. In this modified version, list one items will be replaced by a block of 60 adverts seen at the beginning of the experiment. After viewing the adverts, participants will complete a ten-minute filler task. List two will then be replaced by a block of 75 programme clips, all differing in duration. After each programme clip is viewed, the participant will be asked whether the programme contained a product repeated from the advertising. If they believe it did, they recorded the product, and the advertised brand. The study's design will be between participants, with each participant viewing half the adverts with a repeating product programme clip and the other half without a related programme clip. The two groups will ensure that each advert is seen as a single advert and as with a repeated programme event an equal number of times, with the programme content acting as the studies manipulation. Participant memory will then be assessed using free recall. Cued product recall and a conditional brand recall measure will also be used to assess participant memory.

Question summary

Firstly, what are the effects of seeing an advert with and without an associated programme event on advert free recall, and cued product, and brand recall?

When focusing on the conditionalised analyses, what are the effects of repetition detection and advert reminding on free recall, cued product, and brand recall.

In all conditionalised analyses, are longer programme events associated with better repetition detection and better advert memory?

Finally, what are the effects of lag on repetition detection success?

Methods

Participants

A sample of 32 Durham University students (6 males, 26 females; *M* = 19.6, *SD* = 1.46) participated in the study. All had normal or corrected-to-normal vision and received course credit for participation.

A binomial power calculation assessed power suitability, demonstrating the likelihood of a false negative given the sample size and recall probability. As the recall was a binary decision, the chance probability was set to 0.5. The probability to not have a single individual recall an advert element was was p <.001 at the sample size of 32 participants. Participants were randomly allocated to either viewing condition A or viewing condition B.

To decrease the likelihood of participants using personal encoding strategies during the advert viewing phase, participants received a cover story during experiment recruitment. When agreeing to participate, they were informed that the study would focus on the mood inductive qualities of TV programme clips. Such a task is common in consumer research (Elen, d'Heer, Geuens, & Vermeir, 2013). This put the emphasis on the programme viewing portion, better reflecting the endogenous goals associated with real world viewing, and, importantly, avoided mentioning that the study contained a memory assessment element.

Materials/apparatus

Online Survey was used to collect free recall and participant demographic information. PsychoPy3 (Version 3.1.0) was used to present the adverts and programmes as well as collect the product repetition detection data and present the cued advert memory measure (Peirce, 2007; 2009). Pen and paper measures were used to collect programme reminding information as well as cued recall results (see Appendix A & B). The experiment was conducted on an Intel core i7 laptop with a 17” screen. Presenting the videos on a laptop is congruent with how many consumers, particularly younger demographics, now frequently choose to view live TV content (BARB, 2020). While viewing the adverts and programmes, participants wore over ear headphones. The participants completed the study in a mock living room that contained a sofa and a Samsung TV.

TV programmes clips

Seventy-five programme clips were taken from 32 programmes shown in the UK market. For UK practitioners, it is important that evidence is derived from brands, adverts, and programmes that are typically viewed on native TV. Maintaining stimulus quality was integral for the experiment having any external validity, ruling out bespoke video stimulus creation as has been noted in the literature (Geuens, & De Pelsmacker, 2017). The selected range spanned multiple genres and reflected the diverse programmes seen on linear TV. Programme events that were selected as non-target foils featured either no products, i.e. close-ups of individuals talking, or contained products that were not seen in the advertising. A criterion was created for target TV programme product event selection. Target programme events had to feature the target product by having multiple verbal mentions and displaying characters' interactions with the product (see Appendix C for list of target events). Target and foil clips were selected from each programme to remove any programme pop-out value. As the clips were taken from real TV events, their length was determined by the product's inclusion, and would be included as a covariate. For each participant, the programme clips were presented in a randomised order.

Adverts

The 60 adverts were chosen from the UK market. The products used for repetition in the adverts were a mixture of food, technology, and clothing products (see Appendix C for a list of the adverts chosen). A range of products was chosen to increase the generalisability of the findings, and to show that the effect was not category specific. 40 adverts acted as experimental trials. Per viewing groups A and B, 20 of these adverts were targets, while 20 served as controls. A control advert refers to the advert seen without an associated programme event. All adverts were no longer than a minute in length. For each participant, adverts were randomly presented in a single block lasting just under 30 minutes.

Programme reminding measure

To capture in-programme reminding, a repetition detection measure was adapted from Negley, Kelley, and Jacoby's (2018) paired-associates paradigm. The measure aimed to assess the participants' ability to detect product repetitions between the adverts and programmes as well as to record their ability to retrieve details about the previously seen advert during the programme. After each programme clip, the participant was asked to respond, yes/no, as to whether it featured a product that had also been advertised. For example, a participant would respond 'yes' if they viewed a programme event in which a character danced around his house while using a vacuum cleaner after seeing previously seeing a Dyson vacuum cleaner advert. If the participant detected a product repetition, they were asked to note down the repeated product as well as the brand seen in the advert (see Figure 2.0 below for the three stages). Here, it was stated that it was product category repetition rather than exact product and brand repetition that the participant must detect. Binary repetition detection was collected in PsychoPy and cued brand reminding was recorded using pen and paper. Programme clips were randomly presented to the participant, with the total running time for all clips lasting one hour and ten minutes (not including response time). Both repetition detection and brand reminding were used as fixed effects in the conditionalised reminding analysis. Due to a technical error, all participants before participant nine saw only 74 videos, with each participant only seeing 19 target programme events.

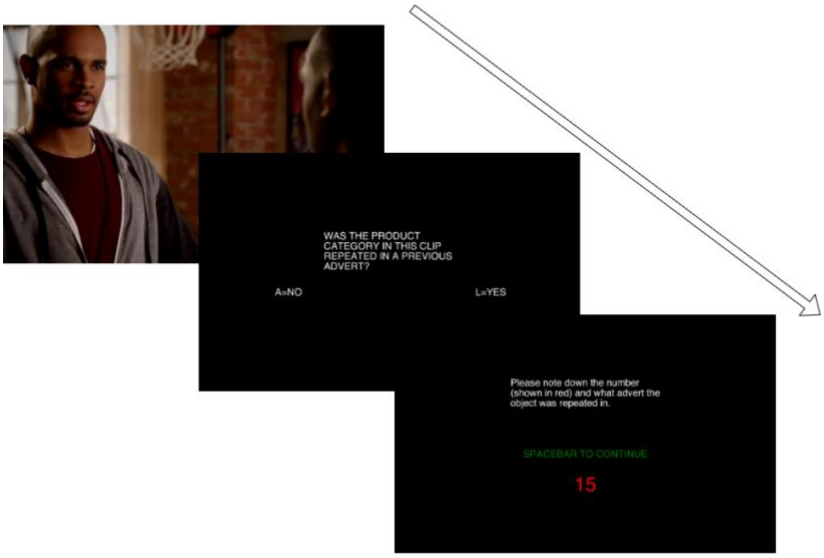

Figure 2.0. Example of a single 'yes' response trial on the in-programme repetition detection measure.

Free recall

Free recall of the adverts was assessed via a three-level points system (Norris & Colman, 1993; Norris & Colman, 1994; Furnham & Goh, 2014). For each advert, participants were asked to recall both the brand and the product/service, as well as give a single line advert description. A point was awarded for the correct brand with slight allowances made for spelling. To be given the point for the product or service, they had to state the correct product category, e.g. beer, shampoo, etc (see Appendix D for coding rubric). For the point to be awarded for the advert description, the participant had to provide some detail from at least one single scene or theme in the advert (see Appendix D For a description of the measure).

If the participant could remember the brand, the product/service, and gave a description of the advert, they were awarded a point on each dimension. If they remembered two of these elements, they received two points. If they could remember a single element of the advert, they were given a single point. If the answer given was completely wrong or did not relate to any advert seen, they were given no points. Each answer was subjected to two independent experimenters' scoring, one of which was naïve to the experiment's purpose (see the Data Analysis section for Cohen's Kappa).

Cued advert recall measure

The cued memory measure, or aided recall, looked to assess product cued recall and cued brand recall. The measure presented the participant, with a series of products in word format e.g. beer. Each word was presented for four seconds after which the question "Was this object in an advert?" appeared. The participant gave a binary decision as to whether the product had appeared in one of the adverts seen in the study (see Figure 2.1 below). If they responded yes to a product, they were asked to write down the name of the brand that was advertising that product (see Appendix B for cued brand recording sheet). The measure was made up of 80 word trials. For each participant 20 of these were repetition trials, 20 were seen controls, and 40 were foil products.

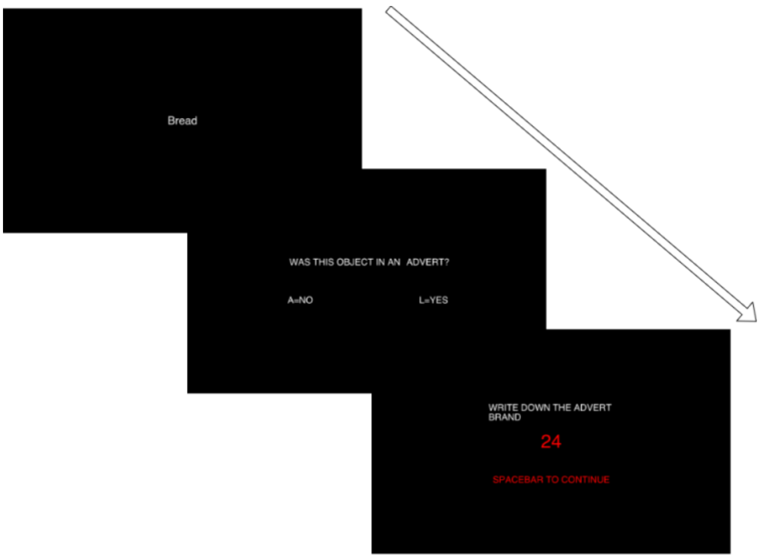

Figure 2.1. Displays a single yes trial on the cued advert recall measure.

Design

The study had a between-participants design. The two groups in the study were determined by the programme clip content assigned for each trial, i.e., a programme clip containing product repetition of an included advert, or not. This meant that each participant saw half the trials as repetitions and the other half the trials as single adverts, with group allocation determining which programme clips were seen for which trials. All participants saw all 40 adverts. In relation to the 40 adverts, viewing group one saw 20 programme repetition clips and 20 unrelated programme clips. Viewing group two saw the exact reverse in terms of repetition content, so that those 20 repetition trials from group one were now seen as non-repetition trials in group two for example. This meant that for each of the 40 adverts, there was a recall percentage for when the advert was part of repetition pair, and when it was not. This led to the hypothesis that those adverts seen with a repetition pair would have a higher recall percentage, than those seen without a related programme clip. To further understand the mechanism, the repetition trials were split based on the results of the programme reminding measure. This meant that advert memory was compared between those who missed the repetition, those who detected the repetition only, and those who both detected the repetition and remembered the advert's brand. Finally, to understand if longer clip lengths presented in the study influenced the rate of detecting the product repetitions, programme clip time was split into three groups and assessed for its predictive ability over repetition detection. The independent variables were the content of the programme clips seen (product repetition/no repetition); for the conditionalised reminding analyses, recollection of reminding status, and programme clip length. The dependent measures were the binary coded free recall responses, binary cued product recall, and binary cued brand recall. The covariates, programme clip duration and advert lag duration were also included.

Procedure

Firstly, participants viewed the initial block of advertising and were instructed to watch as they would at home. While viewing, the participants wore headphones. They then completed a 10-minute Sudoku as a filler activity, before viewing the programme clips and concurrently completing the programme reminding measure. This was done so that the last advert was not seen immediately before the first programme, removing the chance of certain products being observed in a massed fashion. After finishing the programme viewing section, they were given a surprise advert free recall, and then the cued advert memory measure. Finally, they filled in the demographical information, after which they were fully debriefed and informed of the study's true nature. Demographic information was collected at the end to reduce the likelihood of participants gaining any insight into the studies true aim before the manipulation was seen.

Data analysis

Analyses were conducted using R (version 3.5, R Core Team 2018) and R Studio (version 1.1.447). A false discovery rate correction was employed for any multiple comparisons (Benjamini, & Hochberg, 1995). Two independent coders recorded the free recall responses with one being naïve to the purpose of the experiment. Both coders used the same procedural rubric for inputting the data (see Appendix D).

Inter-rater reliability

To ascertain coder reliability, Cohen's Kappa was conducted on both sets of coders' data. From the 40 adverts, there were 3839 observations from the 32 participants. Minimum acceptable Kappa rates were determined based on Cohen's (1988) recommendations, with good level of agreement ($\kappa \geq 0.8$) being the acceptable level prior to testing. An unweighted Cohen's Kappa score was generated (function "kappa2" from the package "irr" (version 0.84.1)), finding there was a good level of agreement between coders ($\kappa = 0.93$, $p = .000$).

Generalised Linear Mixed Model

<u>Why GLMM and not analysis of variance?</u>

Analysis of variance (ANOVA) in memory, learning, and advertising research has become commonplace when assessing the effectiveness of experimental manipulations on proportions based upon binary outcomes (Appleton-Knapp, Bjork, & Wickens, 2005; Negley, Kelley, & Jacoby, 2018), but for categorical data to be used in an ANOVA they must be averaged into a proportion before being transformed to meet the assumption of normality. Jaeger (2008) suggests that a reliance on proportions in ANOVA can lead to potentially misleading results. Firstly, ranges of standard error and confidence intervals can extend beyond values that are possible, e.g. over 1 or below 0, detracting from their interpretability. Secondly, Jaeger suggests that homogeneity of variance is broken when ANOVA is performed on proportions, as the means and variance are highest at .5 and decrease as the probability of an outcome approaches the most extreme values. That is, the increase in success is not constant as changes around .5 are less impactful than changes nearing the ceiling or floor, *i.e.* they are non-linear. Finally, between-participants ANOVA ignores the random effects of participant that arise from the individual difference in response to a stimulus, and that pseudo-replication can occur if repeated observations are taken (Bolker, et al., 2009).

Instead of altering data to fit the test, selecting a test that fits the data appears to be a more parsimonious method of analysis. Thus, generalised liner mixed modelling (GLMM) was selected as the main statistical test in the thesis due to its ability to accommodate multiple error structures (e.g. binomial, Poisson, Gaussian), and link functions (e.g. logit, alpha, identity), while allowing for the simultaneous controlling of multiple random effects in a single model (Agresti, 2003; Baayen, Davidson, & Bates, 2008; Barr, Levy, Scheepers, & Tily, 2013). The link function acts to link together the linear predictor and the fitted values. Thus, GLMM removes the need for normality and homogeneity of variance that reduce ANOVA flexibility. GLMMs have several other benefits; they are more powerful as they do not require prior averaging before model entry meaning the entire dataset can be used and, given that binomial error structures can be accommodated, no transformations are needed

(Baayen, Davidson, & Bates, 2008; Jaeger, 2008). Equally, GLMMs are more robust to imbalances in group or trial numbers and can handle missing data unlike ANOVA (Baayen, Davidson, & Bates, 2008). Also, GLMMs model the influence of random slopes and random intercepts that arise from individual differences in participant response, removing the need for the assumption of independence (Jaeger, 2008). One criticism of the reminding literature is that research is conducted on conditionalised proportions based on earlier repetition detection performance. This has the potential to bias performance in favour of more memorable stimuli, rather than signifying genuine spaced learning effects (Wahlheim, Maddox, & Jacoby, 2014). GLMM allows for the additional stimulus as a random intercept, which will account for stimulus differences without the need for design changes as has been seen in previous work (Wahlheim, Maddox, & Jacoby, 2014).

Structure and implementation of the GLMMs

When running a GLMM one must first decide on an appropriate error structure for the data provided. In the case of binary outcome, a binomial error distribution would be chosen. The link function also needs to be established based on the error structure. When a binary response is used, the fitted probability is bound between 0 and 1 while the increase in probability is not constant like linear regression. Therefore, a logit link matches the fitted values to a linear predictor by way of an inverse logit. As with all null hypothesis significance testing, an acceptable model error rate is also selected. GLMMs have three main model components: The first is the fixed effect and its purpose in the model is to understand its influence on the mean or probability on an outcome variable (e.g. experimental condition). Secondly, there are random effects. Random effects are included so their influence on the model’s variance can be accounted and controlled for (e.g. participant or advert). Thirdly, there are also covariates, which must be continuous data and have a Gaussian distribution. GLMMs are fitted using maximum likelihood estimation, rather than the least squares method used in normal regression, enabling them to model non-Gaussian types of data. Model or predictor significance is established by comparing the full model containing the chosen fixed effects with the null model that contains only the intercept and random effects (Forstmeier, & Schielzeth, 2011). GLMMs are also iteratively simplified by removing non-significant fixed effects and covariates until only those that are significant remain to aid in interpretation (see methods of Sirianni, Mundry, & Boesch, 2015).

Study One data analysis

During model creation, “condition” referred to whether the product was seen in the advert only or in both the programme and the advert. “Participant” was included as a random effect in all models, and “advert” was included as a random intercept in the free recall models. “Advert_element” refers to the product, brand and description scores given in free recall. “Programme_timebin” refers to the composite variable created from programme clip duration, splitting the data at the 33.33, 66.67 and the 100 percentiles.

Before inference was drawn, all model assumptions and model stability were assessed using the package “DHARMa” (Hartig, 2020). Similarly, to check that the full model had predictive capabilities beyond that of the null which comprised only of the intercept and random effects, a likelihood ratio test was computed using the base R function “anova”, with the “Chisq” argument (Forstmeier & Schielzeth, 2011). P values for the individual fixed effects coefficients were tested using the likelihood ratio test, with the “drop1” function in R (Barr, Levy, Scheepers, & Tily, 2013). To run all GLMMs, the function “glmer” with the optimiser “bobyqa” was utilised from the package “lme4” (version 1.1-21; Bates, Mächler, Bolker, & Walker, 2014); all models were allowed a maximum of 100,000 iterations to converge. All models began with their maximal random slope structure, with the correlations among random slopes and the random slopes themselves being iteratively removed (Barr, et al., 2013). To assess models for collinearity, the function “vif” from the package “car” (version 3.0-3) was used (Fox, Friendly, & Weisberg, 2013). All covariates were z-transformed before model inclusion.

Effects of condition

Free recall

A GLMM (Baayen, et al, 2008; Jaeger, 2008) with a binomial error structure and logit link function was built to understand the predictive effects of condition (product seen in advert only or product seen in advert and programme) and advert element (product, brand, description). A total of 3808 observations from 32 participants were included in the model (see Table 2.0).

Table 2.0
Terms for the free recall generalised linear mixed model.

Model	DV	Predictors	Random Intercepts
Free Recall - Full	Binary Recall	Condition, Advert_element, Condition*Advert_element	Participant, Advert
Free Recall - Null	Binary Recall	-	Participant, Advert
Free Recall – Simplified	Binary Recall	Condition, Advert_element	Participant, Advert

Cued advert recall memory

A further two GLMMs with binomial error structure and logit link functions were created to assess the predictive quality of condition on cued product recall performance and cued brand recall performance. The product model was also simplified to remove the random slope structure. Each model contained 1280 observations from 32 participants (see Table 2.1).

Table 2.1
Terms for the cued recall generalised linear mixed models.

Model	DV	Predictors	Random Intercept	Random slopes
Condition Brand Recall - Full	Brand Recall	Condition	Participant	Condition_Participant
Condition Brand Recall - Null	Brand Recall	-	Participant	-
Condition Product Recall - Full	Product Recall	Condition	Participant	Condition_Participant
Condition Product Recall - Null	Product Recall	-	Participant	-
Condition Product Recall – Simplified	Product Recall	Condition	Participant	-

Conditionalised reminding analysis

For the following models, the control adverts were removed and the fixed effects were conditionalised upon programme reminding status. This analysis practice is a common feature in the reminding literature (Negley, Kelley, & Jacoby, 2018). That is, data was compared across those participants who missed the product repetition, detected the product repetition only, or whether they detected the product repetition and were reminded of the advertised brand.

Free recall

A GLMM was constructed to test the predictive effects of product repetition detection and brand reminding on free recall performance (see Table 2.2). This analysis allowed for an assessment of these two factors on global advert memory. The model was also simplified by removing both covariates. The inclusion of advert into the model meant that if reminding was significant this was beyond the influence of individual characteristics. The model included only target product repetition trials, meaning there were 1896 observations from 32 individuals. Post-hoc alpha values were FDR corrected (see Table 2.9 for corrected alpha values).

Table 2.2
Table outlining terms for the conditionalised free recall model.

Model	DV	Predictors	Random Intercepts	Covariates
Reminded Free Recall - Full	Binary Recall	Reminding*Advert_element	Participant, Advert	z.Lag, z.Prog_duration
Reminding Free Recall - Null	Binary Recall	-	Participant, Advert	-
Reminding Free Recall – Simplified	Binary Recall	Reminding*Advert_element	Participant, Advert	-

Cued advert measures

As before, GLMMs were created to model cued brand recall performance *and* cued product recall performance (see Table 2.3). These analyses allowed for more specific investigation of brand reminding on brand memory and product memory. Both models contained only target trials, with 632 observations from 32 participants. The brand model was simplified by removing both covariates, the product model was simplified by removing lag only.

Table 2.3
Terms for the cued product and cued brand recall models.

Model	DV	Predictors	Random Intercept	Covariates
Reminded Brand Recall - Full	Brand Recall	Reminding	Participant	z.Lag, z.Prog_duration
Reminded Brand Recall - Null	Brand Recall	-	Participant	-
Reminded Brand Recall – Simplified	Brand Recall	Reminding	Participant	-
Reminded Product Recall - Full	Product Recall	Reminding	Participant	z.Lag, z.Prog_duration
Reminded Product Recall - Null	Product Recall	-	Participant	-
Reminded Product Recall – Simplified	Product Recall	Reminding	Participant	z.Prog_duration

For both the cued brand and product models, post-hoc comparisons were made upon each of the three levels of the reminding variable. Correct brand cued recall compared those who detected and were reminded with those who missed the repetition, with this model having 446 observations from 32 participants. Next, brand recall was compared across those who detected and were reminded with those who just detected, with this model having 421 observations from 32 participants. The final brand model compared brand recall across those participants who just detected with those who missed the repetition, this model having 397 observations from 32 participants. The post-hoc tests used FDR corrected p-values (see Table 2.10)

The three post-hoc tests for the product reminding model were as follows. First product memory was compared across those who missed the repetition and those who detected it only, with this model containing 397 observations from 32 participants. Next, product recall was compared for those who missed the repetition and those who were reminded, this model contained 446 observations from 32 participants. Finally, cued product recall was compared for those who detected the repetition and those who detected and were reminded. This final model contained 421 observations from 32 participants. Singularity issues arose for this model, meaning the model was uninterpretable. Post hoc test p-values were FDR corrected (see Table 2.11).

Effects of repetition detection

Finally, a GLMM was constructed to test the effects of the “programme_timebin” and lag on programme repetition detection performance (see Table 2.4). This analysis enabled for an assessment of performance over three time windows that could be used when selling the programme event. It also allowed for an assessment of whether lag does determine reminding. The model contained 632 observations from 32 participants. FDR corrected alpha values were used for each post hoc test (see Table 2.14).

Table 2.4

Terms for the repetition detection model.

Model	DV	Predictors	Random Intercepts	Covariates
Repetition Detection - Full	Binary Repetition Detection	Programme_timebin	Participant	z.Lag
Repetition Detection - Null	Binary Repetition Detection	-	Participant	-

Results

Effects of condition

Free recall

The table below represents the recall percentages for both overall condition, as well as for each advert element by condition (see Table 2.5).

Table 2.5
Free recall percentage as a function of condition and advert element.

Condition	Overall Recall (%)	Advert element	Recall (%)
Target	36.2 (1.1)	Product	42.1 (1.97)
		Brand	27.4 (1.77)
		Description	39.1 (1.94)
Control	20.2 (0.9)	Product	22.2 (1.65)
		Brand	16.3 (1.47)
		Description	22.2 (1.65)

Note. () Represent standard error of the mean (SEM).

A likelihood ratio test found that the full model was more predictive of free recall than the null model (χ^2 = 198.64 (5), p < .001). Assessing each of the fixed effects, it was found that the interaction between condition and advert element was not predictive of free recall (χ^2 = 3.11 (2), p = .211). However, the main effects of condition (χ^2 = 149.31 (1), p = .000), and advert element (χ^2 = 48.4 (2), p = .000), were predictive of later advert recall.

The model was then simplified, removing the interaction term, and was found to still be predictive of free recall performance when compared to the null model (χ^2 = 195.53 (3), p < .001). In the simplified model, both condition (χ^2 = 149.309 (1), p < .001), and advert element (χ^2 = 48.396 (2), p < .001), were significantly predictive of free recall performance. For the simplified model, the theoretical marginal R^2 = 0.07 suggested that the fixed effects accounted for 7% of the variance in the model. The theoretical conditional R^2 = 0.31 indicated that the full model could account for 31% of the model's total variance. Overall, the results suggest that seeing the repeated products had a large impact on the later advert memory, although condition did not modulate recall performance of the individual advert elements. Although significant, advert element alone was not assessed post-hoc for lack of meaning to the investigation.

Cued brand recall

The table below represents the effects of condition on cued brand recall performance (see Table 2.6).

Table 2.6
Cued brand recall as a function of condition.

Condition	Brand Recall (%)
Target	44.9 (1.98)
Control	40.0 (1.93)

Note. () Represent SEM.

A likelihood ratio test confirmed that condition was not predictive of cued brand recall performance (χ^2 = 2.95 (1), p = .086). The result suggested that seeing a programme event containing the same product as had been previously advertised did not improve memory beyond simply seeing the advert in isolation. No further analysis was conducted.

Cued product recall

The table below displays the probability of cued product recall as a function of condition (see Table 2.7).

Table 2.7
Product cued recall as a function of condition.

Condition	Product Recall (%)
Target	75.5 (1.71)
Control	67.4 (1.84)

Note. () Represent SEM.

A likelihood ratio test was conducted to assess the predictive effects of condition on cued product recall. It found that condition was significantly predictive (χ^2 = 5.77 (1), p = .016). However, this model containing the random slope demonstrated convergence issues so the model was remade, removing the random slope structure. This simplified model was compared with the null and was found to still be predictive of cued product recall (χ^2 = 11.14 (1), p = .001). The theoretical marginal R^2 = 0.01 suggested that the fixed effects accounted for 1% of the variance in the model. The theoretical conditional R^2 = 0.14 indicated the full model could account for 14% of the model's total variance.

Conditionalised reminding analysis

Given that the repetition missed, repetition detected, and repetition detected + brand reminded groups were determined by the recollection of reminding measure, not experimenter allocation, the number of data points per group did vary. However, GLMMs can cope with slight imbalance in trial numbers, and none of the group differences presented here were substantially different.

Free recall

The figure below shows the probability of subsequent advert free recall when advert elements; brand, product, and description; are combined across the three programme reminding statuses, demonstrating overall advert recall (see Figure 2.2). The descriptive percentages for the model broken down by programme reminding and advert element can be seen in the table below (Table 2.8)

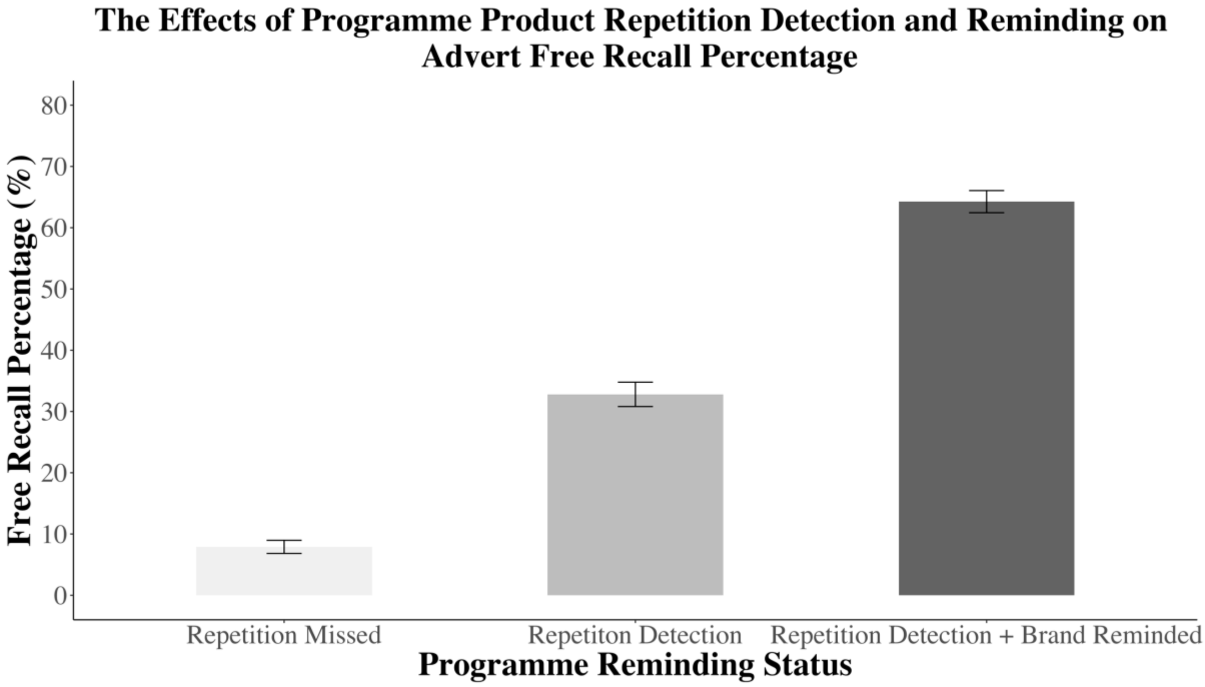

Figure *2.2. Displays the percentage probability of free recall resulting from the in-programme reminding status. Error bars represent 1± SEM.*

A likelihood ratio test compared the full reminding model with the null, the test indicating that the model containing the fixed effect was more predictive ($\chi^2 = 533.37$ (10), $p < .001$). When assessing the fixed effects, it was found that the interaction between reminding status and advert element was predictive of recall ($\chi^2 = 97.43$ (4), p = <.001). However, both the covariates, programme duration ($\chi^2 = 0.02$ (1), $p = .800$), and repetition lag ($\chi^2 = 0.95$ (1), $p = .330$), did not predict later advert memory. The model was then simplified, removing the non-significant variables. When compared to the null, this reduced model was found to still be significant ($\chi^2 = 532.41$ (8), $p < .001$). Reminding status accounted for 40% of the variance in the free recall response (theoretical marginal R^2 = 0.40). The theoretical conditional R^2 = 0.54 suggesting that the full model predicted 54% of the variance in the response. This finding suggested that reminding during the programme determined which parts of the advert were later recalled, but not by how long the programme product was on screen or the length of time between repetitions.

Table 2.8
Free recall as a function of reminding status and advert element.

Reminding Status	Overall Recall (%)	Advert element	Recall (%)
Repetition Missed	7.9 (1.07)	Product	8.06 (1.88)
		Brand	5.69 (1.6)
		Description	9.95 (2.07)
Repetition Detected	32.8 (1.99)	Product	49.5 (3.68)
		Brand	4.3 (1.49)
		Description	44.6 (3.65)
Repetition Detected and Brand Reminded	64.3 (1.81)	Product	66.8 (3.08)
		Brand	65.1 (3.12)
		Description	60.9 (3.19)

Note. () Represent SEM.

To answer the research questions posed, nine comparisons were made. (See Table 2.9 below for corrected alpha levels).

Product comparisons

Those who missed the repetition had significantly worse recall than both those who detected the repeated product only (χ^2 = 79.43 (1), p < .001), and those who detected the product repetition and remembered the brand (χ^2 = 157.11 (1), p < .001). Product recall performance was then compared between those who detected the repetition only and those who were additionally reminded of the advert's brand, with the post hoc suggesting that remembering the brand stimulated increased product free recall ($\chi^2 = 11.67$ (1), $p = .001$). The more the individual could recollect during the programme, the better their later product memory was, with detection creating the largest benefit.

Advert description comparisons

Missing the repetition in-programme also led to the worst advert description performance, with those detecting the repetition ($\chi^2 = 59.1$ (1), $p < .001$), and detecting plus reminding both generating more advert description details ($\chi^2 = 117.74$ (1), $p < .001$). When participants both detected and were successfully reminded of the brand during programme viewing, their advert description performance was better than those who only detected the product repetition ($\chi^2 = 10.69$ (1), $p = .001$). Again, the largest increase in description memory comes from detecting the product, but remembering the brand also conferred additional detail to the advert memory trace.

Brand comparisons

Detecting the product during the programme did not improve brand memory beyond when the repetition is missed ($\chi^2 = 0.12$ (1), $p = .726$). However, both detecting *and* remembering the brand during the programme did improve brand memory compared to when repetition was missed entirely ($\chi^2 = 163.26$ (1), $p < .001$). Importantly, it appears brand memory was only improved when the individual could recall the brand during the programme, with detecting the repetition alone having little effect ($\chi^2 = 167.45$ (1), $p < .001$). That is, detecting the brand alone conveys very little information about the brand, so for advertisers to see demonstrable benefits, the advert brand must be reminded during programme viewing.

Table 2.9
FDR corrected alpha levels for the reminding free recall post-hoc tests.

Reminding free recall post-hoc tests	*p*	FDR *q*
Brand just detection – reminding	<.001	.006
Brand missed – reminding	<.001	.011
Product missed – reminding	<.001	.017
Description missed – reminding	<.001	.022
Product missed – just detect	<.001	.028
Description missed – just detect	<.001	.033
Product just detect – reminding	<.001	.039
Description just detect – reminding	.001	.044
Brand missed – just detection	.726	.050

Note. FDR q represents the corrected alpha level for each post-hoc test.

Cued recall analysis

Cued brand recall

Next, the effects of programme reminding status on cued brand recall was assessed (see Figure 2.3 below). This compared cued advert brand memory based upon in-programme reminding performance.

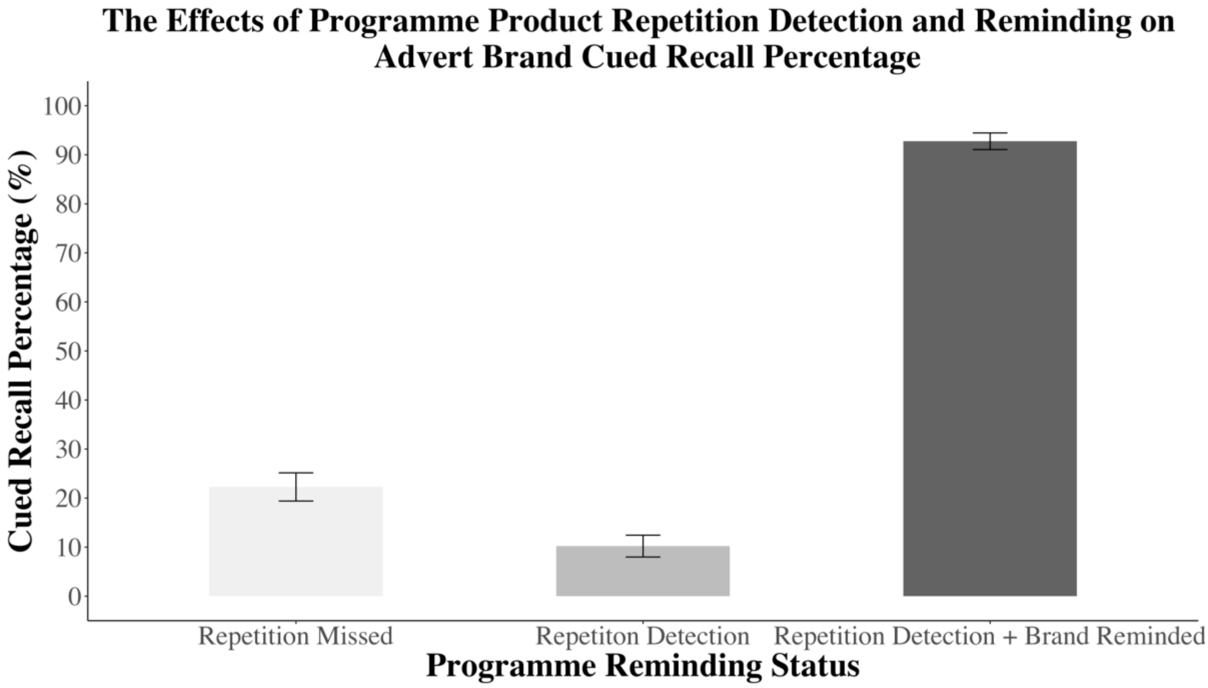

Figure 2.3. Displays the effects of programme reminding on later brand memory. Error bars represent 1± SEM.

A likelihood ratio test compared the full model with the null, finding that the full model was significantly more predictive of cued brand recall ($\chi^2 = 240.92$ (3), $p < .001$). Assessing the individual fixed effects, it was found that reminding was predictive of brand memory ($\chi^2 = 238.36$ (1), $p < .001$). However, as with the free recall reminding results, neither programme clip duration ($\chi^2 = 0.86$ (1), $p = .354$), or repetition lag ($\chi^2 = 1.23$ (1), $p = .267$), predicted later brand memory. The model was the simplified to a single fixed effect and was still found to be significant when compared with the null ($\chi^2 = 238.95$ (1), $p < .001$). The theoretical marginal was $R^2 = 0.42$, suggesting reminding could account for 42% of the variance in the cued brand recall response. The theoretical conditional of $R^2 = 0.45$, suggests the full model accounted for 45% of the variance in cued brand recall performance.

Three contrasts were conducted. It was found that the probability of cued brand recall was higher when the participant detected the repetition and was reminded of the brand during the programme in comparison to when the repetition was missed ($\chi^2 = 236.87$ (1), $p < .001$). Similarly, when detection and brand reminding occurred, cued brand recall was higher than when the product was detected as a repetition only ($\chi^2 = 319.28$ (1), $p < .001$). While no directionality was predicted for this effect, it was found that missing the repetition led to better brand recall than those who detected the programme repetition only ($\chi^2 = 11.48$ (1), p = .001). This finding highlights the need for good initial advert encoding and retrieval of a stable trace containing the brand during programme reminding for brand memory to be enhanced (see Table 2.10 for corrected alpha levels).

Table 2.10
FDR corrected alpha level for the cued brand recall post-hoc tests.

Brand cued recall post-hoc tests	*p*	FDR *q*
Missed – reminding	<.001	.017
Just detect – reminding	<.001	.033
Missed – just detection	.002	.050

Note. FDR q represents the corrected alpha level for each post-hoc test.

Cued product recall

Finally, cued product recall performance compared as a function of reminding status (see Figure 2.4).

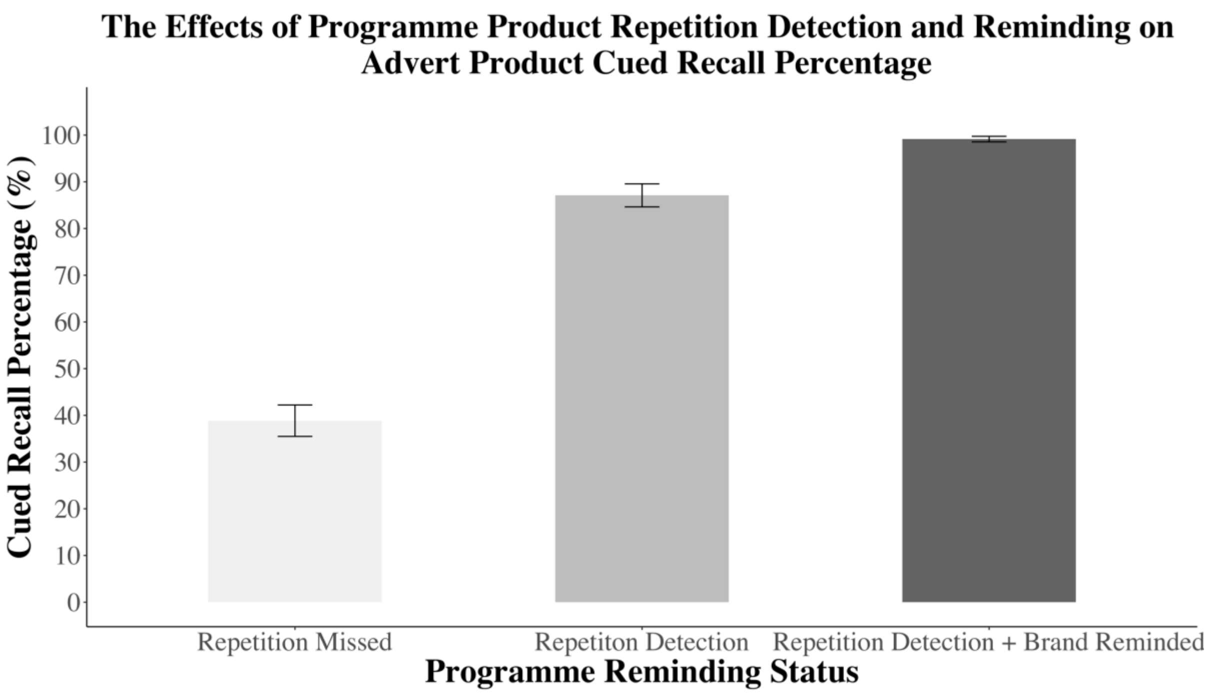

Figure 2.4. Displays cued product recall as a function of in-programme repetition detection. Error bars represent 1± SEM.

A likelihood ratio test found that the full product reminding model had greater predictive value than the null (χ^2 = 256.66 (3), p < .001). When assessing the fixed effects, it appeared that reminding status was predictive of product memory (χ^2 = 255.05 (1), p < .001). When assessing the predictive qualities of the two covariates, it was found that the lag between advert and programme product was not significant (χ^2 = 0.11 (1), p = .736). When the fixed effect of the programme duration was assessed, the length of time available for detection was predictive of later memory (χ^2 = 7.06 (1), p = .008). The model was then simplified, removing the fixed effect of lag, and was found to still be significantly predictive of cued product recall (χ^2 = 256.55 (2), p < .001). Both fixed effects in the model, reminding (χ^2 = 256.55 (1), p < .001), and programme duration (χ^2 = 6.96 (1), p =.008), remained significant. This suggested that the longer the programme clip was, the better the product memory was at test regardless of whether detection was successful although a near ceiling effect is observed for those who were reminded during the programme (see Figure 2.5 below). The effects size for this model suggested the fixed effects explained 58% of the variance in product recall (theoretical marginal R^2 = 0.58). The full model accounted for 60% of the variance in the response (theoretical conditional R^2 = 0.60).

