Hunting and Gathering for Product Placement in Movies: A Visuospatial Approach

By

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ABSTRACT

HUNTING AND GATHERING FOR PRODUCT PLACEMENT IN MOVIES: A VISUOSPATIAL APPROACH

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Previous research has shown product placement in movies to be an effective form of advertising. However, the literature does not inform that sex differences in visuospatial abilities may influence product placement effectiveness. The hunter-gatherer theory of visuospatial sex differences was used to explore product placement effectiveness. To explore the possibility that males and females would respectively show greater retention for dynamic and plot-connected product placements, this thesis used moderation, mediated moderation, and serial mediation experimental models to explore the effect of product placement type and sex differences on placement retention and purchase intention via an indirect effect of processing style. This study found that females and males show better retention for plot-connected and dynamic placements, respectively, than for a control. The findings contribute to theoretical as well as substantive literature in the area of efficiency and effectiveness in product placement retention via multicategorical independent variables in conditional process models.
Dedication

"The highest forms of understanding we can achieve are laughter and human compassion"

- Richard P. Feynman

I dedicate this thesis to everyone who has made me laugh, especially in moments that I have never laughed so hard in my life, throughout my experience as a graduate student. Thank you, from the bottom of my heart. This has been the greatest support of all. To me, laughter is one of the most enjoyable gifts that life has to offer. Never stop chasing it.
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# Table of Contents

CHAPTER 1: INTRODUCTION ........................................................................................................... 1

CHAPTER 2: LITERATURE REVIEW .............................................................................................. 5

2.1 Sex Differences in Evolutionary Psychology ............................................................................. 6

2.1.1 Hunter-Gatherer Theory ........................................................................................................ 7

2.1.2 Physiological Motion Detectors ............................................................................................. 8

2.2 Sex Differences in Visuospatial Abilities .................................................................................. 8

2.2.1 Visualization .......................................................................................................................... 9

2.2.2 Identification and Recognition of Objects ............................................................................. 10

2.2.3 The Hunter-Gatherer Theory of Sex Differences in Visuospatial Abilities ....................... 11

2.3 Sex Differences in Processing Style .......................................................................................... 13

2.4 Sex Differences in Advertisement Processing ......................................................................... 16

2.5 Sex Differences in Product Placement .................................................................................... 16

2.5.1 Plot-Connected Product Placement ..................................................................................... 17

2.6 Recall & Recognition in Advertisement ................................................................................... 18

2.6.1 Recall & Recognition in Plot-Connected Product Placement ............................................ 20

2.7 Gap in the Literature ................................................................................................................ 21

CHAPTER 3: HYPOTHESES ............................................................................................................ 24

CHAPTER 4: METHODOLOGY ........................................................................................................ 29

4.1 Participant Characteristics and Research Design ....................................................................... 29

4.2 Stimuli ..................................................................................................................................... 30

4.3 Pretest ..................................................................................................................................... 32

4.4 Procedures, Measures & Methodological Details ................................................................... 33

4.4.1 Instructional Manipulation Check ......................................................................................... 33

4.4.2 Movie Scene Clip ................................................................................................................ 34

4.4.3 Retention (Recall and Recognition) ..................................................................................... 34

4.4.4 Thought Listing Task ........................................................................................................... 37

4.4.5 Purchase Intention ............................................................................................................... 38

4.4.6 Sex .................................................................................................................................... 38
4.4.7 Debriefing ................................................................. 38

CHAPTER 5: RESULTS ........................................................... 40

5.1 Pairwise Comparisons .................................................. 40

5.2 Assumptions .................................................................... 41

5.3 H1: Moderation .............................................................. 44

5.3.1 Free Recall ............................................................... 44

5.3.2 Recognition Memory ................................................ 45

5.4 H2: Mediated Moderation ............................................... 49

5.4.1 Recognition Memory ................................................ 49

5.4.2 Processing Style ....................................................... 50

5.4.3 Mediated Moderation Results .................................. 50

5.5 H3a: Serial Mediation (Plot-connected Condition) .......... 53

5.5.1 Serial Mediation Results (H3a) ................................. 54

5.6 H3b: Serial Mediation (Dynamic Condition) .................. 57

5.6.1 Serial Mediation Results (H3b) ................................. 57

CHAPTER 6: GENERAL DISCUSSION ............................................. 60

6.1 Limitations & Future Research ...................................... 63

6.1.1 Theory ................................................................. 63

6.1.2 Design ................................................................. 63

6.1.3 Stimuli ................................................................. 63

6.1.4 Procedure ............................................................ 64

6.1.5 Measures and Outcome Variables .............................. 64

6.2 Theoretical Contribution .............................................. 66

6.3 Managerial Contribution .............................................. 67

6.4 Conclusion ............................................................... 68

REFERENCES ................................................................. 70

Appendix A: REB Certificate .............................................. 82

Appendix B: Stimuli .......................................................... 83