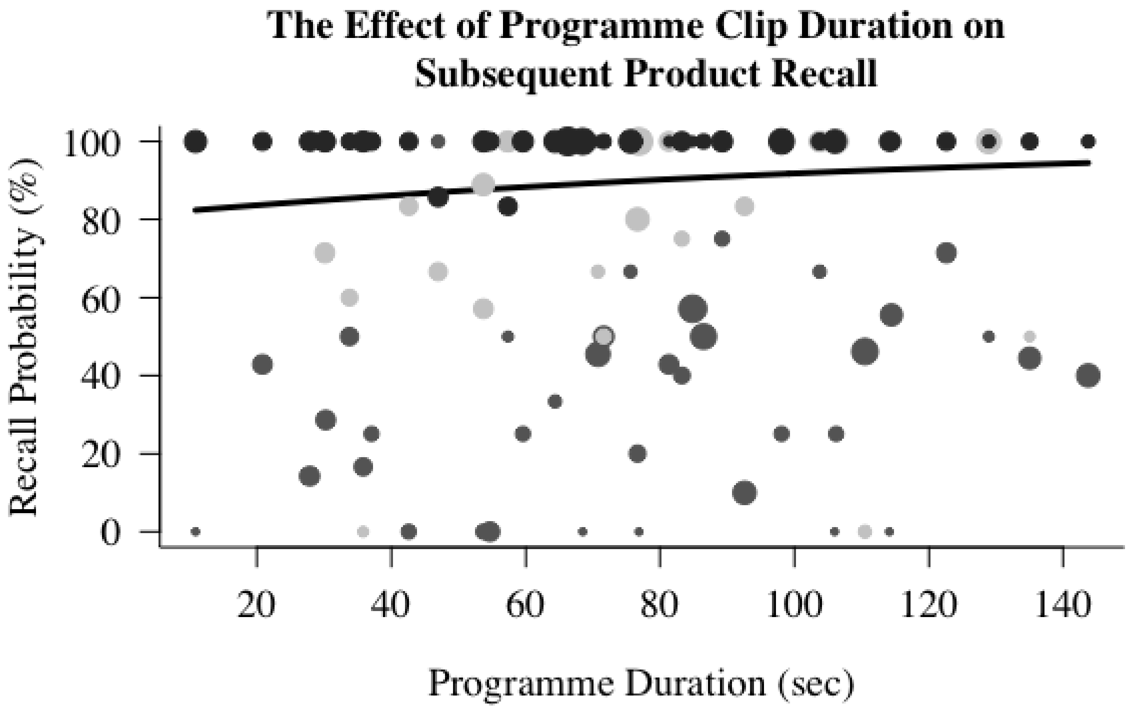

Figure 2.5. Displays product recall probability as a function of programme duration. The graph shows the percentages for those who missed the repetition (dark grey), those who detected the repetitions only (light grey circles), and those who both detected and were reminded during the programme (black circles). The total area of the circles depicts the sample size. The black line represents the fitted GLMM.

Three post-hoc comparisons were then computed for the three levels of the reminding status variable. When comparing cued product recall for those who missed the repetition with those who just detected the repetition, it was found that the probability to recall the product was higher for those who detected the repetition (χ^2 = 108.8 (1), p < .001). It was also found that successful brand reminding and product detection increase the probability of product recall when compared to those who missed the repetition (χ^2 = 231.8 (1), p < .001). Finally, when attempting to compare product cued recall probability for those who were reminded against those who only detected the repetition, the model resulted in a singular fit meaning the comparison was uninterpretable (see Table 2.11 for FDR corrected p values).

Table 2.11
FDR corrected alpha levels for the cued product recall post-hoc tests.

Product cued recall post-hoc tests	*p*	FDR *q*
Missed – reminding	<.001	.025
Missed – just detection	<.001	.050

Note. FDR q represents the corrected alpha level for each post-hoc test.

Repetition detection analysis

The final analysis looked to confirm whether repetition detection was predicted by programme clip length (see Table 2.12 below). That is, did a longer programme clip increase the likelihood that the participant would detect the product repetition between the advert and the programme clip itself.

Table 2.12
Repetition detection percentage by programme clip duration (seconds).

Time bin	Repetition Detection (%)
Short (less than 57 seconds)	72.7 (3.01)
Medium (58 seconds to 87 seconds)	64.4 (3.33)
Long (88 seconds to 114 seconds)	62.3 (3.4)

Note. () Represent SEM.

Once more, a likelihood ratio test found the full repetition detection model to be more predictive of repetition detection performance than the null (χ^2 = 12.59 (3), p = .006). It was found that both the effect of the time bins (χ^2 = 7.0 (2), p = .030), and the covariate, lag (χ^2 = 6.17 (1), p = .013), were significantly predictive of performance. When checking the table of coefficients, it suggested that as lag increased, repetition performance decreased (see Table 2.13 below). This meant that P1 retrieval at P2 became more difficult as the gap between them increased. It was found that the model's fixed effects accounted for 2.75% of the variance in repetition performance (theoretical marginal R^2 = 0.02). The full model accounted for 11% of repetition detection performance (theoretical conditional R^2 = 0.11).

Table 2.13
Displays the coefficients for the Repetition Detection Full model.

Term	Estimate	*SE*	Lower CL	Upper CL	*p*
Intercept	0.51	0.18	0.16	0.88	(i)
Lag	-0.22	0.09	-0.41	-0.06	.013
Medium V Short	0.4	0.22	-0.04	0.81	0.64
Long V Short	0.56	0.22	0.15	1.00	.011
Long V Medium	0.15	0.21	-0.26	0.57	.472

Note. Alpha levels may differ between the coefficients and the tests below due to the use of likelihood ratio tests. (i) intercept p value omitted for lack of interpretable meaning.

To assess the individual effects for each time bin, a series of post hoc tests were conducted. Firstly, it was found that those programme events that were less than 57 seconds in length were no more likely to induce repetition detection than those programme clips which were 87 seconds in length at the corrected alpha level of .017, (χ^2 = 3.73 (1), p = .053). It was also found that clips in the short bin were more likely to induce repetition detection than clips lasting between 88 and 144 seconds (χ^2 = 6.58 (1), p = .010). Finally, the medium and the long bins were compared, but repetition detection was found to be no different across these two conditions (χ^2 = 0.41 (2), p = .521). That is, repetition detection became less likely as clips became longer and as the delay between the repetitions increased (see Table 2.14 for corrected p values).

Table 2.14
FDR corrected alpha levels for the repetition detection post-hoc tests.

Repetition detection post-hoc tests	*p*	FDR *q*
Short – long	.010	.017
Short – medium	.053	.033
Medium – long	.521	.050

Note. FDR q represents the corrected alpha level for each post-hoc test.

Discussion

Detecting product repetition while viewing TV adverts and programme clips appears to improve advert memory. The investigation has shown that for advert memory to be improved by in-programme product repetition, the advert must be retrieved during the programme. Specifically, detecting the product repetition in-programme led to large increases in later advert product free and cued recall. If at the point of detection the brand information was also available, then brand memory was similarly improved. Although conscious control was used in the current study, adverts that were seen in the presence of a related programme event were more likely to be recalled than controls. The findings corroborate and extend the retroactive facilitation effect seen in other paired associates paradigms (Jacoby, & Wahlheim, 2013; Jacoby, Wahlheim, & Kelley, 2015; Negley, Kelley, & Jacoby, 2018). These results call into question the theoretical interpretations of several previous advert-programme product repetition studies, for if priming was indeed the mechanism, conscious detection should not be necessary for later facilitation (Furnham, Bergland, & Gunter, 2002; Davtyan, Stewart, & Cunningham, 2016; see Chapter Six for a discussion). For practitioners, the results are encouraging as advert memory can be improved without the need for purchasing more advertising space, with a single advert exposure able to bring in over double the returns in behavioural outcomes when this associative placement is used (see Chapter Six for discussion).

Retrieving different advert elements while viewing the programme had a varying influence on holistic advert memory at test. Like multiple studies from the spaced learning and interferences literatures, repetition detection during the presentation of list two, or the programme in this experiment, resulted in a spaced learning effect enhancing advert memory (Appleton-Knapp, Bjork, & Wickens, 2005; Wahlheim, Maddox, & Jacoby, 2014; Jacoby, Wahlheim, & Kelley, 2015; Negley, Kelley, & Jacoby, 2018). Unlike previous studies, the present research demonstrated diverging effects of stimulus subcomponent retrieval on later stimulus memory. In other words, the memory benefit was determined by whether product *and* brand information were retrieved during the programme, highlighting that the quality of trace available during the programme had downstream effects on recall. Therefore, how product and advert memory were improved via the reminding mechanism will be deliberated firstly, after which the applied benefits from the study will be then discussed.

If the encoding benefit stopped with only advert product and description information, the reminding mechanism would be of less use to advertisers. The present study showed that both free recall and cued product recall were enhanced when a repetition detection was made during the programme. For product memory only to be improved via the manipulation, as a minimum requirement, an advert representation containing product information had to be encoded and retained from the initial advert viewing. Although the results more often indicated that product information was accompanied by other advert narrative details, this extra trace detail was not required. Once sufficiently encoded, if the programme product uniquely triggered the advert product representation, detection and simultaneous retrieval occurred, bringing the advert's representation back into working memory (Appleton-Knapp, Bjork, & Wickens, 2005; Xue, et al., 2010; Wahlheim, Maddox, & Jacoby, 2014). The act of retrieval led to a secondary encoding of the available advert information as well as the creation of a recursive representation associating the two events. Indeed, this mirrors the effects observed in other advertising spaced learning studies (Appleton-Knapp, Bjork, & Wickens, 2005). Memory for the product at test is improved due to this double encoding, with the additional encoding event being closer to the point of test, as well as the increased accessibility from recalling either the recursive representation or the programme reminding event (see Chapter Three for a detailed discussion on how the recursive trace also aids recall at test). As one method for changing behaviour via advertising is to link and strengthen product-brand associations in memory, simply rehearsing product information does not differentiate a memory in favour of a specific brand, rather it only improves product and advert description information. For reliable improvements in brand memory to be observed, further retrieval during the programme is needed.

Of most importance for advertisers is understanding how a non-branded programme product could improve advert brand memory given that each participant saw the advert just once. The present study showed that for brand memory to be improved in both free recall and cued recall tasks, the brand information had to be retrieved during the programme. When initially encoding the advert, the brand information must be bound with the product information in the advert's overall representation for it also to be later recalled. Once the repeated category product triggered detection in the programme, the only way a secondary encoding benefit could be achieved for brand information was if the individual brought back into working memory a representation containing this non-present brand information (Putnam, Wahlheim, & Jacoby, 2014; Jacoby, Wahlheim, & Kelley, 2015; Putnam, Sungkhasettee, & Roediger III, 2017; Negley, Kelley, & Jacoby, 2018). Thinking back to the example provided during Chapter Two's introduction, this finding emulates when individuals successfully recalled chair-banana during list two in Negley, Kelley and Jacoby's (2018) study. In the current study, if successful at test, brand memory received the same spaced learning benefits as outlined for product recall through a better encoded trace and greater accessibility. When unsuccessful, brand retrieval failure during the programme had stark consequences. For free recall, just detecting the product repetition led to brand memory in line with those who missed the repetition entirely. More interestingly, just detecting the product generated the worst brand cued recall performance of all groups. Again, these results demonstrate that for repetition to positively impact upon memory, retrieval of the information to be remembered at the second presentation is vital (Wahlheim, Maddox, & Jacoby, 2014; Jacoby, Wahlheim, & Kelley, 2015; Putnam, Sungkhasettee, & Roediger III, 2017).

Ultimately, the reminding mechanism can only enhance what is already remembered, with the product creating the retrieval opportunity for brand information to be enhanced. This suggests that reminding cannot compensate for poor advertising quality; indeed, reminding will be most reliable for well branded adverts. For industry application of the mechanism then, adverts used as repetitions must have sufficient design quality to reduce the difficulty in retrieving their brand based on a product cue. To increase the potency of an advert's reminding potential, several design features could be implemented. Advertisers and marketers should focus on designing advertising creative that closely associates the brand with its advertised product. That is, with branding being seen on the product, throughout the advert, and during the most narratively compelling advert events. Furthermore, in an analysis of award winning adverts, it was found that advert creativity can increase free recall which would make programme retrieval easier (Till, & Baack, 2005). Indeed, creative ways of aligning the brand and product in-advert are key for reducing retrieval barriers, as well as increasing the fluency with which an advert product can simultaneously generate brand recollection. Specifically, this may require seeing the brand more overtly on the product in the advert, increasing the use of brand differentiating cues such as slogans, or including more verbal brand mentions in the advert overall, with this latter recommendation being known to drive visual attention during dynamic scene viewing (Bressoud, Lehu, & Russell, 2010; Wilson, & Till, 2011).

For reminding to happen organically during TV viewing, the programme event must instantly trigger the whole advert's representation. Therefore, understanding the time-course of the reminding process should aid in the identification of strong reminding pairs. In the current study, reminding could occur via one of two routes. Firstly, the participants may have attended to the product and then subsequently engaged in conscious search behaviour for further advert details. Secondly, the programme event could have triggered the previously seen advert to such a degree, or the adverts representation was robust enough, that the advert's representation was available simultaneously as detection occurred. Research into involuntary autobiographical memories suggests that when true reminding occurs, retrieval times are shorter than voluntary retrieval, with the retrieved trace being incredibly specific (Berntsen, Staugaard, & Sørensen, 2013). For example, seeing an Audi may quickly trigger the recent memory of the time an Audi driver cut you up on a fast road causing you to break unexpectedly, and probably curse them. Here, seeing the Audi does not trigger Audi's representation generally, rather a specific episode in which its product was encountered in a not necessarily positive way. Reminding is thought to occur when two events uniquely cue one another via a shared feature, and if retrieval was effortless and rapid at the point of detection, this would suggest a pure form of reminding had occurred (Schlagman, & Kvavilashvili, 2008). The current study did not set out to differentiate remindings which originated consciously from those which were autonomous, with individuals being encouraged to engage in search if the advert was not initially available. Future studies should ask participants whether the advert information was instantly available or whether conscious search took place at the point of reminding to better target stronger product pairs. Moreover, future research should also look at the latency differences in response time for detection and brand response. For practitioners, this data could also inform decisions on what is more likely to trigger involuntary retrieval during viewing. For example, screening out any repetition pairs that require extensive conscious search times as presumably any pairs that required conscious search would be less suitable for industry under conditions of passive viewing. Furthermore, if certain programme attributes such as verbal mentions directly interact with retrieval spontaneity, these events should have greater value to broadcasters.

How can reminding aid advert memory beyond viewing the advert in isolation? The results show a 16% rise in advert free recall in the repetition condition, which is in line with much of the spaced learning literature (e.g., Tullis, Benjamin, & Ross, 2014; Maddox 2016). Likewise, cued product recall showed that those given a reminding opportunity remembered the product 7% more than those in the control condition. When viewing the advert alone, as in the control condition, or when participants missed the repetition in the experimental condition, they had to rely solely on their initial encoding; this meant the retention interval between exposure and test was at its greatest. However, if the repetition detection and reminding were successful, the advert was encoded for a second time closer to the point of test, reducing the retention interval while strengthening the trace's acuity. That is, the advert information was "practised" closer to test the time of test due to the repetition (Roediger III, & Karpicke, 2006). Additionally, adverts detected as repetitions also benefitted from the creation of the recursive trace. The recursive representation associates the advert with the programme increasing the number of retrieval cues, as well as allowing for recollection of reminding at test (see Chapter Three for how the recursive trace determines memory at test). When the advert information is not instantly available during search at test, the individual may initially recall that they were reminded of a beer advert, rather than the beer advert coming to mind first, although research has shown that recollection of reminding is not as powerful at improving memory as is the secondary encoding experienced during reminding at P2 (Negley, Kelley, & Jacoby, 2018).

The reminding mechanism outlined in the present study can further account for the brand memory increases seen by Davtyan, Stewart, and Cunningham (2016). Their study used a full TV viewing scenario, in which a product (Heinz Ketchup or Snapple Iced Tea) was either seen only during an advert, or first in an advert then in the programme as a product placement. Repetition detection was not measured, but the researchers found a 16% increase in brand memory when the product placement additionally accompanied the advert. Although no measure of concurrent visual attention was collected, it is likely that participants noticed the repeated item, meaning recalling the advert during the programme likely created the advantage. Although more work is needed, the converging results and now robust underlying psychological theory should validate product repetition as a viable industry mechanism.

When viewing TV at home, the conditions for advert encoding will often be less than optimal, but how is memory affected if an in-programme repetition is missed? Although obvious, if the viewer's attentional state is poor while watching an advert, this will remove any repetition benefit. In the present experiment, as the reminding group allocation was based on conditionalised repetition detection, this meant that a suitable comparison between the single advert trials and those who missed the repetition was not possible due to observation differences. However, the descriptive statistics demonstrate poorer performance on every memory measure for those missing the repetition compared to controls. Although further work is needed to establish such a change in recall, this trend is more reminiscent of the interference found in failed change detection tasks than the comparable performance for exact repetition performance between controls and missed repetitions in the spaced learning literature (Madigan, 1969; Putnam, Sungkhasettee, & Roediger III, 2017; Negley, Kelley, & Jacoby, 2018). Indeed, it is possible that interference from the more recently presented and potentially longer programme product appearance occurred if the two events were stored as separately with no trace dependence upon one another (Benjamin, & Tullis, 2010; also see Chapter Three for such a finding). Yet, considering the contextual differences between programmes and adverts, intuitively, interference should only occur if the advert representation is either weakly encoded or has been forgotten by the participant. If both traces are stable and exist independently from one another, it should be relatively easy to source monitor the advert from the programme event at test given there was no time pressure to respond, allowing participants to discount the presence of the product in the programme (Johnson, Hashtroudi, & Lindsay, 1993). Consequentially, it is likely that interference only compounded reductions in advert memory for participants with weak or no initial advert encoding. Given that most advertising campaigns display the advert multiple times, rather than just once as in the current study, one can postulate that it is less likely that a single instance of programme interference would impact memory long term given other attentional factors were sympathetic.

Poor initial encoding and inadequate advertising creative appear to be the driver for reductions in advert element recall for those who missed the repetition detection. When comparing recall performance for the product and brand across the free recall and cued recall measures, those who missed the repetition performed worse on the free recall than they did for the cued recall for the same information. In other words, the poorly encoded adverts were either not strong enough or temporarily inaccessible when performing unguided free recall. However, when a search cue in the form of a product word was introduced in the cued product task, those who missed the repetition had better recall as the additional information increased accessibility to the advert's representation, albeit not by much. What was clear from the results is that poor initial trace creation is the downfall of advert reminding, especially for brand information, showing that this mechanism cannot compensate for poor advert quality.

Caution is advised when assessing the effects of the product programme duration on repetition detection. Previous work has shown that increasing the study time available at P2 increases successful change detection when using word stimuli at much shorter presentation times (Negley, Kelley, Jacoby, 2018). The current study found worse repetition detection as programme product clips became longer; clips lasting longer than 88 seconds had worse repetition detection performance than clips under a minute in length. Intuitively, having longer to detect the product repetition should provide more opportunity to retrieve the earlier seen advert product information, especially if the lag between repetitions was long. Firstly, it is possible that after a certain duration, extra time available did not aid in searching for the associated advert's representation, especially given that reminding is known to occur rapidly (Berntsen, Staugaard, & Sørensen, 2013). However, this result is likely an artefact of the experimental design, as all programme clips were selected from real TV events, meaning each product occupied a single clip duration. Assessment along this variable then altered both presentation time and the programme characteristics. Therefore, to draw any firm conclusions for industry application, an investigation systematically altering the presentation time of the same product event should be conducted (see Chapter Four for an investigation of product repetition effects in a full TV programme).

The lags used in this experiment are less than applicable for practitioners given the departure in video presentation away from real TV viewing conditions, yet the result that increasing lag length reduced repetition detection success does warrant comment. The longer the length between presentations the greater the amount of trace decay that is expected to have occurred due to lack of new encoding (Benjamin, & Tullis, 2010; Maddox, 2016). Over the course of nearly two hours it was found that repetition detection success did begin to drop, but this repetition detection reduction did not mirror a reduction in product memory performance as has been seen in word memory work (Wahlheim, Maddox, & Jacoby, 2014). If the repetition detection alone or reminding was successful at any lag, product memory performance was above 80% in the cued product measure for example. This suggested that while lag could determine the ease with which retrieval occurred in-programme, once the secondary encoding event was experienced this produced memory effects that were as powerful after 10 minutes as they were after an hour. Previous meta-analysis work has demonstrated that the longer the retention interval, the larger the lag needed to see optimum performance (Cepeda, Pashler, Vul, Wixted, & Rohrer, 2006). This invariability in recall performance suggests that the lags used could support test retention intervals longer than those seen in this study. Indeed, the timescales of minutes or hours is far longer than most of the work conducted on spaced repetitions on word memory, usually consisting of lags of seconds (Maddox, 2016). Although theoretically relevant, the application of these lags to TV viewing would be inappropriate, with respect to the size and the endogenous goals given to participants while viewing.

This study demonstrates the power of looking back across experiences for improving memory, but what will memory performance look like when passively viewing? Findings from word memory research have shown that under conditions of intentional encoding, the lag lengths at which memory can be improved are much longer than when items are incidentally encoded (Shaughnessy, 1976; Verkoeijen, Rikers, & Schmidt, 2005). The current study avoided outlining the utility of the repetition detection task to participants, instead telling them that the purpose of the study was to investigate mood induction from TV programming. Despite this, the present study found that repetition detection was still possible up to an hour and 52 minutes later, with an overall detection rate of 67% across all repetition trials. Regardless of where the repetition detection happened, memory was enhanced.

Is it likely that programmes can trigger the memory for adverts seen over an hour ago when passively viewing? While not impossible, this seems improbable. Involuntary memories occur when current events have shared cue uniqueness with a previously created memory representation (Berntsen, Staugaard, & Sørensen, 2013). Thus, the larger the number of intervening stimuli between repetitions, the increased chance of stimulus generalisation, or the loss of the "pop-outability" created by seeing the same product twice. For example, after viewing a Dyson vacuum cleaner advert, seeing another vacuum cleaner in the subsequent programme segment is likely to trigger pattern repetition as the advert's trace has experienced minimal decay; in comparison, seeing the same programme event in two programmes' time introduces much greater advert decay and has increased the number of interfering stimuli. The next chapter will look to address this question, using passive programme and advert viewing, a recollection of repetition measure at test rather than during viewing, and using more ecologically relevant lag lengths. Equally, Dyson is a category leader, so it is possible that brand strength also aids such retrieval. Future studies should look at the effects of market share on reminding effectiveness, comparing Dyson with adverts for brands like Hoover or Miele.

One limitation of the study was how repetition detection information was collected. As seen in Appendix A, each participant wrote the clip number, advert product and brand if they could remember it on a single sheet. This decision was taken after significant technical difficulty arouse when attempting to link text input with each trial on this measure in PsychoPy. While the participant was unaware this information had any utility as they were not told about the forthcoming memory test, they did experience increased exposure to the items they remembered. As such, future studies should rectify this issue by removing the recorded information after each detection.

While further research is needed, the results suggest several implications for linear broadcasters and brand managers alike. For broadcasters, the adoption of the current paradigm will aid in the identification of suitable programme reminding events for advert association. The paradigm also offers greater insights into what it is about a programme that makes it work as a reminding cue; for example, broadcasters could compare programme events with no product mentions with multiple product mentions to build a valuation scheme for the programme content they have. Once identified, brand managers could be targeted with offers of specific super spots for their product to be repeated. Considering the bottom-up fashion with which reminding occurs, previous adverts must have been serendipitously positioned near programme content that facilitated its performance. Although to widely test this hypothesis would be a herculean task, the current results may clarify some historical, seemingly anomalous, spikes in advert recall performance. For broadcasters then, the viability of this mechanism hinges upon shared cued uniqueness and mediating individual differences in viewers’ propensity to look back. Therefore, a deeper understanding of these factors’ effects on reminding will help improve their real-world efficacy.

For brand managers, whether in-programme reminding can have downstream effects on product choice is unknown; although, some prior research has showed that non-product advert-programme repetition can increase advert liking via the increased sense of involvement a viewer feels for the advertising when it is more closely aligned with the programme they are watching (Myers, Royne, & Deitz, 2014; see Chapter Four for a discussion). In this vein, as retrieval means the individual does not have to fully experience the advert again, whether the negative affect drop seen after multiple advert views can be mitigated by increased feelings of advert involvement is a question of much interest to advertisers (Schmidt, & Eisend, 2015). When creating their adverts then, marketers should closely associate the visual and auditory presentation of the advert brand with their products, and enhancing this association should aid the ease with which advert information can be retrieved during the programme.

Successful in-programme reminding has a large effect on advert memory, but where reminding may also have utility for marketers is in-store. Point of purchase (POP) displays and in-store marketing effects often attempt to bridge the gap between recalling crafted marketing campaign messages while product decisions are being made. The results and the wider literature highlight the need for an investigation into POP marketing through the lens of the reminding framework.

Chapter Three – The effects of advert-programme recollection of reminding.

The findings of Chapter Two evidenced a novel mechanism for improving advertising memory and provided a tool for marketers to more accurately assess advert-programme repetition effects during programme viewing. It also pinpointed how the programme context can be successfully used to aid advert memory, which has thus far eluded advertising researchers (Sharma, 2000; Furnham, Bergland, & Gunter, 2002; Parker, & Furnham, 2007; Furnham, & Goh, 2014; Puccinelli, Wilcox, & Grewal, 2015; Davtyan, Stewart, & Cunningham, 2016). It was clear that when successful, reminding that occurred while viewing a programme clip with a related product could create a similar memory enhancing effect to just re-watching the advert at a later point (Appleton-Knapp, et al., 2005; Schmidt, & Eisend, 2015).

However, in the previous experiment participants had to view a series of adverts for longer than five minutes, and give a product repetition judgement after each programme clip, neither of which are representative of real world TV viewing. Therefore, the present study will ask participants to view blocks of adverts and programme clips without directing them to the repetitions, more closely emulating a home viewing experience. Furthermore, as consumers may not always make product purchase decisions immediately after viewing, whether reminding can influence memory over the longer-term will be of interest to brand managers. Indeed, much of the recent non-advertising research on reminding has not looked at retention intervals beyond tens of minutes' post list two exposure (Jacoby, & Wahlheim, 2013; Negley, Kelley, & Jacoby, 2018). Yet the wider spaced learning literature suggests that the longer the retention interval between P2 and test, the larger the lag between P1 and P2 needs to be for memory to be enhanced (Verkoeijen, Rikers, & Schmidt, 2005). **The first aim of the study then was to establish whether product reminding conveys a memory advantage even after a 24-hour delay.**

For advertisers, further evidence using more realistic viewing criteria is required for advert-programme repetition effects to be implemented on a mass scale, e.g. viewing TV under conditions that do not direct participants to look for product repetitions. **The second aim of the study was to establish whether being able to detect the product in both the advert and programme after testing conferred improved performance on earlier memory measures after passively viewing the TV content.**

<u>Why is it important for reminding to occur passively and have long lasting effects?</u>

The long-term recall of a brand's associations is the most important outcome an advertiser can achieve for purchase behaviour change. For this to happen, the individual must be able to access brand information, even in the form of brand familiarity that can be used to bias choice over other products (Hoyer, 1984). Another way to do this is to remind the shopper of previously seen advertising content during browsing, such as the inclusion of wider advertising campaign themes on in-store POP display advertising or a product's packaging (Keller, 1987). Creating more retrieval routes that typically result from recursive trace creation may help the product enter the consideration set for a category purchase via its increased accessibility (Leong, 1993). Thus, generating greater access to an advert's brand and message, after a day long delay, should be of interest to practitioners. Few advertising repetition studies have implicated reminding as a mechanism for advert memory improvements, but as of yet, none have looked at the long-term memory benefits directly associated with successful reminding (Janiszewski, Noel, & Sawyer, 2003; Appleton-Knapp, Bjork, & Wickens, 2005; Schmidt, & Eisend, 2015). Although using a variation on the traditional advert repetition effects, this chapter looks to fill this gap in the advertising literature. Furthermore, understanding recollection of reminding post-testing could be used to confirm the success of advertising repetitions and give broadcasters and brand managers a method of non-intrusive repetition assessment.

Can recollection of reminding post-testing act as an advert reminding marker?

The previous chapter highlighted the importance of in-programme reminding as the source of the repetition effects, but can this phenomenon be captured once an individual has finished watching TV? Indeed, spontaneous in-programme reminding is a difficult phenomenon to capture without the method influencing the outcome. What is lacking from the current programme-advert repetition studies are insights into the individual's awareness of the repetitions themselves. For example, neither Furnham, Bergland, and Gunter (2002), or Davtyan, Stewart, and Cunningham (2016), asked participants if they were aware that they saw the products repeated, nor did they identify this knowledge as pertinent given their theoretical frameworks (Collins, & Loftus, 1975). Rather, the remindings framework would suggest that the phenomenon, known as recollection of reminding, may act as a retrospective, albeit imperfect, marker for in-programme reminding (Negley, Kelley, & Jacoby, 2018). Recollection of reminding occurs when an individual detects a repetition or change during learning which results in a reminding; later at test, the individual remembers they were reminded, and has access to the recursive trace containing both P1 and P2 information (see Chapter One: Introduction).

Collecting repetition information after test may provide insight as to whom used this knowledge to enhance advert memory. For retroactive facilitation, as will be case in this current experiment, Negley, Kelley, and Jacoby (2018) demonstrated that recalling an earlier word reminding experience at test could provide small improvements to word memory performance. Under conditions of conscious repetition detection, they demonstrated that even when explicit reminding was made during study but forgotten at test, P1 performance was still facilitated, albeit to lower levels than when change was recollected as part of the recursive trace. However, if only P2 could be recollected at test, interference for P1 occurred. Negley, et al. did conclude that the act of reminding during learning was the main effect driving the mechanism, but recollection of reminding could be used as a marker for reminding. This finding is in line with other word memory studies that have demonstrated that recollection of reminding can act as a marker for reminding (Jacoby, & Wahlheim, 2013; Jacoby, Wahlheim, & Yonelinas, 2013). As such, the present work will look to confirm whether having repetition and reminding knowledge available after test can predict better memory performance.

What happens when passively viewing repetitions?

For the validation of advert-programme remindings, bringing reminding under conscious control through the task was desirable in Chapter Two, but these conditions do not emulate real world viewing. Thus, understanding how reminding occurs under passive viewing conditions is key. Much of the empirical remindings literature has shown a benefit to intentional encoding conditions, typically showing that when individuals are consciously told to learn a word stimulus, or warned about an upcoming test; such experimenter directives increase optimum lags between the P1 and P2, seemingly as more attention is paid to each stimulus, creating more stable P1 representations (Russo, Parkin, Taylor, & Wilks, 1998; Wahlheim, & Jacoby, 2013; See introduction for a discussion). Viewing TV on the other hand is the pinnacle of passive exposure, with how viewers engage with on-screen content being determined by the narrative and shot angle, as well as the viewers' motivations and other external distractions rather than explicit task instruction. Still, these passive word memory studies give some guiding rules of thumb, suggesting the viable lags created by the intentional detection task in Chapter Two would not be seen if such lags were used under passive viewing conditions (Greene, 1989; Raaijmakers, 2003; Polyn, Norman, & Kahana, 2009; Siegel, & Kahana, 2014).

One important question is whether passive viewing conditions alter the quality of the recursive trace created in comparison to when one is directed toward repetition information.

More applied work has suggested so, with Putnam, Wahlheim, and Jacoby (2014) showing that directing attention toward and recording changes during a P2 debate position does add additional memory benefits. In a series of studies, Putnam showed that debate position memory was strongest when a politician's political positions were repeated across two disparate narrative contexts as would be predicted by the greater ease of P1 retrieval. However, when looking at the effect of passive and directed change detection during P2, the participants who were made to be explicitly reminded at P2 had better memory performance for both events because of a more robustly created recursive representation. Although this study focused on P2 memory and proactive memory effects, it demonstrates that procedures like those used in Chapter Two can inflate the quality of the recursive trace created by viewers and increase a participant's tendency to use this information. These findings are in line with neuroimaging work, which has demonstrated that the recruitment of attention processing areas during study, such as fronto-parietal increased activity, are understood to increase the effectiveness of reminding (Xue, et al., 2012). Unsurprisingly, those who make better recursive traces during study, or while viewing, will be more able to rely on this integrated information to improve their memory performance at test. Taken together, when passively viewing TV it is likely that viable repetition lags between repeated products will be much smaller than those seen in Chapter Two. As such, reducing the lag times between the advert and programme event to several minutes should increase the likelihood of in-programme reminding as well as being more ecologically relevant for advertisers.

Does varying lag lengths influence recall after a day long delay?

For brand managers, improving advert information straight after viewing is interesting but such memory effects give little indication of long-term advert representation's stability and accessibility. As such, the longer-term benefits of advert-programme repetition on memory need to be explored. Word memory research shows a predictive trend of lag on the optimum retention interval (Glenberg, 1979). Meta-analysis work from Cepeda, Pashler, Vul, Wixted, and Rohrer (2006) of over 317 studies, demonstrated that as the time between P2 and test increases, the optimum lag between P1 and P2 increases. In other words, the longer information needs to be retained after exposure to a repetition pair, the larger the interval between the two repetitions needs to be. For a retention interval of over one day, the closer the lag to 24-hours the more effect this lag will be. While this study looked only at identical repetitions, when variation in the repeated item is introduced, as is the case in the current study, lag that result in successful reminding will be shorter given the increased difficulty in triggering a reminding (Benjamin, & Tullis, 2010; Tullis, Benjamin, & Ross, 2014). These findings suggest a balancing act, with the larger the intervals between the repetitions, the stronger later memory will be, meanwhile the difference in product presentation will modulate the difficulty in retrieving P1 at P2. When subsequent recollection of reminding is successful after a long lag, advert memory should be increased.

Can reminding improve retrieval and recognition measures?

In the supermarket, recognition memory is known to be a driver of snap product decisions, given consumers' reliance on feelings of familiarity for heuristic decision making (Hoyer, 1984; Leong, 1993). However, so far, the sensitivity of recognition memory in response to in-programme reminding has been untested. In the misinformation literature, research has shown that when a misinformation information is identified as a changed item at test, recognition memory for the original information is improved (Putnam, Sungkhasettee, & Roediger III, 2017). The advertising literature has similarly shown recognition alterations in response to reminding; Appleton-Knapp et al.'s (2005) study demonstrated that at longer lags of over 10 minutes, both varied and repeated adverts resulted in enhanced recognition memory. Indeed, unlike with the cued recall results in Appleton-Knapp et al.'s study, the varied advert executions did not detrimentally affect recognition memory. Therefore, increasing the lag between product repetitions should enhance the participant's ability to later recognise the advert.

Current study

The aim of this experiment was to demonstrate whether increased advert availability after a day long delay could improve advert memory after passively viewing TV content. Unlike Chapter Two, to increase ecological validity, participants viewed ten blocks of seven adverts and seven programme clips, rather than splitting the viewing by media type. While viewing, each participant saw many different repeated products within a block, with each repeated product being seen in both an advert (P1) and a programme (P2). Once the participant watched all the video clips they left the mock living room and returned 24-hours later, believing they were completing a mood questionnaire. Instead, participants will completed a surprise cued product and brand recall test, as well as an advert recognition measure. Once the main memory measures were completed, filled out the recollection of reminding measure. This measure asked them to identify which products they believed were repeated in both an advert and a programme clip. Finally, the participant performed a target advert familiarity measure along with several questionnaires, before being debriefed. The experiment was a within participants design, with the content of the programme clip (repeated product or no repeated product) seen at P2 acting as the condition manipulation.

Questions summary

Firstly, what are the effects of recollection of repetition and reminding on previous advert memory performance after a 24-hour delay?

Secondly, is recognition memory improved by recollection of repetition?

Do longer lags results in better memory performance?

Methods

Participants

20 students (*M* = 19.3 *SD* = 0.91) from the Durham University Psychology Department took part in the experiment. Participants were compensated with course credit for their time. All participants had normal or corrected–to-normal vision and had not taken part in the previous study. This study again used the mood induction cover story introduced in Chapter Two (see Chapter Two Participants section).

A binomial power calculation was conducted on the full sample, using the expected cued recall likelihood rate of 0.5. As cued recall was a binary outcome, the assumed likelihood is 50%. The probability of no individual ever recalling an advert was $p < .001$ suggesting the sample size was sufficient to detect an effect using GLMM.

Materials/apparatus

Online Survey was used to collect product purchase intention for the next month, time since food, brand liking, and the demographic information. Given some of the items were considered infrequently purchased, it was important to control for intended purchasing in the next month as this may have influenced their attention to the advert. Time since food was recorded given the number of food adverts included in the study; participants noted down to the nearest minute how long it had been since they last ate. Given that more liked brands may be more salient to participants, leading to easier retrieval, this was also included as a covariate.

To present the video stimuli, repetition recollection, and the cued recall measures, as well as collect the advert recognition, and advert familiarity data, PsychoPy3 (Version 3.1.0) was used (Peirce, 2007; 2009). Pen and paper measures were used to collect the programme descriptions and brand name data for the recollection of reminding measure (see Appendix E). The experiment was run and data was collected on an Intel core i7 laptop with a 17" screen. Participants viewed the advert and programme stimuli on a 42" Samsung TV while sitting on a sofa in a mock living room environment. During viewing, participants wore over ear headphones.

TV programmes clips

Seventy programme clips were used in this study, all had previously aired in the UK market. Again, it was important for industry relevance that evidence for reminding while passively viewing UK programmes and adverts by a UK audience was established. The 35 reminding clips were taken from the most successful in-programme reminding events from the first study. If P2 programme events had a poor detection rate when participants were directed to detect, they there deemed unlikely to result in successful detection under the more difficult conditions of passive viewing. The 35-control programme events once again contained either no products and were close-ups of characters speaking, or contained non-repeated products. Each participant saw all 70 programme clips. Programme clip length was once again determined by the duration of product inclusion and thus P2 length was included as a covariate.

Adverts

Seventy adverts were selected from the UK market. Again, many of these featured in the first experiment. 35 adverts acted as reminded repetition trials (see Appendix F for each advert chosen), while the other 35 acted as seen controls. Using the same adverts under conditions of both directed and passive viewing was important for showing the effect was not only contingent upon the experimental conditions in Chapter Two. Each participant saw all 70 adverts. Advert length was included as a covariate.

Viewing blocks

Given that Chapter Two's design was unrepresentative of a normal viewing schedule of programmes interspersed with adverts, it was desirable for the present study's design to more closely emulate home viewing. Therefore, a more traditional advert and programme presentation style was used, albeit using programme clips. Participants viewed ten blocks of 14 videos, each with seven adverts and seven programmes (see Table 3.0 below for a visual depiction of the advert-programme order and number). Five blocks contained three repetition trials and five blocks contained four repetition trials. Within the block there were seven different lag lengths; zero, three, five, seven, nine, eleven, or thirteen videos apart. Each block had a set number of trials and trial positions, but block presentation order and the advert position were randomised per participant. Each advert had a programme pairing, which for reminded trials was the product's programme event, and for non-target adverts the paired programme event was unrelated. This presentation schedule allowed for a better approximation of real world viewing while maintaining control of the presentation order.

Table 3.0
Table of advert presentation order by block.

Video	Block 1	Block 2	Block 3	Block 4	Block 5
Advert 1	Single	Single	Reminded 3	Single	Reminded 3
Advert 2	Single	Reminded 3	Single	Single	Reminded 2
Advert 3	Single	Reminded 2	Single	Reminded 3	Single
Advert 4	Single	Reminded 1	Single	Reminded 2	Single
Advert 5	Reminded 3	Single	Single	Reminded 1	Single
Advert 6	Reminded 2	Single	Reminded 2	Single	Single
Advert 7	Reminded 1	Single	Reminded 1	Single	Reminded 1
Programme 1	Reminded 1	Unrelated	Reminded 1	Unrelated	Reminded 1
Programme 2	Reminded 2	Unrelated	Reminded 2	Unrelated	Unrelated
Programme 3	Reminded 3	Unrelated	Unrelated	Reminded 1	Unrelated
Programme 4	Unrelated	Reminded 1	Unrelated	Reminded 2	Unrelated
Programme 5	Unrelated	Reminded 2	Unrelated	Reminded 3	Unrelated
Programme 6	Unrelated	Reminded 3	Unrelated	Unrelated	Reminded 2
Programme 7	Unrelated	Unrelated	Reminded 3	Unrelated	Reminded 3
Video	**Block 6**	**Block 7**	**Block 8**	**Block 9**	**Block 10**
Advert 1	Single	Reminded 4	Single	Reminded 4	Reminded 4
Advert 2	Single	Reminded 3	Reminded 4	Single	Reminded 3
Advert 3	Reminded 4	Single	Reminded 3	Single	Reminded 2
Advert 4	Reminded 3	Single	Reminded 2	Single	Reminded 1
Advert 5	Reminded 2	Single	Reminded 1	Reminded 3	Single
Advert 6	Reminded 1	Reminded 3	Single	Reminded 2	Single
Advert 7	Single	Reminded 1	Single	Reminded 1	Single
Programme 1	Unrelated	Reminded 1	Unrelated	Reminded 1	Unrelated
Programme 2	Reminded 1	Reminded 2	Unrelated	Reminded 2	Unrelated
Programme 3	Reminded 2	Unrelated	Reminded 1	Reminded 3	Unrelated
Programme 4	Reminded 3	Unrelated	Reminded 2	Unrelated	Reminded 1
Programme 5	Reminded 4	Unrelated	Reminded 3	Unrelated	Reminded 2
Programme 6	Unrelated	Reminded 3	Reminded 4	Unrelated	Reminded 3
Programme 7	Unrelated	Reminded 4	Unrelated	Reminded 4	Reminded 4

Note. The table above shows the position and number of advert and programme stimuli in the experiment. Reminded refers to a pair which contain product repetition; for example, within each block, reminded 1 in the advert and programme rows denotes the position of the first repetition pair in that block. In the programme rows, unrelated refers to programme clips that contained no product repetition. In the advert rows, single refers to adverts that were not seen as repetitions and denote the control condition. All ten viewing blocks were viewed by all participants. The order in which these blocks were viewed was randomised. Each block showed a varying number of trials for each of the two conditions as was specified in the viewing blocks section.

Cued advert recall memory measure

The cued recall measure, or aided recall, was again the same as Chapter Two (see Chapter Two Methods for details). This time there were 140 word trials, 70 were the seen adverts, with 35 words representing repeated products and 35 representing advert only products. The other 70 word trials were unseen foils.

Advert recognition

This measure assessed the participants' recognition accuracy. The measure presented, one at a time, 140 advert still images to each participant. 70 of the adverts were seen in the viewing scenario (35 repeated product trials, 35 advert only), 70 were unseen foil adverts. Participants gave a yes/no response to indicate whether the advert displayed on screen was an advert seen in the viewing scenario the day before, or not (see Figure 3.0 below). Once the participant responded there was a 0.5 second delay before the next advert appeared. Once on screen, each advert was presented on screen for 0.5 seconds before the participant could respond, after which the participant had five seconds to make a response before the next trial automatically began. This duration has been shown to be sufficient for recollection of reminding to occur (Negley, Kelley, & Jacoby, 2018).

Figure 3.0. Three advert recognition trials.

Post-test recollection of repetition and reminding

Instead of asking participants to detect repetitions after each programme clip, as was the case in Chapter Two, a measure of recollection of repetition and reminding was taken after the other memory measures. This measure was modified from Negley, Kelley, and Jacoby's (2018) measure of recollection of reminding and used the same presentation script as the cued recall measure described in Chapter Two. That is, each trial presented the participant with a product word for four seconds, only this time the participant was then asked to respond with yes or no depending on whether they remembered the product featuring in both an advert as well as a programme clip they viewed (see Figure 3.1 below). If the participant did not detect the repetition they moved onto the next word. If the participant did detect that the product was repeated, they then noted down the brand which appeared in the advert and gave a one line description of the programme event (see Appendix E for the recollection of reminding recording sheet). Here some allowance was given for the spelling of the brand name (see Appendix G for rubric). The programme description given by participants had to feature details from the product's involvement, such as; the setting, the character's actions in the clip, the themes of the scene, or how specifically the product was involved. Once the participant had recorded their answers they moved on to the next trial. This measure contained 140 word trials, 70 of which were seen, with 35 products forming the repetition trials, as well as 70 unseen foil products.