Appendix C: List of Measures ............................................. 85

Appendix D: Conceptual and Statistical Models ..................... 89
Appendix E: \( H_1 \) Data.................................................................92
Appendix F: Glossary of Terms..........................................................95
LIST OF TABLES

Table 1. Operationalization of Conditions

Table 2. H₁ Free Recall Data (percentages)

Table 3. H₁ A’ Recognition Data (means), Pairwise Comparisons (untransformed)

Table 4. H₁ A’ Recognition Data (means), Planned Contrasts (untransformed)

Table 5. H₁ A’ Recognition Data (means), Pairwise Comparisons (transformed)

Table 6. H₁ A’ Recognition Data (means), Planned Contrasts (transformed)

Table 7. H₁ B” Recognition Data (means), Pairwise Comparisons (transformed)

Table 8. H₁ B” Recognition Data (means), Planned Contrasts (transformed)

Table 9. Glossary of Terms
LIST OF FIGURES

Figure 1. Conceptual Moderation Model (H₁)

Figure 2. Statistical Moderation Model (H₁)

Figure 3. Conceptual Mediated Moderation Model (H₂)

Figure 4. Statistical Mediated Moderation Model (H₂)

Figure 5. Conceptual Serial Mediation Model (H₃)

Figure 6. Statistical Serial Mediation Model (H₃)
Chapter 1: Introduction

With the emergence of mass media in the latter half of the 20th century, it has become common practice to presume that traditional forms of advertising, such as print ads and commercials, although effective to an extent, may not be the best way to advertise. A more complex, albeit less orthodox, form of targeting consumers has begun to take effect (Daugherty, Logan, Chu, & Huang, 2008). This relatively new form of advertising is referred to as product placement and is often interchangeable with the term brand placement. To maintain consistency, this paper used the term product placement, which is defined as “the practice in which firms pay to place branded products e.g. brand name/logo, package, signage, other trademarks, in the context of mass media programming” (Homer, 2009, p.21). Here, an exchange occurs between the brand (firm) and the channel (media) in order to create a unique advertisement that will reach a large audience with the goal of converting viewers into consumers of that particular brand.

The automotive industry was one of the first to introduce product placement to mass media (Cowley & Barron, 2008). The main benefit of using it as a method of advertising was that it was a more efficient way to advertise in comparison to using print advertisement (Cowley & Barron, 2008). Over time, companies specializing in the manufacturing of consumer packaged goods began to see the value in this technique and adopted the practice. Placements which are commonly inserted include food and drinks, tobacco, and consumer electronics. A famous example of a successful product placement is that of Reese’s Pieces in E.T.: The Extra-Terrestrial (Gupta & Gould, 1997), which produced a 65% increase in candy revenue after the 1982 premiere of the movie. More recent product placement has consisted of famous brands for technology, apparel and cars, such as Apple, Nike and Chevrolet, respectively, which each
appeared in 15-30% of 2010’s biggest films. With high movie production budgets and the struggle for producers to cover the full cost of creating a movie, product placement helps to offset movie production costs. For example, Bond 23 received $45 million in product placement budgeting, which covered approximately 30% of the film’s budget (Karr, 2011). In 2009, the product placement industry was valued at $24 billion, and is expected to grow by 10% in 2014 (Karr, 2011). The few weeks surrounding a movie’s release has been shown to increase stock prices of placed products (Karniouchina, Uslay, & Erenburg, 2011).

Product placement appears in movies, television, video games, music videos, and most recently, to keep up with technological advances and communication trends, in smartphones (Howell, 2005). One of the main goals of product placement, in terms of capturing the consumer’s interest, is the creation of value, which is “based on the belief that something of worth can be exchanged between parties” (Gangadharbatla & Daugherty, 2013, p.23). Companies using product placement perceive this strategy to be of value to consumers, as these communication messages, if successful, should fulfill the desires of the consumer as well as those of the company (Ducoffe, 1996). It is believed that the media simultaneously serves to fill the void of the search for information and need for entertainment (Conway & Rubin, 1991; Ferguson & Perse, 2000; Palmgreen & Rayburn, 1979). However, the importance of this value should be weighed against the placement’s ability to be processed, stored, and retrieved from the consumer’s memory.

A major component in advertising is segmentation (Darley & Smith, 1995). It is well known that marketers target males and females, with products that are respectively more masculine and more feminine, in order to increase market share (Darley & Smith, 1995; Lin,
2002, Meyers-Levy & Sternthal, 1991). Although product placement is an effective form of advertising for influencing attitude and purchase intention, there may still be unexplored mechanisms in terms of how marketers segment their target markets in order to more effectively display a product placement.

To illustrate an example of this discussion, imagine a male and female sitting together watching a James Bond film when, all of a sudden, a beautiful car races across the screen. The male notices the car and enthusiastically asks his girlfriend if she would find him more attractive if he were to drive a car from the movies. To his dismay, she has no idea what he is talking about, because she did not notice this car. However, later in the movie, she sees this same car parked in the driveway of a beautiful mansion, and immediately takes a liking to it. She later tells him, “You know, you would look very attractive driving a BMW Z3 Roadster.” Perplexed, he spends the rest of the night wondering how on earth she knew the name of the car that raced across the screen earlier. This scenario outlines an example of the use of both a static (stationary) and a dynamic (moving) product placement described in the James Bond movie GoldenEye.

After its feature in the movie, the BMW Z3 Roadster saw a 15,000 unit increase in revenue by the time it was released into the mass market (Sapolsky & Kinney, 1994). In the movie, the car was seen both driving through nature (dynamic product placement) as well as parked in a building lot (static product placement), perhaps indicating that different instances of product placement influenced male and female retention of the vehicle, ultimately influencing their purchase intention.

Keeping this example in mind, the main area of interest for this thesis was in whether there is an underlying reason for a product placement’s effectiveness, particularly in the
questions of a) whether the strength of product placement retention depends on sex and b) whether sex influences product placement retention because of an underlying mechanism such as processing style. Answering these questions were helpful in making the practice of product placement more beneficial to both marketers and consumers, in turn increasing the strategy’s value in the efficiency and effectiveness of its implementation.

In a single study, this thesis attempted to contribute to the existing bodies of literature in product placement and sex differences in visuospatial abilities by exploring retention of product placement in movies, given differences in evolved superior visuospatial abilities in males and females. Using three customized video clips as stimuli, the study first demonstrated superior retention of dynamic and plot-connected product placement for males and females, respectively, relative to a static control placement, and second, attempted to explore individual processing style as a mechanism for these differences in retention. It was anticipated that an item-specific processing style would lead males to recall a dynamic placement over a control, and that a relational processing style would lead females to recall a plot-connected placement over a static control. Third, the study attempted to demonstrate the role these factors play in purchase behavior as a response to recognition of product placement in movies. This novel pairing of the literature serves to encourage further thought in the quest for efficient and effective advertising with satisfactory responses from consumers and advertisers alike.
Chapter 2: Literature Review

Male and female segmentation in advertising can be explored in a variety of ways, depending on the theoretical lens that is utilized by a researcher. One angle to explore these research questions was through the evolutionary psychology lens. This is because sex differences are widely documented, particularly within the hunter-gatherer theory, which accounts for sex differences as a result of division of labour (Silverman & Eals, 1992, Tooby & DeVore, 1987). Researchers have hypothesized from the hunter-gatherer theory that males and females evolved different visuospatial abilities that influence our cognitive processing of objects (Silverman & Eals, 1992). Objects used in product placement in movies are considered in line with objects described in hunter-gatherer research, due to their geometric components typical in objects encountered on a regular basis (Biederman, 1987). Therefore, this thesis attempted to find sex differences in product placement retention when displayed static (stationary) and dynamic (moving) objects (stimuli) in product placement. These stimuli respectively paralleled the male need to track moving prey, and the female gathering of stationary vegetation. Another area of interest that was observed in this thesis is sex differences in processing style (Hunt & Einstein, 1981). These differences in processing style were relevant to the literature review and research question because product placement can be plot-connected at times (Russell, 1998, 2002). In other words, it can be related to something that is happening in the scene. Following this logic, in this case, males and females would in fact recall a product placement differently, depending on whether the product placement is dynamic or static, and depending on the individual’s item-specific (object attributes) or relational (object within a context) processing style. Therefore, in this thesis, the literature review assessed theories of sex differences from the broad to narrow
spectrum of visual processing, beginning at the broad domain of evolutionary psychology, to a more narrow understanding of sex differences in visual processing, and concluding with an application of these theories to a product placement context.

Prior to discussing the conceptual framework for this thesis, it is important to clarify the distinction between the terms *sex* and *gender*, as the two terms are often used interchangeably but may convey different meanings. Whereas *gender* refers to “psychological features frequently associated with biological states of male and female, that are assigned by an observer or by the individual,” *sex* refers to “the biologically based categories of male and female” (Deaux, 1985, p. 51). For the purpose of this thesis, this distinction is important due to the contribution of sex differences in visuospatial abilities that are discussed in terms of product placement effectiveness. Males and females were explored from an evolutionary perspective, and thus a biological referent for the individuals, *sex*, was used.