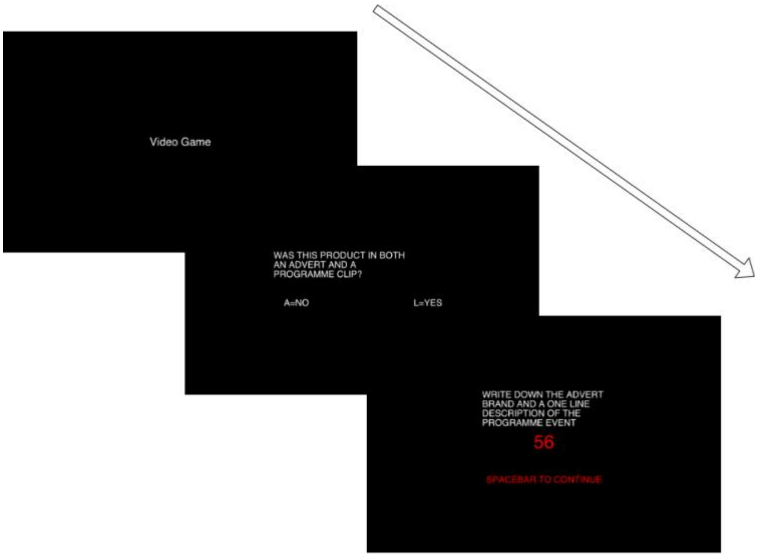

Figure 3.1. The figure displays a simple schematic for a yes response on the recollection of reminding mechanism.

Advert familiarity

To control for the influence of advert familiarity in the GLMMs, participants were asked to respond, on a one to seven Likert scale, as to how familiar each seen advert was to them. That is, for the 70 seen adverts, participants rated how familiar each advert was to them from exposures prior to the study. The scale item was adapted from Fu, Ding, and Qu's (2009) measure of product familiarity ("1 = not familiar with at all; 7 = very familiar with"). The measure presented adverts, one by one, with the seven point Likert scale positioned below the advert. There was no delay before the participant could respond and after an input was made, the next trial began.

Product purchase intention

To assess near future purchase intention (within the next month), a three-item measure from Dodds, Monroe, and Grewal (1991) was adapted for use in the study. Each item was answered on a one to seven scale from very high to very low. The three questions were; "The likelihood of purchasing this product is", "The probability that I would consider buying the product is", and "My willingness to buy the product is". All questions were framed within the context of purchasing the product within the next month. Various items throughout this measure were selected for reverse coding. This measure was used as a covariate in each model.

Brand liking

To control for the influence of brand liking in the GLMMs, participants were asked to rate brand liking on a scale of one to seven, from strongly like to strongly dislike, adapting the brand liking measure from Fu, Ding, and Qu, (2009). Some of the items were reverse coded. Again, this measure was included as a covariate.

Design

The study was a within-participants design. In this chapter, every participant viewed all stimuli rather than each participant seeing half the adverts as repetitions and half as single adverts. As noted in the viewing block section above, participants saw 70 adverts in total, 35 of these adverts had their products repeated in a later programme clip, while the remaining 35 were seen without product repetition. This allowed for a comparison between single seen adverts and adverts that had their product repeated. Furthermore, repetition adverts were split again on a conditionalised basis, with participant's ability to recall the product repetitions also being used as a fixed effect to also predict advert memory. Condition was the first independent variable referring to whether a repetition programme clip was seen, or not. Conditionalised analysis, used repetition trials only with repetition detection and reminding status acting as further independent variables. In the final analysis, repetition detection was also used as a independent variable in the final analysis. The dependent variables were cued product recall, cued brand recall, advert recognition, and repetition detection. Covariates used in the study were brand liking, advert familiarity, purchase intention, time since last food consumption, advert duration, programme duration.

Procedure

The study took place over two days. During the first day, participants watched the advert and programme clips on a sofa in a mock living room. Once they had finished viewing, they then left the lab and were instructed to return 24 hours later. On returning to the lab on day two, they took part in surprise advert cued recall measure and advert recognition task. After this, they were given the recollection of reminding measure, before completing the prior advert familiarity measure. They then completed the questionnaire section of the experiment. Participants were then debriefed as to the study's true nature.

Data analysis

GLMM

All analysis used R (version 3.5, R Core Team 2018), and R Studio (version 1.1.447). All models were found to be stable via the assessment of "DHARMa" package (Hartig, 2020). See Chapter Two for all other relevant R packages and functions used. The fixed effect repetition recollection split target trials by those trials where participants could later detect the repetition from those trials where participants could not. The fixed effect recollection of reminding split participant brand recall by those who could recall both the programme event and the advert brand from those who could only recall programme event details and the repetition or the repetition only. Before entry into the various models, all covariates were z-transformed, with advert familiarity, time since food, and purchase intention all undergoing a logarithmic transformation. In Appleton-Knapp et al., (2005) study lags of over 10 minutes were considered long and created significantly different learning conditions from items seen less than a minute apart when static adverts were used. The current study created more difficult conditions for repetition detection given the category repetition employed, and as such, any lag longer than four minutes 20 seconds was considered long.

Inter-rater reliability

To establish the reliability of the recollection of reminding data, two independent raters, one of whom was naïve to the purpose of the experiment, coded the recollection of reminding written work. Here, both checked whether the advert brand names and programme product event descriptions were correct given the rubric (see Appendix G). To establish reliability, Cohen's Kappa was calculated for the 35 target adverts with 1379 observations from 20 participants being compared. Acceptable levels of reliability were set to $\kappa = 0.8$, in line with Cohen's (1988) recommendations for good reliability. An unweighted Kappa was computed, finding there was a good level of agreement between the coders ($\kappa = 0.95$, $p = .000$; function "kappa2" from the package "irr" (version 0.84.1)).

Condition analysis

Cued product recall

A GLMM with a binomial error structure and a logit link function assessed the predictive value of condition on product recall (Baayen, et al, 2008; Jaeger, 2008). The fixed effects were condition and advert familiarity. The random effects of participant and advert were also included. The model's dependent variable was product recall. There were 1400 observations from 20 participants.

Cued brand recall

A GLMM was created to assess the predictive value of condition on cued brand recall. The fixed effects in the model were condition and advert familiarity with random intercepts of participants and advert also being included. The model's dependent variable was brand cued recall. There were also 1400 observations from 20 participants.

Advert recognition

A further binomial GLMM was created to assess the fixed effect of condition on advert recognition. The covariate of advert familiarity was used in the model. Random intercepts of participant and advert were included. The model included 1400 observations from 20 participants.

Conditionalised cued recall

Given the non-normal distribution of the advert familiarity, purchase intention, time since food, and advert duration covariates, even after a logarithmic transformation; for each dependent variable, a second model was created without the covariate to assess for its additional influence. Each conditionalised analysis only contained target trials.

Cued product recall

A GLMM with a binomial error structure and logit link function assessed the predictive value of post-test repetition detection on cued product recall performance (see Table 3.1 for model terms). The fixed effects in the model were binary repetition recollection, lag, and the covariates were brand liking and programme duration. A second model additionally containing the covariates advert familiarity, purchase intention, time since food, and advert duration was also created. As these four additional covariates did not meet the assumption of normality, the two models were contrasted for additional predictive power from the non-normal covariates; however, caution is advised when assessing for their influence in all models. 700 observations were included in the model from 20 participants.

Table 3.1
Terms for the conditionalised product cued recall models.

Model	DV	Predictors	Random Intercept	Covariates
Cued Product Recall - Full	Product Recall	Repetition Recollection, Lag	Participant	z.Brandlike, z.Prog_duration
Cued Product Recall - Null	Product Recall	-	Participant	
Cued Product Recall 2 - Full	Product Recall	Repetition Recollection, Lag	Participant	z.Brandlike, z.Ad_familiarity, z.Purchaseintention, z.Timesincefood, z.Ad_duration, z.Prog_duration
Cued Product Recall 2 - Null	Product Recall	-	Participant	
Cued Product Recall 2 – Simplified	Product Recall	Repetition Recollection	Participant	z.Ad_familiarity, z.Ad_duration

Cued brand recall

A further GLMM was constructed to assess the effect of product repetition recollection on advert brand memory (see Table 3.2). Here it was desired that a comparison across the three reminding statuses be computed but due to the conditionalised nature of the groups, trial imbalances made comparisons between missed and just repetition detection and recollection of reminding impossible. The fixed effects in this model were repetition recollection, lag, brand like, and programme duration. Again, a second model was constructed with the additional non-normal covariates. The covariate brand liking was removed due to issues with model convergence. The model contained 700 observations from 20 participants.

Table 3.2

Terms for the conditionalised cued brand recall models.

Model	DV	Predictors	Random Intercept	Covariates
Cued Brand Recall - Full	Brand Recall	Repetition recollection, Lag	Participant	z.Prog_duration
Cued Brand Recall - Null	Brand Recall	-	Participant	
Cued Brand Recall 2 - Full	Brand Recall	Repetition recollection, Lag	Participant	z.Ad_familiarity, z.Purchaseintention, z.Timesincefood, z.Ad_duration, z.Prog_duration
Cued Brand Recall 2 - Null	Brand Recall	-	Participant	
Cued Brand Recall 2 – Simplified	Brand Recall	-	Participant	z.Ad_familiarity, z.Ad_duration

Cued brand recall detection and recollection of reminding

This GLMM compared brand recall performance between those who only could detect the repetition or detect the repetition and recall the programme product event with those could access their full recursive trace when prompted. Therefore, the sample was cut down to only those who successfully identified the product repetition. This model contained fixed effects of brand liking, reminding status, and lag. A single random effect of participant was included. The dependent variable was again cued brand recall performance. The model was also simplified so that only reminding status was included as a fixed effect. The model contained 306 observations from 20 participants.

Conditionalised advert recognition memory

A GLMM was built to assess the effects of repetition recollection on recognition memory performance (see Table 3.3). The fixed effects of the model were; repetition recollection, lag, brand liking, and programme duration. When attempting to make the second model with the non-normal covariates, significant stability issues were encountered. The model was also simplified so that only repetition detection and lag were included as fixed effects. There were 700 observations from 20 participants. When attempting to make the model with the non-normal covariates, DHARMa detected significant quantile deviation between the residual and predicted values, suggesting the assumptions of GLMM were broken, thus the model was both unstable and unusable.

Table 3.3
Terms for the conditionalised advert recognition models.

Model	DV	Predictors	Random Intercept	Covariates
Advert Recognition - Full	Advert Recognition	Repetition Recollection, Lag	Participant	z.Brandlike, z.Prog_duration
Advert Recognition - Null	Advert Recognition	-	Participant	
Advert Recognition – Simplified	Advert Recognition	Repetition Recollection, Lag	Participant	-

Advert recognition recollection of reminding status

Next, to understand if being aware of repetitions would improve recognition memory beyond just detecting the product repetition or detecting and remembering the programme products inclusion only, a GLMM was constructed. Again, this model contained only trials in which participants detected the repetition. The fixed effects in the model were brand liking, recollection of reminding status, and lag. The dependent variable was once more advert recognition. The random effect in the model was participant. There were 306 observations from 20 participants.

Repetition detection

The GLMM assessed the predictive quality of lag on post-test repetition detection probability (see Table 3.4 for terms). The fixed effects were lag, along with the covariates brand liking, and programme duration. The additional covariates in the second model were advert familiarity, purchase intention, time since food, programme duration, and advert duration. Visual inspection indicated slight over-dispersion, however, this visual difference did not trigger any violations of “DHARMa” over-dispersion tests, thus use of the model continued. Both models were simplified to a single covariate of programme duration. The model contained 700 observations from 20 participants.

Table 3.4
Terms for the conditionalised repetition detection models.

Model	DV	Predictors	Random Intercept	Covariates
Repetition Detection - Full	Repetition Recollection	Lag	Participant	z.Brandlike, z.Prog_duration
Repetition Detection - Null	Repetition Recollection	-	Participant	
Repetition Detection – Simplified	Repetition Recollection	-	Participant	z.Prog_duration
Repetition Detection 2 - Full	Repetition Recollection	Lag	Participant	z.Brandlike, z.Ad_familiarity, z.Purchaseintention, z.Timesincefood, z.Ad_duration, z.Prog_duration
Repetition Detection 2 - Null	Repetition Recollection	-	Participant	
Repetition Detection 2 – Simplified	Repetition Recollection	-	Participant	z.Prog_duration

Results

Condition analysis

The table below outlines the cued recall and advert recognition performance (Table 3.5).

Table 3.5
Displays the percentage accuracy from the three memory measures.

Condition	Cued Product Recall (%)	Cued Brand Recall (%)	Advert Recognition (%)
Reminded	62.4 (1.83)	31.1 (1.75)	74.0 (1.66)
Control	55.0 (1.88)	20.9 (1.54)	66.3 (1.79)

Note. () Indicates SEM.

Cued product recall

It was found that the full model was significantly more predictive than the null, when compared via the likelihood ratio test ($\chi^2 = 41.5$ (2), $p < .001$; see Table 3.6 for model coefficients). Further likelihood ratio tests found that advert familiarity predicted cued product recall ($\chi^2 = 39.2$ (1), $p < .001$), but condition did not ($\chi^2 = 1.41$ (1), $p = .234$). The fixed effect in this model accounted for 6% of the variance (theoretical marginal $R^2 = 0.06$). The full model accounted for 35% of the model (theoretical conditional $R^2 = 0.35$). This meant that after controlling for prior advert familiarity and the individual advert effects, adverts which were seen with a programme repetition did not improve advert product recall.

Table 3.6
Coefficients for the cued product recall model.

Term	Estimate	*SE*	Lower CL	Upper CL	*p*
Intercept	0.3	0.25	-0.16	0.74	(i)
Condition	0.33	0.27	-0.2	0.88	.232
Advert Familiarity	0.51	0.08	0.36	0.67	<.001

Note. (i) Intercept p-value omitted for lack of interpretable meaning.

Cued brand recall

A likelihood ratio test found that the full model was more predictive than the null model (χ^2 = 87.68 (2), p < .001; see Table 3.7 for model coefficients). It was found that condition (χ^2 = 5.45 (1), p = .020), and advert familiarity (χ^2 = 81.85 (1), p = <.001), significantly predicted cued brand recall memory. The fixed effects in the model accounted for 14% of the variance in cued brand recall response (theoretical marginal R^2 = 0.14). The full model accounted for 51% of the variance in the cued recall response (theoretical conditional R^2 = 0.51). This meant, even after prior advert familiarity and individual advert effects were accounted for, having the opportunity to see the advert with a programme repetition improved advert brand memory.

Table 3.7
Coefficients for the cued brand recall model.

Term	Estimate	*SE*	Lower CL	Upper CL	*p*
Intercept	-2.05	0.34	-2.76	-1.41	(i)
Condition	0.8	0.34	0.11	1.51	.020
Advert Familiarity	0.87	0.1	0.67	1.08	<.001

Note. (i) Intercept p-value omitted for lack of interpretable meaning.

Advert recognition

A likelihood ratio test found that the full model significantly predicted advert recognition, beyond the null model (χ^2 = 91.13 (2), p < .001; see Table 3.8 for model coefficients). Whilst Advert familiarity was found to significantly predict advert recognition (χ^2 = 88.66 (1), p = <.001), condition did not (χ^2 = 1.34 (1), p = .247). The fixed effects accounted for 14% of the variance in advert recognition performance (theoretical marginal R^2 = 0.14). The full model accounted for 48% of the variance in advert recognition performance (theoretical conditional R^2 = 0.48). The result showed that after controlling for prior advert familiarity and advert level random effects, participants were no more likely to recognise the advert when seen in the context of a programme product repetition.

Table 3.8
Coefficients for the advert recognition model.

Term	Estimate	*SE*	Lower CL	Upper CL	*p*
Intercept	1.1	0.29	0.52	1.77	(i)
Condition	0.4	0.34	-0.23	1.02	.243
Advert Familiarity	0.9	0.1	0.7	1.1	<.001

Note. () Intercept p-value omitted for lack of interpretable meaning.

Conditionalised cued recall

Product cued recall

Below is the percentage cued product recall by recollection of product repetition (see Figure 3.2).

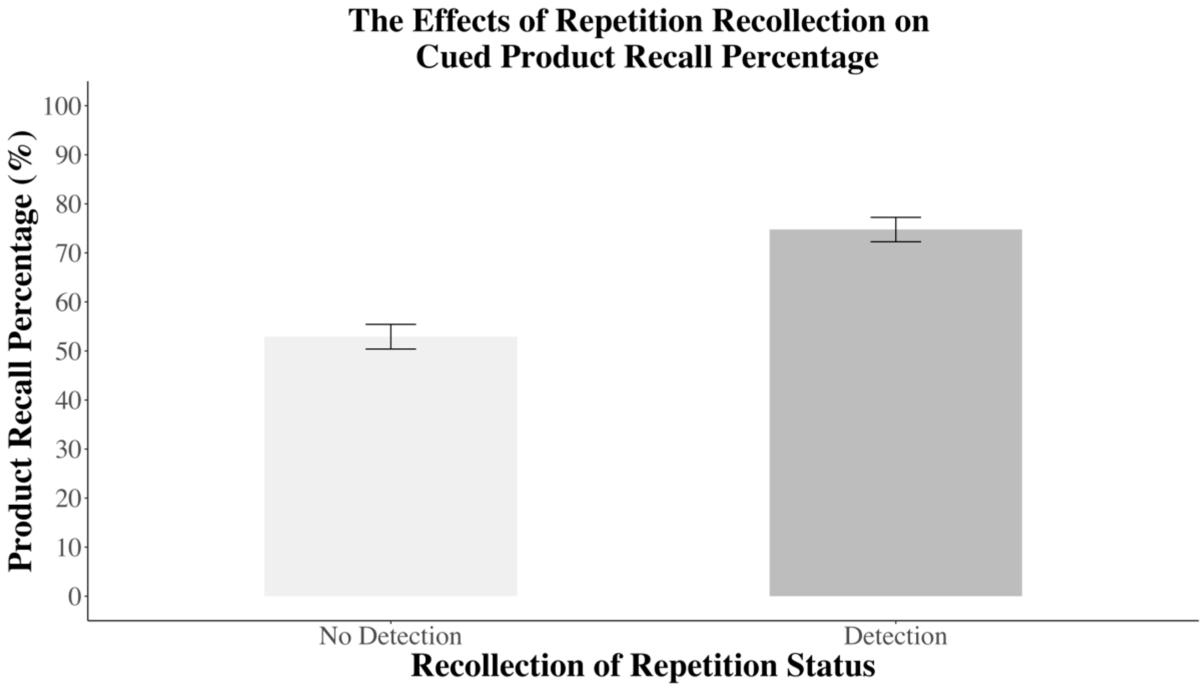

Figure 3.2. Displays cued product recall percentages as a function of product repetition detection. Error bars represent 1± SEM.

A likelihood ratio test found the full cued product model was significantly more predictive of product recall than the null model (χ^2 = 75.3 (8), p < .001). The fixed effects were then assessed for the predictability. The fixed effects brand liking (χ^2 = 0.09 (1), p = .769), purchase intention (χ^2 = 0.25 (1), p = .614), time since food (χ^2 = 0.94 (1), p = .334), programme duration (χ^2 = 0.07 (1), p = .788), and lag (χ^2 = 1.09 (1), p = .297), were all found to be non-predictive of product cued recall. However, advert familiarity (χ^2 = 26.97 (1), p = <.001), advert duration (χ^2 = 18.48 (1), p = <.001), and product repetition recollection (χ^2 = 28.19 (1), p = .000), significantly predicted product recall performance. The model was then simplified, removing the insignificant fixed effects. Compared to the null, the simplified model was still significantly more predictive (χ^2 = 72.89 (3), p = <.001). It was found that advert familiarity (χ^2 = 28.59 (1), p = <.000), advert duration (χ^2 = 18.51 (1), p = <.001), and repetition detection (χ^2 = 29.04 (1), p = <.001), remained predictive of product memory (see Table 3.9 for the coefficients). Here, the fixed effects in the simplified model accounted for 15% of the variance in cued product recall (theoretical marginal R^2 = 0.15). The full model accounted for 26% of the variance in cued product recall (theoretical conditional R^2 = 0.26). Finally, it was found that the model with the non-normal covariates was more predictive than the model without (χ^2 = 41.29 (2), p = <.001). Individuals in the study were more likely to recall the product, if they could later recollect that it was repeated in both the advert and the programme. Equally, it appears that being more familiar with the advert itself as well as adverts being longer both also increased the likelihood of product recall.

Table 3.9
Coefficients for the conditionalised product cued recall model.

Term	Estimate	*SE*	Lower CL	Upper CL	*p*
Intercept	0.19	0.19	-0.24	0.59	(i)
Advert Familiarity	0.55	0.10	0.35	0.76	<.001
Advert Duration	0.39	0.09	0.22	0.58	<.001
Repetition Detection	0.96	0.18	0.62	1.31	<.001

Note. () Intercept p-value omitted for lack of interpretable meaning.

Brand cued recall

The figure below displays the cued brand recall performance by recollection product repetition status (see Figure 3.3 below).

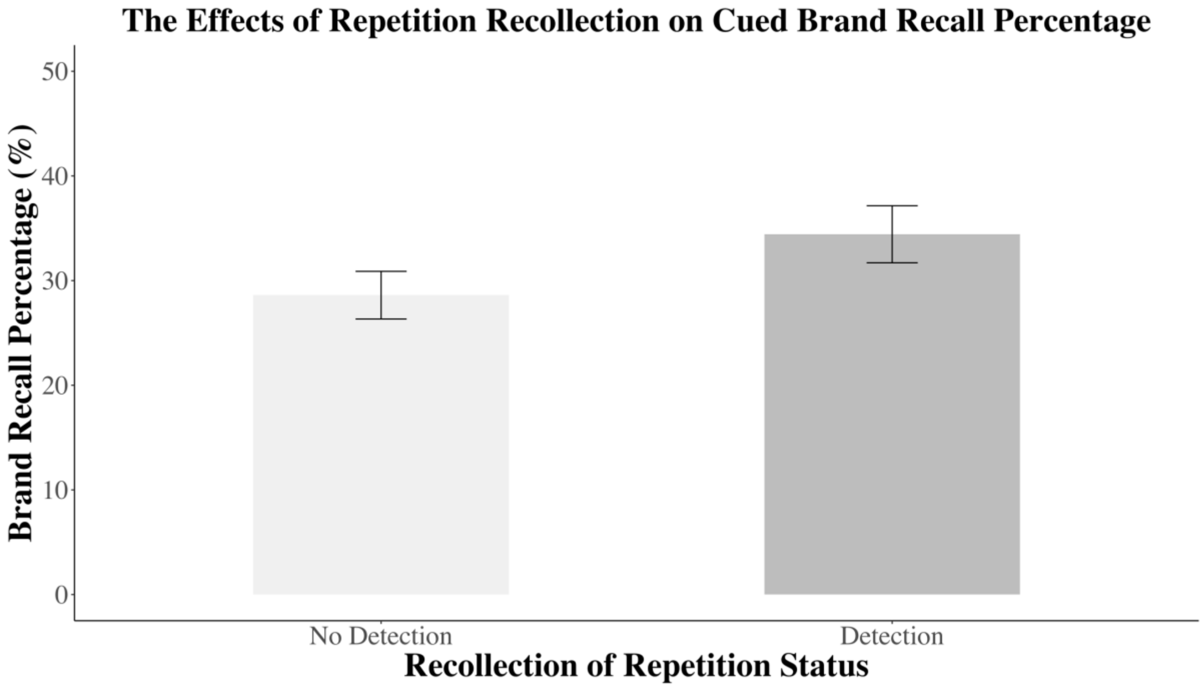

Figure 3.3. Displays cued brand recall percentages as function of recollection of repetition status. Error bars represent 1± SEM.

A likelihood ratio test compared the null to the full brand cued model, with the model including the fixed effects being more predictive (χ^2 = 95.61 (7), p < .001). When assessing the influence of each fixed effect, it was found that time since food (χ^2 = 0.05 (1), p = .821), programme duration (χ^2 = 0.61 (1), p = .433), lag (χ^2 = 2.24 (1), p = .134), and repetition recollection (χ^2 = 0.72 (1), p = .396) did not significantly predict brand recall. However, purchase intention (χ^2 = 6.03 (1), p = .014), advert familiarity (χ^2 = 76.4 (1), p < .001), and advert duration (χ^2 = 7.59 (1), p = .006), did predict brand recall probability. The model was then simplified and compared with the null, finding that it was still significantly more predictive than the null (χ^2 = 92.07 (3), p < .001). All three fixed effects, (χ^2 = 79.45 (1), p <.001), purchase intention (χ^2 = 6.97 (1), p = .018), and advert duration (χ^2 = 6.97 (1), p = .008), remained predictive of brand cued recall (see Table 3.10 for the fixed effect coefficients). The model that did not contain the additional covariates was non-predictive of cued brand recall performance. The fixed effects in the simplified model accounted for 21% of the variance in cued brand recall (theoretical marginal R^2 = 0.21). The whole model accounted for 36% of the variance in cued brand recall (theoretical conditional R^2 = 0.36).

Table 3.10
Coefficients for the conditionalised brand cued recall model.

Term	Estimate	*SE*	Lower CL	Upper CL	*p*
Intercept	-1.01	0.22	-1.46	-0.56	(i)
Advert Familiarity	0.97	0.12	0.75	1.21	<.001
Purchase Intention	0.23	0.1	0.03	0.43	0.19
Advert Duration	0.25	0.09	0.06	0.45	.009

Note. () Intercept p-value omitted for lack of interpretable meaning.

Cued brand recall detection and recollection of reminding

See figure below for the cued brand recall by reminding status (see Figure 3.4).

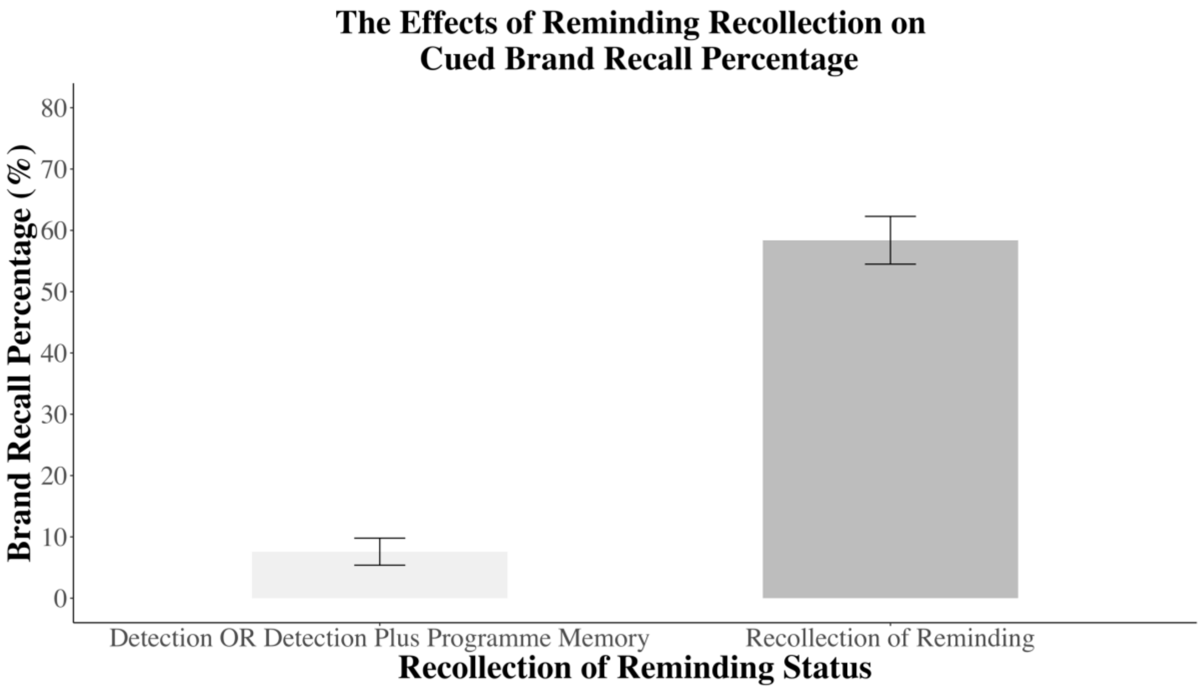

Figure 3.4. The figure displays brand recall performance as a function of whether the individual had a full recursive representation or not. Error bars represent 1± SEM.

A likelihood ratio test compared the full to the null model, finding it to be significantly more predictive (χ^2 = 92.93 (3), *p* = <.001). When assessing the individual fixed effects, it was found that reminding status predicted brand memory (χ^2 = 85.63 (1), *p* = <.001). However, both covariates, brand liking (χ^2 = 0.97 (1), *p* = .324), and lag (χ^2 = 0.1 (1), *p* = .746), did not. The model was then simplified and again compared to the null, finding it to still be predictive of cued brand recall (χ^2 = 91.89 (1), *p* = <.001). The fixed effect in this model accounted for 38% of the variance in the cued brand recall response (theoretical marginal R^2 = 0.38). The full model could account for 39% of the variance in the cued brand recall response (theoretical conditional R^2 = 0.39). This suggested that having access to the recursive trace infer an advantage beyond detecting and recalling only the programme event. Thus, the full recursive trace is key for improving brand memory after a 24-hour delay.

Advert recognition memory

The figure below displays advert recognition percentages by the recollection of product repetition (see Figure 3.5). The table below also demonstrates the recognition by the short and long lags (Table 3.11).

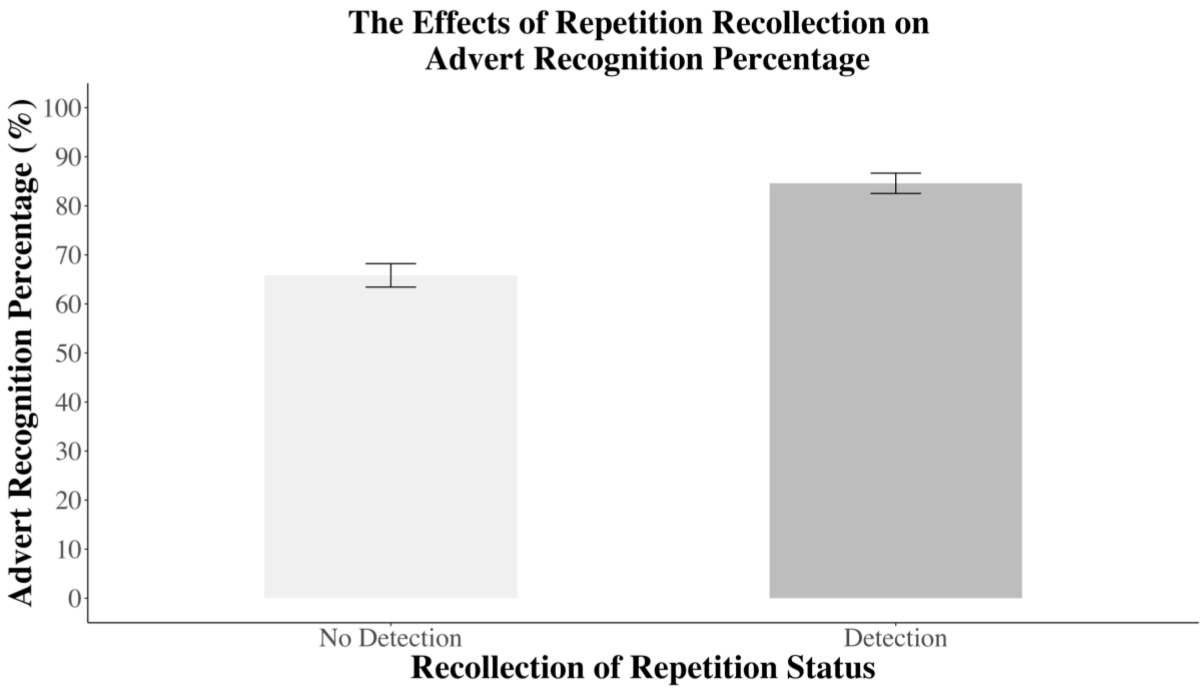

Figure 3.5. Displays advert recognition percentages as a function of reminding status. Error bars represent 1± SEM.

Table 3.11
Advert recognition as a function of lag grouping.

Lag	Advert Recognition (%)
Short	70.5 (2.43)
Long	77.5 (2.24)

Note. () indicates SEM.

Once more, a likelihood ratio test confirmed that the advert recognition model was more predictive than the null ($\chi^2 = 40.47$ (4), $p < .001$). Assessing the individual predictors, it was found that brand like ($\chi^2 = 1.18$ (1), $p = .276$), and programme duration ($\chi^2 = 3.09$ (1), $p = .079$), were both non-predictive of advert recognition. In contrast, recollection of repetition ($\chi^2 = 28.04$ (1), $p = <.001$), and lag ($\chi^2 = 5.11$ (1), $p = .024$), significantly predicted advert recognition. The simplified model was still more predictive than the null model ($\chi^2 = 36.3$ (2), $p <.001$; see Table 3.12 for the model coefficients). Both fixed effects remained significant post the model simplification; repetition detection ($\chi^2 = 30.88$ (1), $p = <.001$), and lag ($\chi^2 = 4.9$ (1), $p = .027$). The fixed effects in the model could account for 8% of the variance in advert recognition (theoretical marginal $R^2 = 0.08$). The full model accounted for 16% of the variance in the advert recognition response (theoretical conditional $R^2 = 0.16$). The results suggest that repetition recollection had influence over advert recognition.

Table 3.12
Coefficients for the conditionalised advert recognition model.

Term	Estimate	*SE*	Lower CL	Upper CL	*p*
Intercept	0.11	0.31	-0.46	0.76	(i)
Repetition Detection	1.06	0.2	0.68	1.44	<.001
Lag	0.4	0.18	0.04	0.78	.027

Note. () Intercept p-value omitted for lack of interpretable meaning.

Advert recognition recollection of reminding status

See below for the advert recognition by reminding status (Figure 3.6).

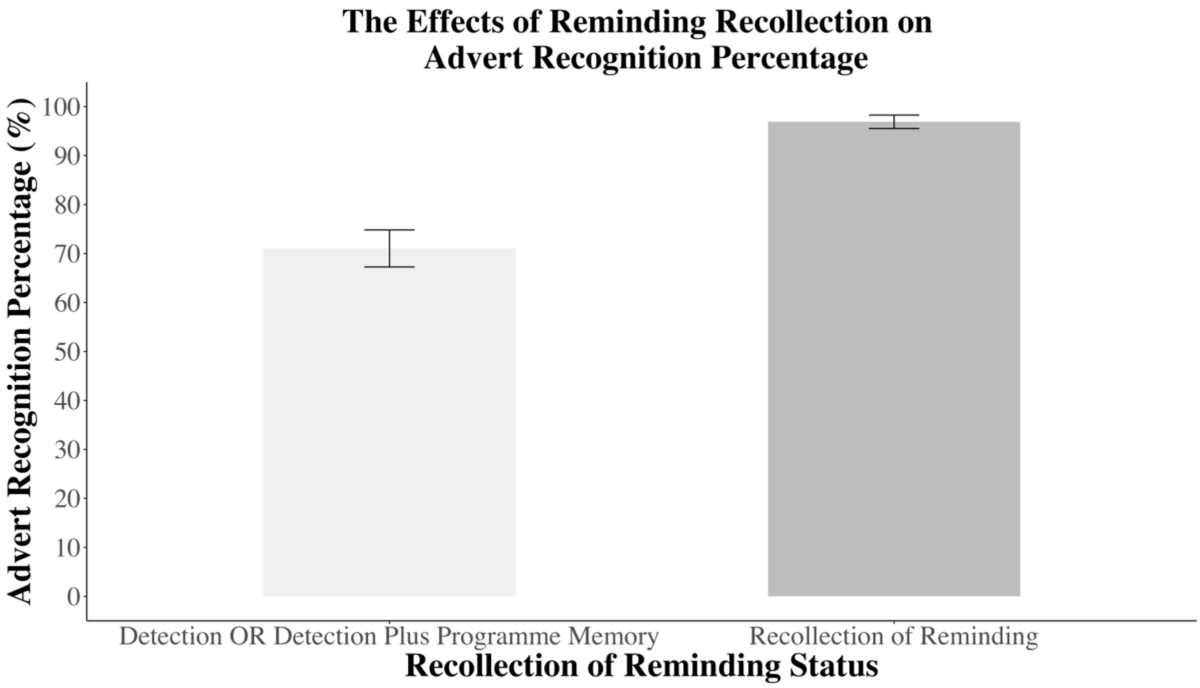

Figure 3.6. Displays advert recognition performance as a function of whether participants could only make a product detection or remember the programme and those who had a recursive recollection for both events.

Unfortunately, the model resulted in a singular fit and was thus uninterpretable. No further analysis was conducted.

Repetition recollection

The table below indicates the repetition detection percentage across the two lag groups (see Table 3.13).

Table 3.13
Repetition recollection by lag grouping.

Lag	Repetition Recollection (%)
Short	42.5 (2.63)
Long	44.1 (2.67)

Note. () indicate SEM.

A likelihood ratio test compared the full model with the null, finding that the full was significantly more predictive than the null (χ^2 = 28.15 (7), p < .001). Assessing the fixed effects, it was found that brand like (χ^2 = 1.04 (1), p = .307), time since food (χ^2 = 0.92 (1), p = 338), advert duration (χ^2 = 0.103 (1), p = .748), product purchase intention (χ^2 = 3.83 (1), p = .050), and lag (χ^2 = 0.34 (1), p = .562), did not predict repetition detection likelihood. Two of the covariates however, were found to be predictive; advert familiarity (χ^2 = 4.06 (1), p = .044), and programme duration (χ^2 = 20.53 (1), p = <.001). The model was then simplified down to only the predictive fixed effects, and was found to be more predictive than the null (χ^2 = 19.09 (2), p = <.001). The fixed effect of advert familiarity was not predictive of repetition detection (χ^2 = 2.67 (1), p = .102), but programme duration was (χ^2 = 18.65 (1), p = <.001; see Table 3.14 below for the model coefficients). Finally, the model was simplified one more time, so that only programme duration remained as a fixed effect, and this model was found to be more predictive than the null (χ^2 = 19.99 (2), p = <.001). The covariate programme duration was predictive of later repetition detection, so the longer the programme product was on screen, the more likely later detection was (χ^2 = 17.34 (1), p = <.001). The model without the non-Gaussian covariates also converged on the same final model structure. The fixed effects in the simplified model accounted for 3% of the variance in the recollection repetition (theoretical marginal R^2 = 0.03). The full model accounted for 7% of recollection of repetition (theoretical conditional R^2 = 0.7). This suggested that the longer the programme clip duration, the more likely repetition detection was.

Table 3.14
Coefficients for the repetition detection model.

Term	Estimate	*SE*	Lower CL	Upper CL	*p*
Intercept	-0.28	0.12	-0.51	-0.03	(i)
Programme Duration	0.33	0.08	0.17	0.49	<.001

Note. () Intercept p-value omitted for lack of interpretable meaning.

Discussion

When attempting to make a product decision, having a recursive trace containing advert information as the result of earlier reminding will increase the ease with which a brand's advertising is recalled. The results of this study, confirm and extend several findings from the first experiment. Firstly, those who could later recall the recursive trace were disproportionately more likely to recall the brand than those who only detected the repeated product. Again, having only product repetition or programme product information present in the recursive trace appears to do little to aid brand memory performance, highlighting a consistent pitfall for practitioners to consider. These findings mirror the effects found for cued recall in Chapter Two and other previous research (Negley, Kelley, & Jacoby, 2018). The study also showed that being able to recollect the repetition increased both advert recognition and cued product memory, providing further evidence for the spaced learning mechanism (Maddox, 2016). Thus, both in-programme reminding and recollection of reminding can predict a viewer's advert memory facilitation. While reminding in-programme is the source of the memory effect, when recursive trace information is available at test, advert memory is improved. Importantly, these repetition effects were seen even after controlling for a myriad of other advert variables such as; advert familiarity, brand liking, purchase intention, etc. For practitioners then, the results suggest capturing reminding does not have to interrupt a viewer's TV experience, instead evidence of a reliable memory benefit can be captured long after viewing.

Again, repetition detection and memory for such detection events are key to improving advert memory from reminding. That is, the study showed that those who later have product repetition information available previously had better cued product and advert recognition memory, even when they initially did not know that repetition information had utility in their retrieval process. The final analysis equally showed that repetition detection behaviour was supported by the screen time length the product had at P2, which is again in concurrence with prior work (Negley, Kelley, & Jacoby, 2018). Such an effect suggests that, for a large part, participants detected the repetition during viewing instigating the creation of recursive trace, which could later be recalled and used to guide retrieval of product information. Recalling the recursive trace with advert-product associations should have also made recollective-based recognition easier, given that participants could not disqualify an advert as unseen on the basis that it contained a product that they had been reminded of. Also in keeping with Chapter Two's results, it was again found that if the participant missed the repetition, this created difficult conditions for advert remembering, with the individual relying only on their initial advert exposure to determine its recall. Indeed, if the repetition is missed, and the word beer insufficiently cues the beer advert's representation, for example, meaning accurate performance becomes harder. However, this simple study-phase retrieval of product information alone does not appear to convey brand recall advantages, in line with Chapter Two; instead a more detailed recursive trace is required.

What should excite practitioners most about the advert-reminding mechanism are the dual routes available for memory improvement; the strengthening of the initial advert trace at P2, as well as its increased accessibility at retrieval due to the recursive trace creation (Jacoby, Wahlheim, & Yonelinas, 2013; Negley, Kelley, & Jacoby, 2018). The present study demonstrates that the encoding enhancement evidenced in Chapter Two results in a long-term retrieval benefit. That is, in-programme reminding makes retrieval easier for viewers, with the results collectively showing that the more information that is available in the recursive trace, the better memory performance becomes. This occurs for two reasons. The first, as evidenced in Chapter Two, was that advert memory was strengthened by a secondary cognitive exposure during the programme when its representation was retrieved, offsetting decay of the advert trace, albeit only by several minutes. Neuroimaging research supports this, showing that the secondary encoding at P2 helps to create a more stable neural representation of P1 (Xue, et al., 2010; 2012; Bradley, et al, 2015). Secondly, as evidenced by the current work, accessibility to the advert trace was improved as the repeated product information becomes bound together, e.g. beer, becomes associated with the advert, the programme event, as well as with memory for the item being reminded during the programme. After 24-hours, those who experienced reminding during viewing can use one or a combination of these cues (advert directly, the programme product event, the recursive trace, and/or the recollection of reminding) to trigger the advert's representation. This finding should be encouraging for advertisers, especially when the viewer's chosen programme can improve advert retrieval for at least 24-hours after lags ranging between several seconds to tens of minutes.

For advertisers, to see the best memory performance from advert-programme repetitions, remembering the product's inclusion in both events is the first step; yet how this information is captured influences the end state of advert memory (Jacoby, & Wahlheim, 2013; Negley, Kelley, & Jacoby, 2018). The present study deviated from prior attempts in non-advertising studies to capture recollection of reminding at test by making the memory measures a two-part process (Jacoby, & Wahlheim, 2013; Jacoby, Wahlheim, & Yonelinas, 2013; Negley, Kelley, & Jacoby, 2018). Traditionally, these studies have added the recollection of reminding to the cued memory task. Instead, the present work first assessed advert memory, then subsequently tested the state of the recursive representation. Even after splitting the memory measures, the current research showed spaced learning effects for those who demonstrated repetition and recursive trace recollection (Appleton-Knapp, Bjork, & Wickens, 2005; Wahlheim, Maddox, & Jacoby, 2014; Jacoby, Wahlheim, & Kelley, 2015). The decision to split these two measures was chiefly made when considering how product recall takes place in the real world. Typically, product decision processes combine conventional retrieval and recognition strategies to drive individuals toward familiar products and away from riskier, unknown purchases (Locander, & Hermann, 1979; Folkes, 1988). Unsurprisingly, this real-world search behaviour does not include the additional criteria of assessing for recent repetition experience at retrieval, instead repetition information should influence advert memory in a spontaneous fashion. Splitting the measures then removed this task-orientated goal, enabling individuals to use their own subjective retrieval strategies, providing a cleaner demonstration of how recursive trace information organically improves advert recollection.