### 2.1 Sex Differences in Evolutionary Psychology

The main assumption of the evolutionary psychology paradigm is that “the human brain is comprised of a large number of specialized mechanisms that were shaped by natural selection over vast periods of time to solve the recurrent information processing problems faced by our ancestors” (Symons, 1995, p. 1). This assumption acted as the foundation for this thesis, which discussed the influence of specific ancestral behaviours on the effectiveness of current practices of product placement advertising. It introduced sex differences as a moderator to further test recall and recognition memory, which are collectively referred to as *retention* (immediate memory; Benton, 1945, p. 1), in product placement research.
2.1.1 Hunter-Gatherer Theory. Sex differences exist in areas such as visuospatial ability (“the ability to keep in mind a definite configuration so as to identify it in spite of perceptual distractions”; Steele, Walder, & Herbert, 1992, p. 1066), mathematical ability and verbal ability (Hines, 1982; Wesman, 1949). Of particular interest to this thesis was the sex differences in spatial ability research program and its well-known Hunter-Gatherer Theory, which is linked to survival, in which males were primarily hunters of prey, while females were primarily gatherers of edible vegetation (Buss, 2008; Tooby & DeVore, 1987). Research in human hunter-gatherer behaviour has suggested the prehistoric emergence of a division of labour between males and females (Burke, Kandler & Good, 2012; Hill, 1982; Silverman & Eals, 1992).

“Man the Hunter” and “Woman the Gatherer” analyses have often been criticized due to their distinct, sex-specific approaches to account for hominization, the “evolutionary biological process of becoming a human from ancestral primates” (Tooby & DeVore, 1987, p.202), as several arguments exist that selection depends not only on age or sex, but also on various other categories, such as altruism and reproduction levels (Eagly & Wood, 1999; Lovejoy, 1981; Teleki, 1973). Furthermore, according to Tooby and DeVore (1987, p.193), natural selection is “the major constructive and ordering force in evolution” and traits often associated with natural selection are presumed to be adaptive and fitness-promoting. The process of hominization is such that behaviours adapt over time, through natural selection, to develop the skills needed in order to survive (Tooby & DeVore, 1987; Williams, 1966). Behaviours that did not provide benefit to the actor did not continue to evolve, and behaviours that did provide benefit to the actor did continue to evolve in succeeding generations. An example of an adaptive trait is visuospatial
ability. From the hunter-gatherer theory, it has been posited that spatial abilities between males and females evolved to develop different cognitive abilities in information processing to maximize survival (Halpern, 1986). Emphasis is placed on the argument that the testing of this theory is the main focus of this thesis, rather than the magnitude of these differences that exist in literature. Effect sizes are discussed further in the methodology section of this thesis.

2.1.2 Physiological Motion Detectors. Research in motion detection has tested human response to dynamic stimuli, with findings that support tracking of movement and direction of a stimulus (Hubel & Wiesel, 1979). The eye-head movement system (Coren & Ward, 1989, p.389) allows us to detect a physically moving object with our retina and follow it with our head. Two examples of this type of movement, called smooth-pursuit movement (Epstein & Hanson, 1977; Neimann & Hoffmann, 1997; Rock & Halper, 1969), are tracking moving prey, which male hunters engaged in, as well as following the direction of a moving vehicle on a street. The latter example is commonly displayed in a product placement context. Research indicates that reasoning for dynamic and static displays are correlated (Schiff & Oldak, 1990; Smith & McPhee, 1987), and that males outperform females in movement-related tasks (Law, Pellegrino & Hunt, 1993), suggesting a link for movement-related tasks between visuospatial abilities and product placement retention.

2.2 Sex Differences in Visuospatial Abilities

Previous research over the last few decades has shown that males and females differ in visuospatial abilities (Cherney & Ryalls, 1999; Collins & Kimura, 1997; Newcombe, Bandura & Taylor, 1983; Silverman & Eals, 1992; Voyer, Postma, Brake, & Imperato-McGinley, 2007). The male foraging hypothesis and the female foraging hypothesis (Silverman & Eals, 1992) were
discussed in terms of evolved visuospatial abilities. The *male foraging hypothesis* (Silverman & Eals, 1992) suggests that males had to hunt for food in locations farther away from their homes. Over time, males developed long-range navigation and throwing accuracy, leading to their superior spatial abilities in mental rotation and orientation. *Mental rotation* is defined as “the ability to rotate mental images quickly and accurately” (Auyeung, Knickmeyer, Ashwin, Taylor, Hackett, & Baron-Cohen, 2012, p.1). In a similar vein, the *female foraging hypothesis* suggests that females searched for and collected food that was non-mobile in nature, such as vegetables. Whereas males had developed superior mental rotation abilities by hunting, females, too, had developed superior memory for identification and location of *object arrays*, defined as “groupings of visual objects” (Noseworthy, Cotte, & Lee, 2011, p.1) by gathering (Silverman & Eals, 1992). This superior ability in females is known as *object location memory (OLM)* (Silverman & Eals, 1992, p.1). The male and female foraging hypotheses have lent themselves to the expansion of research in visuospatial abilities, as empirical evidence continues to show male superiority in mental rotation, and female superiority in OLM (Brown, 2013; Kimura, 1999; Halpern, 2000; Voyer et al., 2007). Support in this area of literature was helpful in understanding the overarching question in this thesis, of whether these processing mechanisms influence an individual’s retention of modern day product placement.