The varying lags between the advert and programme products appear to influence recognition in a manner similar to previous advertising research (Appleton-Knapp, et al., 2005). Those who saw the product in the programme after lags longer than 4 minute 20 seconds had better recognition performance than those who saw the repetitions at shorter lags. This increasing recognition performance in response to increasing lag length is the hallmark of spaced learning and reminding (Raaijmakers, 2003; Cepeda, Pashler, Vul, Wixted, & Rohrer, 2006; Cepeda, et al., 2009; Maddox, 2016). This finding mirrors Appleton-Knapp et al.'s (2005) experiment four, in which spaced repetitions of exact and varied adverts improved later recognition probability from around 62% to 90% when repetitions were seen over several minutes rather than seconds. Why does longer spacing lead to better memory? As noted in the Introduction (see Chapter One), the closer to the point of testing that the advert is encoded the less trace decay will occur; in conjunction, memory is also improved due to the different context cues that are now related with that trace (Greene, 1989; Wahlheim, Maddox, & Jacoby, 2014). Further research containing a repetition detection measure in study would be required to investigate such a hypothesis.

While advert memory was reliably predicted by advert familiarity, advert length, as well as advert reminding, repetition recollection itself was predicted by programme clip duration alone. Although an imperfect replication of Chapter Two, it was again found that longer P2 durations were associated with later recollection of repetition, this time at test. Such a finding has been seen in the word memory literature also (Negley, Kelley, & Jacoby, 2018). This make sense, having the product in the scene for longer gives more opportunity for the viewers' attention to be directed to the product and for spontaneous repetition detection to occur. When individuals are not given a conscious goal to look for product repetitions, as was the case in this study and during real world viewing, advertisers would do well to select programme events that contain the product for long durations. Yet as each product was again seen in one clip with a single advert and programme duration as well as the set intrinsic programme characteristics, it is likely that these other stimulus qualities had a moderating influence over this relationship. Again, further research into the exact stimulus characteristics that elicit remindings will be beneficial for broadcasters to optimise the advert-programme repetitions.

Although this study focused on the effects of reminding recollection in response to a testing delay, an effect of condition was also seen for advert brand memory. This effect remained even after controlling for advert familiarity and individual advert item effects. If robust, this finding mirrors how the recall of word B can be improved via reminding in the AB-AD paired associates paradigm as well as the findings of Chapter Two (Jacoby, Wahlheim, & Kelley, 2015; Negley Kelley, & Jacoby, 2018). However, even though in line with the free recall results observed in the first experiment, as different adverts with different brands were seen across groups, advertisers are advised to treat this finding with caution; further work utilising a between-participants design is advised to confirm this benefit.

The implications for practitioners are as follows. In combination with Chapter Two, the results highlight the viability and value to broadcasters if viewing conditions allow for successful advert reminding. Indeed, it appears that reminding produces a long-term memory advantage over adverts that are not recognised as repetitions. For brand managers, these long-term memory effects after a single exposure should guide integration into a wider media campaign. Although customers' advert memory is not formally tested when in store, point of purchase displays create the opportunity for a marketing campaign to be recognised and recalled in a bottom-up fashion. The previous chapter noted the importance of creating synergy between in-store advertising and TV adverts; the results from the present experiment extend this notion, outlining that off-shelf promotional displays that contain congruent styles and themes of previously reminded advertising should act as a potential retrieval cue for the advert's recursive trace while shopping (Keller, 1987). Equally, the study outlined a non-invasive technique with which industry can evidence reminding effects in both applied lab and field studies further aiding understanding of what makes a programme a good reminding cue. This technique could also be used to study variation on the reminding repetition effect.

Chapter Four – The effects of order and delay on advert reminding during an emulated TV viewing scenario

The first two chapters have demonstrated that advert reminding can occur when viewers are consciously directed as well as when viewing passively. Although, Chapter Three's design borrowed characteristics of a TV viewing event, its short clip format may still not have convinced some advertisers. It is important then, to evidence advert-reminding in a full TV viewing scenario using simple product repetition. **Thus, can programme events facilitate advert memory during a full 30-minute TV programme?** Although a series of theoretically congruent findings were established, an area neglected in the previous chapters has been the presentation order in which the advert and programme are seen. Retroactive facilitation has been evidenced in both previous experimental chapters thus far, and by other non-advert empirical researchers, demonstrating a P1 encoding advantage at P2 (Jacoby, Wahlheim, & Kelley, 2015; Negley, Kelley, & Jacoby, 2018). Yet, linear TV creates opportunities to view advertising both before and after a programme event, and as such, understanding whether placing the advert at either P1 or P2 can produce equal benefit is valuable information for broadcasters (with position 1 (P1) referring to the first instance of an object repetition and position 2 (P2) referring to the second instance in which the object is repeated). Switching the position of the advert to P2 alters the mechanism with which memory can be improved, with proactive facilitation yet to be evidenced with TV stimuli. **Therefore, does advert-programme presentation order mediate the effectiveness of the advert-programme reminding mechanism?**

Given the importance of presentation order seen in the empirical reminding literature, and understanding how facilitation can occur, this chapter will also ascertain whether the short and long term benefits of advert reminding are the same for adverts seen prior to the programme event and after. **Finally, does advert-programme presentation order determine effectiveness after ten minutes and 24 hours?**

Why is it important to evidence product repetition in a full viewing scenario?

For broadcasters, the multiple variables associated with reminding potentially make it a difficult mechanism to consistently finesse. One such variable, advert order, is of considerable value to linear TV providers. If a certain position produces the most stable advert memory over time, this will allow broadcasters to value this advertising space at a higher premium. Equally, this knowledge will highlight when and where to avoid placing adverts to mitigate the classic paired associates paradigm effect, interference (Wahlheim, & Jacoby, 2013; Jacoby, Wahlheim, & Kelley, 2015). Although yet unassessed, attitudes toward marketing material are also of keen interest to advertisers. Indeed, creating adverts that are perceived to be engaging, involving, and most importantly, liked, is a key goal beyond simply recalling an advert message. Prior research from Myers, Royne, and Deitz, (2014) has looked at repetition effects of programme elements in adverts, finding that this form of repetition increased advert liking via an enhanced perceived advert involvement with the programme. If advert-programme reminding can result in similar attitudinal benefits as those seen by Myers et al. without the additional cost of incorporating expensive TV or licensing deals, such a finding should encourage wider use of the mechanism by advertisers. **So, this creates an additional question of whether product repetition can influence viewer advert involvement, and consequently their ratings of advert- and brand-liking?**

Can programme events facilitate advert memory during a full 30-minute TV programme?

The previous chapters in the thesis suggest that it is the conscious, although not always intended, retrieval of the advert information during the programme that drives advert memory, yet these findings are at considerable odds with previous work in the advert-programme context field (Furnham, Bergland, & Gunter, 2002; Parker, & Furnham, 2007;

Furnham, & Goh, 2014; Puccinelli, Wilcox, & Grewal, 2015; Akram, McClelland, & Furnham, 2018). For example, Furnham, Bergland, and Gunter (2002) designed an interesting experiment to assess the effects of product repetition, but used semantic priming to explain their results. Their experimental design had participants view a 14-minute long excerpt from Coronation Street with a single, central, advert break containing four adverts. They found that when participants viewed a programme containing a scene with a character drinking a non-branded pint of beer, shortly after viewing a John Smith's advert in the previous break, advert memory increased. In their paper, Furham et al. underpinned their results with cognitive priming as a theoretical account, which suggests that the shared construct (beer) allowed for greater advert accessibility (Collins, & Loftus, 1975). Indeed, specifically they account for retroactive facilitation with the concept of backwards priming, yet gave no mechanistic account of how such an implicit phenomenon can improve explicit advert-programme association, or advert encoding and retrieval.

While Furham et al.'s (2002) study design robustly investigated the advert-programme product repetition phenomenon with their results demonstrating similar findings to previous chapters in the thesis, a more parsimonious explanation of the results comes from remindings. Indeed, the finding that the John Smith's advert was remembered better when it was seen before the programme event can be accounted for by the spaced learning that likely resulted from in-programme reminding. Yet the outstanding questions presented in the introduction remain, specifically how the position interacts with the delay in testing. Therefore, this work will look to further Furnham et al.'s findings while applying the remindings framework (Hintzman, 2004; 2011).

Chapter Three evidenced recognition memory alterations after successful reminding, but the measure used did not capture the phenomenological process via which recognition took place. As stated in the introduction (see Chapter One), recognition is a two-factor process, with recognition occurring via stimulus familiarity that is the result of fluency, or a more retrieval-based recollection of a stimulus's inclusion (Yonelinas, 2002). As such, the present study will employ the remember/know paradigm to assess rates of recollection and familiarity that correspond to yes recognition decisions (Tulving, 1985; Rajaram, 1993; Yonelinas, 2001b). The study looks to assess whether the presence or absence of product programme repetition has an effect on rates of advert, brand, and product recollection. Understanding whether advert reminding influenced recollection, or even familiarity, would help to further identify and customise the awareness aims of a company; do brand mangers only need people to have greater product recognition, or does a brand need its customers to be able to more easily retrieve its advert information when related marketing messages are seen? While this is a one-off event, such acute alterations may have other longer term impacts.

<u>Does advert-programme presentation order mediate the effectiveness of the advert-programme reminding mechanism and is this effect mediated by the retention interval?</u>

Critical for broadcasters is not only the fact that advert reminding works, but also how to achieve optimum performance, which in the case of category product repetition may be dictated by the order in which the advert and programme are seen (Appleton-Knapp, Bjork, & Wickens, 2005; Tullis, & Goldstone, 2016). Thus far, experiments in this thesis have evidenced instances of retroactive facilitation of adverts from later seen programme products (see Figure 4.0 for difference between retro and proactive facilitation). However, the interference and spaced repetition literatures show a divergence in how P1 and P2 order affects facilitation for changed events (Wahlheim, Maddox, & Jacoby, 2014; Jacoby, Wahlheim, & Kelley, 2015; Negley, Kelley, & Jacoby, 2018). Firstly, focusing on retroactive placement, Furnham et al.'s (2002) results, and previous work in this thesis, converge on retroactive facilitation improving advert memory via a secondary advert encoding during programme viewing (see Chapter Two), when it is noticed as a repetition combined with its greater accessibility that results from the advert trace being stored in the recursive representation (Jacoby, Wahlheim, & Kelley, 2015; Negley, Kelley, & Jacoby, 2018; see Chapter Three).

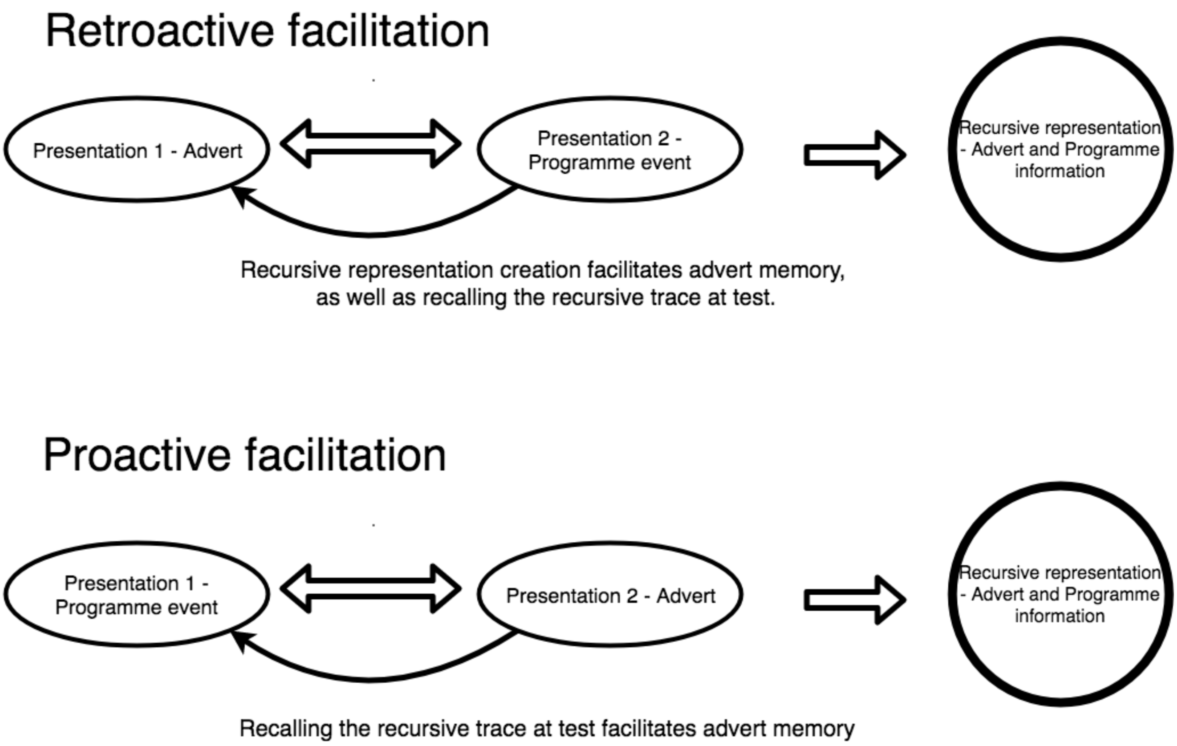

Figure 4.0. Demonstrating the order position for retroactive and proactive facilitation.

Understanding proactive facilitation is equally important for adverts seen the programme event. For example, in Furnham et al.'s (2002) study, the presentation order was also altered so that the beer programme event (P1) appeared before the advert (P2); finding that when the programme event occupied P1, the John Smith's advert recall and recognition performance was worse than when the advert was placed retroactively. This finding is in line with much of the wider inference literature where failure to detect the repetition and recall the recursive trace can result in interference from P1, when attempting to recall P2 (Putnam, Wahlheim, & Jacoby, 2014). Moreover, when testing an individual's memory for conflicting politicians' debate positions, not recalling the change at test resulted in the initial position

(P1) interfering with the second debate position (P2; Putnam, Sungkhasettee, & Roediger III, 2017). In Furnham's example, as the programme now occupies P1, the point of reminding is shifted so that the advert acts as a reminding cue rather than receiving the secondary encoding benefit. Instead, here the programme product event should be rehearsed if repetition detection occurs. Therefore, the only way advert memory can improve at P2 is if a recursive trace is created and that recursive trace, containing the advert information, is then available at test to improve the advert's accessibility (Jacoby, Wahlheim, & Kelley, 2015; Negley, Kelley, & Jacoby, 2018). Collectively then, prior research suggests that retroactive placement should create the easier conditions for facilitation given the dual methods of improving recall, both during viewing and at test. To test this, the current study will compare advert recall when adverts are placed before and after programme events.

It is also of interest whether advert position moderates the facilitation effect seen over time. While both short- and long-term benefits of product repetition have been evidenced in this thesis, as of yet these effects have not been found in a full viewing scenario. It is important to see if these effects hold under conditions that more closely emulate home viewing. Word memory research has shown that simple repetitions of a repeated item can influence memory for up to five days (Slamecka, & McElree, 1983). Indeed, free recall is known to be sensitive to spaced repetition of words for up to a two-day delay, even when the words were incidentally learned (Godbole, Delaney, & Verkoeijen, 2014). However, unlike exact repetition, when items change form between instances, reminding becomes more difficult, lowering the likelihood of facilitation over time (Appleton-Knapp, Bjork, & Wickens, 2005; Jacoby, & Wahlheim, 2013; Tullis, & Goldstone, 2016). Given that P1 and P2 retrieval are required for proactive facilitation to occur, after a 24-hour delay this should be more difficult without the in-programme strengthening associated with retroactive advert placement (Jacoby, Wahlheim, & Kelley, 2015). What is currently unknown is how category product repetition order will affect memory across ten-minute and 24-hour delays. That is, does viewing the advert prior to the programme have a distinct advantage over viewing the programme event first, or will stable reminding during the programme infer a comparable benefit over time.

<u>Can product repetition influence viewer advert involvement and consequently their ratings of advert- and brand-liking?</u>

As advertising develops in an increasingly cluttered market, brands are looking to have closer associations with their consumers and the leisure activities they enjoy; be this brand sponsorship of sporting events or sports people, or via product placement (Bressoud, Lehu, & Russell, 2010; Williams, Petrosky, Hernandez, & Page Jr, 2011; Walraven, Bijmolt, & Koning, 2014). What is more, learning to associate positive traits of the chosen entertainment should be beneficial, with adverts that are emotionally engaging and liked perennially performing the strongest in market (Binet, & Field, 2009; Zdravkovic, & Till, 2012). Indeed, product placement has been shown to enhance attitudes toward placed brands, as well as having other downstream effects on purchase intention (Baker, & Crawford, 1995; Russell, 2002). Similarly, advert-programme reminding encourages viewers to form associations between adverts and programmes where traditional advertising would not. This raises the question of whether repetition of product type can equally bridge the gap between the entertainment and the advert, *and* improve advert liking.

By what mechanism might advert-programme repetitions improve advert memory? One piece of applied research from Myers, Deitz, and Royne, (2014) has focused on this issue; providing a framework for incorporating programme elements into adverts, and how this can impact advert liking. In their design, they used overt programme cues that were highly specific to the programme; a celebrity actor, the programme setting, as well as a nickname given to one of the programme characters. The authors found that this form of repetition improved advert and brand liking, as well as product purchase intention, but this relationship was mediated by the increase in personal relevance resulting from the adverts being perceived to be more involving. In other words, the associations created with the programme increased perceived advert involvement, which then had downstream effects on other attitudinal measures. Myers et al.'s study used overt programme specific cues that were not themselves the advertised products. In comparison, the advert-programme reminding focuses on less programme specific, and arguably subtler, product repetition. Of great interest to advertisers will be if similar attitudinal effects can be achieved using simple product repetition.

Building upon their work, the current study will assess whether simple product repetition is capable of increasing perceptions of advert personal relevance. Given the reduction in shared cued uniqueness, one could posit that when comparing non-specific product repetition with specific programme narrative repetition, if this more basic repetition can generate changes in relevance perceptions, this would provide a far more generalisable method for increasing attitudinal effects, without the cost of creating custom adverts. Therefore, the current study will use the same attitude measures from Myers et al. (2014) to understand if similar attitude effects can be attained.

Current experiment

While Furnham et al. (2002) executed a good experimental design, tightly controlling the product's inclusion in the programme's narrative, they interpreted their results via a different theoretical framework. Instead of accounting for the study's findings using semantic and backwards priming, which draws on non-conscious and implicit availability of the repeated object's concept, the current study will interpret advert-programme product repetition using reminding (Hintzman, 2004; 2010).

The current study looks to assess the effectiveness of programme cues as reminders for related advertising during a naturalistic viewing experience, after both ten-minute and 24-hour delays. Critically, it was decided that US adverts and brands would be used as a more stringent assessment, to ensure participants had not seen the adverts themselves prior to study entry. To investigate, a viewing scenario was created whereby two episodes were chosen from the same US sitcom, 30 Rock, each featuring three product events that would act as repetitions for advertised products. Each programme was broken up into halves, with three advert breaks emulating British linear TV. Retention intervals of either ten-minutes or 24-hours were employed. This meant that each participant was assigned to one of four groups, with product repetition and delay being tested for influence over advert recall and advert recognition. Participant memory was assessed using a free recall measure as well as either advert recognition or brand and cued product recognition. The aforementioned attitude scales were taken from Myers et al.'s (2014) study and administered to all participants.

Question summary

Firstly, does viewing advert-programme product repetitions, embedded in a full 30-minute TV programme, improve advert recall and recognition?

Equally, does product repetition facilitate advert memory over both ten-minutes and 24-hours?

Does advert position before and after the programme event have the same effect on advert memory across the two delays?

Do both advert positions lead to memory performance that are better than controls?

Does product repetition alter the subjective experience of the recognition process?

Finally, does advert-programme repetition lead to improved advert involvement, advert liking, and brand liking?

Methods

Participants

A sample of 96 individuals (23 males, 72 females; *M* = 20.3, *SD* = 4.16) participated in the study. All had normal or corrected-to-normal vision. An opportunity sample of Durham University staff and students was collected, with participation being compensated with a £5 Amazon voucher or course credit. Sampling error was calculated per condition to be 10±, thus the true population score will be 10% more or less of the obtained score.

Again, a binomial power calculation was conducted on recall likelihood and the selected sample size. The probability of recall was set to 0.5, give that it was a binary outcome. The probability of no advert recall occurring was $p < .001$, suggesting sample size sufficiency.

For this study, the experimental guise was an investigation of humour and culture in viewing programmes from other countries. Participants were told they may watch a programme from one of a series of countries. Afterward they would rate how funny they found the programme to be. Instead, all participants watched one of two programmes from the same US series. Again, the experimental guise focused participants on the programme without mentioning the advertising.

Materials/apparatus

Online Survey was used to collect participants free recall data and participant demographic information. PsychoPy2 (Version 1.84.1) was used to present the programmes and adverts (Peirce, 2007; 2009). Pen and paper advert, brand, and product recognition questionnaires were also used, along with a pen and paper culture survey (see Appendices H, I J & K). Pen and paper measures were also used to collect the attitude scale data.

Participants viewed the programme and adverts on a 42” Samsung TV while seated on a sofa in a mock living room.

TV Programmes

The two programmes used in this experiment were both taken from the series 30 Rock, a US based sitcom about an NBC screen writer. The programme had previously aired in the UK; however, it had not been a feature of terrestrial TV since 2009 at the time of testing. First and foremost, it was critical that each episode did not contain target product repetition outside of the intended manipulation. This meant the episodes were primarily chosen as they did not feature events or products that were to be used as targets in the other episode, while still containing the same characters. 30 Rock was chosen as it offered a combination of unknown branded products as well as some overt product placements, reflecting the different types of product appearances typically observed in TV. Each of the six programme products were chosen because; they received verbal reference to the product, were involved in a character interaction, and featured as the central focus of a at least one shot (Bressoud, Lehu, & Russell, 2010).

Episode one featured three target programme events; an oven, hotdogs, and beer. The first product was a picture of a GE-branded oven (see Figure 4.1). This item featured intermittently from 4 minutes 50 seconds to 8 minutes 14 seconds. This product was verbally described during the introduction to one of the characters and a large picture was shown (onset 5 minutes and 29 seconds) being placed on a wall in a character’s office. The total screen duration for the product was 13 seconds, with the oven receiving nine unique mentions. GE does not sell products under this name in the UK and while the brand is mentioned in the dialogue there were no overt brand logos visible on the product.

Figure 4.1. Displays a screen shot of the oven programme product moment.

The second target product was a collection of hotdogs. Visually, a hotdog stand appeared on screen 6 seconds into the programme (see Figure 4.2). The hotdog products first appeared on screen at 43 seconds, after which the main character is seen giving them to several background characters during the introductory credits. The total screen time for the hotdogs was 1 minute 52 seconds. The hotdogs appeared in a large box after the character purchases all of them from the hotdog vendor. The box and individual hotdogs were intermittently on screen until 3 minutes 51 seconds. Multiple characters are seen eating the product. The first verbal reference to the hotdogs occurred at 17 seconds after which there were multiple verbal references to the product. In total there were 6 unique verbal mentions to the product. The brand of hotdogs that appears on the vendors stand is fictional.

Figure 4.2. Displays a screen shot of the hot dog programme product moment.

The final product for this episode was a lager beer (see Figure 4.3). The product again had a fictitious brand in the programme, although a fake logo was seen on the front. This product was shown in the context of a group drinking in a fried chicken shop. The beer bottles had a total screen time of 26 seconds with multiple bottles seen on the counter next to the characters. Beer was verbally mentioned on one occasion when “ten beers” were asked for along with an overt hand gesture made by one of the characters; both male and female main characters were seen drinking the beer (onset 12 minutes 28 seconds and 13 minutes four seconds).

Figure 4.3. Displays a screen shot of the beer programme product moment.

For consistency, episode four of 30 Rock from the same season was chosen as the second programme. Again this episode contained three target product events; event tickets, pizza, and jewellery.

The first target product was a pair of event tickets for a concert given from one main character to another (see Figure 4.4). Visually, the event tickets appeared on screen for 36 seconds. During this time, the first verbal reference occurred at 5 minutes and 11 seconds. The category of event tickets is then discussed, with another verbal reference at 5 minutes and 36 seconds. There were three unique product mentions in total. There was no obvious branded information on the ticket wallet seen on screen.

Figure 4.4. Displays a screen shot of the event ticket programme product moment.

The second target product was takeaway pizza (see Figure 4.5). This product featured in the second half of the episode and was first seen at 7 minutes and 58 seconds when a deliveryman brings several pizzas in boxes into the office. Pizza had a total screen time of 1 minute and 22 seconds, with multiple characters eating the pizza and holding the pizza slices. The first verbal reference to pizza is made at 8 minutes and 1 second, when an extra exclaims “Pizza!”. The final verbal reference to the pizza was made concurrently with the final visual shot in the programme’s final scene at 10 minutes and 30 seconds. There were seven unique mentions of the product. There was no branded information on the pizza boxes.

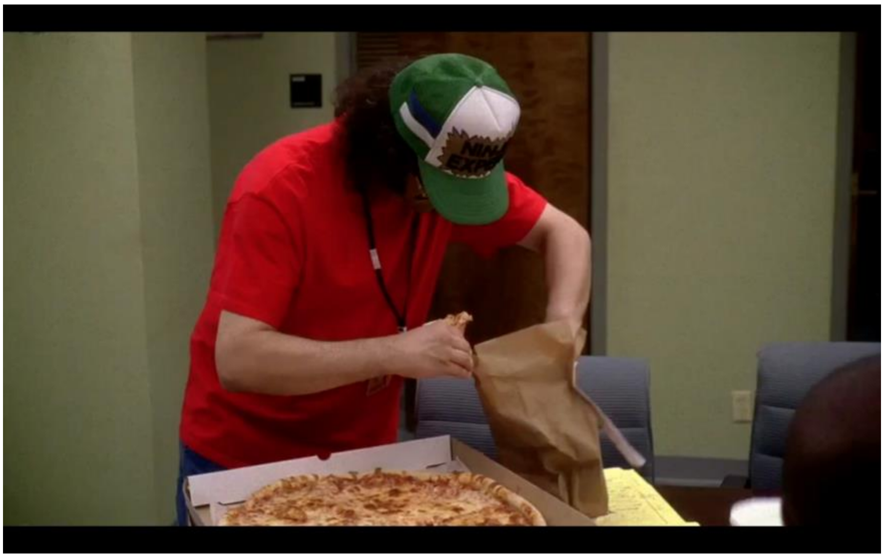

Figure 4.5. Displays a screen shot of the pizza programme product moment.

The final target product is a jewellery gift given by one character to another for their anniversary; only the jewellery box is seen in the programme (see Figure 4.6). The first visual appearance of the gift is in the second half of the programme at 8 minutes and 45 seconds, after which a female character is seen holding the gift box intermittently until 9 minutes and 2 seconds. The product had a total screen time of six seconds. The first verbal reference to gift giving/jewellery is one of the characters asking another to visit his jeweller's which occurs at 4 minutes 44 seconds. The other only other verbal reference made to the gift is when one character wishes another happy anniversary as the gift box is given at 8 minutes 57 seconds. There were only two unique references to jewellery. There was no branding in-programme for this product.

Figure 4.6. Displays a screen shot of the jewellery programme product moment.

Episode one has a total run time excluding adverts of 21 minutes and 52 seconds. Episode four had a total runtime of 21 minutes and 41 seconds. Both programmes were interpolated with advert breaks before, in the middle, and at the end of the programme. All target adverts were counter-balanced inter-break, and randomised intra-break.

Adverts

All adverts were chosen from the US market and had never been aired on UK TV, each having a 30 second duration. The adverts were selected from the US market due to the country's cultural similarity along Hofstede's dimensions, allowing for adverts to be selected that were novel to a UK viewership but similar in execution to native adverts (Hofstede, 2011). Target adverts used in this experiment were; Maytag ovens, Pop's hotdogs, Dos Equis beer, Little Caesar's pizza, Ticket City ticketing website, and Zales jewellery store. Each advert was linked to one of the aforementioned programme product events that appeared in one of the two programmes. A pilot study was conducted to check none of the brands were highly familiar to a UK market, with participants rating their familiarity with each brand on a 10-point Likert scale (n = 26). Brands achieving more than a median score of 5 would be discounted. Although a Friedman test suggested Little Caesar's and Dos Equis did appear to have significantly higher brand familiarity than other target brands, neither had a median familiarity above 4. It was only after the study was completed that the researcher discovered that Little Caesar's had been a pizza outlet in the UK until withdrawing in 2000, which may have explained this slight increase in brand familiarity. Equally, Dos Equis long running "Greatest man in the world" advert campaign had attained Twitter notoriety explaining this slight increase. Advert familiarity was also rated on a 10-point Likert scale. Again, any adverts having median scores above 5 would be discounted. All six were given low familiarity ratings, all having median scores of 1.

The filler adverts were; Blue Bunny sundaes, Five Star stationary, HomeEquity Bank, Moen kitchen design, Panama Tourism, Reliant home energy, Sparkle kitchen roll, Stein Mart women's clothing, and UpTime energy drink. All adverts had never aired on UK TV. These adverts were selected as they represented a range of typical products seen advertised on UK TV.

Advert-programme event similarity

In the same pre-test pilot (n = 26), participants also gave ratings of advert-programme visual similarity. This was to check that none of the events were considered dissimilar by a panel of independent raters. To do this, participants watched shortened video clips of each target product's inclusion in the programme and the advert. They were then asked to rate how similar the two products looked in terms of perceptual characteristics. When asked to rate the similarity of each repetition's physical product features, a Friedman test indicated there were differences in the perceptions of object similarity (χ^2 = 20.9 (5), p < .001; see Table 4.0).

Table 4.0
The median advert-programme perceptual similarity rating.

Product	Advert-Programme Perceptual Similarity Ratings		
	25th percentile	Median	75th percentile
Beer	8	8	9
Oven	4.25	8	8
Hotdog	3	6	8
Pizza	7	7.5	9
Event Tickets	3.25	7	7.75
Jewellery	5.25	7.5	8

A pairwise comparison revealed that the beer product was rated as significantly more similar than the hot dogs, event tickets, and jewellery products. Similarly, pizza products were also rated as having greater similarity than the hot dog and event ticket products. That is, the pizza and beer repetitions appeared the most perceptually similar. This indicated potentially better shared cue uniqueness than the other events. However, none of the events received median perceptual similarity scores that indicated substantial difference, and were thus all deemed appropriate enough to be used in the study.

Advert break structure

Each advert break consisted of five adverts and was two and a half minutes in length. Maytag, Pop's and Dos Equis were target adverts for episode one while Ticket City, Little Caesar's and Zales were the target adverts for episode four. When not featuring in a programme as a target advert, they served as a control.

Questionnaire measures

Free recall used the same procedure as in Chapter Two, and was administered using Online Survey (see Chapter Two Methods). Answers from the free recall measure were binary coded for each participant's product, brand, and description answer per advert. Coding was completed by two independent coders, both of whom were naïve to the experiment's purpose (see data analysis section for Cohen's Kappa).

Advert, brand and product recognition were also assessed using a binary recognition with a supplementary R/K paradigm for those who gave a yes response (Tulving, & Murray, 1985; Yonelinas, 2001b). The instructions given to participants for this measure were as follows. A participant gave a "remember" response if they could consciously recall seeing the stimulus in the viewing scenario, they could mentally re-live the experience, and they had supporting memories leading up to the recalled event. A participant should give a "know" response if they couldn't recall the incident in which the stimulus appeared in the advert section of the viewing scenario, but they felt it was familiar.

The administering of the recognition measure was split so that half of the participants took the brand and product recognition tasks, while the other half of participants completed the advert recognition measure. This split was enacted to reduce the multiple measures acting as retrieval cues to the advert information creating ceiling effects in response.

In line with the guise of the experiment, a distractor questionnaire was completed by those in the ten-minute delay. The Rokeach Terminal Values Survey was used for two reasons; firstly, as it was in keeping with the idea of the assessment of culture (see Rokeach, 1973; Hofstede & Bond, 1984), and secondly it required introspection that actively engaged participants without introducing contaminating products or brands. The questionnaire asked participants to rank the 24 terminal values in an order that was most important to them. How humorous participants found the programme was also assessed in this section, in line with the cover story used.

Advert attitude scale items were taken from several different studies, but the combination used was based on research from Myers et al. (2014; see Appendix L for copy of scales). The attitudes toward the brand and advert were taken from Holbrook and Bantra (1987); both measures contained four items, and used seven-point Likert scales. The three-item purchase intention measure was taken from Yi (1990; $\alpha = 0.89$), and each scale item was rated on a seven-point Likert. The ten-item advert involvement scales were adapted from Zaichkowsky (1994; $\alpha = 0.80$-0.98), and were rated on a seven-point Likert scale. The three-item programme liking measure was adapted from Murry, Lastovicka, and Singh (1993; $\alpha = 0.89$), with each item using a five-point Likert scale.

Design

The experiment employed a between-participants design. Half the participants viewed episode one and the other half viewed episode 4. Out of the six adverts, this meant that for each episode three adverts were seen with a programme repetition and three that were seen as single adverts without repetition. There were also two retention intervals used in this study, with participants being tested either after 10 minutes or 24 hours. This meant that there were four groups in total: episode one ten minutes, episode one 24 hours, episode four ten minutes, and episode four 24 hours. It was also assessed whether the advert attitudinal measures could be predicted by the presence of product repetition. The study's independent variables were condition, which determined whether an advert was seen as part of a product repetition or not, delay, and advert position. The dependent measures were the free recall scores for product, brand, and advert description as well as cued advert, brand, and product recognition.

The attitudinal dependent measures were advert involvement, advert liking, brand liking, as well as product purchase intention.

Procedure

Participants first viewed one of the programme episodes interspersed with the three advert breaks. During viewing, the participant was seated on a sofa with headphones. Once they had finished the viewing phase, half of the participants left and returned 24 hours later, the other half completed the terminal values survey as a 10-minute distractor task. After their respective retention intervals, participants then completed the surprise free recall measure before filling in their assigned recognition measures. Next, participants filled in the attitude questionnaire scales, after which participants gave programme humour and enjoyment ratings as well as filling out their demographic information. Finally, participants were debriefed and allowed to ask any questions they had about the study.

Data analysis

All analyses were conducted in R (version 3.5, R Core Team 2018) and R Studio (version 1.1.447). A false discovery rate correction was again employed to account for multiple comparisons (Benjamini, & Hochberg, 1995). Two independent coders, both of whom were naïve to the purpose of the experiment, inputted the participants' responses to the advert free recall measure. Each received the same rubric outlining the procedure for whether an item was correctly remembered or not (see Appendix M). All advert evaluation measures were assessed using principle component analysis with a VARIMAX rotation, with parallel analysis being using to confirm factor loadings. Each measure also underwent Cronbach's alpha reliability assessment.

Inter-rater reliability

To establish the coder reliability, their input for each of the six target adverts and their corresponding brand, product, and descriptions were assessed, equalling 1727 observations from 96 participants. This represented a smaller sub-set of the overall 15 adverts each of the coders processed. Once again, acceptable reliability was set to $\kappa \geq 0.8$ in accordance with Cohen's (1988) recommendation for good reliability. To compare the coders, an unweighted Cohen's Kappa score was calculated (the function "kappa2" from the "irr" package (version 0.84.1) was used). A good reliability level was attained ($\kappa = 0.92$, $p = .000$).

GLMM

In the models created, the fixed effects of condition, delay, and advert position were assessed for their predictive value over free recall probability. The fixed effect of condition was also assessed for its predictive value on recognition probability and advert attitude ratings. Condition in each model refers to whether a participant saw a reminding programme event or not. Delay refers to whether the participant had a retention interval of 10 minutes or 24-hours. All covariates were z-transformed before model entry. All models also used the optimiser "bobyqa", with the "glmer" control allowing for 100,000 iterations for each model to converge (see Chapter Two methods for GLMM associated R packages used). When a Gaussian error structure was required, the function "lmer", also from the package "lme4", was used. All models met the stability assumptions from the "DHARMa" package (Hartig, 2020).

Free recall

A GLMM with a binomial error distribution and logit link function was built to assess the effects of condition (product repetition, single advert) and delay (10 minutes, 24 hours) on free recall probability (see Table 4.1). The free recall dependent variable represents binary recall per advert element recalled (product, brand, and description). A simplified version of the model, which dropped the interaction term and the covariate was also created. Overall, there were 1728 observations from 96 participants across the four groups included in the model.

Table 4.1
Terms for the overall free recall generalised linear mixed model.

Model	DV	Predictors	Random Intercepts	Covariate
Free Recall 1 - Full	Binary recall	Condition, Delay, Condition*Delay	Participant, Advert	z.Programme_like
Free Recall 1 - Null	Binary recall	-	Participant, Advert	-
Free Recall Simple - Full	Binary recall	Condition, Delay	Participant, Advert	-

Advert position analysis

To understand the effect of the advert position on the recall probability, a GLMM with a binomial error distribution and logit link function was created (see Table 4.2). For this analysis, control trials were removed so only those adverts seen in the context of a programme product repetition were analysed. The variable “advert position” was also created based on the advert order position. The variable indicated whether the advert was seen prior to or after the related programme event (before/after). This variable did not consider lag magnitude, merely temporal order. A simplified version of this model removed the programme liking covariate. In total, the model comprised of 864 observations from 96 participants. Each of the delay conditions in the after-advert position consisted of 192 observations. Each delay condition in the before-advert conditions consisted of 240 observations. The four post-hoc tests used FDR corrected alpha values (see Table 4.18).

Table 4.2
Terms for the overall advert position generalised linear mixed model.

Model	DV	Predictors	Random Intercepts	Covariates
Overall Position - Full	Binary recall	Delay, Advert_position, Delay*Advert_position	Participant, Advert	z.Programme_like
Overall Position - Null	Binary recall	-	Participant, Advert	-
Simplified Position - Full	Binary recall	Delay, Advert_position, Delay*Advert_position	Participant, Advert	-

Given the effects of variable lag on performance, an additional analysis that included a comparison of single-seen controls from each of the advert breaks with those adverts seen either in the break preceding or succeeding the programme segment containing the target object (see Table 4.3 below). This short before and short after meant that reminded adverts that had been seen two advert breaks away were removed restricting the total repetition lag to a single programme segment. In this analysis, short before and short after were compared with non-reminded adverts seen in the beginning, middle, and end advert break. Once again, a GLMM with a binary error structure and logit link function was employed. A simplified model containing only main effects of delay and advert position was also created. This model contained 1440 observations from 96 participants.

Table 4.3
Terms for the short advert position generalised linear mixed model.

Model	DV	Predictors	Random Intercepts	Covariates
Advert Short Position 1 - Full	Binary recall	Delay, Advert_Short_Position, Delay* Advert_Short_Position	Participant	z.Programme_like
Advert Short Position 1 - Null	Binary recall	-	Participant	-
Advert Short Position Simple - Full	Binary recall	Delay, Advert_Short_Position	Participant	-

Recognition memory

Advert recognition

A GLMM with a binomial error distribution and logit link function was created to assess the influence of the interaction between condition and delay on binary advert recognition (see Table 4.4 below). The model contained 287 observations from 48 participants.

Table 4.4
Terms for the advert recognition generalised linear mixed model.

Model	DV	Predictors	Random Intercept
Advert recognition - Full	Binary advert recognition	Condition*Delay	Participant
Advert recognition - Null	Binary advert recognition	-	Participant

Two further GLMMs were constructed, both with binomial error structures and logit link functions, to assess the remember and know responses given by the participants who correctly recognised the advert as being present (see Table 4.5). Both models had 287 observations from 48 individuals.

Table 4.5
Terms for the advert remember and know recognition generalised linear mixed models.

Model	DV	Predictors	Random Intercept
Advert Remember - Full	Binary Remember Recognition	Condition	Participant
Advert Remember - Null	Binary Remember Recognition	-	Participant
Advert Know - Full	Binary Know Recognition	Condition	Participant
Advert Know - Null	Binary Know Recognition	-	Participant

Brand Recognition

A further GLMM was created to understand whether viewing an advert-programme repeated product could facilitate brand recognition memory (see Table 4.6). The model contained 288 observations from 48 participants.

Table 4.6
Terms for the brand recognition generalised linear mixed model.

Model	DV	Predictors	Random Intercept
Brand Recognition - Full	Binary Brand Recognition	Condition*Delay	Participant
Brand Recognition - Null	Binary Brand Recognition	-	Participant

Again, two further GLMMs investigated brand remember and know responses (see Table 4.7). The models contained 288 observations from 48 participants.

Table 4.7

Terms for the brand remember and know recognition generalised linear mixed models.

Model	DV	Predictors	Random Intercept
Brand Remember - Full	Binary Remember Recognition	Condition	Participant
Brand Remember - Null	Binary Remember Recognition	-	Participant
Brand Know - Full	Binary Know Recognition	Condition	Participant
Brand Know - Null	Binary Know Recognition	-	Participant

Cued product recognition

A GLMM was also conducted to understand if product repetition influenced cued product recognition rates. The model contained 288 observations from 48 participants (see Table 4.8 below).

Table 4.8

Terms for the cued product recognition generalised linear mixed model.

Model	DV	Predictors	Random Intercepts
Product Recognition - Full	Binary Product Recognition	Condition*Delay	Participant
Product Recognition - Null	Binary Product Recognition	-	Participant

Again, the effect of condition on product remember and know rates was assessed. Each model contained 288 observations from 48 participants (see Table 4.9).

Table 4.9
Terms for the product remember and know recognition generalised linear mixed models.

Model	DV	Predictors	Random Intercept
Product Remember - Full	Binary Remember Recognition	Condition	Participant
Product Remember - Null	Binary Remember Recognition	-	Participant
Product Know - Full	Binary Know Recognition	Condition	Participant
Product Know - Null	Binary Know Recognition	-	Participant

Attitude measures

To assess the relationship among the dependent measures a point-serial correlation matrix was created using the function “rcorr” from the package “Hmisc” (version 4.3-1; Harrell, 2020). To allow for a likelihood ratio test of the full models in these analyses, each model was fitted using the maximum likelihood rather than using restricted maximum likelihood (Bolker, et al., 2009). As the measures in this section were contingent on the individual’s ability to remember each advert after a visual prompt, this led to a variable number of observations per GLMM.

Advert involvement

The effects of condition on advert involvement ratings were assessed via a GLMM with a Gaussian error structure, with an identity link function (see Table 4.10). The model consisted of 516 observations from 96 individuals.

Table 4.10

Terms for the advert involvement generalised linear mixed model.

Model	DV	Predictors	Random Intercepts	Covariates
Advert Involvement - Full	Advert Involvement	Condition	Participant, Advert	z.Programme_like
Advert Involvement - Null	Advert Involvement	-	Participant, Advert	-

Advert liking

To assess the effects of seeing the programme reminding event on advert liking, a GLMM with a Gaussian error structure and identity link function was constructed (see Table 4.11). This model included 518 observations from 96 participants.

Table 4.11

Terms for the advert liking generalised linear mixed model.

Model	DV	Predictors	Random Intercepts	Covariates
Advert Liking - Full	Advert Liking	Condition	Participant, Advert	z.Programme_like
Advert Liking - Null	Advert Liking	-	Participant, Advert	-

Brand liking

The effects of the programme reminding event on brand liking were assessed via a GLMM with a Gaussian error structure and identity link function (see Table 4.12). This model contained 517 observations from 96 individuals.

Table 4.12

Terms for the brand liking generalised linear mixed model.

Model	DV	Predictors	Random Intercepts	Covariates
Brand Liking - Full	Brand Liking	Condition	Participant, Advert	z.Programme_like
Brand Liking - Null	Brand Liking	-	Participant, Advert	-

Product purchase intention

The effects of product repetition on product purchase intention were also assessed via a GLMM with a Gaussian error structure and an identity link function (see Table 4.13). The included 518 observations from 96 participants.