2.2.1 Visualization. Sex differences play an important role in forming spatial mental imagery (Campos, 2014). The two main types of forming mental images are a) forming the actual object itself comprised of its physical attributes, and b) forming the object in space, relative to other objects. The former is characterized as *object visualization* and the latter is characterized as *spatial visualization* (Campos, 2014). Due to a large variation of imagery types,
Campos (2014) sought to find sex differences between these two types of visualizations by measuring mental imagery abilities, of both males and females, using various tests of performance and imagery, such as the Measure of the Ability to Form Spatial Mental Imagery (MASMI; Campos, 2009, 2012), the Spatial Scale of the Primary Mental Abilities (PMA), the Vividness of Visual Imagery Questionnaire-2 (VVIQ-2), the Measure of the Ability to Rotate Mental Images (MARMI) and the Object-Spatial Imagery and Verbal Questionnaire (OSIVQ). Previous research has found higher performance scores for males in the MARMI, higher scores for females in the OSIVQ, and no sex differences in imagery scores. The ultimate goal of Campos’ (2014) research was to find a correlation between these tests within each sex. The results of his research were similar to previous research, and found an overall higher performance score for males on spatial relation and mental rotation scores, a higher score for females on the OSIVQ, and no sex differences on VVIQ-2 (Campos, 2014).

2.2.2 Identification and Recognition of Objects. The difference between identifying an object and recognizing an object is in the ability to respectively know something about an object as opposed to knowing that it has been seen before (Mandler, 1980). Identification is simplified when expectations about an object to be seen are met; whereas the opposite is true for objects that are not expected to be seen (Palmer, 1975a). Tasks involved in the measurement of sex differences in visuospatial abilities include disentangling an object from its surroundings (in the embedded figures test/hidden figures test) and recognizing rotated targets in a mental rotation task (Coren & Ward, 1989, p.521). Tests of visuospatial ability include the Water Level Task (Piaget, 1970; Sholl & Liben, 1995), Vandenberg Mental Rotations Test (Cherney & Collaer, 2005; Cherney & Neff, 2004; Vandenberg & Kuse, 1978; Voyer, Voyer, & Bryden, 1995) and
wayfinding (Silverman, Choi, Mackewn, Fisher, Moro, & Olshansky, 2000). According to Wilson and Vandenberg (1978), male superior abilities range between slightly above female ability to one standard deviation above females. It is believed that the strategies used for various spatial imagery tests differ between males and females (Linn & Petersen, 1985). In complementing these findings, there is a wealth of evidence showing that males have superior mental rotation skills, whereas females have superior OLM skills (Eals & Silverman, 1994, James & Kimura, 1997; Jausovec & Jausovec, 2009; McBurney, Gaulin, Devineni, & Adams, 1997; Silverman & Eals, 1992).

2.2.3 The Hunter-Gatherer Theory of Sex Differences in Visuospatial Abilities. The information discussed above was important to introduce the seminal piece of research pertaining to this thesis: the hypothesis that females have evolved to develop a stronger spatial ability for identification and object location memory than have males has been supported by Silverman and Eals (1992). Silverman and Eals (1992) hypothesized that females would show significantly higher scores for both object and location memory. The researchers tested for a female spatial advantage and showed that, during a memory task, females scored higher than males on object location, suggesting that they are better able to recall objects from memory than are males. In the experiment, participants were given one minute to examine a display of objects. They were then tested on object memory as well as location memory using recall and recognition as the performance measures. Following the one minute, they were left in an office containing both office and personal items. The directed learning condition asked participants to learn the objects in the room in the two minutes they were in the office; the incidental learning condition had no such instruction. Females outperformed males on all measures. A replication of this study, due
to suspicion of female superior verbal ability as the main reason for outperforming males, was conducted using completely unlabeled objects among common objects showed that females still showed superior recall for both common and unlabeled objects in the incidental condition, but superior recall of unlabeled objects only in the incidental condition (Silverman & Eals, 1992), which shows that novel items are better recalled when presented without any prior knowledge.