Table 4.13

Terms for the product purchase intention generalised linear mixed model.

Model	DV	Predictors	Random Intercepts	Covariates
Purchase Intention - Full	Purchase Intention	Condition	Participant, Advert	z.Programme_like
Purchase Intention - Null	Purchase Intention	-	Participant, Advert	-

Results

Sample characteristics

Firstly, a Kruskal-Wallis test confirmed that there was no difference in median age between the four groups ($\chi^2 = 2.58$ (3), $p = .461$). Next, a chi squared test confirmed there was no association between gender and condition ($\chi^2 = 1.12$ (3), $p = .773$). It was also found that there was no difference in the likelihood that participants had viewed 30 Rock before, across both conditions ($\chi^2 = 3.59$ (3), $p = .309$). It was also found that the likelihood of having seen the episode previously was not associated with condition allocation ($\chi^2 = 6.26$ (3), $p = .100$). Out of the total sample 81.3% reported watching less than 20 hours of TV a week.

Scale validity and reliability checks

It was found that the ten-item advert involvement measure loaded onto a single factor (57.1% of variance). The four-item advert liking measure loaded onto a single factor (85.7% of variance). The four-item brand liking measure loaded onto a single factor (84.2% of variance). The three-item purchase intention measure also loaded onto a single factor (83.1% of variance).

Next the reliability of each measure was checked. The advert involvement scale had a high Cronbach's alpha ($\alpha = 0.92$). Likewise, both the advert liking ($\alpha = 0.94$), and brand liking had high internal consistency ($\alpha = 0.94$). Finally, the purchase intention measure also demonstrated high internal consistency between scale items ($\alpha = 0.90$).

Free recall

The tables below represent the overall recall percentages collapsed across conditions (Table 4.14) and the overall recall by delay, condition and trial type (Table 4.15).

Table 4.14
Table displaying advert recall percentage by condition.

Condition	Recall (%)
Reminded	22.5 (1.42)
Control	17.5 (1.29)

Note. () Represent SEM.

Table 4.15

Table displaying advert recall by condition and delay and advert element individual recall.

Delay	Condition	Overall Recall (%)	Advert element	Recall (%)
10 minutes	Reminded	29.2 (2.19)	Product	39.9 (4.09)
			Brand	6.94 (2.13)
			Description	41.0 (4.11)
	Control	22.5 (2.01)	Product	29.2 (3.8)
			Brand	8.33 (2.31)
			Description	29.9 (3.82)
24 hours	Reminded	15.7 (1.75)	Product	22.9 (3.51)
			Brand	2.78 (1.37)
			Description	21.5 (3.44)
	Control	12.5 (1.59)	Product	17.4 (3.17)
			Brand	2.08 (1.19)
			Description	18.1 (3.44)

Note. () Represents SEM.

A likelihood ratio tested found the full model was better at predicting free recall performance than the null (χ^2 = 29.6 (4), p < .001). The model suggested that the interaction between delay and condition (χ^2 = 0.18 (1), p = .672), and the covariate programme liking (χ^2 = 0.64 (1), p = .423), were not predictive of free recall. The model was then simplified, removing the interaction term and the covariate. The simplified model was then compared with the null (χ^2 = 28.79 (2), p < .001), finding it to be more predictive. Assessing the individual fixed effects, it was found that both delay (χ^2 = 21.44 (1), p = <.001), and condition (χ^2 = 7.42 (1), p = .006) were predictive of recall performance. This suggested that over the two groups, seeing the repeated product in the advert and the programme increased free recall performance among non-native advertising. The theoretical marginal R^2 = 0.05, suggesting the fixed effects explained 5% of the total variance. The theoretical conditional R^2 = 0.22 suggesting the full model explained 22% of the variance in recall performance.

Given that condition was predictive of recall, the percentage for each advert is given below (Table 4.16).

Table 4.16
Table displaying individual advert recall by condition.

	Recall (%)	
Advert	Control	Reminded
Dos Equis	6.94 (2.13)	16 (3.06)
Little Caesar's	29.9 (3.83)	35.4 (4.0)
Maytag	11.1 (2.63)	25.7 (3.65)
Pop's	34 (3.96)	36.8 (4.03)
Ticket City	13.9 (2.89)	10.4 (2.55)
Zale	9.03 (2.4)	10.4 (2.55)

Note. () represents SEM.

An analysis of condition and individual advert was unfortunately not possible due to non-convergence issues.

Advert position

The table below represents the percentage recall by whether the advert was seen before or after the advert, this table contains only reminded trials (Table 4.17).

Table 4.17
Table displaying advert recall as a function of delay and advert position in relation to the programme event.

	Advert Recall (%)	
Delay	Advert Before	Advert After
10 minutes	26.7 (2.86)	32.3 (3.38)
24 hours	18.3 (2.5)	12.5 (2.39)

Note. () represents SEM.

A likelihood ratio test demonstrated that the full model containing advert position was more predictive of recall than the null (χ^2 = 19.4 (4), p = .001). It was found that the interaction between delay and advert position was predictive of recall performance (χ^2 = 5.35 (1), p = .021). However, the covariate programme liking was not predictive of recall performance (χ^2 = 0.67 (1), p = .414). The insignificant covariate was then removed and this simplified model was compared to the null, finding it was still significantly more predictive than the null (χ^2 = 18.73 (3), $p < .001$). When looking at the fixed effects, it was found that the interaction was still significant (χ^2 = 5.2 (1), p = .023). This suggested that recall performance depended upon both the delay before testing and the position of the advert. The fixed effects in the model accounted for 6% of the variance in free recall (theoretical marginal R^2 = 0.06). The total model could account for 36% of free recall variance (theoretical conditional R^2 = 0.36).

Two post hoc tests were them conducted assessing the effect of condition after ten minutes and then after 24 hours. It was found that after ten minutes, advert recall was no different for adverts seen before or after the programme event (χ^2 = 0.85 (1), p = .355). However, after a 24-hour delay, it was found that adverts seen before the programme event were better recalled than adverts seen after the programme event (χ^2 = 9.68 (1), p = .002).

This finding suggests that for advert-programme repetition to have a longer lasting effect, the advert needs to be seen prior to the programme event (see Table 4.18 for corrected p values).

Two further post-hoc tests were conducted to assess the effects of delay on both before and after advert positions. It was found that in the before position, the likelihood of recalling the advert after 10 minutes or 24 hours did not differ ($\chi^2 = 2.88$ (1), $p = .090$). However, as would be expected, in the advert after position, adverts seen after 10 minutes had a higher likelihood of recall than adverts seen after 24-hour delay ($\chi^2 = 13.35$ (1), $p < .001$).

Table 4.18
FDR corrected alpha levels for the advert position post-hoc tests.

Advert position post-hoc tests	*p*	FDR *q*
After	< .001	.013
24 hours	.002	.025
Before	.090	.038
10 minutes	.355	.050

Note. FDR q represents the corrected alpha level for each post-hoc test.

Given the effects of variable lag on performance, the position data was reduced to only target adverts seen in the break directly before or after the programme reminding event with control adverts from each advert position being added into the analysis.

The table below outlines the recall performance by delay and advert position (Table 4.19).

Table 4.19

Table displaying advert recall by delay and advert position.

	Advert position in relation to programme event (%)				
	Reminded		Controls		
Delay	Short Before	Short After	Beginning	Middle	End
10 minutes	29.2 (3.8)	31.3 (3.88)	25.8 (4.01)	18 (3.15)	24.1 (3.37)
24 hours	20.1 (3.35)	10.4 (2.55)	10.4 (2.63)	15.6 (3.07)	11.5 (2.57)

Note. () represent SEM.

A further likelihood ratio test indicated that the advert short position model was more predictive of free recall than the null model (χ^2 = 37.81 (9), p < .001). It was found that the interaction between advert break and delay was not significantly predictive (χ^2 = 8.85 (4), p = .065). The model was then simplified, removing the interaction term, and was found to still be significant (χ^2 = 28.96 (5), p < .001). In the simplified model, it was found that delay was predictive of advert memory (χ^2 = 21.38 (1), p < .001). However, the position in which the advert was seen, was not predictive (χ^2 = 7.68 (4), p = .104). The fixed effects could account for 5% of the variance in free recall (theoretical marginal R^2 = 0.05). The full model could account for 10% of free recall variance (theoretical conditional R^2 = 0.10). There was no effect of position, which may be related to the reduced quantity of trials per group in the analysis.

Recognition memory

Advert recognition

The table below represents the advert recognition percentages by condition and delay (Table 4.20).

Table 4.20
Table displaying advert recognition by condition and delay.

Delay	Condition	Advert Recognition (%)
10 minutes	Control	90.3 (3.52)
	Reminded	84.7 (4.27)
24 hours	Control	76.1 (5.1)
	Reminded	83.3 (4.42)

Note. () represent SEM.

A likelihood ratio test was conducted on the full model containing the fixed effect of condition against the null and it was found to be significantly more predictive ($\chi^2 = 4.99$ (3), $p = .173$). This indicated there was no difference in advert recognition. No further analysis was conducted.

Below are the descriptive statistics for the remember and known responses for advert recognition (4.21).

Table 4.21
Table displaying advert remember and know recognition by condition.

Condition	Advert Remember (%)	Advert Know (%)
Control	66.4 (3.96)	16.8 (3.14)
Reminded	65.3 (3.98)	18.8 (3.26)

Note. () represents SEM.

A likelihood ratio test found that the full model, with the fixed effect of condition, was no more predictive than the null model ($\chi^2 = 0.04$ (1), $p = .835$). No further analysis was conducted. The full advert recognition know model resulted in a singular fit, meaning no inference could be drawn, halting any further analysis.

Brand recognition

The table below represents brand recognition by condition and delay (Table 4.22).

Table 4.22

Table displaying brand recognition by condition and delay.

Delay	Condition	Brand Recognition (%)
10 minutes	Control	70.8 (5.39)
	Reminded	66.7 (5.59)
24 hours	Control	62.5 (5.75)
	Reminded	59.7 (5.82)

Note. () represents SEM.

Using the likelihood ratio test, the full model containing the interaction between condition and delay was found to be no more predictive than the null model ($\chi^2 = 1.78$ (3), $p = .618$). This indicated that product repetition did not impact brand recognition. No further analysis was conducted.

The table below displays the remember and know response performance by condition (Table 4.23).

Table 4.23

Table displaying brand remember and know recognition by condition.

Condition	Brand Remember (%)	Brand Know (%)
Control	43.4 (4.16)	21.5 (3.44)
Reminded	36.8 (4.03)	28.5 (3.77)

Note. () Represents SEM.

Two likelihood ratio tests found that the condition did not predict brand remember ($\chi^2 = 1.49$ (1), $p = .223$), or brand know ($\chi^2 = 1.91$ (1), $p = .167$), responses beyond their respective null models.

Product recognition

The table below represents product recognition by condition and delay (Table 4.24).

Table 4.24
Table displaying cued product recognition by condition and delay.

Delay	Condition	Product Recognition (%)
10 minutes	Control	81.9 (4.56)
	Reminded	83.3 (4.42)
24 hours	Control	79.2 (4.82)
	Reminded	75.0 (5.14)

Note. () Represents SEM.

A likelihood ratio test confirmed that the model containing the interaction between condition and delay did not predict product memory (χ^2 = 1.76 (3), *p* = 624). This result suggests that product repetition between the programme and advert had no effect on cued product recognition.

The table below displays remember and know responses by condition (Table 4.25).

Table 4.25
Table displaying product remember and know recognition by condition.

Condition	Product Remember (%)	Product Know (%)
Control	65.7 (3.98)	14.6 (2.95)
Reminded	67.4 (3.92)	11.8 (2.7)

Note. () represents SEM.

Two likelihood ratio tests suggested that condition did not predict product remember (χ^2 = 0.09 (1), *p* = .765), or product know (χ^2 = 0.5 (1), *p* = .479), responses beyond their respective null models.

Attitude measures

Measure correlations

The table below outlines the correlations among measures (see Table 4.26).

Table 4.26

Table displays the correlations among measures in the study.

Measure	Advert Involvement	Advert Liking	Brand Liking	Purchase Intention	Programme Liking	Brand	Description	Product
Advert Involvement	-							
Advert Liking	.71**	-						
Brand Liking	.66**	.85**	-					
Purchase Intention	.62**	.53**	.57**	-				
Programme Liking	.06	.1*	.09*	.03	-			
Brand	.11*	.11*	.08	.09*	.07	-		
Description	.11*	.07	.03	.05	-.01	.31**	-	
Product	.10*	.05	.03	.06	-.04	.35**	.87**	-

Note. * = .05 ** = .01. *Brand, description, and product refer to the binary recall of each advert element. Given the missing data from a number of participants being unable to remember the adverts at all during the attitudes questionnaire, this analysis used 504 cases from 96 participants.*

The table below demonstrates the mean attitude ratings by condition (see Table 4.27).

Table 4.27
Table displays the mean advert attitude and product purchase ratings.

Condition	Advert Attitude Ratings			
	Advert Involvement	Advert Liking	Brand Liking	Purchase Intention
Reminded	36.8 (0.75)	17.8 (0.36)	17.7 (0.32)	11.8 (0.33)
Control	37.4 (0.74)	18 (0.36)	17.7 (0.33)	12.1 (0.31)

Note. () represent SEM.

Advert Involvement

A likelihood ratio test compared the full advert involvement model against the null, it was to be no more predictive (χ^2 = 0.95 (2), p = .623). This confirmed that seeing the adverts in conjunction with a related programme event did not influence their perceived involvement ratings. No further analysis was conducted.

Advert Liking

A likelihood ratio test found that the full advert-liking model was no better than the null model in predicting advert liking (χ^2 = 4.12 (2), p = .127). This meant that having the opportunity to see the adverts with a programme reminding event did not influence how much the individual liked the advert. No further analysis was conducted.

Brand liking

A likelihood ratio test found that the full brand-liking model was no more predictive of brand liking than the null (χ^2 = 4.08 (2), p = .130). Seeing adverts with a reminding programme event had no effect on whether the individuals liked the advert brand. No further analysis was conducted.

Product Purchase Intention

Finally, a likelihood ratio test confirmed that there was no difference in model predictability between the full and null model ($\chi^2 = 0.85$ (2), $p = .655$). Seeing the product repetition made no difference to the individual's likelihood to later consider the product for purchasing. No further analysis was conducted.

Discussion

For consumers, watching TV offers an opportunity to unwind and escape the daily grind, with large quantities of linear TV still being consumed to this day (ThinkBox, 2018a; 2019). Not only can a viewer's chosen programme entertain them; the present study suggests TV programmes can enhance advertising recall. Indeed, it appears under some of the most difficult conditions for facilitation, the programme context makes advertising more mentally available. Specifically, when adverts were seen in conjunction with an overt programme product repetition, this advert reminding opportunity increased advert recall beyond regular advert placement during a full TV episode. This effect was seen even when no reference to the repetition was made at any point during the study. Moreover, how advert-programme product pairs are presented also influences advert recall over time. Importantly, and in line with Furnham et al. (2002), adverts seen prior to the programme event generated greater recall performance after a 24-hour delay when looking only at reminded trials. The finding that adverts seen before the programme created conditions for superior performance corroborates the earlier thesis findings, as well as being in keeping with the wider predictions made by reminding theory (Hintzman, 2004; 2010; Negley, Kelley, & Jacoby, 2018). Although a criterion was used for reminding event selection and a pre-test found reasonable subjective similarity between the event pairs, the study did present evidence that three of the six programme reminding events may not have created reliable reminding effects. For practitioners, this ineffectiveness demarcates the boundary condition for appropriate programme reminding events, and should help drive more successful selection in the future. For broadcasters specifically, the findings were simple: advertising space prior to the programme event is more valuable. The present study did also demonstrate relationships between programme liking and advert liking, which is in keeping with older contextual advert work (Norris, & Colman, 1993).

The most pertinent question, and the one of most interest to practitioners, is whether programme reminding events can increase advert mental availability beyond regular advert placement. Much like the experiments conducted in Chapters Two and Three, the present study indicated increased advert recall probability when seen in the context of a programme product repetition. Interestingly, the overall interaction between the delay and condition did not predict recall. One possible reason is that this analysis did not factor in advert order which was known to alter the recall probability after 24-hours given that this variable had no meaning in the control condition. However, the main effect of condition suggests viewers can look back and associate discrete events containing the same product during a regular home like viewing scenario, with this association helping participants during a later recall measure (Tullis, Benjamin, & Ross, 2014; Jacoby, & Wahlheim, 2013; McKinley, Ross, & Benjamin, 2019). Even when participants passively consume content, without any explicit goal for monitoring the stimulus they are viewing, reminding can spontaneously occur to the advantage of advertisers.

The fact that product repetition improved advert recall beyond regular placement in the current study is somewhat at odds with Furnham et al. (2002). They demonstrated advert recall parity across the two types of placement. Given reminding should offer a means to both strengthen and increase access to the advert trace, there are two possible reasons for their null results. Firstly, in Furnham et al.'s study, only four adverts were seen in the single central break, with the programme lasting just 15 minutes as well as all brands and adverts coming from the UK market. Given the lack of competition from other marketing messages and the reduced decay time due to a shorter programme, it may be that the additional reminding benefit was unable to further facilitate the already easy recall task. Secondly, task difficulty was further decreased by introducing no delay between viewing and testing. These conditions would have resulted in minimal advert trace decay, regardless of which condition the beer advert was seen. As such, the present study more closely emulates the cluttered media environment that is associated with real world TV viewing. Unlike Furnham et al.'s research, practitioners should take note that the current study suggests reminding adds additional recall value to their advertising.

Much like Furnham et al.'s (2002) study, the present research indicated advert position influences recall performance, but the difference only became apparent after 24-hours. After a ten-minute delay, the present study demonstrated no difference between the before and after position. One would predict that retroactive advert placement would be highly effective due to the dual route of facilitation (Negley, Kelley, & Jacoby, 2018). One would further predict that only being able to rely on accessibility, and having to overcome the influence of proactive interference would lead to slightly worse advert memory when it was seen at P2 (Jacoby, Wahlheim, & Kelley, 2015). Why was this not seen after a ten-minute delay? How the before and after groups were created will have contributed to this divergence from the theoretical prediction. For an advert to be categorised as being in the before position, it needed to be seen prior to the programme event. This meant that adverts could only occupy the beginning and middle advert breaks. In contrast, the advert after group could only be categorised as such if they were seen after the programme event. This meant they could only occupy middle and end advert breaks. Thus, individuals who saw the adverts in the after position had a shorter retention intervals, as well as experiencing less intervening stimulus, between the advert at P2 and test, making their recall easier after ten minutes. This recency effect and reduced decay time may well have contributed to an inflation in the advert after recall performance (Tzeng, 1973). However, the presentation of the full programme as a naturalistic event made it impossible to randomise the break position for the after group while retaining the proper narrative order of the programme.

Memory alterations after a short delay are of theoretical interest, but of greater importance to advertisers are persistent changes over hours or days, with the current study showing that after 24-hours, adverts seen prior to the programme event were better remembered. This effect was found after passively viewing just a single repetition pair. Given that retrieval was made more difficult by the delay, it is not surprising that adverts seen prior to the programme were better remembered. If in-programme reminding was successful for an advert seen prior to the programme, with the individual having a second encoding during viewing, they did not need to solely rely on retrieving the recursive trace to have their memory improved, reducing the criteria for successful enhancement over time, offsetting advert forgetting (Benjamin, & Tullis, 2010; Negley, Kelley, & Jacoby, 2018). That is, retroactive advert placement can benefit from a form of spaced learning, whereas proactive placement cannot (Godbole, Delaney, & Verkoeijen, 2014). This finding extends Furnham et al.'s (2002) work, demonstrating the adverts seen before the programme can have long lasting effects on advert memory.

After 24 hours, proactive placement created the most difficult conditions for recall. Adverts seen at P2 could only rely on the more difficult recollection of reminding and recursive trace retrieval, increasing condition difficulty for facilitation (Jacoby, & Wahlheim, 2013; Jacoby, Wahlheim, & Kelley, 2015). Moreover, the risk of potential interference was enhanced. If those who saw the advert after the programme event failed to be reminded, or were reminded during viewing but failed to retrieve the repetition at test, then the programme event at P1 and the advert at P2 could now compete with each other's representation during recall (Jacoby, & Wahlheim, 2013). Either outcome would increase the likelihood of proactive interference from the programme during recall (Putnam, Wahlheim, & Jacoby, 2014). For example, the participant may remember they saw an oven in the viewing scenario, but when attempting to retrieve the associated context information they could only retrieve the P1 programme product representation, meaning that the programme's oven representation outcompeted the oven's inclusion in the advert. These two proactive effects create a stringent criterion for improving advert memory via proactive advert placement when memory is tested after a delay.

The diverging influence of easier retroactive facilitation coupled with the more difficult conditions for proactive facilitation created the observed difference in recall performance after a day in the current study. For advertisers, this finding demonstrates the instability in using proactive facilitation for creating lasting advert memory effects. Equally, the finding substantiates the hypothesis that the most beneficial process in the reminding phenomenon for advertisers is the in-programme reminding from retroactive advert placement, which gives an invariant enhancement that is not dependent on retrieval. Advertisers should, therefore, covet the advertising space before a related programme product's inclusion, when programme events are suitable agents for advert reminding.

One downside of using naturalistic advert positioning in the study was the fixed break position of each target advert for both retroactive and proactive placement. That is, while each advert contributed to the before and after groups, each programme product event was in a fixed position, meaning certain advert breaks always contained the short before, short after, long before, or long after position for a specific advert (e.g. the short before position for the beer advert was always the middle advert break, whereas the short before position for the oven advert was always the beginning advert break). Furnham et al., (2002) manipulated the narrative so during the programme a beer event could appear either side of the central advert break, which helped to mitigate this positional issue. In the current study, altering the position would have reduced the ecological relevance of viewing a full TV episode as the narrative would have no longer followed a linear format. Therefore, while the study did find a benefit for retroactive facilitation that is in accordance with previous work and theory, some reservations must be maintained when assessing this result. As such, further research allowing for greater control of the advert position during full TV viewing is to be advised, combining the design of Furnham et al.'s narrative manipulation with the more difficult recall conditions used in the present study.

From an industry perspective, one further finding of note was that a product placement event could facilitate a competitor's advert memory. Indeed, research has already shown that linking adverts and identical product placements can improve brand memory (Davtyan, Stewart, & Cunningham, 2016). Here, the product placement, a GE branded oven, aided the recall of their competitor's advert, Maytag. Product placement events may be ideal targets for advert reminding given that the purpose of the product's inclusion in the programme is to be attended to and recalled. These types of events may create a distinctiveness of encoding episode that is unrivalled with non-paid product placement. Indeed, increasing retrieval cue distinctiveness is understood to be one of the most potent ways to enhance and differentiate memory for similar events (Tullis, & Benjamin, 2015). For brand managers, being able to directly increase one's own advertising recall at the expense of a competitor's marketing budget is an alluring finding. If it is possible to use these events consistently as reminding cues, product placement events could also create new revenue streams for broadcasters. Here there is evidence for advert facilitation, but given the precarious relationship between facilitation and interference shown in the literature, future research should investigate how branded adverts can influence programme recall, and vice versa (see Chapter Five; Putnam, Sungkhasettee, & Roediger III, 2017).

Looking further at the programme events, the ineffectiveness of several trials inadvertently identified a number of boundary conditions for how to select programme product events. Although an interaction between individual adverts and condition was not possible due to low trial levels, descriptively the Maytag, Dos Equis and Little Caesar's adverts all appeared to be reminded by their respective programme events, whereas the case for Pop's, Zales and Ticket City influence was less clear cut. The pre-test pilot had indicated suitable ratings of perceptual similarity for all trials, given that content and context similarity drives reminding (Hintzman, & Stern, 1978; Zawadzka, Simkiss, & Hanczakowski, 2018). It is likely that as the perceptual similarity questions did not factor in how attention would be drawn to the product in-programme. Indeed, pilot participants were told to look out for each product before watching a clip, which may have failed to capture the event characteristics that determine spontaneous reminding. Instead then, future pilots should check participants' abilities to detect the repetitions from each repetition trial when they were seen with numerous other trial clips, similar to the design of Chapter Two. The jewellery event was rated highly on subjective perceptions of similarity, yet this item showed no discernible ability to remind. Advertisers and broadcasters are advised then to use the design of Chapter Two to validate all product pairs before usage rather than relying on subjective ratings of product event similarity.

Focusing on the programme events themselves, the relationship between the product's audio-visual presentation appears to be key to successful reminding. To be selected for use in the programme in the current study, a programme product needed to receive a single verbal mention and be in the centre of the screen for a single shot. Of the trials that failed to elicit a reminding, it may have been that the on-screen time available for the jewellery event was too short and that there were too few concurrent verbal mentions. Indeed, the results of both Chapter Two and the work of Negley, Kelley, and Jacoby, (2018) show that having more time available for repetition detection at P2 enhances subsequent recall. Similarly, comparing the number of mentions between the descriptively successful and unsuccessful reminding trials, the jewellery product moment had a substantially lower number of verbal mentions, receiving just one. Verbal mentions drive visual attention in screen viewing and are directly predictive of later programme product memory (Gupta, & Lord 1998; Bressoud, Lehu, & Russell, 2010; Andersson, Ferreira, & Henderson, 2011; Cavicchio, Melcher, & Poesio, 2014). Future research should look to manipulate programme product events so that the contribution of visual and audio presentation can be parsed out. Specifically, changing the number of unique mentions a product receives during the same programme event would be of considerable interest although using naturalistic programme stimulus makes this a harder proposition. These failings to induce stable repetition effects likely impacted on the results of the study, however, such results shed light on how programme events instigate involuntary cognition. Once again, this study calls for a codification of programme event “remindability” so practitioners can more easily select appropriate events.

While the addition of programme product repetition facilitated advert recall, recognition performance and the subjective ratings of the recognition process were insensitive to the manipulation. This result diverges from prior work which showed that the repetition of a product category could increase brand recognition (Furnham, et al., 2002). Indeed, the result is at odds with reminding theory, which suggests that recognition should be enhanced via the increase in accessibility in both positions and spaced learning effect experienced in the retroactive placement of the advert (Appleton-Knapp, et al., 2005; Jacoby, Wahlheim, & Kelley, 2015). This result is likely due to the design of the study; first and foremost, the decision to split the sample when administering the two forms of recognition which generated too few observations per model. This may suggest that the effect magnitude of advert reminding on recognition may be somewhat smaller than the effects of purely retrieval-based recall. As certain reminding events were not powerful enough to demonstrate consistent advert reminding, this perhaps contributing to a loss of power as would be expected. Therefore, future work should look to increase the number of observations per group when assessing for recognition effects to confirm or reject this null result.

One of the most interesting findings was the inability to generate attitudinal effects from subtle programme product repetitions. Correlational analysis showed relationships between programme liking with advert and brand liking, as well as advert involvement with each element in the free recall task, but none of these attitudinal relationships were influenced via the placement of advert reminders. This finding highlights a possible boundary condition for the influence of programme repetition on advert involvement seen in Myers et al.'s (2014) research. Their study shifted the focus away from the products themselves as the source of repetition. Instead they used overt *and* specific programme elements to draw attention to the advert. This distinction in how reminding was generated appears critical for influencing attitudes toward the advert. Reminding research would suggest programme specific element repetition (e.g. a character from the programme also featuring in the advert) should be far better at increasing the shared cue uniqueness between the individual's programme representation and the advert (Benjamin, & Tullis, 2010; Berntsen, Staugaard, & Sørensen, 2013; Myers, et al., 2014). Yet, as the current study attempted to initiate reminding through simple product repetition, this meant that if successful, it was the product in the programme that the individual was reminded of and not necessarily the positively perceived programme nor unique programme features. That is, the recursive trace created for the repeated product failed to associate the programme representation with the advert; this meant that individuals did not perceive the advert to be more relevant to the programme they were watching resulting in no alterations to perceived advert involvement. As involvement mediates the effect of the other attitude and purchase metrics, this explains why no other effects were seen

(Myers, et al., 2014). Thus, the null results in this study provide a valuable insight into the limits of advert-programme associations, highlighting a need for greater thematic overlap to influence personal relevance. Crucially, this finding does not refute a relationship between reminding, sponsorship, and attitude change, it merely evidences its limits.

Future directions

There are several future directions based on the current study. Firstly, the pre-pilot method for selecting the programme events appears to have been unreliable in successfully capturing reminding pairs. Identifying either spontaneous or consciously controlled reminding prior to use would validate trial suitability before use in a larger experiment. If a pair cannot trigger any form of reminding, it will not be able to facilitate advert memory. Some evidence for this proposition comes from the oven product pair used in all three chapters so far. That is, the GE branded oven showed it could be consciously detected as a pair in Chapter Two, the pair could be recollected in Chapter Three and then in the current study, the oven pair appears to have demonstrated reminding in a more naturalistic viewing scenario. Clearly, subjective ratings of similarity fail to fully capture this phenomenon. Therefore, future studies should employ a similar design to that of Chapter Two to capture conscious repetition detection first and then using this as a proxy to drive decisions for pair inclusion. Furthermore, the use of a completely naturalistic viewing scenario did somewhat complicate the analysis of several variables used in the study. A future study should combine the multiple narrative exposure design used by Furnham et al., (2002) with the more difficult memory task and testing delays used in the present study. This would allow for a more controlled analysis of advert break and advert position effects. Likewise, this combined design would also enable an investigation into how multiple programme product events interact with an advert for a repeated product. Equally, understanding how multiple programme exposures interact with multiple advert exposures is another future avenue for testing. For example, seeing a washing machine in both segment one and two of a programme, combined with one, two, or three exposures to the washing machine advert. This would give a clearer picture for advertisers of the additive or interfering nature of using multiple repetitions, be it advert or programme events, allowing for the detection of a facilitation sweet spot. Such a study would further help with advertising space valuation as well as finessing the advertising outcomes for brand managers. Finally, combining the present recall conditions with Furnham et al.'s design would allow for a more tightly controlled analysis of product lag, and its interaction with retention interval (Cepeda, Vul, Rohrer, Wixted, & Pashler, 2008). A further future study of interest would be to directly compare the attitudinal and memory effects from product or programme element repetitions (Myers, et al., 2014). This would help advertisers more accurately tailor the repetition type needed for a brand's marketing campaign goals; be it to increase brand and advert affect or whether merely to improve the mental availability required such as for a public service announcements. In addition, such a comparison would further codify the advert-reminding product value in comparison to other forms of repetition.

Further considerations: Recollection of Reminding

Previous chapters in this thesis have established that the source of advert-programme product repetition effects originates from a viewer's ability to detect the product repetition, be that consciously or spontaneously. Although often imperfect at capturing all cases of reminding, a measure of recollection of reminding at test has been found to act as a marker for in-programme reminding behaviour (see Chapter Three). However, during the design of the experiment in this chapter, it was not yet apparent to the researcher of the importance of repetition detection at test for providing support of the remindings framework. Were one to design this study again, it would definitely be included, but while the study omitted this measure, its findings are in line with reminding predictions. However, any future industry or applied remindings work should include this measure.

On a side note, this information could additionally have been assessed by the collection of product order data. That is, whether a participant could provide the correct order in which the products were seen, e.g. advert or programme product first, would have highlighted the existence of a robust recursive trace as order is known to be marker, given that judgments of recency are one of the hallmarks of reminding (Hintzman, 2010; Wahlheim, Smith, & Delaney, 2019). This also is another potential method via which repetition detection/recollection information could be assessed by practitioners.

Practical applications

More research is needed for the mechanism to be completely understood, but the results of the study also highlight several potential practical applications for the study's findings. This study provides further evidence that including advert-programme reminding in a wider marketing campaign is effective in improving advert recall. Specifically, the findings and wider reminding literature suggest that adverts should be placed before the programme product event, with this being the surest way to improve memory (Furnham, et al., 2002; Jacoby, Wahlheim, & Kelley, 2015). Given that previous work has shown that pre-roll adverts seen before online content are often well-attended and not skipped, the placement of reminding adverts pre-roll for broadcaster video on demand content should be an obvious choice (Campbell, Mattison Thompson, Grimm, & Robson, 2017). Similarly, though the study did not confirm the presence of proactive interference, avoiding the advertising space immediately after an overt product event may potentially reduce risk to the advertiser. In addition, while more work is needed to catalogue the ideal programme characteristics for reminding, the study suggests that product events which are on screen for longer and have more unique verbal mentions should improve reminding likelihood (Negley, Kelley, & Jacoby, 2018).

Chapter Five - The effects of advert misinformation, and the devilish ambiguities of media misremembering

The previous thesis chapters demonstrated that viewing related advert-programme events can facilitate advert memory (see Chapters Two, Three, & Four). Prior work has, however, highlighted the close relationship between facilitation and interference for repeated items (Jacoby, Wahlheim, & Kelley, 2015). In fact, research has shown that repetition and suggestion can lead to misremembering that biases recognition in favour of a false alternative (Putnam, Wahlheim, & Jacoby, 2014; Putnam, Sungkhasettee, & Roediger III, 2017). **Therefore, is it possible for advertised brands to be misrecognised as programme content when both events feature a product of the same category?**

It is a common experience for individuals to be exposed to information regarding sponsored TV programmes or brand events after viewing has finished. The basis for such an investigation comes from studies regarding the misinformation effect, a special case of memory interference, which has demonstrated how related information seen prior to or after a target event can disrupt and even bias later recognition (see Chapter One for a discussion; Loftus, & Palmer, 1974; Loftus, Miller, & Burns, 1978; Rantzen, & Markham, 1992; Holliday, & Hayes, 2002; Loftus, 2005).

Understanding the cognitive factors that can mediate this false brand memory will be of keen interest to any currently ambushed brand. Empirical work has shown that the type of memory information used to determine whether an event occurred has a large effect on the recognition outcome (Lindsay, & Johnson, 1989a; Belli, Lindsay, Gales, & McCarthy, 1994). Indeed, the source monitoring framework posits that an individual’s ability to correctly allocate the source of a memory is a dual process (Johnson, Hashtroudi, & Lindsay, 1993; Mitchell, & Johnson, 2009; see Chapter One: Introduction for an extensive outline). During low cost, low involvement decisions, as is assumed to be the case that when individuals are assessing advertising in the real world, more heuristic feelings of familiarity are taken as veridical evidence of an event taking place (Johnson, Hashtroudi, & Lindsay, 1993; Chaiken, & Ledgerwood, 2011). In contrast, research has suggested that increased engagement with the decision process via systematically recollecting event details can reduce the reliance on the more fallible heuristic system (Okado, & Stark, 2005; Mitchell, & Johnson, 2009 Lewandowsky, et al., 2012). **Accordingly, how does encouraging heuristic or systematic processing alter the outcome of an advert-programme recognition decision?** The present study will again use a full TV viewing scenario to present adverts with related programme events, only this time, the individual's ability to recognise the programme itself will be investigated.

<u>Why is it important to understand media misinformation?</u>

One goal of marketing is to create associations between a promoted brand and the viewer's chosen media context so as to later change behaviour, with techniques such as sponsorship and product placement frequently being employed. While both these techniques are common place for films, TV programmes, and sports events, their ubiquity has also increased in other online platforms such as Instagram and YouTube (La Ferle, & Edwards, 2006; Redondo, 2006; Alassani, & Göretz, 2019; Gerhards, 2019; Jin, & Muqaddam, 2019). The tangible outcomes of brand sponsorship are understood to be improved recognition, increased purchase intention, as well as increases in perceptions of quality, and liking (Herrmann, Walliser, & Kacha, 2011; ThinkBox, 2017). For example, sponsoring sporting events like the UEFA Champions League has shown long-term benefits to brand recall and recognition (Walraven, Bijmolt, & Koning, 2014). Despite their lucrative price tags, this media channel is a particularly attractive offering.

One downside to sponsorship is that the official brand needs to produce lots of marketing content to associate their brand with the promotion event. Sponsorship associations rely heavily on the viewer being able to successfully encode and recall the correct brand, which creates an opportunity for potential ambushers (see Chapter One: Introduction for discussion; Cornwell, & Humphreys, 2013). Indeed, given that retrieval is fallible, an ambushing brand can imitate the sponsor by placing marketing messages during specific advert breaks, use related but not regulated imagery, products, or wording, as well as using real time promotions that link the ambushing brand with the event via social media (McKelvey, & Grady, 2008). A classic real-world example of advert ambushing came from Nike's "Find Your Greatness" campaign, which was run during the 2012 London Olympic Games. Although having no formal relationship with the event, Nike shot a series of adverts featuring regular people performing Olympic events such as running, diving, tennis, and gymnastics, all in towns with the same name, London, around the world (Passikoff, 2012). Nike enhanced their position through suggestion in their ads and messaging, using straplines such as "Greatness doesn't only exist in SW19" referring to Wimbledon, the site of the Olympic tennis tournament (Sweney, 2012). On the week of the opening ceremony, "Find Your Greatness" adverts were viewed 4.5 million times, vastly outperforming the official sponsor Adidas' "Take the Stage" campaign, which garnered only 2.9 million views (Russell, 2012). What were the outcomes of this ambushing? In one survey of US consumers, just 24% correctly identified Adidas as the sponsors, whereas 37% suggested Nike had the official honours (Wentz, 2012). One questions that remains though is quite how Nike pulled off this brand misremembering campaign, and what memory mechanism did Nike draw upon?

Given the use of product category repetition across the adverts and programmes in the thesis, it was decided that the paradigm could offer a platform for investigating how programme brand misinformation can first occur after viewing video advertising. Nike's use of suggestion in their ambushing techniques raised the question of whether reminding advert placement could lead to individual's reporting that these reminded brands were programme content. While live sport event and programme viewing are obviously different contexts, the mechanism by which false memory occurs remains the same (Johnson, Hashtroudi, & Lindsay, 1993). Thus, the paradigm offered a way to measure heuristic and systematic processing of novel programme-brand associations that did not rely on past sporting events. Understanding the cognitive processes under which the inception of misinformation is most likely has wide-reaching implications given the current rise of fake news, “alternative facts”, and the hyper-normalisation of false information (Lewandowsky, Ecker, Seifert, Schwarz, & Cook, 2012; Lewandowsky, Ecker, & Cook, 2017; Shao, et al., 2018).

The role of misinformation in event memory

Can advert brands interfere with programme event memory and bias subsequent reporting in their favour? For such an effect to happen, conditions must promote errors in the retrieval process that allow for brand commission (Johnson, Hashtroudi, & Lindsay, 1993). Indeed, previous empirical research has shown that the introduction of additive or contradictory misinformation, information that adds to or changes a remembered event, can alter how participants recount it (Loftus, Miller, & Burns, 1978; Lindsay, 1990; Zaragoza, & Lane, 1994; Loftus, 2005; Holmes, & Weaver III, 2010; Moore, & Lampinen, 2016). As a reminder of the misinformation paradigm, consider Belli’s (1989) study (also see Chapter One for further explanation). He demonstrated false memory for various brands across several categories (e.g. coffee and fizzy drinks) using the misinformation paradigm to assess participants’ memory of a robbery. In his work, participants first viewed a series of static slides depicting a theft, before reading a narrative that retold the viewed event while making subtle changes. During this written retelling, the subtle changes were made along product brand dimensions; for example, if a can of 7-Up was seen during the slides, the written account now suggested it was Coca-Cola. On a later recognition test, this mismatch between the original information and the misinformation resulted in lower levels of accurate recall for the 7-Up while increasing the likelihood of Coca-Cola being reported as present in the viewing portion. When information was changed regarding the brand of product seen, the post-viewing suggestion altered how individuals reported their earlier viewing experience. An analogous example might be viewing a TV programme event in which a character is seen using Hellman's ketchup. In the subsequent advert break, a Heinz Ketchup advert was then viewed. When thinking back to the programme event, if a friend suggested that it was a Heinz product placement, it may be that the viewer would be more likely to later report Heinz as programme content.

Misinformation brands can directly compete with the original brand present in memory, but if the original information is missed entirely, then the misinformation will be more readily accepted (Loftus, & Hoffman, 1989). In Belli's (1989) study, when viewing a series of static images he found that individuals were often unable to remember 7-Up appearing in the slides, due either to trace decay or because of an initial failure to encode this fizzy drink information during the viewing. This meant that when later reading the narrative purporting Coca-Cola to be present, participants had no information to refute this claim leading to a proportion of the sample then reporting Coca-Cola. Misinformation acceptance is common in much of the literature, but certain conditions increase its likelihood (Belli, 1993; Roediger III, Jacoby, & McDermott, 1996). For example, if distracted while viewing the original event, unsurprisingly this divided attention can increase later misinformation acceptance (Zaragoza, & Lane, 1998; Lane, 2006; Umanath, Ries, & Huff, 2019). In the ketchup example, if the individual failed to remember the Hellman's brand in the programme, as well as the individual failing to remember they saw the Heinz brand, such conditions may result in acceptance of the advertised Heinz brand as programme content. Thus, when participants are less involved with the programme narrative or fail to encode the product events in the programme, it is likely that misinformation acceptance may increase.

For advertisers it is the outcome of whether an ambushing brand can be misattributed into the programme that is of most interest. As such, the focus of the current study will be on whether brand misattribution can be created, and under which retrieval conditions is false memory most likely to occur.

Recognition process and source monitoring

How can a simple retrieval task result in a divergence from accurate reporting? False memory is thought to be an issue with source allocation during episodic retrieval (Mitchell, & Johnson, 2009). The source monitoring framework from Johnson, Hashtroudi, and Lindsay, (1993; see Chapter 1: Introduction for a more extensive source monitoring framework outline), suggests that during retrieval, an episode's context is determined by the average cue characteristics that make up the memory trace. This means that the quality of the retrieved perceptual, temporal, spatial, schematic, and modality details determines the source assigned (Mitchell, & Johnson, 2009). Indeed, all episodic retrieval involves a degree of source monitoring. Most of the time this process is quick and unconscious but monitoring can also be an act of deliberate cognitive control as well (Johnson, Hashtroudi, & Lindsay, 1993; Johnson, 2005). Equally, how the information is accessed, and the level of evidence the individual requires while endorsing a source, will have influence over the rates of recognition (Chaiken, & Eagly, 1989; Johnson, Hashtroudi, & Lindsay, 1993). This means that how the brand and programme information (programme or advert) are stored, their representation similarity, as well as how the recognition questions are phrased, should affect the levels of brand misattribution.

Typically, individuals are required to make decisions along simple yes/no dimensions; did this happen or did it not (Lindsay, & Johnson, 1989a). In these situations, individuals are generally predisposed to use the path of least effort, using automatic, undifferentiating, and rapid metacognitive familiarity judgements to decide on an item's context (Chaiken, &

Eagly, 1989; Gardiner, & Parkin, 1990; McElree, Dolan, & Jacoby, 1999). Indeed, this ease of retrieval and fluency is the basis for the availability heuristic, with events that feel more familiar being perceived to be of greater importance than their less familiar alternatives (Tversky, & Kahneman, 1973). When recognition measures are employed then, research shows that misinformation acceptance and suggestibility effects are increased (Lindsay, & Johnson, 1989a). Thus, when advert brands are offered as an option for appearing in the programme during a yes/no decision task, participants will need to discount the sense of brand familiarity created via the earlier advert viewing to avoid misinformation suggestibility.