The findings for female superior spatial abilities in OLM have been replicated across several studies (e.g., Choi & Silverman, 1996; Dabbs, Chang, Strong, & Milun, 1998; Eals & Silverman, 1994; James & Kimura, 1997; McBurney et al., 1997; Silverman & Phillips, 1998; Stoet, 2011). These findings are particularly important in the context of product placement in movies, as novel products are presented when the audience does not necessarily expect an appearance of a product.

Silverman, Choi and Peters (2007) generalized the hunter-gatherer theory of sex differences in spatial abilities across 40 countries. The researchers tested OLM of males and females. It was found that in 35 of 40 countries, females, in comparison to males, were superior in tests of OLM, providing further evidence in support of the sex differences in visuospatial abilities. McBurney et al (1997) also found superior spatial sex differences in females in terms of OLM with their updated version of Silverman and Eals’ (1992) task, in the form of a Memory™ game. The evidence that various tasks in OLM support a female spatial advantage was beneficial to the notion that this tendency may apply to viewing static product placement objects.

Overall, Silverman and Eals’ (1992) hypotheses for male and female foraging built the foundation for this thesis as it sought to explore how evolved spatial relation and mental rotation, as well as OLM abilities, influence the effectiveness of product placement.
2.3 Sex Differences in Processing Style

Another component of sex differences that pertains to visuospatial abilities is that of processing style, which occurs in two fashions. The first, *relational processing*, is defined as “the encoding of similarities among a class of events” (Hunt & Einstein, 1981, p.497). Finding the commonality between unrelated items, such as beer, hot dogs, and a baseball (that is, they are all found at a baseball game/event) is an example of this type of processing. The second, *item-specific processing*, is defined as “encoding of item-specific information” (Hunt & Einstein, 1981, p.497). Pointing out which food item is green among peas, corn, and tomatoes, is an example of item-specific processing, as it focuses on particular attributes of separate objects, as opposed to how the objects function together in a greater context (Hunt & Einstein, 1981).

Hunt and Einstein (1981) discussed the effects of relational and item-specific processing on memory. The researchers experimented with these processing styles by having participants sort one of two 36-item list of nouns. One list contained related words from six different categories (animals, body parts, etc.), and the other list contained unrelated words from six broad categories (things that are green, liquids, etc.). To test relatedness, participants sorted words in the related list into their respective categories. The individual item list was measured with ratings of pleasantness (Hunt & Einstein, 1981). It was found that sorting items into categories was higher in the relational task than in the individual-item task, and that orienting an individual into a relational processing style yielded higher recall for items in similar categories (Hunt & Einstein, 1981). To elaborate on the examples provided earlier, the first experiment consisted of three tasks: a relational orienting task, an item-specific orienting task, and a combined relational and item-specific task. Results showed higher scores for the related items than for the unrelated
items. It was also found that relational processing induced high levels of category clustering but not as high levels for item-specific processing. In general, these results showed different encoding styles for each strategy, and therefore show an emphasis of similarities of items through relational processing and an emphasis of differences in item-specific processing. Overall, it was found that relational processing was better for recall, especially when given a relational task, as items that were categorized similarly were remembered more, whereas item-specific processing did not yield high categorization of unrelated items, and did not yield greater recall of information. This information is useful in determining ad processing strategies in males and females due to the wide variation in ad types that can be viewed by particular attributes or as a whole (Noseworthy & Goode, 2011; Noseworthy, Wang, & Islam, 2012).

Sex differences in relational processing have been studied prominently by Meyers-Levy (1994) and have been expanded by several researchers (Kim & Meyers-Levy, 2008; McGivern, Huston, Byrd, King, Siegle, & Reilly, 1997; Meyers-Levy & Malaviya, 1999). In the last decade, research on relational processing has found that visuospatial processing is linked to processing style and sex, such that males perceive objects in a more item-specific manner, and females perceive objects in a more relational manner (Barkley & Gabriel, 2007; Jiang, Olson, & Chun, 2000; Putrevu, 2001). In addition, Noseworthy et al (2011) conducted a thought listing task to determine whether participants elaborated on target products in a more item-specific or a more relational manner. After viewing several advertisements, participants were asked to complete a thought listing task pertaining to the target products (e.g. digital cameras). The thoughts were then coded and compiled into an index, which was used to determine an individual’s processing style. They found that males processed information in an item-specific
manner, whereas females processed information in a relational manner. These results support preliminary research pertaining to sex differences in processing style (Barkley & Gabriel, 2007; Jiang et al., 2000; Putrevu, 2001).