Alternatively, when made to systematically engage with the decision process, effortful monitoring can mitigate the influence of familiarity and subsequent misinformation suggestibility (Chaiken, & Eagly, 1989; Johnson, Hashtroudi, & Lindsay, 1993). When asked to focus on the details of a situation, the criteria for recognition evidence is shifted away from the more available familiarity information, and toward other, more differentiating, event characteristics such as retrieved perceptual details (Johnson, Hashtroudi, & Lindsay, 1993). To generate this change in retrieval process, researchers have developed the source monitoring paradigm, which requires the individual not only to decide whether an item was present, but also whereabouts they encountered the item (see Chapter One section 5.2.2; Lindsay, & Johnson, 1989a; Okado & Stark, 2005). When this paradigm is employed, the misinformation effect is reduced due to the more stringent evidence criterion required, e.g. perceptual event recollection, and while misinformation effects have been seen using this measure, source monitoring typically removes misinformation effects that arise from familiarity misattributions alone (Lindsay, & Johnson, 1989a). In the current experiment, source monitoring will be offered as method for overcoming any suggestibility effects seen in the first measure. That is, encouraging individuals to systematically differentiate the advert and programme contexts along the context characteristic dimensions should help to decrease the rate of misinformation. If source monitoring does offer a way of reducing misinformation, its implications will be important for combating ambusher brands. Equally of interest is whether endorsing the false advert brand during heuristic processing is associated with higher rates of robust false memory, or whether source monitoring can remove the suggestibility effect entirely.

Does programme-advert event order effect interference?

When considering the effects of reminding, advert memory facilitation was more effective when the advert was seen in the P1 position, but does advert position affect the rate of misinformation endorsement (as discussed in Chapter Four)? In a TV viewing context, adverts can appear either before a programme event or after, depending on the programme product's position. The traditional misinformation paradigm linearly displays the original information before then introducing the misinformation in the post-event narrative (McCloskey, & Zaragoza, 1985; Zaragoza, McCloskey, & Jamis, 1987; Lindsay, Allen, Chan, & Dahl, 2004). That is, the original event occupies P1 and the misinformation is positioned at P2. Conversely, findings have demonstrated that when the order of information is reversed, with the misinformation being seen prior to a target event, similar misinformation effects to the traditional paradigm are produced (Lindsay, & Johnson,1989b; Rantzen, & Markham, 1992; Holliday, & Hayes, 2002). In the reverse case, the misinformation occupies P1 and the original information is at P2. Given that misinformation suggestibility is driven by an item's fluency, which is created via exposure, the position order at which the advert and the programme products appear are not predicted to have influence over yes/no recognition performance (Gardiner, & Parkin, 1990). Equally, the order does not change the physical characteristics of each context that would be required to make source monitoring harder, meaning robust memory should also not be influenced. As such, rates of suggestibility and source monitoring performance should be equal for adverts seen both before and after the programme events.

Current experiment

Understanding the cognitive causes of misinformation in a media context will be of interest to a wide array of readers. As such, the current experiment extends the effects of product repetition by investigating the conditions in which advertised brands can be recognised as programme content. To do this, a modified version of the misinformation paradigm was created out of a TV viewing scenario, with the programme and advert events substituting the original information and misinformation respectively. The design was between-participants, with the misinformation group seeing the repeated product adverts and the control group seeing unrelated adverts that did not contain the same product. This meant that recognition memory for the programme could be tested when individuals had previously seen the related brands adverts, or not, allowing for an understanding of recent brand exposure on programme misinformation endorsement. Memory for the programme events was tested using a recognition measure with an associated remember/know/guess paradigm in conjunction with a source monitoring paradigm. All participants viewed a single episode of an American sitcom. The advert order presentation was the same as in Chapter Four, with individuals viewing five adverts before, in the middle, and at the end of the programme.

Question summary

Does viewing related advertising increase the likelihood of observing a misinformation effect?

Does viewing related advertising increase the likelihood of misinformation suggestibility?

Does viewing related advertising change the likelihood of committing a source monitoring error?

Does the advert order affect the likelihood of misinformation effect?

Does endorsement of the misinformation brand in the recognition task influence robust memory?

Methods

Participants

A total of 96 individuals (20 males, 76 females) aged between 18 and 49 (*M* = 22.2, *SD* = 5.46), all with normal or corrected–to-normal vision participated in this experiment. Participants were Durham University students and staff recruited via opportunity sampling, and were compensated with a £5 Amazon voucher or course credit. Sampling error was calculated per condition to be 10 ±, thus the true population score will be 10% more or less of the obtained score.

A binomial power calculation was conducted on sample size given the expected likelihood of brand misattribution. The chance of false recognition was 50% given it was a binary outcome. This expected likelihood probability was again set to 0.5. Again, a sufficient sample size was selected $p < .001$.

The cover story for this study suggested that participants were taking part in an experiment regarding the participant's culture, the programme's country of origin, and programme humour perceptions.

Materials/apparatus

PsychoPy2 (Version 1.84.1) was used to present participants with the programme, adverts, and the three recognition memory measures (Peirce, 2007; 2009). Online Survey was used to collect demographic information. The experiment ran on an Intel core i7 laptop with a

17” screen, on which participants completed the three memory measures. Participants viewed the programmes and the adverts on a 42” Samsung TV, in a mock living room environment.

Programme

The programme used was again episode one of 30 Rock (see Chapter Four for details). Products were chosen so no semantic associations between them could act as retrieval cues. However, in a development from Chapter Four, one of the programme product events was changed.

Instead of the hotdogs seen in Chapter Four being used as a repeated product and which appeared not to have reminding capabilities, a Hummer 4x4 was selected to be the final target misinformation event. The 4x4 appeared in multiple scenes from 11 minutes 38 seconds to 18 minutes 37 seconds. A non-branded verbal reference to the car was made at 17 minutes 28 seconds when one of the characters offers the main character a lift home. The car is also driven in one of the later scenes by the main character herself.

The beer and oven events were also used as targets for the misinformation adverts (see Chapter Four methods for further details). Three other non-target programme events were selected as foils for both groups; a haemorrhoid cream, a handbag, and a news network. No adverts related to these latter three events.

The programme had a total run time of 21 minutes and 52 seconds and was interspersed with advert breaks at the beginning, middle, and end.

Advertisements

All adverts were chosen from US and Canadian markets and had not previously been aired on UK TV, with each advert having a 30 second duration. The adverts were selected from US and Canadian markets due to their culture similarity with the UK along Hofstede’s dimensions (Hofstede, 2011). All the adverts were pilot tested for prior familiarity and were found not to be familiar to a UK audience. Target misinformation adverts were for; a Maytag oven, a Jeep 4x4, and Dos Equis beer. Dos Equis and Maytag had already been rated as similar to their respective programme events (see Chapter Four Methods). The Jeep 4x4 advert was selected as the product contained the most perceptual similarity in terms of colour and design with the Hummer in the programme (Pansky, & Koriat, 2004; Pérez-Mata, & Diges, 2007; Pansky, Tenenboim, & Bar, 2011). These three adverts would only be seen by the misinformation group.

In the control group, three unrelated adverts were substituted for the target adverts: Kayak travel comparison site, Otter Box phone cases, and Powerade isotonic drink. These products did not appear in the programme. Thus, these three unrelated adverts were viewed only by those in the control group. Twelve non-target filler adverts which remained the same across conditions featured the following brands: Air France, Bank of America, Dockers, Estée Lauder, Fiber One, Gorton's, HP, Loctite, Secret, Verizon, Walmart, and Wendy's. Again, these adverts were selected as they represented a range of product categories seen on UK TV advertising. Each of the advert breaks contained five adverts and were 2 minutes 30 seconds in length. All target adverts positions were counter-balanced inter-break, and randomised intra-break (see Table 5.0).

Table 5.0
Represents the six advert viewing permutations for the target adverts.

Advert Block 1	**Programme 1st Half**	**Advert Block 2**	**Programme 2nd Half**	**Advert Block 3**
Target 1	Oven	Target 2	Beer & Car	Target 3
Target 1	Oven	Target 3	Beer & Car	Target 2
Target 2	Oven	Target 3	Beer & Car	Target 1
Target 2	Oven	Target 1	Beer & Car	Target 3
Target 3	Oven	Target 1	Beer & Car	Target 2
Target 3	Oven	Target 2	Beer & Car	Target 1

Note. Each advert block contained five adverts with the intra-block position of the target advert being randomised. The oven programme event was always seen in the first half, and the beer and car programme events were always seen in the second.

Programme event recognition measures

The first measure looked to assess branded recognition memory for six programme product events, three of which were the target programme events that shared a product with the adverts in the experimental group. The purpose of this measure was to understand if seeing the related product brands would increase the rate of seen advert brands as programme content, when compared to those who had not seen related adverts. Thus would those who saw related products and brands in adverts be more likely to say yes to that advert brand as programme content. So that participants were clear which programme event each question referred to, a picture of the event was displayed with the question (see Figure 5.0 below). This decision was made after participant confusion during a pilot where the measure did not contain an image. On each trial, the participant was asked if the stated brand appeared in the depicted section of the programme. The participant was provided with a screen shot of the event, with the product covered up. The participant gave a yes/no response to each trial. To increase the difficulty of the task, for each of the target events, a mixture of five different branded and non-branded trials was included. For non-target filler events, there were four branded/non-branded trials included. The trial types were as follows: original programme brand, misinformation advert brand, two unseen competitor brands and a non-branded trial option. All brands included were from the US market. Thus, in total there were 27 trials in this measure (see Figure 5.0 below for an example of a single trial). Each trial was self-paced as it was not desired that the measure further inflates participant reliance on heuristic processing via a time limit (Zaragoza, & Lane, 1998).

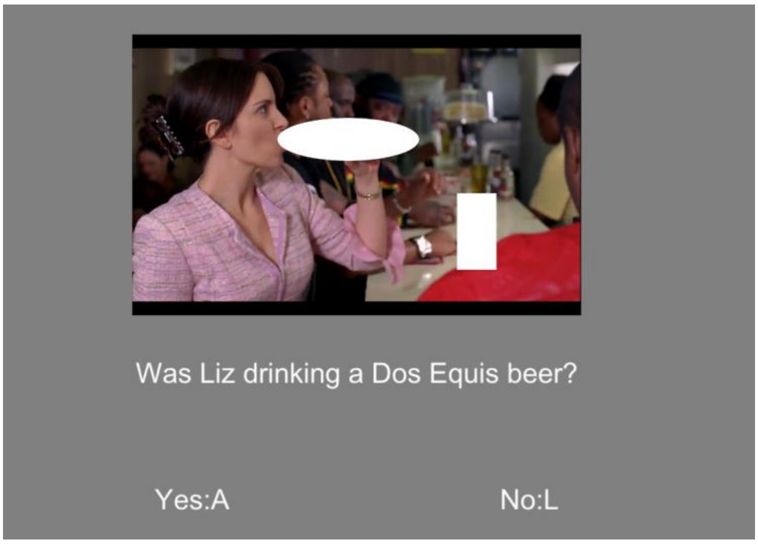

Figure 5.0. Example of the advert brand trial for the programme beer event.

The second measure was a remember/know/guess paradigm (Tulving, 1985; Gardiner, Java & Richardson-Klavehn, 1996). This measure was contingent on the first and was only presented when a yes response was given (see Figure 5.1 for an example of a single trial). The addition of the guess response allowed for these to be filtered out of the remember/know analysis (Gardiner, Java & Richardson-Klavehn, 1996). A “remember” response indicated that the participant could consciously recall seeing the suggested brand in the programme, that they could mentally re-live the experience, and they had supporting memories leading up to the recalled event. A “know” response indicated that while the participant couldn’t recall the incident in which the brand appeared in the programme, they felt the brand was familiar in the scene specifically. Finally, participants gave a “guess” response if they could neither consciously recall the brand being present and they had no sense of the brand being familiar in that situation, however, they couldn’t completely rule out having seen it. Thus, the total number of trials in this condition was dependent on the number of “yes” responses from the first measure. Once the individual gave their answer, the next recognition trial began.

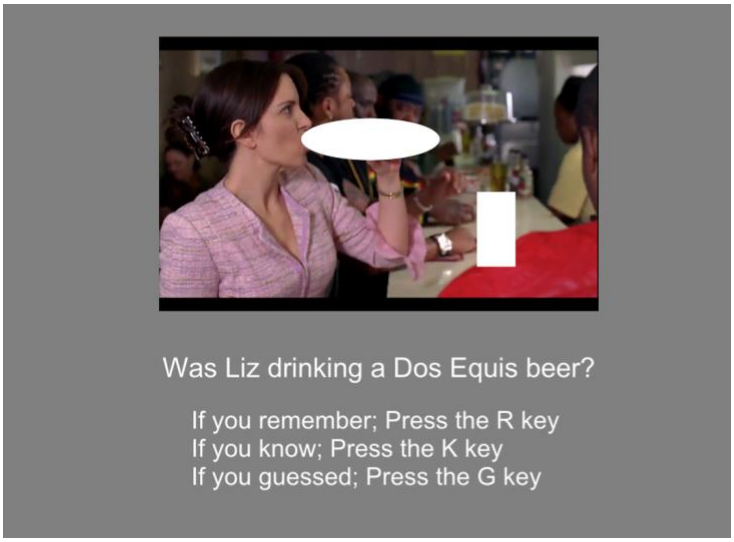

Figure 5.1. Example of the remember/know task for an advert branded trial.

The final recognition measure was a source monitoring task, which was presented after the recognition and remember/know/guess paradigm (Okado & Stark, 2005). The task presented all 27 trials from the yes/no recognition measure again, however, this time, each trial used a multiple-choice format. This source measure asked them to identify the context in which they encountered each brand. Specifically, each trial asked them to think back to the viewing event and indicate where each brand was seen. The five possible responses were: In the programme, in the adverts, in both programme and in the adverts, in neither the programme or adverts (as part of the questioning), or whether they'd have to guess (see Figure 5.2 below for a single trial example). Again, each trial had no time limit and ended when the participant responded (Zaragoza, & Lane, 1998).

Figure 5.2. An example of beer advert brand's source monitoring trial.

Questionnaires

Demographic information was collected via Online Survey. It also assessed whether they had seen the specific episode of 30 Rock before or the series more widely. They also recorded if they believed they had seen any of the adverts before.

Design

The experiment was a between-groups design. The study's manipulation depended on the content of the adverts seen across the three advert breaks. Those in the misinformation condition saw a beer, 4x4, and oven adverts, which related to three distinct programme events. The control group instead saw three unrelated adverts, an isotonic drink, phone case, and holiday comparison site adverts that did not related to any programme events. Brand memory for three target programme events was then tested to understand if seeing the related advert brands influenced the recognition of programme brands (for the beer, 4x4, and oven programme events). The independent variable was the target advert's content. The dependent measures were the raw yes responses to the original programme brands and the misinformation brands on the recognition measure and the corresponding R/K/G raw scores. Robust memory scores were collated via responses to the source monitoring task (see Data

Analysis section below). Initial yes response rection time was also included as a covariate in certain analysis.

Procedure

Participants were told that they would be involved in an investigation on the effects of culture on TV programme humour perceptions. They were informed they had been allocated to the US sitcom condition. Participants were instructed to watch as they would at home, with the adverts not being mentioned prior to the viewing. Participants watched the full viewing scenario, with the misinformation group viewing the three related adverts and the control group viewing the unrelated adverts. Once they finished the viewing phase of the experiment, participants were instructed that they would now be asked questions pertaining to some of the events in the programme. They then completed the yes/no recognition measure with the associated remember/know/guess paradigm, as well as the source monitoring task. At this point, participants indicated how humorous they found the programme to be. Finally, participants filled in the demographics questionnaire. The participant was then debriefed to the study's true nature and participants were offered the opportunity to ask any questions they had about the experiment.

Data analysis

All analyses were conducted using R (version 3.5, R Core Team 2018) and R Studio (version 1.1.447). An FDR correction was used for post-hoc tests.

GLMMs

Three trial types were analysed by splitting brands into those seen during the programmes, those seen during the adverts for the target events, as well as the programme brands for the foil events. The advert and programme brands referred to one of the three target events (oven, beer and car). The control brands referred to the correct endorsement of the other three events that had no programme relation (haemorrhoid cream, handbag, and news network). Before inference was drawn, all model assumptions and model stability were assessed using the package “DHARMa” (Hartig, 2020). For other packages used in the analysis, see Chapter Two Data Analysis section. All covariates were z-transformed before respective model entry.

Recognition memory

A GLMM (Baayen, et al, 2008; Jaeger, 2008) with a binomial error distribution and logit link function was built to ascertain the effects of condition (misinformation exposed and misinformation unseen) and trial type (original programme product information, advert product misinformation, and a control programme product information) on the probability of true and false recognition memory. The model represents a comparison of raw yes responses to original programme hits, misinformation advert false alarms, and control programme product information hits (the model terms are outlined below in Table 5.1). The model was also simplified by removing the covariate. Overall, there were 864 observations from 96 participants.

Table 5.1
Terms for the overall recognition generalised linear mixed model.

Model	DV	Predictors	Random Intercepts	Covariate
Recognition - Full	Binary Recognition	Condition, Trial type, Condition*Trial type,	Participant, Brand	z.recognition_RT
Recognition - Null	Binary Recognition	-	Participant, Brand	-
Recognition – Simplified	Binary Recognition	Condition, Trial type, Condition*Trial type,	Participant, Brand	

Several post hoc tests were also conducted on the raw recognition scores. Firstly, the original programme brand memory was compared across conditions. This model contained condition as a single fixed effect as well as random effects of participant and brand and contained 288 observations from 96 participants. Misinformation advert brand suggestibility was then compared across condition. This model contained condition as a fixed effect as well as random effects of participant and brand and was based on 288 observations from 96 participants. Control programme brand endorsement was also compared across groups, with the model containing the same fixed and random effects as the previous models as well as the same number of observations and participants.

The next post-hoc test compared endorsement rates of the programme brand information and advert information in the experimental condition only. That is, were participants who saw the misinformation adverts more likely to endorse the original or the misinformation brand in the recognition task? This model had a single fixed effect of trial type and random intercepts for participants and brand. The model contained 288 observations from 48 participants.

Finally, the likelihood of endorsement was compared for misinformation brands in the experimental condition, with original programme brand endorsement from the control condition. The model had a single fixed effect of trial type, with random effects of participant and brand and contained 288 observations from 96 participants (see Table 5.11 for FDR corrected alpha levels).

Recognition guessing

To understand whether the criterion for guessing differed across groups and between trial types, guess response likelihood rates were compared (see Table 5.2). The model once more used a binomial error structure and a logit link function. A simplified model was also made without the interaction term. The model contained 864 observations from 96 participants

Table 5.2
Terms for the guess rate generalised linear mixed model.

Model	DV	Predictors	Random Intercepts	Covariate
Guess – Full	Recognition Guess	Condition, Trial type, Condition*Trial type	Participant, Brand	z.recognition_RT
Guess – Null	Recognition Guess	-	Participant, Brand	-
Guess – Simplified	Recognition Guess	Condition, Trial type	Participant, Brand	z.recognition_RT

Three post-hoc tests were conducted to assess the effects of trial type. In all post-hoc models, the dependent variable was the recognition guess rates. Firstly, guess rates between the original programme brands and the misinformation advert brands were compared, and once more the model had fixed effects of trial type and recognition reaction time, and random effects of participant and brand. The model contained 576 observations from 96 participants.

The unrelated programme brand memory was then compared first with the misinformation brand, and in a second model, with the target programme brands. The dependent variable in both models was the guess rate. Both models had fixed effects of trial type and recognition reaction time, as well as random effects of participant and brand. Both models contained 576 observations from 96 participants. (see Table 5.15 for FDR corrected alpha levels).

Remember/Know

To assess remember and know rates across trial type and condition, two models were constructed with both containing the fixed effects of an interaction between trial and condition as well as recognition reaction time. Both models contained participant and brand as random effects. The first model's dependent variable was the remember recognition rates, and the second model's dependent variable was the know response rate. The remember model contained 864 observations from 96 participants.

Advert order

The next GLMM investigated the effect of the misinformation advert position on misinformation brand suggestibility (see Table 5.3). The model contained 142 observations from 48 participants.

Table 5.3
Terms for advert order generalised linear mixed model.

Model	DV	Predictors	Random Intercept	Covariate
Advert order recognition-Full	Binary Recognition	Position	Participant	z.recognition_RT
Advert order recognition - Null	Binary Recognition	-	Participant	-

Recognition by advert

Next, three logistic regressions were conducted looking at the predictive effect of seeing the misinformation adverts on reporting them as programme content; these tests used an FDR-corrected alpha level to maintain a long-term error rate of .05 (see Table 5.11). The package "mlogit", was used to construct the logistic regressions in R (version 1.0-1; Crossiant, 2019).

Robust source memory

In this analysis, true original programme event memory was compared to false misinformation advert brand memory and true control programme event robust recognition. To compare robust true and false memory across groups, a robust false memory score was created. To assess robust false memories of the misinformation advert brands, incorrect programme (1), and programme and advert (3) responses were collapsed together to give an overall robust false memory score. For both true programme brand events (original programme and control programme), robust true memory was marked by correct responses given to the programme (1) option. Indeed, such a practice is common in both the empirical and applied misinformation literatures (Zhu, et al., 2012; Hellenthal, Howe, & Knott, 2016).

Robust source monitoring

To assess robust memory, a GLMM with a binomial distribution and logit link function looked to assess the fixed effects of the interaction between condition and trial type on robust recognition memory likelihood (see Table 5.4 for the model terms). The model was also simplified, removing the interaction and recognition reaction terms and instead using only main effects of condition and trial type as fixed effects. The model contained 864 observations from 96 participants.

Table 5.4
Terms for the robust memory generalised linear mixed model.

Model	DV	Predictors	Random Intercepts
Robust SM - Full	Robust Recognition	Condition, Trial type, Condition*Trial type	Participant, Brand
Robust SM - Null	Robust Recognition	-	Participant, Brand
Robust SM - Simplified	Robust Recognition	Condition, Trial Type	Participant, Brand

There were three post-hoc tests from the overall robust memory GLMM. The first compared the whole sample’s robust memory performance across both misinformation and original programme brand information. This model had a single effect of trial type with the random effects of participant and brand. The model contained 576 observations from 96 individuals. Next, the robust memory for the control programme event was compared to both false memory for the advert brand and true memory for the original programme brands. The same model parameters were employed as the first post-hoc model (see Table 5.23 for the FDR corrected alpha levels used).

Robust memory guess rate

Although guesses were separated out as part of the source monitoring paradigm, of particular interest was whether individuals had a higher rate of uncertainty across the different trials and in different conditions. The fixed effects in the initial model were an interaction between condition and trial type, with recognition reaction time being included as a covariate. The dependent variable used was the source monitoring guess rates. Random effects of participant and brand were also included. The model contained 864 observations from 96 participants. The model was also simplified, so that the interaction term was the only fixed effect.

Robust advert order memory

Next, a GLMM was constructed to investigate the effects of advert position on robust misinformation recognition (see Table 5.5). The model included 142 observations from 48 participants.

Table 5.5
Terms for the robust advert order generalised linear mixed model.

Model	DV	Predictors	Random Intercept
SM Order – Full	Robust false recognition	Position	Participant
SM Order – Null	Robust false recognition	-	Participant

Predicting robust memory performance from suggestibility.

Robust false memory for misinformation brands

To understand if heuristic endorsement could predict later robust false memory, robust false advert brand endorsement was compared across those who said yes and no on the first recognition task (see Table 5.6). The model contained 142 observations from 48 participants. The model was then simplified so that recognition was the only fixed effect.

Table 5.6
Terms for the robust false misinformation generalised linear mixed model.

Model	DV	Predictors	Random Intercept	Covariates
Robust False Misinformation - Full	Robust False Recognition	Recognition	Participant	z.recognition_RT, z.brand_liking z.advert_liking, z.advert_quality
Robust False Misinformation - Null	Robust False Recognition	-	Participant	-
Robust False Misinformation - Simplified	Robust False Recognition	Recognition	Participant	-

Robust true memory for misinformation brands

Next, whether the recognition task performance could predict robust true memory for the misinformation brands was tested (see Table 5.7). That is, a GLMM predicted whether initial recognition performance could influence correct selection of advert during the source monitoring measure. The model contained 142 observations from 48 participants.

Table 5.7
Terms for the robust true misinformation generalised linear mixed model.

Model	DV	Predictors	Random Intercept	Covariates
Robust True Misinformation - Full	Robust Advert Recognition	Recognition	Participant	z.recognition_RT, z.brand_liking z.advert_liking, z.advert_quality
Robust True Misinformation - Null	Robust Advert Recognition	-	Participant	-

Robust true memory for the original programme event

This model predicted whether performance on the initial recognition measure predicted correct robust true performance on the source monitoring measure (see Table 5.8). That is, did the assigned condition interact with participants' memory performance to influence robust memory? The model contained 288 observations from 96 participants. The model was also simplified to contain only recognition and condition as main effects.

Table 5.8
Terms for the robust true programme generalised linear mixed model.

Model	DV	Predictors	Random Intercept	Covariates
Robust True Programme - Full	Robust Programme Recognition	Recognition*Condition	Participant	z.recognition_RT
Robust True Programme - Null	Robust Programme Recognition	-	Participant	-
Robust True Programme - Simplified	Robust Programme Recognition	Recognition, Condition	Participant	-

Brand Liking

Brand liking was compared across groups using a GLMM with an identify link function and Gaussian error distribution. Maximum likelihood estimate was enabled. The model contained a single fixed effect of condition and a single random effect of participant. The dependent measure was the brand liking rating. The model contained 286 observations from 96 individuals.

Results

Firstly, the demographic differences were compared across groups. It was found that there were no differences in gender, age, prior 30 Rock viewing, or programme humour ratings between the two conditions.

Recognition memory

The table below represents the raw percentage scores by condition and trial type (see Table 5.9). The chance performance on overall recognition per trial type was 11.11%.

Table 5.9
Recognition measure yes endorsement percentages by condition and trial type.

		Trial Type (%)		
Condition	Response	Original Trials (Hits)	Misinformation Trials (False Alarms)	Control Programme Trials (Hits)
Experimental	Overall Recognition	37.5 (4.05)	46.5 (4.17)	65.3 (3.98)
	Remember	16.0 (3.06)	16.7 (3.12)	13.2 (2.83)
	Know	8.33 (2.31)	14.6 (2.95)	16.7 (3.12)
	Guess	13.2 (2.83)	15.3 (3.01)	35.4 (4.0)
Controls	Overall Recognition	36.1 (4.02)	24.3 (3.59)	65.3 (3.98)
	Remember	12.5 (2.77)	7.64 (2.22)	11.8 (2.7)
	Know	11.1 (2.63)	7.64 (2.22)	32.6 (3.92)
	Guess	12.5 (2.77)	9.03 (2.4)	20.8 (3.4)

Note. () represent SEM.

A likelihood ratio test found that the model with the interaction between condition and trial type predicted recognition better than the null model (χ^2 (6) = 29.1, p < .001). Assessing the influence of each predictor, the interaction between condition and trial type was predictive of recognition performance (χ^2 (2) = 10.39, p = .005), however, recognition reaction time was not (χ^2 (1) = 3.08, p = .079). The model was then simplified so that only the interaction remained and upon comparison with the null it was found to be significant (χ^2 (5) = 26.02, p = .001; see Table 5.10 for model coefficients). The theoretical marginal R^2 = 0.11, suggesting that the fixed effects could account for 11% of the variance in recognition. The theoretical conditional R^2 = 0.16, suggesting the total model explained 16% of the variance in overall recognition. This suggested that there were differences in yes endorsement across the trial types based on group allocation.

Table 5.10
Generalised linear mixed model demonstrating the coefficients from the recognition model.

Term	Estimate	*SE*	Lower CL	Upper CL	*p*
Intercept	0.65	0.27	0.14	1.21	(i)
Condition Experiment:Trial Type MI	1.03	0.36	0.41	1.77	.004
Condition Experiment:Trial Type OI	0.06	0.36	-0.65	0.74	.858

Note. (i) P-value of intercept omitted due to lack of interpretable meaning.

Firstly, it was found that when comparing the programme original event memory across conditions, there was no difference in recognition (χ^2 (1) = 0.06, p = .809). Similarly, when comparing the recognition of the control programme event across conditions there was no difference in recognition performance (χ^2 (1) = 0.00, p = .999). That is, seen event recognition did not differ across groups. However, when comparing those who saw the misinformation adverts with those who did not, those who saw the misinformation adverts were more likely to report the brands as programme content (χ^2 (1) = 13.87, p < .001).

Next when looking at recognition rates of the misinformation brands and the original programme events in the experimental group only, it appears that seeing the misinformation brands leads to equal recognition performance across these two types of trial (χ^2 (1) = 1.33, p = .248). Individuals who saw the misinformation were as likely to endorse the original programme information as they were to report the misinformation brand. Similarly, comparing endorsement rates of the misinformation brand in the experimental condition with the rates of endorsement for the original brand information for those who were in the control condition showed recall was similarly equal (χ^2 (1) = 1.43, p = .231). Together, these comparisons confirmed that misinformation endorsement was at least as likely as endorsement of the original programme information (see Table 5.11 for corrected alpha levels).

Table 5.11

FDR corrected alpha levels for the brand recognition post-hoc tests.

Brand recognition post-hoc tests	*p*	FDR *q*
Misinformation	<.001	.006
Maytag recognition	.001	.013
Dos Equis recognition	.029	.019
Jeep recognition	.15	.025
Experimental misinformation – control original information	.231	.031
Experimental misinformation – experimental original information	.248	.038
Original information	.809	.044
Control	.999	.050

Note. FDR q represents the corrected alpha level for each post-hoc test.

Recognition guessing

The tables below demonstrate guess rates by condition (see Table 5.12), and by trial type (see Table 5.13).

Table 5.12

Table displays the guess rates by condition.

Condition	Guess Rate (%)
Experimental	21.3 (1.97)
Control	14.1 (1.68)

Note. () represent SEM.

Table 5.13
Table displays the guess rate by trial type.

Trial Type	Guess Rate (%)
Original Programme	12.8 (1.98)
Misinformation Advert	12.2 (1.93)
Control Programme	28.1 (2.65)

Note. () represent SEM.

A likelihood ratio test comparing the full and null guess models demonstrated predictive capabilities of the full over the intercept-only model (χ^2 (6) = 22.86, p < .001). It was found that recognition reaction time was predictive of recognition guessing (χ^2 (1) = 5.36, p = .021). However, the interaction term between condition and trial type was not (χ^2 (2) = 2.6, p = .265). The model was then simplified, removing the interaction term. The simplified model was then subsequently compared with the null, and found to still be more predictive (χ^2 (4) = 20.21, p < .001; see Table 5.14 for model coefficients). Assessing the fixed effects, it was found that condition (χ^2 (1) = 5.27, p = .022), trial type (χ^2 (2) = 8.25, p = .016), and recognition reaction time (χ^2 (1) = 5.29, p = .021), were all significantly predictive of recognition guessing likelihood. Overall the model's fixed effects accounted for 9% of the variance in guess response (theoretical marginal R^2 = 0.09). The overall model accounted for 19% of the total variance in the guess response (theoretical conditional R^2 = 0.19). This suggested that those who took longer, as well as those participants in the experimental conditions, had a higher likelihood of guessing.

Table 5.14
Table displays the coefficients for the full recognition guess rate model.

Term	Estimate	*SE*	Lower CL	Upper CL	*p*
Intercept	-1.34	0.25	-1.88	-0.83	(i)
Recognition RT	0.21	0.09	0.09	0.5	.019
Condition	0.51	0.22	0.08	0.93	.019
Trial Type MI	-1.08	0.32	-1.78	-0.37	<.001
Trial Type OI	-1.00	0.09	-1.62	-0.34	.002

Note. (i) intercept p-value omitted for lack of meaningful interpretability.

To ascertain which trial type had the highest guess rate, three post-hoc tests were run. Firstly, original programme and advert misinformation guess rates were compared, finding that there was no difference between the two trial types across the whole sample (χ^2 (1) = 0.98, p = .320). However, when comparing control programme brand guessing with misinformation brand (χ^2 (1) = 7.5, p = .006), and original programme brand (χ^2 (1) = 4.33, p = .037), it was found that both were different. This suggested that control programme recognition guess rate was significantly higher than the other two trial types (see Table 5.15 for corrected p values).

Table 5.15
FDR corrected alpha levels for the recognition guess rate post-hoc tests.

Recognition guess rate post-hoc tests	*p*	FDR *q*
Misinformation – control	.006	.017
Original information – control	.037	.033
Misinformation – original information	.320	.050

Note. FDR q represents the corrected alpha level for each post-hoc test.

Remember/Know

GLMM analysis was attempted on both remember- and know-dependent measures. It was found that the remember model containing the interaction between condition and trial type was no more predictive than the null (χ^2 (6) = 8.45, p = .207). This suggested there was no difference in remember responses across condition or trial type. Unfortunately, the know model resulted in a singular fit, meaning the analysis was abandoned for lack of interpretable meaning. The descriptive remember and know percentages are given in the table below (see Table 5.16).

Table 5.16
Remember and know percentages by condition and trial.

Condition	Trial Type	Trial	Remember (%)	Know (%)
Experimental	Misinformation	Dos Equis	4.17 (2.91)	18.8 (5.69)
	(False Alarms)	Maytag	18.8 (5.69)	16.7 (5.44)
		Jeep	27.1 (6.48)	8.33 (4.03)
	Original Information	Non-brand Beer	0.0 (0.0)	8.33 (4.03)
	(Hits)	GE	12.5 (4.82)	8.33 (4.03)
		Hummer	35.4 (6.98)	8.33 (4.03)
Control	Misinformation	Dos Equis	2.08 (2.08)	6.25 (3.53)
	(False Alarms)	Maytag	10.4 (4.46)	2.08 (2.08)
		Jeep	10.4 (4.46)	14.6 (5.15)
	Original Information	Non-brand Beer	0.0 (0.0)	6.25 (3.53)
	(Hits)	GE	16.7 (5.44)	6.25 (3.53)
		Hummer	20.8 (5.92)	20.8 (5.92)

Note. () represents SEM.

Recognition advert order effects

The table below demonstrates the recognition suggestibility rates for the misinformation advert brand (Table 5.17).

Table 5.17
Table displays the recognition percentage for misinformation adverts by the position they were seen.

Position	Recognition (%)
Before	48.7 (5.25)
After	43.8 (6.25)

Note. () represent SEM.

A likelihood ratio test compared the predictive ability of the full and null advert position recognition model, finding that the full was no better at predicting recognition performance (χ^2 (2) = 4.4, p = .111). This result suggested that whether adverts were seen prior to or after the programme event, both could influence the suggestibility on a later test supporting the idea of familiarity misattribution requiring no specific locality. No further analysis was conducted.

Recognition by advert

Below are the individual recognition scores per advert across conditions and by original programme brand and advert brand (Table 5.18).

Table 5.18

Recognition percentages for the original programme and misinformation advert brands by condition and trial.

Condition	Trial Type	Trial	Recognition (%)
Experimental	Misinformation (False Alarms)	Dos Equis	43.8 (7.24)
		Maytag	43.8 (7.24)
		Jeep	52.1 (7.29)
	Original Information (Hits)	Non-brand Beer	25 (6.32)
		GE	33.3 (6.88)
		Hummer	54.2 (7.27)
Control	Misinformation (False Alarms)	Dos Equis	22.9 (6.13)
		Maytag	12.5 (4.82)
		Jeep	37.5 (7.06)
	Original Information (Hits)	Non-brand Beer	25 (6.32)
		GE	29.2 (6.63)
		Hummer	54.2 (7.27)

Note. () represent SEM.

To further elucidate which of the three trials was driving the effect, three logistic regressions were conducted (see Table 5.11 for FDR correction).

Dos Equis

Firstly, a logistic regression was constructed to assess whether a participant seeing the Dos Equis advert predicted later endorsement of the brand in the programme. It was found that the condition was not a significant indicator of whether Dos Equis was reported at the corrected alpha level ($\chi^2(1) = 4.75$, $p = .029$).

Jeep

The next model looked to assess whether viewing the Jeep advert had a predictive influence on reporting the Jeep in the programme content. The model suggested that whether the advert was seen by the participant did not influence the likelihood of reporting the Jeep in the programme ($\chi^2(1) = 2.07$, $p = .15$).

Maytag

Finally, the effect of Maytag advert exposure on Maytag programme recognition was investigated. It was found that whether a participant had seen the advert determined whether the Maytag was endorsed as programme content ($\chi^2(1) = 12.11$, $p < .001$). The model could explain between 10% (Hosmer and Lemeshow R^2) and 17% (Nagelkerke's R^2) of the total variance. The odds ratio for the experimental condition predictor was 5.44, indicating that individuals who viewed the Maytag advert were 5 times more likely to report seeing it in the programme than controls.

Table 5.19
Logistic regression predicting the likelihood of reporting advert brand as programme content based on advert exposure.

			95% CI for Odds Ratio		
	B (*SE*)	*p*	*Lower*	Odds ratio	*Upper*
Maytag Recognition					
Constant	-1.95 (0.44)	<.001			
Condition	1.69 (0.52)	<.001	2.05	5.44	16.44

Note. Odds ratio and associated CIs were not created for the intercepts due to a lack of interpretable value.

Robust memory measure

The table below displays the percentage of yes responses in the source monitoring paradigm, splitting the responses by each individual response and the robust memory score (see Table 5.20).

Table 5.20
Showing the percentage of yes responses on the source monitoring task by condition, response and trial type.

Condition	Response	Trial type (%) Original Trials	Misinformation Trials	Control Trials
Misinformation	Programme	35.4 (4.0)	24.3 (3.55)	61.8 (4.06)
	Advert	4.2 (1.67)	40.3 (4.09)	1.4 (0.98)
	Both	3.5 (1.53)	6.9 (2.13)	4.86 (1.8)
	Neither	32.6 (3.94)	15.3 (3.12)	23.6 (3.55)
	Guess	24.3 (3.55)	13.2 (2.83)	8.3 (2.31)
	Robust	35.4 (4.0)	30.6 (3.85)	61.8 (4.06)
Control	Programme	41 (4.11)	31.9 (3.9)	68.1 (3.9)
	Advert	5.6 (1.92)	3.5 (1.53)	2.08 (1.19)
	Both	1.4 (0.98)	2.08 (1.19)	4.86 (1.8)
	Neither	36.1 (4.02)	42.4 (4.13)	14.6 (2.95)
	Guess	16 (3.06)	20.1 (3.35)	10.4 (2.55)
	Robust	41 (4.11)	34 (3.96)	61.8 (3.9)
Trial type	**Total robust**	38.2 (2.87)	32.3 (2.76)	64.9 (2.82)

Note. () represent SEM.

A likelihood ratio test suggested that the model containing the fixed effects was more predictive of robust source memory than the null (χ^2 (5) = 12.62, p = .027). Assessing the individual fixed effect, it was found that the interaction between condition and trial type did not predict robust source memory (χ^2 (2) = 0.11, p = .945). The model was then simplified, removing the interaction term, before again being compared to the null model. This second likelihood ratio test found that the simplified model remained predictive over the null (χ^2 (3) = 12.51, p = .006; see Table 5.21 for model coefficients). In the simplified model, it was found that condition did not predict source memory (χ^2 (1) = 2.42, p = .120), however trial type did (χ^2 (2) = 10.09, p = .006). This suggested underlying differences in performance across the various trials that was not associated with condition allocation. It was found that the model's fixed effects could account for 10% of the variance in the robust source memory performance (theoretical marginal R^2 = 0.10), whereas the full model accounted for 14% (theoretical conditional R^2 = 0.14).

Table 5.21
Generalised linear mixed model demonstrating the fixed effect of condition and trial type on robust source monitoring performance.

Term	Estimate	*SE*	Lower CL	Upper CL	*p*
Intercept	0.75	0.26	0.24	1.26	(i)
Condition	-0.23	0.15	-0.51	0.06	.118
Control:MI	-1.41	0.35	-2.09	-0.74	<.001
Control:OI	-1.14	0.35	-1.83	-0.49	.001

Note. (i) p value not included due to lack of interpretable value.

Three post-hoc tests confirmed the differences in trial type responding (see Figure 5.20 for robust trial type scores). Firstly, when attempting a post-hoc test, the model containing original programme hits and the advert robust false alarms resulted in singular fit. This is not surprising given how similar these scores were. However, it was found that the control programme hits were more likely than both original programme hits (χ^2 (1) = 6.39, p = .011), and misinformation advert false alarms (χ^2 (1) = 9.02, p = .003). This suggested that overall, the individuals had a harder time recognising the correct events for the original programme when compared to other programme events (see Table 5.22 for corrected alpha levels.).

Table 5.22
FDR corrected alpha levels for the robust recognition post-hoc tests.

Robust recognition post-hoc tests	*p*	FDR *q*
Misinformation – control	.003	.013
Dos Equis - Maytag	.005	.025
Original information – control	.011	.038
Dos Equis – Jeep	.419	.050

Note. FDR q represents the corrected alpha level for each post-hoc test.

Source monitoring guessing

See Table 5.20 above for the guess rates by condition and trial. A likelihood ratio test then compared the rate of guess response given to the source monitoring measure. It was found that the full model was no more predictive than the null (χ^2 (5) = 10.68, p = .058). No further analysis was conducted.

Robust false memory advert order

The table below shows robust false rates by advert position (Table 5.23).

Table 5.23
Table displays robust false recognition rates of advert misinformation brands by advert position.

Position	Robust False (%)
Before	30.0 (5.16)
After	31.3 (5.84)

Note. () represent SEM.

A likelihood ratio test found that the full position source monitoring model was not better at predicting robust false memory than the null (χ^2 (1) = 0.00, p = .929). No further analysis was conducted.

Predicting robust performance from initial recognition

Suggestion's effect on robust false memory

The table below displays the rates of robust false memory by initial false recognition for individuals who saw the misinformation advertising (see Table 5.24). This analysis contained only misinformation trials.

Table 5.24
Table displays robust false memory as a function of whether the participant initially endorsed the advert brand or not.

False Recognition	Robust False Recognition (%)
Yes	50.7 (6.15)
No	13.0 (3.86)

Note. () represent SEM.

A likelihood ratio test found that the full model was significantly predictive of advert robust false memory (χ^2 (5) = 54.98, p <.001). When assessing the individual fixed effects, it was found that initial recognition performance was predictive of robust false memory (χ^2 (1) = 30.95, p = .000). However, each of the covariates; recognition reaction time (χ^2 (1) = 0.62, p = .431), advert liking (χ^2 (1) = 2.48, p = .115), brand liking (χ^2 (1) = 0.49, p = .486), and advert quality failed to provide predictive value (χ^2 (1) = 1.82, p = .178). The model was then remade without the insignificant covariates. It was found that the reduced model was still significant when compared with the null model (χ^2 (1) = 50.09, p = <.001). The model's fixed effect could explain 27% of the variance in robust false memory (theoretical marginal R^2 = 0.27). The full model could account for 55% of the variance (theoretical conditional R^2 = 0.55).

Suggestion's effect on robust true advert recognition

The table below displays robust true source monitoring performance by initial false recognition for those who saw the misinformation advertising (see Table 5.25). This analysis contained only misinformation trials.

Table 5.25
Table displays rates of correct source monitoring by initial false recognition endorsement status.

False Recognition	Robust True Recognition (%)
Yes	32.8 (5.78)
No	45.5 (5.78)

Note. () represent SEM.

A likelihood ratio test suggested that the full model was more predictive than the null (χ^2 (5) = 11.29, *p* = .046). A further likelihood ratio test demonstrated that false recognition was not predictive of robust true memory (χ^2 (1) = 3.85, *p* = .050). Equally, none of the covariates were predictive of robust source memory; recognition reaction time (χ^2 (1) = 0.11, *p* = .736), advert liking (χ^2 (1) = 1.87, *p* = .171), brand liking (χ^2 (1) = 1.96, *p* = .162), and advert quality (χ^2 (1) = 0.33, *p* = .568). No further analysis was conducted.

True recognition memory's effect on robust memory performance

The table below displays true source monitoring rates for the original programme events across both conditions as an effect of initial correct recognition (see Table 5.26).

Table 5.26
Correct source monitoring performance as a function of condition and correct initial recognition.