As the processing strategies used by males and females are different, the significance of this section to this thesis was in the suggestion that relational processing is applicable to consumer behaviour, such that this affects how consumers pay attention to and evaluate products that they see or come in contact with (Noseworthy, Finlay, & Islam, 2010; Noseworthy & Trudel, 2011). With strong evidence catering to superior mental rotation ability in males, the relational processing argument served to strengthen the evidence that exists for superior spatial ability in females, that is, object location memory (Meyers-Levy, 1989; Silverman & Eals, 1992).

Furthermore, relational processing is measured using a thematic relation, which is described as “a temporal, spatial, causal or functional relation between things that perform complementary roles in the same scenario or event” (Estes, Golonka, & Jones, 2011, p.250). For example, Meyers-Levy and Maheswaran (1991) found that females use all available informational cues in a given context. It has also been found that objects are processed more quickly when they are thematically related (Estes, Gibbert, Guest, & Mazursky, 2012). To put in practical terms, brand extensions of novel products are evaluated more positively when the new product is displayed with another product that is related to the original product but performs a different role but in a related context. For example, pizza and beer are often consumed together, in a similar context, and are therefore thematically related. Therefore, incorporating thematically related objects in product placement may yield more positive evaluation.
2.4 Sex Differences in Advertisement Processing

Various research has shown sex differences in advertisement processing (Darley & Smith, 1995; Noseworthy et al., 2011; Putrevu, 2001; Putrevu, 2004; Putrevu, Tan, & Lord, 2004). Much of the research in advertisement processing between males and females regards the selectivity model (Darley & Smith, 1995; Meyers-Levy & Sternthal, 1991), which states that, in information processing, whereas females respond to subtle cues, males do not respond to subtle cues. Noseworthy et al (2011) expanded research on visuospatial abilities between sexes and found that, due to superior visuospatial elaboration, which is defined as “the heightened ability to maintain several visual objects in memory” (Barkley & Gabriel, 2007; Eals & Silverman, 1994), females tended to involuntarily shift resource allocation from verbal processing to visuospatial processing in order to identify incongruent products, in an array, that would normally be left unidentified. This research was applied to a marketing context using advertisements and is mentioned here to strengthen the link between sex differences in processing in an advertising context, which could be translated to product placement processing.

2.5 Sex Differences in Product Placement

Although there is research on sex differences in advertising processing, current product placement research suggests a large disparity between (or lack thereof) sex and gender variables in product placement literature (Carsky & Zuckerman, 1991). As was mentioned in the beginning of this literature review, sex and gender convey different meanings, respectively comprising of biological and social components. The literature available in product placement refers to gender differences, and is limited to particular contexts in which males and females are studied, such as tobacco exposure (Balasubramanian, 1994) and video game playing (Lee &
Faber, 2007; Tangmanee & Rustanavibul, 2012). The limited research in sex differences in product placement effectiveness provided an optimistic space to synthesize research from sex differences in visuospatial abilities to its application to product placement research. Sex differences can enhance what is currently known about gender differences in product placement effectiveness, as investment in the use of product placement can become costly. The practical importance of targeting males and females is in the expansion of effective strategies used in implementing the practice of product placement. In addition, literature on processing styles was also useful in the contribution to the effectiveness of product placement, due to plot-connection serving as an effective strategy for product placement when evaluating cognitive, affective and behavioural effects (Lehu & Bressoud, 2009). Although the research from these areas heavily supports sex differences in visuospatial abilities and processing styles, their influences on product placement effectiveness was unknown. However, the effectiveness of product placement on consumers is integral to the normative use of the practice. The most common signals of effectiveness given by the consumer are signals of liking, attitude, and purchase behaviour (Balasubramanian, Karrh, & Patwardhan, 2006).

2.5.1 Plot-Connected Product Placement. In product placement literature, a thematically related scene is known as a plot-connected scene, and research indicates that females should show a processing style towards a plot-connected product placement that assimilates all available informational cues about the object in question (Meyers-Levy & Maheswaran, 1991). Plot connection is established when “the product was involved in the action and/or was in contact with the main character” (Galician & Bourdeau, 2004; Lindstrom, 2008). Product placement in movies is said to yield heightened attention when the placement is plot-
connected (d’Astous & Chartier, 2000; Fontaine, 2002b; Lindstrom, 2008). Retention of plot-connected product placement has also been studied with various roles that the placement played in the stimuli (Fontaine, 2002b; Ong & Meri, 1994). For instance, the role of the product in the intrigue or situation (Fontaine, 2002a, 2002b; Ong & Meri, 1994), the brand in the action, the relation to the context of the movie (d’Astous & Chartier, 2000), and/or character association/identification with the product (Fontaine, 2002a, 2002b; Russell, 2002) have all been used to conceptualize plot connection of a product placement, and have been useful in deriving insights pertaining to these variables in the context of product placement. It has been shown that plot-connection increases memory when a product placement’s plot-connection is incongruent with its modality, such that a plot-connected placement that was visual was greater recalled than a plot-connected placement that was auditory (Russell, 2002). Other studies on plot-connected placement have also found that a plot-connected placement yields higher acceptability and recall than a non-connected product placement (d’Astous & Chartier, 2000). Therefore, the effectiveness of plot-connected product placement shown here qualifies further inquiry about the nature of this strategy, and is a key component of this thesis.