Condition	Recognition	Robust True Recognition (%)
Experimental	Yes	66.7 (6.48)
	No	16.7 (3.95)
Control	Yes	84.6 (5.05)
	No	16.3 (3.87)

Note. () represents SEM.

Firstly, it was found that the full model was significantly more predictive of robust true recall (χ^2 (4) = 106.17, p <.001). Furthermore, the fixed effect of recognition reaction time (χ^2 (1) = 0.44, p = .506), and the interaction term between condition and recognition (χ^2 (1) = 2.86, p = .090), were non-predictive. The model was then simplified to only main effects of recognition and condition. It was found that this reduced model remained predictive over the null (χ^2 (2) = 103.06, p = <.001). The main effect of condition was not predictive of robust true original programme memory (χ^2 (1) = 1.73, p = .188). However, initial recognition performance did predict subsequent robust true programme memory (χ^2 (5) = 102.21, p = .000). The model's fixed effects could account for 36% of the variance in robust true original programme recognition score (theoretical marginal R^2 = 0.36). The full model could explain 40% of the variance in the robust true original programme memory score (theoretical conditional R^2 = 0.4). Those who initially endorsed the correct brand option were more likely to correctly report on the robust memory measure.

Brand liking

The figure below displays the mean ratings of brand liking across the two conditions (see Figure 5.3 below).

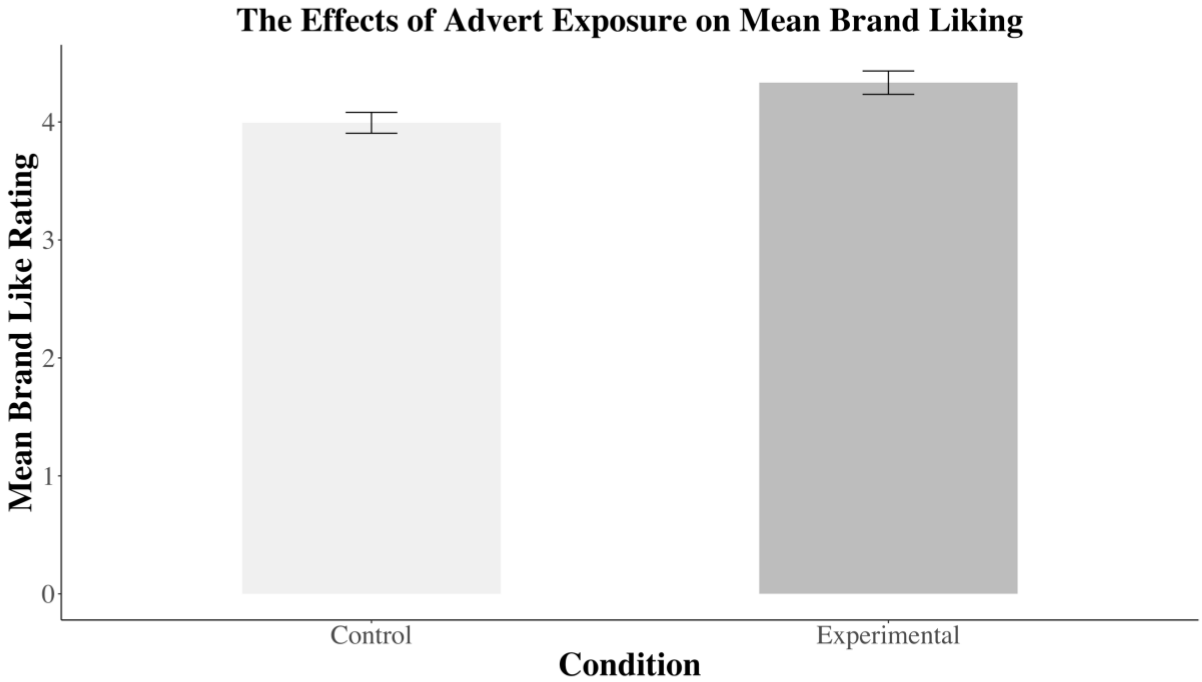

Figure 5.3. *Graph displaying the mean brand liking rating by condition. Error bars represents 1± SEM.*

When attempting to create a brand-liking model, significant stability issues arose from non-normality. As such, the comparison was abandoned.

Discussion

When viewing TV programmes, category product related adverts can sow the seeds of misinformation for on-screen events. Indeed, those who saw misinformation advert brands reported at an equal rate to the real programme brand events. Equally, viewing the category related adverts doubled endorsement of these false alternatives when compared to simply having the same brand mentioned as part of the questioning in the control condition. For currently ambushed brands, the most worrisome finding is that misattribution effects do not hinge upon the position of the advert, rather adverts seen before or after were just as likely to produce this effect on heuristic processing. This effectively reduces the criteria for successful ambushing. However, the results did indicate that the use of familiarity can be somewhat curtailed when event recollection is required as memory evidence, with source monitoring bringing robust false brand recognition back in line with controls which is in accordance with previous research (Lindsay, & Johnson, 1989a; Mitchell, & Johnson, 2009). The study did provide some tertiary evidence that prior-experimental brand familiarity can influence robust memory reporting. This has implications for how available brand information is remembered and how a brand's wider market standing can influence its suggestion efficacy (Johnson, & Seifert, 1994). What is more, initial recognition performance did appear to have some lasting influence over robust memory, with those who initially demonstrated false advert brand endorsement going on to have robust false memory at a much higher rate. Likewise, those who initially endorsed the correct programme event were more likely to have a later correct robust true memory. These effects show it is important to minimise the likelihood of misinformation taking hold but when it does, misinformation acceptance as a mechanism is of great use to any ambusher.

Brands such as Nike have been capitalising on their own form of media misinformation for decades, targeting real world events that are prevalent in the current social consciousness (Passikoff, 2012). However, to date, no study has created a modified misinformation paradigm out of a TV viewing event, specifically investigating how heuristic and systematic processing influences and moderates brand memory misattribution. The study allowed for a closer inspection of the mechanism's nuance, as well as highlighting when and where ambushing maybe at its weakest as well as the conditions where it should be most fertile. The present research indicates that while changing the decision criteria is key for reducing misinformation, programme events that encounter similar category product adverts combined with false suggestion, be it via word of mouth, social media posting, or advertising, can still lead to enduring deficits in accurate recognition.

How was it that viewing adverts that made no explicit reference to a programme event could influence how the programme was recognised? When later giving a recognition judgement regarding the programme, the cost of being incorrect was, as in real life, low. This low involvement means participants can answer the recognition question entirely based on how familiar the brand felt to them with no additional need to recruit recollective mechanisms. The source monitoring framework predicts that yes/no recognition causes an over-reliance on meta-cognitive strategies such as familiarity to increase the ease and speed of decision making (Lindsay, & Johnson, 1989a; Mitchell, & Johnson, 2009; see Chapter One: Introduction). In line with this prediction, after viewing the advert, the brand's resting familiarity was increased, and this fluency of experience was incorrectly drawn upon as evidence in the simple recognition task. This did not mean individuals could not initially remember what really occurred, as evidenced by the equal rates of correct recognition, rather this finding suggests that familiarity opens the door for later misremembering. Furthermore, the increase in false recognition was not accompanied by a change in the remember rates across the two conditions; that is, seeing the Maytag oven advert did not change the participant's ability to retrieve advert event details with Maytag embedded, indicating another mechanism for the change. Equally, while the interaction between the programme condition and trial type for the recognition guess rate was not predictive, there was an overall increase in recognition guessing for those in the experimental condition. Seeing the advert brands may have increased the overall uncertainty in respondents' answering increasing misinformation acceptance likelihood. Overall, it appears that when adverts are viewed without making direct reference to the programme, these brands can be endorsed as programme content. For an ambusher, this ambiguity is an opportunity. In real world ambush campaigns, adverts would use related events and be accompanied by suggestive strap-lines or social media activity as has been noted in Nike's ambush success, which would further increase misattribution likelihood. Regardless of these additional qualities that would enhance misattribution, the present study shows that simply viewing a proximally and plausibly placed competing product brand in the surrounding advert breaks increases false recognition when individuals use heuristic decision making.

As well as brand familiarity being increased by advert exposure, the study rather unintentionally demonstrated that the different levels of pre-experimental brand familiarity had an impact on both recognition and source monitoring performance. For example, it was found that in the source monitoring measure, Dos Equis had higher sample-wide robust recognition than the Maytag brand. This indicated that the sample had greater pre-experimental awareness of Dos Equis than the Maytag brand. Indeed, existing brand familiarity has been shown to be a driver of false memory (Krug, & Weaver, 2005; as noted in Chapter Four, it was discovered after the experiments were conducted that Dos Equis had gained Twitter notoriety). In the current study, given over 75% of the sample were from westernised cultures living in the UK, it is highly likely that they had existing knowledge of both Jeep and Hummer brands. This will have predisposed them to higher levels of familiarity regardless of the condition the participant was allocated to. Prior familiarity may explain why the rates of robust false memory for Jeep were so high in the control condition. In fact, it changed the criteria for endorsing brands even when they had not been seen in the experiment, as was the case for the control condition. This suggests a flaw in the selection of brands used in the study, as the analysis should have factored in their prior familiarity more robustly rather than simply measuring advert familiarity. Although the prior familiarity difference did influence the results, this finding in and of itself is useful in guiding how brand managers think about and counter ambushing in terms of their own, as well as their ambusher's, market standing. Future studies should split trials in the analysis by prior familiarity or use brand familiarity as a covariate in their modelling. Regardless of the source then, brand familiarity can be a driving force for false heuristic endorsement effects.

The effect of familiarity in influencing suggestibility has wider implications for how a brand's market standing can influence suggestion. Firstly, eye-witness research studying product brand memory has shown that familiar brands are more readily reported as seen, especially when original product memory is poor (Krug, & Weaver, 2005). Quite simply, those brands which are seen more, either because of advertising or everyday exposure, have greater top-of-mind availability. The availability heuristic predicts that the fluency of an item or its ease of retrieval provides insight into item importance, frequency, and the probability of it having been seen (Tversky, & Kahneman, 1973). This means that brands which enjoy a high base rate familiarity should distort the individual's perception of item plausibility, making them more inclined to agree that such an item was seen (Johnson, & Seifert, 1994). At the time of Nike's "Find Your Greatness" campaign, Nike ranked second on the Customer Loyalty Engagement Index, with Adidas coming in fifth (Russell, 2012). During the 19-day event, reports also showed that the number of tweets containing "Nike" and "Olympics" was nearly double the number of tweets containing "Adidas" and "Olympics" (Socialbakers, 2012). Given the top-of-mind position Nike had going into its ambushing campaigning and widespread availability online, the present study indicates that this greater familiarity and concurrent availability will have aided the success of their misinformation campaign. When considering suggestion or ambusher misinformation more widely then, market leading brands may be more effective at being interpolated into or associated with events that they were not otherwise partnered with. Simply put, the more exposure a brand has, the easier ambushing becomes.

It is evident that seeing related advert brands can influence their false recognition rates after viewing, but this process may have also been aided via the poor encoding that was seen for the programme events themselves. If when presented with the image of the oven whited out at test, the participant was unable to retrieve details of the GE brand mentioned/seen in the programme, then the high familiarity for the Maytag advert brand would have had no trace with which to compete and its plausibility along product category dimensions would lead to misinformation acceptance (McCloskey, & Zaragoza, 1985).

Indeed, looking at both recognition and source monitoring performance, regardless of condition allocation, the non-target control programme events were correctly recognised at a much higher rate than the original programme brand target events. This suggested that the seen car, beer, and oven events were not well encoded and ambiguous. When uncertainty is high, familiarity becomes harder to discount (Lee, 2001; Whittlesea, & Williams, 2001; Chew, Ebstein, & Zhong, 2012). If an individual failed to properly encode the programme brand information the chance of later accepting the seen advertised brand as programme content will increase, given its proximity, plausibility, and familiarity generated from seeing the advert. Moreover, supporting research has shown that peripheral items are, unsurprisingly, less well remembered and more often altered via misinformation acceptance (McCloskey, & Zaragoza, 1985; Belli, 1989; Loftus, & Hoffman, 1989; Luna, & Migueles, 2009; Mahé, Corson, Verrier, & Payoux, 2015; Putnam, Sungkhasettee, & Roediger III, 2017). Although none of the target events in the study could be considered background events, their branded information did not appear to stimulate sample-wide robust encoding given the low rates of hits in the original brand condition for both conditions, making them prime targets for misinformation acceptance (Bressoud, Lehu, & Russell, 2010).

When an ambusher is looking to associate themselves with an event or programme, they are usually attempting to alter the sponsor recall. As a sports event is more amorphous and less concrete than the specific instances used in the experimental trials, it is probable that misattribution is even more likely. In support of this, one large scale survey, conducted after the 1996 Olympic Games, showed there was widespread confusion as to which companies were sponsoring the event and how the tiered sponsorship structure worked (Shani, & Sandler, 1998). As the Olympics has multiple sponsors, and the fact that each of the myriad of sponsors comes from a different sector as well as having varying degrees of promotion rights, such conditions can only increase both uncertainty for true sponsors and plausibility for category-related ambushers. Considering London 2012, Adidas spent between 60 and 157 million dollars on sponsorship rights but in one market research survey, only 24% of the sample could correctly recall it as a sponsor (Passikoff, 2012; Wentz, 2012; Lee Yohn, 2016). Their marketing efforts failed to embed their brand into the event, and what peripheral brand information was available seems to have been missed by the lion's share of consumers. This ambiguity of the original information (e.g. the Olympic Games sponsor) meant that suggestion and misinformation acceptance were even more likely considering Nike's top-of-mind status.

For the purposes of this experiment, highly specific product events were chosen to enable a better trial structure, with a picture accompanying each written recognition question. This decision was made for several reasons. Firstly, given that the viewing experience was half an hour in length, the picture removed the ambiguity as to which scene, and specifically, which product the question referred to. The visual image also helped to speed up the measure, as during the experimental design phase written questions alone had led to confusion, dramatically increasing the time participants were spending on each trial. While this design decision did potentially reduce the generalisability of the findings, the proliferation of online fake information using Photoshopped and doctored photographs seemed congruent with the wider implications of the investigation (Sacchi, Agnoli, & Loftus, 2007). Despite this alteration to the stimulus presentation, the results were in line with the predictions made in the misinformation literature (Lindsay, & Johnson, 1989a; Tversky, & Tuchin, 1989; Johnson, Hashtroudi, & Lindsay, 1993).

Another important implication raised by the study's findings are that the order in which advert and programme event pairs were seen had no effect on the rates of heuristic endorsement, a finding that is in line with previous misinformation work (Lindsay, Johnson, 1989b; Rantzen, & Markham, 1992; Holliday, & Hayes, 2002). Familiarity as a memory evidence source is useful when one needs to make a simple present/absent judgement, but this information does not differentiate where an item was encountered. As such, where the misinformation advert was seen did not matter, what was important was that the individual encoded the brand information sufficiently that it would later feel familiar to them. In other words, misinformation suggestibility does not arise from where an item is seen, rather it is whether an item is experienced. Similarly, as order had no effect of changing the differentiating qualities of the two events at such short retention intervals, the position in which the advert was seen also did not have influence over robust source monitoring as was predicted. Unfortunately for currently ambushed brands, brand misattribution is a flexible mechanism requiring concept/stimulus familiarity rather than an order effect to be robustly achieved, unlike advert reminding (see Chapter Four). For Nike, the study's finding suggests that exposure to their adverts throughout the Olympic coverage may have been able to generate interference, regardless of where the adverts were seen. For ambushers then, social media or other ambushing marketing efforts occurring before, during, and after an event are likely to yield results from suggestion.

When participants were made to actively remember the context of each brand, robust false memory was no more likely for those who saw the misinformation adverts, than those who merely had the brand suggested as part of the questioning. This finding is in-keeping with the wider misinformation literature, showing that source monitoring can reduce suggestibility effects (Lindsay, & Johnson, 1989a; 1989b; Lindsay, & Johnson, 1991; Okado, & Stark, 2005). The source monitoring paradigm encouraged individuals to discount feelings of brand familiarity and instead shift the criteria for their recognition decision toward the perceptual and temporal information that participants could retrieve about the programme, and in the experimental condition, the adverts (Mitchell, & Johnson, 2009). Indeed, the divergent visual characteristics of the adverts and programmes should have allowed for rejection of false information if the participant could correctly retrieve the programme event (Gallo, Bell, Beier, & Schacter, 2006). Additional support for this retrieval of advert information comes from the fact that initial recognition performance was not predictive of the participant’s ability to later correctly source monitor the advert brands as advert content, indicating some alternative source of information was determining performance. That is, regardless of whether individuals said yes or no initially to the false brand, they did not use this information to later determine what was programme content. A true misinformation effect would be if the initial endorsement of false suggestion had a lasting effect on reducing robust true advert brand monitoring. If this was the case then one would expect a reduction in correct advert information monitoring after it was initially endorsed. It appears therefore that source monitoring and encouraging recollection can slow the spread of false brand information by decoupling viewers from their principle of least effort.

Did initial endorsement of the advert brand have any lasting effects on robust false memory for those who saw the misinformation adverts? As stated, false advert brand recognition performance for those in the experimental condition did not influence later correct monitoring. However, it did appear that those who initially endorsed the false brand on the first recognition measure were more likely to have a robust false memory for the advert brand as programme content. Indeed, those in the experimental condition who initially endorsed the advert brands went on to have a 50% likelihood of having a robust false memory. Although this subset of participants was not large enough to influence the overall results, it implies that suggestion has some lasting influence over more stringent memory processes for certain individuals. This finding bears relation to the wider continued influence of misinformation effects seen in other media contexts that once accepted, misinformation’s influence can be persistent (Ecker, Lewandowsky, & Tang, 2010). The only way to truly determine how this lasting influence occurred would be to test programme memory in the absence of suggestion first, but one can postulate that this finding results instead from misinformation acceptance (Belli, 1989; Loftus, & Hoffman, 1989; Mahé, Corson, Verrier, & Payoux, 2015). Once initially endorsed, those who failed to retrieve any conflicting advert or, more importantly, target programme event information, instead looked to their initial answer on the recognition task as a further evidence source, informing them that the brand had been encountered in the programme during the source monitoring measure. Indeed, this brand information was fluent, compatible, and coherent with what the viewer had seen, making it easier to accept (Lewandowsky, Ecker, Seifert, Schwarz, & Cook, 2012). In fact, this repetition and further acceptance of this false alternative may have resulted in a robust association between the programme and the misinformation brand, especially given the known effects of trace strengthening that result from repeated testing (Roediger III, & Karpicke, 2006). Although found in a minority of participants, the results provide further evidence of the effectiveness of the power of suggestion when events are poorly encoded.

The present study did not investigate the effects of retention interval on misinformation suggestibility and robust false memory. However, here it is worth noting that initial familiarity effects are often considered a marker for stronger and more robust misinformation effects that develop over time (Frost, 2000; Frost, Ingraham, & Wilson, 2002; Holmes, & Weaver III, 2010; Sherman, et al., 2015). Typically, after short retention intervals, recollective-based misinformation effects are harder to produce and it is more likely that misattribution errors are familiarity-associated, as was the case in the present study (Frost, 2000). After longer intervals, the same information that initially resulted from a familiarity misattribution can be reported as a consciously remembered event (Frost, 2000). The source monitoring framework predicts that initially, when trace acuity is high due to the minimal decay, source confusion is unlikely given the high levels of distinctiveness between traces (Mitchell, & Johnson, 2009; Moore, & Lampinen, 2016). Instead, at short retention intervals, it is a failure to engage in effortful cognition that is the basis for such errors (Mitchell, & Johnson, 2009; Moore, & Lampinen, 2016). Over time though, as memory decays and accurate event recall becomes harder, misinformation "remember" responses increase as the average difference between original and misinformation events decreases with this loss of trace acuity, making monitoring difficult (Moore, & Lampinen, 2016). With this prior work in mind, it is likely that the suggestibility effect seen in the present study may change over time, with more robust false memory occurring after a day or week long delay. Extrapolating from the present work and the wider literature then, correcting ambushers early and not allowing their familiarity associations to mature into robust false memories would seem to be a critical strategy.

The study has provided evidence for false brand memory during a typical TV viewing scenario but the study has many future directions. Firstly, given the large influence of prior brand familiarity, an assessment of high familiarity and low familiarity brand alternatives would provide further evidence for the market leader effectiveness in false memory. A further interesting addition to the present study or other advertising misinformation studies would be to ignore the misinformation literature orthodoxy and include free recall as the first memory measure. This would serve as a baseline of actual recall before experimental suggestion was introduced. As with the previous chapter, a form of recollection of repetition after advert memory was tested would have confirmed that individuals were able to detect the repetition and change in brand without explicit cuing from the questioning only. Similarly, on reflection the present study's application was too esoteric when compared to a more general investigation of programme interference. A future study then should increase the number of trials, similar to the design used in Chapters Two and Three, looking at the effects of recalling products seen in both adverts, and programmes. In this way, the conditions under which programme-only recall would lead to interference could be modelled and such conditions could be mitigated for when designing advert reminding products.

Although the study did have certain areas for future development, its findings directly evidence the mechanism of real world brand misinformation. This study is an original attempt to create a modified misinformation paradigm using real world TV stimuli, a technique that could be used to investigate sports event sponsorship brand memory or other media misinformation phenomenon, by combining the viewing procedures here with fake social media accounts adding suggestion (Hellenthal, Howe, & Knott, 2016). Secondly, ambiguity is the friend of the ambusher, robustly embedding sponsorship associations in event marketing or in misinformation-corrective messages is the only way to reduce its effectiveness. Finally, the study outlined the influence of brand familiarity on brand misattribution, misinformation acceptance, and on robust false memory, which will help guide smaller, non-market-leading brands, not be drowned out by their larger competitors.

Chapter Six – General discussion

TV advertising's value to brand managers in 2020 is clear; it provides unrivalled reach and effectiveness (Binet, & Field, 2019; Ebiquity, 2019; Thinkbox, 2019). However, these marketing performance outputs appear not to be echoed with interest from those allocating advertising spend and in fact, interest in TV advertising pre COVID-19 has been diminishing (Ebiquity, 2019). This thesis focused on understanding the reminding effects of advert-programme product repetitions on subsequent advert mental availability, in the process offering a new form of evidence-based, principle-driven, contextual advertising. To do this, several of its studies used modified versions of the paired associate paradigm. While the industry has seen certain worrisome trends, this thesis provides clear evidence, rooted in the cognitive psychology literature, that broadcast media should look to their contextual environment to increase their attractiveness (Ebiquity, 2019).

Summary of findings

Firstly, it was established that viewing repeating products between adverts and programmes could improve advert memory. The finding showed a much greater level of consistency than has been observed in other advertising programme context work (Furnham, Bergland, & Gunter, 2002; Furnham, Gunter, & Richardson, 2002). Verily, this effect was found under conditions of intentional and passive encoding of product pairs (Chapter Two and Three). Most importantly, and in accordance with the remindings framework, this effect was contingent upon the individual detecting and recollecting episodic detail from both the programme (P2) and the advert (P1). On a theoretical note, Chapter Two provided robust support for the reminding mechanism. Examination of this hypothesis has predominately relied upon simple stimuli, e.g. words or random word pairs, in-order to investigate its effects. Word pair studies have demonstrated the need for related episodic detail retrieval, for example; retrieving word B from an A-B word pair, when word pair A-D is encountered at P2 (e.g. Negley, Kelley, & Jacoby, 2018). Only when A-B is successfully brought back into working memory at A-D can it be enhanced. Chapter Two supported this finding, showing that the degree of advert memory enhancement was determined by the quantity and quality of advert retrieval during the programme (P2). At a basic level, detecting the product was sufficient to consistently show spaced product learning effects as has been shown in the literature (Maddox, 2016). Yet simply detecting the product repetition at P2 was not sufficient to facilitate advert brand memory, as detecting the product alone did not offer any encoding benefit to the brand during the programme. Instead, recalling the brand during the programme led to an increased recall probability of all three advert elements, suggesting quality trace availability at P2 leads to best memory performance later at test. Interestingly, repetition detection alone did have positive effects on participant's ability to describe the advert and its message. This suggests that participants generally were associating the product to the context within which it was found relatively easily. Such a finding suggests that for public information messaging, when only the message itself needs to be conveyed, advert reminding may have particularly positive effects on dissemination (e.g. governmental messaging such as COVID-19 controls, speeding awareness, drinking, or drug usage, that have a less direct focus on branded memorability).

Chapter Two also showed that the greater the length of time between P1 and P2, the harder it became for participants to make product repetition detections, although it must be noted that the combination of the endogenous goal and experimental conditions likely increased the viable lag length. However, this general trend is in line with the assumptions of reminding (Maddox, 2016). All effects were in line with reminding predictions, giving this updated advertising mechanism guiding principles that govern when and why advert memory can be improved (Hintzman, 2010; Negley, Kelley, & Jacoby, 2018).

Without intentional encoding directives, it would be difficult to capture reminding at P2, yet Chapter Three showed that having detection information available at test and after passive viewing could enhance advert memory. This study demonstrated that having product repetition recollection information was related to better advert product recall at test, but again, detection alone was not associated with improved brand memory directly. Indeed, the individual had to recollect details regarding both P1 and P2 events for advert brand memory to see any improvement. In fact, there was an additional benefit of reminding; while Chapter Two evidenced the secondary encoding efficacy at P2, Chapter Three demonstrated that the degree of recursive trace detail at test corresponded to the amount of facilitation seen after 24-hours. Although not always essential for facilitation to have occurred, remindings theory suggests that having access to a detailed recursive trace containing P1 and P2 will facilitate retrieval at the point of test (Negley, Kelley, & Jacoby, 2018). This is exactly what was found in Chapter Three. Moreover, this chapter confirmed that it was not only recall that could be influenced via detection information being available, but also advert recognition, *i.e.* being able to recollect the repetition meant performance on an earlier advert recognition measure was enhanced. All these effects were found while controlling for brand liking and advert familiarity. This study provides further support for reminding theory and should also be of interest to practitioners as all effects were established after a 24-hour delay between viewing and test. For complex stimuli such as adverts, it appears when lags are just tens of minutes between product placements, advert reminding can enhance memory over 24-hours.

The effects of product repetition using unfamiliar adverts from the US market were demonstrated in Chapter Four. Critically, having the opportunity to see programme events containing a product repeated from the advertising still resulted in better advert free recall. This was found when brand memory and prior advert exposure were minimal, with these conditions demonstrating poor brand memory regardless of experimental group. Even though a repetition detection measure was not included, Chapters Two and Three would suggest the benefit is derived from programme reminding. This study further allowed assessment of advert position on advert memory, as adverts were seen both before and after their respective programme events. If reminding were not to occur, the slightly reduced decay time and less intervening stimuli afforded to those adverts seen after the programme should have been remembered better. Instead, reminding would predict that those adverts seen before would benefit from a secondary encoding experiencing meaning the information has been passively rehearsed (Jacoby, Wahlheim, & Kelley, 2015). It was found that after 24-hours, reminded adverts that were seen prior to the programme event were better recalled than those seen after. This finding is therefore in line with reminding theory and, as initial evidence, has important implications for practitioners (Jacoby, Wahlheim, & Kelley, 2015; Negley, Kelley, & Jacoby, 2018). In addition, this chapter highlighted that simple product repetitions were unable to alter advert perceptions, unlike more programme-specific forms of repetition seen in other studies (e.g. Myers, Deitz, & Royne, 2014). As product repetitions are not programme-specific they do not appear to generate unique programme retrieval, thus are unable to influence how involved the advertising appears with respect to the viewer's current goal, the programme. Yet, given the difference in repetition locus (product- or programme-specific cues), Myers, Deitz, and Royne's (2014) study suggests that future advert reminding research may locate the attitudinal boundary, with Chapter Four establishing a limit to this effect. Overall, this chapter evidenced the product repetition mechanism in a situation more closely emulating the real world, with a diminished influence of advert familiarity given the US adverts and brands selected.

The final experimental chapter investigated how adverts placed in a reminding positioning can potentially interfere with the chosen media content itself. That is, after viewing adverts containing the same products as the programme, can this similar exposure bias programme recall? This study was inspired by Nike's now famous ambushing campaign, "Find Your Greatness", which inadvertently or otherwise used reminding adverts and proximal advert placement to induce brand misinformation. The study looked at how biasing memory decision making toward the more commonly used familiarity, and then more effortful recollection, could influence misinformation endorsement rates. When using familiarity measures to make recognition decisions, misinformation brands are endorsed at a higher rate when exposed to misinformation brands in a seen advert break. However, when encouraged to engage in more effortful recollection, those exposed to misinformation brands had advert brand endorsement rates in line with controls. This finding mirrors previous empirical work investigating the misinformation effect (Allen, & Lindsay, 1998; Lindsay, & Johnson, 1989a; Lindsay, 1990). Before this, no study had directly evidenced heuristic and systematic misinformation mechanisms during TV viewing. Furthermore, it was found that once the advert brand had initially been endorsed as programme content, around half of these participants went on to have robust false memories for the advert brand. Therefore, the study outlined that those seeking to control brand ambushing must command their environmental touch points and exposure regarding three key areas; brand familiarity, heuristic decision making, and programme/event ambiguity.

Reminding in the real world

The present work has demonstrated a method by which non-brand programme content can facilitate advert recall and recognition, even when that programme repetition contains no advert information. Equally, this phenomenon has been shown with both native and non-native advertising, as well as over various retention intervals and viewing conditions. Yet the possible reminding extensions mean this work should be considered a baseline for practitioners. If non-brand events are sufficient to trigger advert memory as has been the case in this thesis, then there should be myriad different avenues for enhancing memory. Indeed, although more esoteric and spanning multiple disciplines, studies in which the principles of advert reminding have been unknowingly adhered to consistently generate greater efficacy than the more prevalent thematic context work (Furnham, Bergland, & Gunter, 2002; Parker, & Furnham, 2007; Furnham, & Goh, 2014; Puccinelli, Wilcox, & Grewal, 2015; Davtyan, Stewart, & Cunningham, 2016).

In the following section, the mechanism behind the context congruency will be assessed given the evidence presented in this thesis, followed by discussion of how to make advert reminding more effective. Finally, some of the real-world impacts of advert reminding will be considered and the future of TV advert reminding will be deliberated.

Why prime, when one can remind?

Advertising research focusing on programme effects have generally looked to mood-congruency and priming to account for why adverts are sometimes recalled better in congruent contexts (Sharma, 2000; De Pelsmacker, Geuens, & Anckaert, 2002; Furnham, Bergland, & Gunter, 2002; Parker, & Furnham, 2007; Furnham, & Goh, 2014; Puccinelli, Wilcox, & Grewal, 2015; See Chapter One for theory discussions). The present thesis does not refute these mechanisms as having some explanatory value for some higher-order advertising effects, given what is known about context-dependent memory (Godden, & Baddeley, 1975; 1980). However, the broad-brush approach and unclear boundary conditions of advert cognitive priming struggle to account for the category product repetition nuance demonstrated throughout this thesis. Given the collection of findings from Chapters Two, Three, and Four, it is pertinent to address the difference in the predictions made by priming, and those by reminding, as to how advert memory can be improved.

Although very little detail is given in the advertising literature beyond construct availability, cognitive priming is sometimes referred to as cognitive semantic priming and references from the semantic priming literature are cited, as such, semantic priming will be drawn upon as an evidence base (Collins, & Loftus, 1975; Furnham, Bergland, & Gunter, 2002; Furnham, 2019). Prior research from Roediger, and Challis, (1992) investigating either exact or associated word pairs, such as synonyms or category words, for repetition effects has found divergent influences on explicit free recall and implicit priming measures. Exact repetitions led to the greatest increase in free recall, with the effect size for associated words on the same measure being half of that of the exact repetitions as is typically seen in other reminding studies (Hintzman, Summers, & Block, 1975; Tullis, Benjamin, & Ross, 2014; McKinley, Ross & Benjamin, 2019). In contrast, word fragment priming performance showed only small effects for exact repetitions, and for category or synonym repetitions, no evidence of priming was found at all. As well, Roediger and Challis' design also allowed for a 5 second exposure to each item, more than enough time than has been shown for reminding to occur (Negley, Kelley, & Jacoby, 2018). If semantic concept priming was as efficacious as Furnham et al. (2002) suggest, one would expect word fragment performance for conceptual items to be equal to or greater than that of free recall response in Roediger and Challis' (1992) work. Quite simply, category repetition is unable to produce semantic priming when exposure is over one second.

Priming is typically thought to be an automatic process, occurring without the need for cognitive control (Tulving, & Schacter, 1990). If priming were the mechanism behind advert-programme product repetition, advert memory facilitation would not be dependent on the participant's ability to consciously detect the repetition and retrieve the advert memory during viewing, even if this process is spontaneous; yet this is exactly what was found in Chapter Two. Likewise, at test, being able to consciously recollect the repetition pair should have no predictive value over memory facilitation, but this was not the case in Chapter Three. Rather, semantic priming would argue that the availability created via the shared concept should implicitly lead to higher recall without conscious insight into any processes used to retrieve the event/advert. The primed concept/product should be easily retrieved at test, without any conscious or even spontaneous cognition during viewing. The thesis findings appear hard to reconcile with the cognitive priming account (Zillmann, & Bryant, 1994; Furnham, Bergland, & Gunter, 2002).

At this point, it is important to highlight the explicit differences in implicit priming and involuntary retrieval, as for practitioners, such concepts can appear exceedingly similar. Priming predicts that exposure to a repeated stimulus does not require the individual to remember any of these specific exposure instances; likewise, priming also suggests that these exposure events do not consciously result in interdependence via retrieval (Roediger, & Challis, 1992). Instead at test, the stimulus should come to mind without any need for conscious insight, with performance based on the association strength between the test cue and the primed concept (Tulving, & Schacter, 1990; Roediger, & Challis, 1992; Hutchison, 2003). In contrast, reminding theory suggests that if P1 is similar enough to P2, they may generate a conscious but involuntary retrieval of the prior instance (Hintzman, 2004; 2010; 2011). Reminding's bottom-up involuntary retrieval is analogous to exogenous attention cues, such as flashing, moving, or facial elements of a visual array; while not in control of this reflexive action to attend to these events, individuals are conscious of their effects (Mulckhuyse, & Theeuwes, 2010; Berntsen, Staugaard, & Sørensen, 2013). It is this conscious awareness that allows for advert and programme interdependence, the secondary encoding at P2, and the recursive trace retrieval at test. Given that remindings' hypothesised purpose is to track frequency patterns over time, conscious insight is essential (Hintzman, 2011)!

Proponents of semantic priming suggest that its effectiveness is greatest when items are massed, with priming efficacy reducing as lag increases (Challis, 1993). However, what lag constitutes too greater an interval is not defined in the advertising cognitive priming literature (Furnham, 2019). One can assume that the benefit would be contingent upon diminishing concept availability. If this is so, it is likely to that the "window of opportunity" or the time between stimulus onset and the concept's availability reducing to the point beyond facilitation would be extremely short. For example, empirical work suggests semantic priming is most robust when it occurs at latencies of less than one second (Richardson-Klavehn, & Bjork, 1988; Bentin, & Feldman, 1990). Indeed, evidence for semantic priming at latencies at just tens of seconds is contingent upon semantic engagement with the priming item, a condition that seems unlikely when passively viewing (Becker, Moscovitch, Behrmann, & Joordens, 1997). This proposal struggles to account for either the exceedingly long lags seen in Chapter Two or the tens of minutes' lags used in Chapter Three. This would suggest that unless the advert and programme product were seen directly after one another in the viewing experience, cognitive priming is inadequate to account for Furnham et al.'s (2002) work specifically, and other advert context work more generally (Parker, & Furnham, 2007; Furnham, & Goh, 2014; Puccinelli, Wilcox, & Grewal, 2015).

Semantic priming thus appears to not fully account for product category repetition effects during TV viewing. Specifically, it struggles to account for category repetition (Roediger, & Challis, 1992; Hutchison, 2003), long lags (Richardson-Klavehn, & Bjork, 1988; Bentin, & Feldman, 1990; Becker, Moscovitch, Behrmann, & Joordens, 1997), and the interdependence that appears vital for advert-programme reminding to influence subsequent advert recall (Negley, Kelley, & Jacoby, 2018).

Future advertising research should look more closely toward the underlying context memory effects principles, which share some reminding assumptions. Extrapolating from the context dependent memory literature, the encoding specificity principle suggests the more similar two contexts become, the easier episodic retrieval becomes, not unlike shared cue uniqueness in the reminding literature (Tulving, & Thomson, 1973; Godden, & Baddeley, 1975; Hintzman, 2011, Berntsen, Staugaard, & Sørensen, 2013). On some level, it may be possible that high order categories can improve advert memory if such conditions satisfy encoding specificity principles (car/food, comedy/documentary, etc.). Yet, even for context dependent memory effects to occur, one can assume that an assumption of event characteristic similarity will further aid prediction (Tulving, & Thomson, 1973; Godden, & Baddeley, 1975). Furthermore, accepting shared cue uniqueness, or more closely adhering to the encoding specificity principle, would aid practitioners beyond simple category distinctions by focusing on the individual characteristics that may aid the combination of similar advert and programmes (e.g. do these advert and programme events share objects, actors, themes, colours, etc.?). The bottom line is a hypothesis that cannot outline whether a situation will facilitate or interfere with advert memory prior to testing is of little use to practitioners. As such, advert context researchers should expand their hypotheses with additional assumptions that can further guide practitioners as to when, where, and why context can work for them.

Brands as heuristics

On their most basic level, brands merely represent a mental short cut for making more complex decisions, whether online or in-store. Yet most of the time, consumers have little interest in brands themselves until their respective product category is needed (Macdonald, & Sharp, 2000). In fact, brands that are liked represent a heuristic for a fulfilled promise and loss avoidance, with these qualities interacting with decision structures (Peatfield, Parkinson, & Intriligator, 2012). While the present thesis has looked at the acute effects from advert-programme reminding, *creating brand awareness is not an overnight process* (Clark, Doraszelski, & Draganska, 2009; Schmidt, & Eisend, 2015). How a consistent reminding advert strategy will influence mental availability over time by increasing the channels and frequency in which a brand is encountered will be important to quantify. Indeed, one goal of advertising is to make a brand feel ubiquitous, familiar, and mentally available, so when a product category requires purchase, the marketed brand feels like a less risky option than its competitors (Baker, Hutchinson, Moore, & Nedungadi, 1986; Ambler, Braeutigam, Stins, Rose, & Swithenby, 2004; Coates, Butler, & Berry, 2006). In this way, reminding TV advertising creates another avenue to increase a brand's perceived ubiquity, as well as learn the advertising appeals embalmed into their marketing messages. The thesis results indicate that this strategy will be most effective when advertising has strong branded memorability, and thus may work best for increasing large scale campaigns. The bottom line is thus; over hours and days, when reminding is successful, brands can be made more mentally available, but more research is needed as to how reminding's campaign integration can affect long term marketing goals, which is key for the advertising industry.

Applied implications of exact and category repetition

Using category repetition to induce advert reminding, as was the case in the current thesis, created the most difficult conditions for retroactive facilitation, and thus consequently produced the strongest evidence that reminding could be used during TV viewing (Tullis, Benjamin, & Ross, 2014; McKinley, Ross & Benjamin, 2019). Indeed, it is well documented that repetition detection is harder to induce from category repetition; so, if it was efficacious, as was shown to be the case, further work containing exact product brand repetitions is much more likely to be effective (Tullis, Benjamin, & Ross, 2014; McKinley, Ross & Benjamin, 2019). The category repetition format was also chosen as it evidenced a more versatile mechanism that could be applied to a greater number of programmes and programme events, e.g. for a beer brand, there are thousands of generic programme events containing beer that they could look to associate themselves with.

In the commercial market, many adverts lack sustained brand presence, suitable brand-story integration, or creative quality to make them robust reminding stimuli. Poor advert brand memorability can be an impediment to successful reminding. In addition, advertisers have historically had little or no creative control over programme events with which they may wish to associate their adverts (although see section “That reminds me” below). Similarly, even when each chapter attempted to identify strong programme events and reasonable quality advertising, work in Chapters Three, and in an assumed sense, Chapter Four, found that most advert-programme pairs were missed. This detection failure was found even despite the advert-programme pairs used in Chapter Three showing a good reminding rate when an endogenous goal of detection was used in Chapter Two. This is not to say that category repetition cannot consistently remind, for example in Chapter Three, the suit and condom product repetition pairs achieved sample detection recollection rates of 70% and 65% respectively after 24-hours. Rather, achieving these high recollection of reminding percentages may take time, money, and effort on behalf of the practitioner. Endogenous conditions were required for creating compelling evidence of advert reminding viability, yet some advertisers may still be put off by the currently low hit rate during passive viewing, or may not have the time to invest in extensive advert-programme pair testing (*although this is highly recommended*).

Although more research is needed in this area, advertisers may wish to “hedge their bets” and increase the likelihood of repetition detection. If an advertiser is worried that the individual P1 and P2 components of a repetition pair may not be sufficient to trigger product reminding, then shared cue uniqueness could be increased via the combination of an advert with an identical product placement; as has been attempted in previous advertising research (Davtyan, Stewart, & Cunningham, 2016). Indeed, in advert repetition studies it has been shown that adverts with variable executions are capable of being detected as repetitions, albeit to lower levels than their identically repeated counter parts (Appleton-Knapp, Bjork, & Wickens, 2005). This identical repetition should facilitate reminding in two ways. Firstly, the increase in shared cue uniqueness would increase the associative overlap of the events making the repetition detection threshold lower and reminding easier (Benjamin, & Tullis, 2010; Berntsen, Staugaard, & Sørensen, 2013). Word memory research corroborates this notion, with identical repetitions (queen-queen) leading to better recall than related repetitions (queen-king), as well as identical repetitions requiring less study time to produce the same associated benefit (McKinley, Ross, & Benjamin, 2019). Secondly, including the brand in the programme also gives an additional visual opportunity to strengthen brand memory, for example, an individual would be exposed to Heinz Ketchup in the advert and the programme, while cognitively experiencing the advert again during reminding at P2 (Davtyan, Stewart, & Cunningham, 2016). The only drawback to this strategy is that product placement events will be less ubiquitous than non-branded product events. Yet, advert reminding's bottom-up nature provides versatility in how one can present repeated items to create further advertising value.

As very little literature has looked at direct product repetition on advert memory, the Davtyan, Stewart, and Cunningham (2016) study has been cited as evidence for a product placement instance of advert reminding, yet several design decisions do not make their study a perfect investigation. Firstly, their memory measures asked participants to recall and recognise brands they had seen in the entire video, not specifically looking at advert memory alone. Similarly, they did not include a repetition detection or recollection measure that would have helped to confirm the mechanism. Therefore, any researcher looking to extend the present work would do well to conduct this study and make these changes.

One criticism that may be levelled against advert reminding as a mechanism is how practical, and logistically possible, delivering adverts to specific breaks is on a national scale.

Luckily, the proliferation of programmatic advertising helps to resolve this issue where once such deliverability might have been this mechanisms downfall (Malthouse, Maslowska, & Franks, 2018). Programmatic advertising allows for a real-time auction of advert space meaning brand managers can purchase specific break space based on time of day, the exact programme as well as specific breaks and, potentially, what demographics will be watching (Malthouse, Maslowska, & Franks, 2018). This ability to target specific programmes would allow advertisers to buy space before their brand's product placements or highly desirable category product programme events. For example, Werther's Original may target programme events containing sweets in the middle of the day with known popularity among the elderly, whereas, Harribo may target programmes events in the early evening once children are back from school during non-COVID-19 times and watching TV with their parents. For category product repetition, such an advertising strategy could save brand managers the cost incurred from true product placement deals. This would also enable brands to "turn on" programme events as reminding cues only when and where the known target audiences are watching. For programme product placement events, historically this has been no small market, meaning larger and established brand managers should have multiple programmes with which to target and create strong branded memories, albeit not to the extent of the category mechanism, using programmatic advert purchase (Williams, Petrosky, Hernandez, & Page Jr, 2011).

How repetition is presented does not always have to be centred on a recursive product. Although beyond the scope of this investigation, the mechanism should further be developed to understand how non-product brand placements in-programme could be utilised for reminding, especially in the arena of live sport and other sponsorship events. Live sport's engagement level and investment are typically high given its variable affective nature and tribal-like loyalty (Newell, Henderson, & Wu, 2001; Moorman, Neijens, & Smit, 2007; David, Horton, & German, 2008). For example, it may be possible that when seeing the

English rugby union player, Jack Nowell, who wears a Red Bull branded scrumcap when playing for his club, Exeter, celebrate a try he has scored, that the Red Bull logo may generate a retrieval of a Red Bull advert an individual viewed during the half-time commercial break. Combining reminding with sponsorship is yet another channel reminding may enhance, particularly given that sponsoring brands may have some influence over brand cue placement during the event itself. One example that may already be occurring each year, is that during the live broadcast of the Six Nations Championship, mentioning the Guinness sponsorship in the build-up commentary, or seeing the central Guinness indent on the pitch, may trigger a reminding of the brand's advertising seen in an earlier commercial break. Such a prospect seems even more likely as Guinness's advertising efforts during this period contain cross modal (visual and auditory) rugby and Six Nations references, meaning the brand is likely already benefiting from this effect. Here, as exact repetition of the same brand cue is used (albeit potentially cross-modally), if repetition detection is successful, the programme brand may trigger spontaneous advert retrieval. As a brand-building activity, using reminding in this way should help achieve sponsorship goals of improving top-of-mind brand awareness as well as encouraging spontaneous brand message rehearsal. The Guinness example may be particularly effective as it is also cueing a product for a specific event, meaning that the Six Nations in effect becomes a Guinness reminding cue. Future research should examine this extension of the advert-programme reminding mechanism to quantify additional improvements to mental availability.

While all the previous possible reminding variants discussed product/brand repetition; shifting the repetition to contextual programme elements may also be effective. In fact, changing the context around the advert is another way to enhance repetition detection likelihood. If a more bespoke fit was required, much like Guinness's Six Nations adverts, brand managers could create adverts that explicitly refer to the product category's inclusion or a specific narrative event in a programme, making the repetition salient. Such a proposed strategy may appear to be unrealistic, but Ambler and Hollier's (2004) research has shown that advertising that appears to spend big is often the most persuasive. In their work, they showed that advertising can be most effective when brands portray extravagant executions, in a way signalling the brand's financial fitness and market standing. This has an indirect effect based upon changes in brand quality produced by this exorbitant display. Indeed, creating unique contextual adverts for specific programme events would undoubtedly meet these criteria. Given the closer involvement in the programme, such advertising could show similar attitudinal benefits to those previously seen (Myers, Deitz, & Royne, 2014). For certain high profile associations, such as cinema advertising, immensely popular TV programmes such as Madmen, or high broadcast frequency programmes, such as Big Bang Theory, these adverts maybe profitable. For a bespoke advert example, if a programme/film contained a scene with two friends going for a beer at a bar, creating an advert that contained a similar scenario and which actively referred to the programme event or the actors themselves, could be one way to increase shared uniqueness when applying this mechanism. On a wider scale, creating stock adverts that simply have similarity to generic programme events where an advertiser's product category might be seen is a more broad-brush, but viable alternative; to again use the example of beer, creating adverts that contain the product during parties, during dates, or in bar scenes, etc., would seemingly be a smart option. This second alternative would create more flexibility in placement as any historical programme could be selected that contained the portrayed event.

Today, many adverts may already be benefitting from reminding due to their serendipitous placement or an advertiser's hunch. This thesis has demonstrated that under the hardest conditions for reminding to occur, it can facilitate advert memory, suggesting many further avenues for expansion discussed here. Such examples could include; combining reminding adverts with sponsorship during live and traditional TV content, combining reminding adverts with product placement events in programmes, as well using programme elements as the cue for reminding much like previous work (Myers, Deitz, & Royne, 2014), creating stock adverts that contain similar events to classic programme moments, and supplying all these adverts where needed based on programmatic advertising.

<u>Where to position adverts to benefit the best from reminding programme events</u>

Chapter Four established some base evidence that, in line with reminding theory predictions, viewing the advert at P1 conferred a greater advert recall benefit after 24-hours. It was noted in Chapter Four that this finding did have certain limitations due to the viewing conditions used in the study (see Chapter Four for a discussion). Yet, given the finding's theoretical congruence one can postulate how this finding could be applied. Firstly, the finding indicates where not to place category product-related advertising if alterations in brand recall are desired. Brand managers should avoid purchasing advertising space after their chosen programme event, as this gives no encoding advantage during viewing and creates the hardest conditions for facilitation during recall (Wahlheim, & Jacoby, 2013; Wahlheim, Maddox, & Jacoby, 2014; Negley, Kelley, & Jacoby, 2018). Typically, adverts are not just seen as one-offs in a programme like in the current thesis, but often seen multiple times in the same programme episode. Currently, it is unknown how multiple adverts will interact with a single programme reminding, meaning further work is needed.

Whether there is an encoding benefit during the programme also raises another question. During real-world viewing, would the benefit only be seen if the advert was placed prior to the programme event? This proposition may have some weight when it is considered that individuals may not have a need to retrieve brand information from that category for some time, or ever. In which case the recursive trace created while watching TV three weeks prior seems unlikely to affect an in-store memory. However, if the advert is seen prior, mental availability is increased while viewing meaning no additional search effort is required at test for the trace to have been facilitated. As such, until further work is completed, the present research and remindings hypothesis would suggest purchasing advert space before a TV moment is a safer option for brand managers.

This finding helps determine advertising space value, highlighting certain areas for creating additional broadcaster revenue. Media outlets will be able to utilise these premium pre-roll spots on both live TV and on broadcaster video on demand, charging more for pre-roll advert space. This form of advert placement may be particularly effective as it is known that levels of attention to pre-roll adverts is higher than in other advert breaks, meaning robust encoding and stable advert traces are more likely (Campbell, Mattison Thompson, Grimm, & Robson, 2017). While intended for linear TV, it cannot be ignored that the mechanism can be used in a more limited way by digital advertising entrants also. Chapter Four's findings would suggest that YouTube, who have a strong focus on pre-roll adverts, served by Google's AdSense, would benefit from displaying adverts for products that appear in a user's chosen media content (Moyen, 2017). For example, a mountain bike brand such as Scott would do well to advertise before a Global Mountain Bike Network video featuring a mountain bike review. An additional question practitioners may ask is how long after their advert can the programme event be seen to expect a good level of repetition detection. Chapter Three evidenced that under passive viewing conditions and testing after 24-hours, recollection of reminding was seen after 10 minute lags. Yet as definitive parameters for what are suitable lag limits, these will be determined by multiple factors; event/product similarity, programme placement salience, programme product on-screen duration, advert quality, viewer's attention, etc. Future research may further this understanding, but the heterogeneity among product pairs may make hard and fast rules difficult to establish. As such, *pair testing will be critical*.

Is reminding a new advertising phenomenon?

Reminding, while not explicitly named as a strategy, is seen in other areas of advertising. When constructing a mixed marketing campaign, advertisers aim to create mental availability through mass exposure, via mediums like TV, out-door, or digital advertising. Yet, many marketing strategies, particularly those for fast moving consumer goods whose purchase decision are often more spontaneous, will also attempt to initiate advertising messaging retrieval at the point of the purchase decision. In-store, this takes the form of point of purchase displays. Online, digital adverts assume this function by allowing consumers to make a product purchase in a few clicks. POP and digital adverts are reminding cues, and both work as they retain themes, characters, or colours schemes from the campaign that can help the individual retrieve advert information as well as make salient the previously seen advert messages. In fact, one market research agency terms the advert's most pivotal point, in which emotion and brand presence are highest, as the "creative magnifier", which can act as potent retrieval cues (Moran, n.d.). Pertinent examples might be the actor Gio Compario in the Gocompare.com adverts or Aleksandr Orlov, the Meerkat in the Comparethemarket.com adverts. By placing these reminding cues in the purchase location, brand managers are hoping to increase the likelihood of bottom-up advert information retrieval, that may alter consumer decision-making (although, whether this is a good idea for Gio Compario is questionable). Indeed, large-scale commercial research has shown that the combination of in-store display advertising with TV vastly outperforms TV alone, or TV plus price reductions in terms of sales volume increases (Harvey, Herbig, Keylock, Aggarwal, & Lerner, 2012). Reminding as a mechanism therefore is not altogether foreign to practitioners and in fact, they implicitly appear to understand certain principles. Formalising reminding as a theory in advertising and having practitioners be aware of its assumptions will ultimately create better advertising products across the consumer journey.

<u>That reminds me</u>

While adverts themselves can be made to look more like the programme events people are viewing, a more recent trend in TV production has seen programme events become ever more under brand manager control. Although this discussion has already outlined where reminding principles can be brought in to aid traditional linear TV; two further TV production styles that have already been popular with brands may symbiotically be enhanced by reminding. These are, branded entertainment (Verhellen, Eelen, Dens, & De Pelsmacker, 2016), and advertiser storyline purchasing from established programmes (Sweney, 2018).

Firstly, branded entertainment, or advertiser sponsored programme series involve a brand having commercial control over a TV programme, usually in a reality-style challenge (Hudson, & Hudson, 2006). These programmes typically contain lots of brand mentions and product placement, allowing for a brand to be embedded in a funny or emotive narrative that they ultimately control, *e.g.* Channel 4's Suzuki's All Star Driving School, in which celebrities learned to drive in a Suzuki Ignis. Research shows that these programmes, when liked by viewers, can have positive effects on brand affect (Verhellen, Eelen, Dens, & De Pelsmacker, 2016). Yet, given these multiple brand/product placements, the opportunity for spaced learning arises, further enhancing the brand memorability component. Indeed, placing reminding adverts in the break when individuals are already enjoying the brand's content may be an optimum time to introduce further products or other brand extensions. Such placement should complement the positive attitudinal component, as well as satisfying the conditions of similarity and proximity in aiding advert memory.

Similarly, when broadcasters and advertisers work together, the creation of bespoke adverts for programme events should facilitate detection likelihood and increase message take-out. On the other end of the spectrum, advertisers are now seeking creative control of

TV content, with brands now able to purchase TV programme storylines (Sweney, 2018). In his Guardian article, Sweney outlined how Procter and Gamble (P&G) purchased a storyline from ABC's drama Black-ish, in which characters, in a somewhat meta fashion, discussed a real-world P&G advert campaign regrading race and racism. Placing this same advert in a subsequent advert break could perhaps be considered the holy grail of reminding opportunities. Firstly, shared cue uniqueness will be high given the same advert is seen in both the programme and real world viewing meaning repetition detection likelihood is high. Secondly, the advert has become programme content and given its congruous poignant educational message should be a well-remembered event from the programme that is easily retrievable (Verhellen, Eelen, Dens, & De Pelsmacker, 2016). Thus, it is possible that such placement receives the positive benefits associated with strong programme involvement (Myers, Deitz, & Royne, 2014). Equally, as both P1 and P2 events in this scenario contain the brand and its message it may be that the interference likelihood is reduced, as well as the recursive trace being highly potent given its associations to the real and viewed world. Although this tactic is already becoming more popular, reminding should only enhance this success and as this technique becomes more prevalent, live TV can create advert campaigns that are unrivalled.

Reminding is a bottom-up memory phenomenon that enables humans to monitor the frequency and recency of objects that are encountered in the world (Hintzman, 2011). Like other bottom-up attention and memory phenomena, reminding's utility to advertisers is derived from an individual's inability to control such cognition while retaining awareness of its effects. This thesis has been the first to leverage reminding as a mechanism for advert-programme memory. More specifically, the evidence presented in conjunction with the remindings framework has outlined how programme context can be a powerful cue for advertisers. It is hoped that this hypothesis can drive forward research and implementation of context in TV advertising.

How to solve a problem like an ambusher

What do Chapter Five's findings collectively highlight about how media misinformation occurs (see Chapter Five for further mechanism discussion)? The results corroborate the real-world example, demonstrating that when media memory is poor or ambiguous, brand familiarity can be powerful. Indeed, Nike's ambushing of the Olympic Games occurred through proximal advert placement combined with the not so subtle, and just about legal, suggestion that it was associated with the event. The present study's results suggest this was successful for several reasons. The Adidas campaign had poorly linked itself with the event, with these ambiguous conditions allowing for Nike's top-of-mind availability, as well as their clever use of suggestion, to create such a successful misinformation campaign based on familiarity misattribution (Lewandowsky, Ecker, Seifert, Schwarz, & Cook, 2012; Wentz, 2012). Equally, the Nike brand did not violate the assumptions of sponsorship coherence or product plausibility, given its shared category membership with Adidas and sports events more generally (Johnson, Hashtroudi, & Lindsay, 1993). Nike's campaign may have also unwittingly incorporated the effects of reminding to further increase suggestion effectiveness (Hintzman, 2011). Their campaign created multiple different executions for many of the events seen during the Olympics, with these tailored adverts potentially benefiting from in-event reminding via the shared activity. That is, viewing a Nike advert of a child preparing for, and then jumping from, an Olympic diving board before viewing the same event during the live broadcast may engender in-event advert reminding. More generally then, the findings suggest that when an individual is under a degree of uncertainty about an event, they gravitate toward brands that feel most familiar, regardless of the source of that familiarity, and away from lesser known, “riskier” brand options. This finding is in line with other consumer research that has looked at the guiding role of brand familiarity, even after low levels of brand exposure, in influencing purchase decisions (Coates, Butler, & Berry, 2006).

Yet Chapter Five also showed that the effects of heuristic processing can be reduced when viewers are encouraged to use recollection and retrieve an item’s source. Indeed, fostering critical thinking is understood to be an effective mechanism against fake news proliferation, for example, providing opportunity to detect discrepancies can help reduce false memory, which is the basis of reminding in the paired associates paradigm (Tousignant, Hall, & Loftus, 1986; Lewandowsky, Ecker, Seifert, Schwarz, & Cook, 2012; Ecker, Hogan, & Lewandowsky, 2017; Putnam, Sungkhasettee, & Roediger III, 2017). In keeping with this idea, the Heuristic-Systematic model of persuasion suggests that for an individual to engage in systematic information processing, contextual factors must allow them to be motivated and able to attend to said information (see Chapter One; Chaiken, & Ledgerwood, 2011). However, these conditions seem unlikely to be attained for such trivial matters as brand sponsorship. Why would viewers care enough to actively source monitor an issue as inconsequential to them as remembering the correct sponsor? Adverts used to combat misinformation then must supply the corrective information and perform the source monitoring on behalf of the individual while speaking to the heuristic system using emotive devices, which is understood to facilitate misinformation correction (Sangalang, Ophir, & Cappella, 2019). Any brand managers looking to address their ambushers should use their marketing efforts to closely link their brand with the target event, grounding their brand into the source of the sponsorship, use emotive claims, audio or imagery, while refraining from mentioning the competitor by name, which could only increase the ambusher brand’s familiarity further. Equally, they should address the issue head on, highlighting the discrepancy in the individual's knowledge ("We believe you have been misled, our brand X is the true sponsor!"; Tousignant, Hall, & Loftus, 1986), accompanied via visual imagery of the correct brand and event logos next to one another, which should again foster reminding. Such an appeal comes from a position of authority (the real sponsor), labels the issue without repeating the perpetrating brand, uses emotion to speak to the heuristic system, and helps to embed the sponsoring brand in the event's source.

Reminding-based advertising techniques may also have uses for those in the greyer area of the marketing profession. The author cannot deny that those seeking to ambush may use the information garnered here to aid in such marketing efforts. However, by highlighting the psychological mechanism behind the technique it is hoped that ambushed brands can strengthen their response to and aid in the countering of brand misinformation by altering the contextual environment to their favour. Do those who look to disrupt memory for financial gain have a monopoly on ambushing? Not necessarily. On Twitter, a variant of ambush marketing could be used by social or environmental causes to promote their activities and create brand awareness. For example, anti-pollution charities like Plastic Oceans UK would do well to advertise before viral videos like the now infamous turtle nose straw removal video, potentially turning this content into a piece of campaign media (Lee, 2015). Online, video adverts can be made far more quickly and at much less cost to the marketer, making bespoke advert creation much easier. That which is familiar will bias decision making when uncertain about the veridical information. As such brands must avoid sponsorship ambiguity, have brand familiarity awareness, and interrupt heuristic processing when responding to brand misinformation.

Limitations and future directions

The main thesis limitation was that recollection of repetition was not included during the latter two experiments, even after it was shown to be effective in Chapter Three. While this was discussed in Chapter Four extensively (see Chapter Four's discussion), adding an additional option to Chapter Five's source monitoring measure would have captured when an individual could detect that a presented brand was from an advert and the programme brand was different. At the same time, the inclusion of a programme free recall measure before the recognition measure was employed in Chapter Five would have evidenced participants' programme knowledge prior to their assessment of the misinformation. This would have aided the investigation is two ways. Firstly, this could have provided further reminding evidence with those able to correctly identify the changed repetition having increased programme memory. Secondly, this would have enabled a comparison of reporting between measures to better understand the fate of the programme brand's trace and documented any changes in response due to the questioning used.

One criticism that could equally be made of the thesis regards the choice of sample used, that of students. Indeed, using this available group does mean there are generalisation issues with the wider population given their typical characteristics (Peterson, 2001; Peterson, & Merunka, 2014). For example, younger individuals are known to have better working memory capabilities than older adults (Wahlheim, & Huff, 2015). Equally, it is known that younger adults often view TV via different means when compared with other age groups, e.g. the devices and the channels they use to watch TV (BARB, 2020). However, this group was chosen for two primary reasons. Firstly, prior applied advertising and theoretical research investigating learning and reminding have drawn from student samples; thus, in order to draw effective comparisons between previous work and the current thesis it was important to select participants from the same demographic group (e.g., Furnham, Bergland, & Gunter, 2002;

Negley, Kelley, & Jacoby, 2018). Secondly, given that much of the thesis focused on paradigm creation, to immediately test the novel effect on a national representative sample could have been potentially wasteful in terms of time and cost. Together, these factors led to the testing of students in this thesis.

It might also be worth considering if the memory manipulation was concealed enough from those participating in the studies. Indeed, a small proportion of the participants may have guessed the true aims of the study when they first saw the advertising. However, steps were taken to mitigate this issue. Firstly, none of the experiments alluded to a memory component before participants encountered the memory measures, directing them instead to the programme itself, with cover stories relating to programme attitudes as well as programme humour. The aim here was to direct the viewers to focus on the programme content, as would be the case in real world viewing. Secondly, in each experiment's introduction it was suggested that the advert inclusion was merely to improve the ecological validity in relation to live TV viewing rather than being part of the research. Equally, much advertising research has shown adverts in a similar fashion, combining conscious viewing with an experimental guise such as programme attitudes (e.g., Norris, & Colman, 1993; Furnham, Bergland, & Gunter, 2002). Furthermore, it can be assumed that individuals understand the goals of the advertising industry, whether viewing at home or in the lab. As such, viewing adverts in this context did not appear to be beyond what would be considered ecologically valid. One way to gauge manipulation knowledge proportions would be to ask participants at the end of each experiment whether they guessed the study's true aim before encountering the memory-measuring element.

As well as potential issues relating to sample selection, another area of potential criticism regards the stimuli selection process. This process was perhaps not as good as it could have been as there were no method precedents available given the investigation's novelty: It was unknown what types of clip length, product position, or product-storyline integration would best aid reminding, and as such these variables were not as tightly controlled as the author would have liked. This, in conjunction with having no creative control over the clips, led to a large amount of variation in clip presentation therefore reducing the ability to generalise the findings from the present research. Whilst including advert as a random effect did control for the advert variation in most analyses as well as using some guiding principles from the product placement literature (Bressoud, Lehu, & Russell, 2010), future work should match stimuli more closely on their characteristics now the effect's mechanism has received initial evidence. As called for throughout this thesis, isolating and codifying the influence of each stimulus variable's effect on remindings is needed to further the mechanism's usefulness.

A final limitation of the present thesis was the inability to compare the control condition with those who missed the repetition due to a trial imbalance in Chapter Two. While GLMMs can deal with unbalanced groups, the severity in this case was too great. Given that allocation to the missed repetition group was conditional upon repetition detection behaviour during viewing, as such the imbalance was not unexpected. In future, to test this comparison, a design change would be required that allowed for a balancing across these prescribed and autonomously allocated groups.

In terms of researching advert reminding theory, there are several future avenues that merit exploration. Firstly, the present work looked at single advert-programme pairs in isolation, yet how this format compares to either viewing additional adverts, or combining more adverts with a single advert programme pair, are thus far not understood. From an advertiser's perspective, understanding memory outcomes of advert-programme reminding versus regular advert repetition will further aid the valuation of advert-reminding to advertisers in the long-term. That is, to what degree could advertisers rely on reminding to compliment, or in some cases, replace traditional advertising? Equally, whether the reminding pair have a diminishing effect if further adverts are viewed will be important insights for industry. Secondly, the wear-in effect is the advertising phenomenon where each advert exposure can increase recall and attitudinal effects (Schmidt, & Eisend, 2015). Although a reminding exposure was unable to alter advert attitude perceptions in Chapter Four, whether consecutive reminding exposures produce similar wear-in effects over time to regular advertising exposures will be of keen interest for any brand managers launching a new advert. On a related note, does character or programme dislike have any negative attitudinal effects over the long-term? Given that involvement with the programme influences liking, whether this affect transfer also becomes detrimental is important to understand before industry usage (Myers, Deitz, & Royne, 2014). Thirdly, further research is needed to understand the subjective qualities of reminding during programme viewing, as has been called for in other theoretical papers (Hintzman, 2011). That is, how much does reminding differ across the population, what factors determine whether it will be successful, what is the reminding time course, and what combination of audio-visual cues represents the reminding sweet spot? Indeed, evidence has shown that older adults are less able to rely on reminding than younger adults for example, meaning advertisers need to make reminding easier for old people or avoid this tactic altogether when targeting this demographic (Wahlheim, & Huff, 2015).

Ultimately, adopting advert reminding into the linear TV model offers broadcasters a revenue lifeline against the rise of the streaming services that have become a major threat to their existence. Although more research is needed, the thesis has outlined a route by which TV advertising can be made a more attractive prospect for brand managers, and through the application of cognitive science, how the programme context can be a powerful driver for advert memory in TV viewing environments.

Appendix A – Repetition detection sheet

Reminding recording sheet

Participant:

Condition:

Programme clip number:	Advert product:	Advert brand:

Appendix B – Cued recall sheet

Cued recall

Participant:

Condition:

Word number:	Suggested brand:

Appendix C – Chapter Two advert and programme product list

Product	Advert	Programme clip
Pasta	Tesco	Travel Man
Coffee	McCafe	Peep Show
		Made in Chelsea Does Come
Prawns	Waitrose	Dine With Me
Paint	Dulux	Friday Night Dinner
Fresh food	Hello Fresh	Jamie at Home
Cake	Dr. Oetker	New Girl
Tablet	Microsoft	Humans
Vacuum Cleaner	Dyson	Raised by Wolves
Jewellery	H Samuel	The Undateables
Clippers	Babyliss	Brooklyn Nine Nine
Dating site	Match.com	Friday Night Dinner
Blender	Aldi	New Girl
Phone	O2	Big Bang Theory
Pizza	Papa John's	Travel Man
Washing Machine	Beko	New Girl
Headphones	Beats by Dre	Banana
Sausages	Richmond	Jamie's Quick and Easy Food
Fitness watch	Withings	Big Bang Theory
Tea	Yorkshire Tea	Made in Chelsea
Chinese	Blue Dragon	Fresh Meat
Indian sauces	Pataks	Peep Show
Beer	Bombardier	Friday Night Dinner

Postal service	UPS	Home
Bread	Kingsmill	Peep Show
Lasagne	Dolmio Lasagne	Tried and Tasted: The Ultimate Shopping Guide
Porridge	Quaker Oats	Eden
Pie	Hollands Pies	Tricks of the Restaurant Trade
Chocolate	Cadbury’s Dairy Milk	Eat the Week
Nappies	Pampers	Supernatural
Milk	Cravendale	Friday Night Dinner
Condom	Durex	New Girl
Oven	BOSCH	30 rock
jigsaw puzzle	Wentworth	Big Bang Theory
Camera	Cannon	IT Crowd
Suits	Armani	Inbetweeners
Toothbrush	Philips	New Girl
Greetings card	Hallmark	New Girl
Shoes	Clarks	Friday Night Dinner
Video game	World of Warcraft	Dead Pixels
Boiler	British Gas	Peep Show

Appendix D – Coding rubric for Chapter Two

Advert recall rubric

Aim:

1. To quantify the advert free recall responses.
2. To code each participant's answers along the dimensions of brand, product/service, and advert description.

Process:

1. Watch all 60 adverts. <u>We are only interested in the recall of the first 40 in the advert folder, the final 20 you will not need to code.</u> I've only included the final 20 so you are aware of what you are not looking for.
2. You will then need to open the word doc with the participants' written responses as well as the excel spreadsheet to record their performance.
3. Go through each participant's answers and record whether they gave the correct; brand, product/service and description for each advert.
4. The numbers on the top of each advert column in the excel sheet correspond to the first 40 adverts in the folder.
5. Once you are finished, send me back the excel folder.

Marking

- Check the order of participants between the free recall text doc and the free recall coding sheet match up, there participant ID will be a number e.g. 1.
- For each answer given by the participant you will be asked to record whether it sufficiently met the criteria for that dimension. If it did, put a 1 in the associated column, if not, add a 0.
- Lots of adverts will not be remembered at all, add a 0 to their respective columns.
- If an answer was attempted and was close but you didn't feel it meet the criteria, add a 0.
- Each advert will be marked along the dimensions of brand, product/service, and description, see below for the criteria.
- If you are unsure whether to give the mark, re-watch the corresponding advert, look at the criteria and then make a judgement.
- Please record the order that recall occurred based on the number next to the answer.
- Finally, if you notice any intrusions that are clear misremembering of content, add it in the participants notes column at the far right hand side. E.g. The brand was Evian water and instead someone put Highland Springs.
- If capital CR is included in a participant's answer, this stands for can't remember, add a 0.

Criteria:

- Brand 0/1
    - Correct spelling is NOT required.
    - If a good attempt has been made and yet there was a slight misspelling, give the mark.

    - E.g. If the brand was called Office Depot, acceptable answers would be; office depot, office depo.
- Product/service 0/1
    - In their answer the product or service type is named at some point.
    - E.g. if the product was bottled water, answer such as: bottled water, water, plastic bottled water could be accepted as correct.
- Description 0/1
    - As a minimum, they need to have described a scene, feature, action or theme of the advert that infers they have some knowledge of the event.
    - E.g. an advert heavily featured a couple dancing romantically in a Swedish park. At one point in the advert the couple kissed after which the man said I love you.
    - Acceptable answers could be as little as: Swedish park, a couple dancing, a man and women kissing, romantic couple, Swedish couple dancing, Sweden, I love you, man said I love you in park, etc.

Appendix E – Recollection of reminding measure

Reminding recording sheet

Participant:

Word number:	Advert Brand:	Programme clip description:

Appendix F - Chapter Three advert and programme product list

Product	Advert	Programme clip
Coffee	McCafe	Peep Show
Prawns	Waitrose	Made in Chelsea Does Come Dine With Me
Paint	Dulux	Friday Night Dinner
Baking	Dr. Oetker	New Girl
Vacuum Cleaner	Dyson	Raised by Wolves
Jewellery	New H Samuel	The Undateables
Clippers	Babyliss	Brooklyn Nine Nine
Dating site	Match.com	Friday Night Dinner
Blender	Aldi	New Girl
Pizza	Papa John's	Travel Man
Washing Machine	Beko	New Girl
Headphones	Beats by Dre	Banana
Sausages	Richmond	Sausages
Fitness watch	Withings	Big Bang Theory
Tea	Yorkshire Tea	Made in Chelsea
Chinese food	Blue Dragon	Fresh Meat
Indian curry sauces	Pataks	Peep Show
Beer	Stella Artois	Friday Night Dinner
Bread	Kingsmill	Peep Show
Lasagne	Dolmio Lasagne	Tried and Tasted: The Ultimate Shopping Guide
Porridge	Quaker Oats	Eden
Pie	Holland’s Pies	Tricks of the Restaurant Trade
Chocolate	Cadbury’s Dairy Milk	Eat the Week

Nappies	Pampers	Supernatural
Milk	Cravendale	Friday Night Dinner
Condom	Durex	New Girl
Oven	Bosch	30 rock
Jigsaw puzzle	Wentworth Puzzles	BBT
Camera	Cannon	IT Crowd
Suits	Armani	Inbetweeners
Toothbrush	Philips	New Girl
Greetings card	Hallmark	New Girl
Shoes	Clarks	Friday Night Dinner
Video game	World of Warcraft	Dead Pixels
Boiler	British Gas	Peep Show

Appendix G – Coding rubric for Chapter Three

Recollection of reminding rubric

The aim of this task was to measure participants recall of the adverts and the programmes that contained a repeated product. For example, if a participant saw a Heineken beer advert and then a programme clip with a central focus on beer, this measure looked to capture knowledge of both events. Participants first gave a Y/N response on the computer as to whether they could detect the repetition between the two events. If they detected a product repetition between the events, they were asked to recall the advertising brand and give a short, one-line description of the programme event containing the product.

The recollection of reminding excel sheet is where you will record the participants' performance. Here I have complied all 35 target Y/N responses to the repetition detection question, per person, into one excel. The order will follow the same order on the paper response sheets but without the non-target trials. The column word name refers to the product in question, the word number column is the unique code participants will have written to link their paper response with the computer response, and accuracy is if they successfully detected a repetition or not. The empty columns, brand, description, wrong brand, and notes are what you'll be filling in.

Process:

1. Please first watch each of the 35 programme clips, try to familiarise yourself with what occurs in each video.
2. Open the recollection of reminding excel sheet.
3. Check the participant paper response sheets are in the correct participant order.
4. To code, look down the accuracy column, where you see a 1 on the excel sheet, there should be a response on the paper response sheet. These might not always be in order, for example, if a participant has said yes to non-target trials, these will be on the paper response sheet. As such, you need to check the word number matches between the excel sheet and the paper response sheet.
5. If the participant gave a correct response for the advertised brand and/or a programme description, add a 1 to the response column, if they were incorrect, or wrote CR, input a 0. For the trials they missed, leave these blank.
6. Once finished, send me back the completed recollection of reminding excel sheet.

Marking criteria

- Check the order of participants between the free recall text doc and the free recall coding sheet match up, there participant ID will be a number.
- For each answer given by the participant you will be asked to record whether it sufficiently met the criteria for that dimension. If it did, put a 1 in the associated column, if not, add a 0.
- Lots of products will have no recall at all, leave these blank.
- If you are unsure whether to give the mark, re-watch the corresponding programme clip (and advert if needed), look at the criteria and then make a judgement.
- If the participant is incorrect, but made a within category error e.g. put Warburton's instead of Kingsmill for the brand advert, add a 0 in the advert brand column and put a 1 in the wrong brand column. In the notes, write the brand name given by the participant.

- If you notice any other intrusions, please add these to the notes section.
- CR stands for can’t remember.

Advert brand 0/1

- Correct spelling is NOT required.
- If a good attempt has been made but the answer is slightly misspelled, give the mark.
- E.g. If the brand was called Office Depot, acceptable answers would be; office depot, office depo.

Programme description 0/1

- The participant must be able to describe at least some theme, action, or event that happened in the target programme clip.
- Here is an example of a beer product moment. If a programme clip featured friends siting around in their living room drinking beer, toasting to the quality of the beer and then discussing the beer’s merits. Acceptable one line descriptions would be; “drinking beer in living room”, “friends discussing beer”, “friends sat on the sofa and made a toast to beer”, or “the clip featured friends sat in their living room drinking beers, while they discussed the beers quality, they also made a toast to the beer itself”.
- At first, you will most likely have to re-watch each video as you mark.
- If you are unsure whether to give the answer, re-watch the programme clip check this rubric and then code the response.

Appendix H – Example advert recognition measure.

Advert cued recognition measure:

In this task you will be presented with 30 screen shots from TV adverts. Your task is to simply identify any adverts that appeared in the TV viewing portion of this experiment. For each advert, please indicate yes or no as to whether that specific advert was present during the experiment. If it was present please circle/bold Yes. If it was not present please circle/bold No.

You'll notice that below each of the Yes/No responses is an R / K. If you have selected Yes for any of the adverts we would also like to know how you came to that decision.

An R response represents a Remember judgement. R responses are the recollection of an association, image or thought that occurred in the study period, or contain information about the stimulus' position or physical appearance. E.g. you can remember the content and context of your memory. Also, a Remember response is associated with recalling other supporting memories such as something that occurred to you while you viewed the piece of media e.g. you were reminded of someone/something or you had a strong like/dislike.

A K response represents a Know judgement. K responses are described as memory without any conscious recollection. Instead, you should report a K response if you have a strong sense that you have seen the advert in the viewing scenario but can't recall any robust details about the episode.

<table>
<tr><th>Advert:</th><th>Memory:</th></tr>
<tr><td>


Bernie & Phyl’s
</td><td>

1. **Did this advert appear in any of the advert breaks you viewed?**

Yes / No

a) **If it you did see it, please indicate which process best describes how you recognised it?**

R / K
</td></tr>
<tr><td>


Blue Bunny
</td><td>

2. **Did this advert appear in any of the advert breaks you viewed?**

Yes / No

b) **If it you did see it, please indicate which process best describes how you recognised it?**

R / K
</td></tr>
<tr><td>


Dos Equis
</td><td>

3. **Did this advert appear in any of the advert breaks you viewed?**

Yes / No

c) **If it you did see it, please indicate which process best describes how you recognised it?**

R / K
</td></tr>
<tr><td>


Five Star
</td><td>

4. **Did this advert appear in any of the advert breaks you viewed?**

Yes / No

d) **If it you did see it, please indicate which process best describes how you recognised it?**

R / K
</td></tr>
</table>

Appendix I – Example of brand recognition sheet.

Brand cued recognition measure:

In this task you will be presented with 30 brand logos. Your task is to simply identify any brands that appeared in the adverts you watched. For each brand, please indicate yes or no as to whether it was present during the experiment. If it was present please circle Yes. If it was not present please circle No.

You'll notice that below each of the Yes/No responses is an R/K. If you have selected Yes for any of the brands we would also like to know how you came to that decision. The R/K reflects the two types of recognition memory.

An R response represents a Remember judgement. R responses are the recollection of an association, image or thought that occurred in the viewing period, or contain information about the stimulus' position or physical appearance. E.g. you can remember the content and context of your memory. Also, a Remember response is associated with recalling other supporting memories, such as something that occurred to you while you viewed the piece of media. E.g. you were reminded of someone/something or you had a strong like/dislike.

A K response represents a Know judgement. K responses are described as memory without any conscious recollection. Instead, you should report a K response if you have a strong sense that you have seen the advert in the viewing scenario but can't recall any robust details about the episode.

Brand:	Memory:
FIVE STAR	**Did this brand appear in any of the adverts you viewed?** **Yes / No** **Please indicate which process describes how you recognised the brand?** **R / K**
Bernie&Phyl's	**Did this brand appear in any of the adverts you viewed?** **Yes / No** **Please indicate which process describes how you recognised the brand?** **R / K**
Blue Bunny	**Did this brand appear in any of the adverts you viewed?** **Yes / No** **Please indicate which process describes how you recognised the brand?** **R / K**
DOS EQUIS	**Did this brand appear in any of the adverts you viewed?** **Yes / No** **Please indicate which process describes how you recognised the brand?** **R / K**

Appendix J – Example of product recognition sheet.

Product category cued recognition measure:

In this task you will be presented with 30 product categories. Your task is to simply identify any product categories that appeared in the adverts you watched. For each product category, please indicate Yes or No as to whether it was present during the experiment. If it was present please circle Yes. If it was not present please circle No.

To represent each product category, a visual example is used. To explain when you should indicate that you had seen a product category, the example of a non-branded car will be outlined. You would say yes to the picture of the car if there were any car adverts in the 3 advert breaks. You would say no if there were no car adverts.

You'll notice that below each of the Yes/No responses is an R/K. If you have selected Yes for any of the product categories, we would also like to know how you came to that decision. The R/K reflects the two types of recognition memory.

An R response represents a Remember judgement. R responses are the recollection of an association, image or thought that occurred in the viewing period, or contain information about the stimulus' position or physical appearance. E.g. you can remember the content and context of your memory. Also, a Remember response is associated with recalling other supporting memories, such as something that occurred to you while you viewed the piece of media. E.g. you were reminded of someone/something or you had a strong like/dislike.

A K response represents a Know judgement. K responses are described as memory without any conscious recollection. Instead, you should report a K response if you have a strong sense that you have seen the advert in the viewing scenario but can't recall any robust details about the episode.

Product category:	**Memory:**
	**Did this product category appear in any of the adverts you viewed?** **Yes / No** **Please indicate which process describes how you recognised the product category?** **R / K**
	**Did this product category appear in any of the adverts you viewed?** **Yes / No** **Please indicate which process describes how you recognised the product category?** **R / K**
	**Did this product category appear in any of the adverts you viewed?** **Yes / No** **Please indicate which process describes how you recognised the product category?** **R / K**
	**Did this product category appear in any of the adverts you viewed?** **Yes / No** **Please indicate which process describes how you recognised the product category?** **R / K**

Appendix K – Rokeach Value Survey

Rokeach Value Survey:

On the next page there is a list of values. The 18 Terminal values are possible end states about what you would like to get out of life.

<u>The aim of this task is for you to rank, in order of importance, each list of values from 1 (being most important) to 18 (least important).</u> Therefore, those closer to 1 on the list will be more important to you than those closer to 18 on the list. Try to think exclusively about the order that is important to you, not anyone else.

Make sure you start the terminal list by asking "What it is that you want most from life?"

Next, you need to write a single sentence next to each value explaining why that value is important to you. E.g. if Freedom is one of your top values, you might understand it (and yourself) better by identifying why it is a priority for you.

Remember, the ultimate goal is to identify how you see yourself. The end result should be a picture of how you feel about what's important in your life.

List of Terminal values

Terminal Value	Description
A Comfortable Life	A prosperous life.
Equality	Brotherhood and equal opportunity for all.
An Exciting Life	A stimulating, active life.
Family Security	Taking care of loved ones.
Freedom	Independence and free choice.
Health	Physical and mental well-being.
Inner Harmony	Freedom from inner conflict.
Mature Love	Sexual and spiritual intimacy.
National Security	Protection from attack.
Social Recognition	Respect and admiration.
True Friendship	Close companionship.
Wisdom	A mature understanding of life.
A World at Peace	A world free from war and conflict.
A World of Beauty	Beauty of nature and the arts.
Pleasure	An enjoyable, leisurely life.
Salvation	Saved; eternal life.
Self-Respect	Self-esteem.
A Sense of Accomplishment	A lasting contribution.

Rank	Terminal Value	Why?
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		

Appendix L – Attitude scales for Chapter Four

Advert attitudinal measures and quality:

In this task you will be presented with a screen shot from 6 of the adverts you saw in the viewing scenario. For each advert, there are a series of 7-point semantic differential scales. Please circle the number that best represents your thoughts toward that scale item with regards to the corresponding advert. Beware, the direction of the scales can switch so that the positive answer can appear on the left and right-hand side. Vice versa for the negative response as well. Also, there is a final 5-point Likert about your feelings toward the programme at the end of this measure.

Advert 1.

Dos Equis

1. Thinking about your feelings toward the advert, please indicate your agreement along each 7-point semantic differentials scale below:

I like the ad 1 2 3 4 5 6 7 I dislike the ad

I react favourably to the ad 1 2 3 4 5 6 7 I react unfavourably to the ad

I feel negative towards the ad 1 2 3 4 5 6 7 I feel positive toward the ad

The ad is bad 1 2 3 4 5 6 7 The ad is good

2. Thinking about your feelings toward the brand, please indicate your agreement along each 7-point semantic differentials scale below:

Like more 1 2 3 4 5 6 7 Dislike more

More negative 1 2 3 4 5 6 7 More positive

More bad 1 2 3 4 5 6 7 More good

More favourable 1 2 3 4 5 6 7 More unfavourable

3. Thinking about purchasing likelihood, please indicate your agreement along each 7-point semantic differentials scale below:
Unlikely 1 2 3 4 5 6 7 Likely Probable 1 2 3 4 5 6 7 Improbable Possible 1 2 3 4 5 6 7 Impossible
4. To me the Dos Equis advert is:
Important 1 2 3 4 5 6 7 Unimportant Boring 1 2 3 4 5 6 7 Interesting Relevant 1 2 3 4 5 6 7 Irrelevant Exciting 1 2 3 4 5 6 7 Unexciting Means nothing 1 2 3 4 5 6 7 Means a lot to me Appealing 1 2 3 4 5 6 7 Unappealing Fascinating 1 2 3 4 5 6 7 Mundane Worthless 1 2 3 4 5 6 7 Valuable Involving 1 2 3 4 5 6 7 Uninvolving Not needed 1 2 3 4 5 6 7 Needed
5. This advert appeared to be of good quality:
Strongly disagree 1 2 3 4 5 6 7 Strongly agree

Appendix M – Chapter Four free recall rubric

Advert recall rubric

Aim:

3. To quantify the advert free recall responses.
4. To code each participant's answers along the dimensions of brand, product/service, and advert description.

Process:

6. Watch all 15 adverts. Make sure you're familiar with all the adverts to the level whereby you could automatically recall the brand name, the product or service that is was advertising and recognise what happens in the advert.
7. You'll then need to open the word document with the participants' written responses as well as the excel spreadsheet to record their performance.
8. Go through each participant's answers and record whether they gave the correct; brand, product/service and description for each advert.
9. Once you are finished, send me back the excel folder.

Marking

- Check the order of participants between the free recall text doc and the free recall coding sheet match up, there participant ID will be a two-digit code and a letter.
- For each answer given by the participant you will be asked to record whether it sufficiently met the criteria for that dimension. If it did, put a 1 in the associated column, if not, add a 0.
- Lots of adverts will not be remembered at all, add a 0 their respective columns.
- If an answer was attempted and was close but you didn't feel it meet the criteria, add a 0.
- Each advert will be marked along the dimensions of brand, product/service, and description, see below for the criteria.
- If you are unsure whether to give the mark, re-watch the corresponding advert, look at the criteria and then make a judgement.
- Please record the order that recall occurred based on the number next to the answer.
- Finally, if you notice any intrusions that are clear misremembering of content, add it in the participants notes column at the far right hand side. E.g. The brand was Evian water and instead someone put Highland Springs.

Criteria:

- Brand 0/1
    - Correct spell is NOT required, remember, participants have no familiarity with these brands.
    - If a good attempt has been made and you feel they had some idea of what the brands name was, give the mark.
    - E.g. If the brand was called Office Depot, acceptable answers would be; office depot, office depo.
- Product/service 0/1

    - In their answer the product or service type is named at some point.
    - E.g. if the product was bottled water, answer such as: bottled water, water, plastic bottled water.
- Description 0/1
    - As a minimum, they need to have described a scene, feature, action or theme of the advert that infers they have some knowledge of the event.
    - E.g. say an advert heavily featured a couple dancing romantically in a Swedish park. At one point in the advert the couple kissed after which the man said I love you.
    - Acceptable answers could be as little as: Swedish park, a couple dancing, a man and women kissing, romantic couple, Swedish couple dancing, Sweden, I love you, man said I love you, etc.

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