2.6 Recall and Recognition in Advertisement

Since it is known that males and females perceive objects differently in terms of physical attributes and interpretive concepts (Meyers-Levy & Maheswaran, 1991; Meyers-Levy & Sternthal, 1991), and that this is due to heightened visuospatial elaboration, which has been shown in a recall task (Noseworthy et al., 2011), research suggests that recall memory is essential to understanding object effects. Particularly, recall memory is central to the
understanding of product placement effectiveness, and is a dominant measure of product placement effectiveness.

Recall and recognition components of retention exist in two hemispheres: explicit and implicit memory. “Tapping” explicit memory is done using directed tasks for recall and recognition of information from a previous exposure (Krishnan & Chakravarti, 1999; Shapiro & Krishnan, 2001) and is more commonly researched than implicit memory in advertising and product placement studies (Law & Braun-La Tour, 2004; Shapiro & Krishnan, 2001). On the other hand, implicit memory is accessed using indirect tests such as word association and sentence completion (Duke & Carlson, 1993; Krishnan & Chakravarti, 1999), and is “characterized by a response bias that increases the likelihood that information from a recent stimulus exposure (e.g. an ad) will be used to perform a subsequent task (purchase) without conscious retrieval or even awareness of prior exposure to that information” (Lee, 2002).

According to Lehu and Bressoud (2009), there are three types of explicit recall: free recall, prompted recall, and recognition. Free recall occurs when “the consumer can cite the brands seen in a film without additional prompting” (Lehu & Bressoud, 2009, p.10). Prompted recall occurs when “the consumer cites brands seen with the help of product categories present in the movie” (Lehu & Bressoud, 2009, p.10). Recognition occurs when “the consumer cites brands seen with the help of a list,” (Lehu & Bressoud, 2009, p.10), and is also defined as “perceiving something as previously known” (Mandler, 1980). Free recall is the most common measure of the three as it is the most accessible and open-ended. The outcome measures of these types of tests surround cognitive effects of product placement rather than affective (attitude) or
conative (purchase intention), which are more closely linked with persuasion rather than memory (Lehu & Bressoud, 2009).

2.6.1 Recall and Recognition in Plot-Connected Product Placement. Going back to the execution/stimulus factors in Balasubramanian et al’s (2006) model, it was believed that distinct mechanisms mediated the relationship between those factors and an individual’s retention. The most commonly researched mechanisms include plot-connectedness and placement modality (auditory vs. visual). Other effects that are measured include short-term memory effects measured though free recall, prompted recall and recognition (Babin & Carder, 1996a; Baker & Crawford, 1995; Gupta & Lord, 1998; Johnstone & Dodd, 2000; Karrh, 1994; Nelson, 2002; Sabherwal, Pokrywcynski, & Griffin, 1994). Overall, it has been shown that product placements are most effective when processing depth is evaluated on the high end of the continuum, such that explicit memory is accessible and recall and recognition of products/brands is more consciously activated. Given that plot-connectedness and placement modality are the two most commonly researched mechanisms for retention, sex differences in spatial abilities served to explain a deeper understanding for why they may be effective mechanisms, as spatial abilities are also measured with memory tests.

There have been several recall studies done on product placement effectiveness across various cultures (Balakrishnan, Dousin, & Permarupan, 2012; Lee & Faber, 2007; Tangmanee & Rustanavibul, 2012). Research on plot-connected product placement is well-documented (Law & Braun, 2000; Lehu & Bressoud, 2008; Ravi, 2011; Yang & Roskos-Ewoldsen, 2007). Of particular interest to this thesis was the research done by Lehu and Bressoud (2008), who tested whether prominence and plot-connection of a product placement had an effect on memorization.
The researchers had participants fill out a questionnaire after they had watched one of 11 feature-length films, controlling for whether a participant had seen the movie more than once before. Free recall was measured for product placement effectiveness. Prominence and plot connection were coded into two subgroups of each category. The researchers found that prominent plot-connected placements yielded higher recall than subtle, not-connected placement. The researchers concluded that prominence is stronger in eliciting recall than is plot connection, but plot connection is still beneficial in the effectiveness of product placement. This research provided an avenue for the application of plot connection to the retention of a product placement exposure, via sex differences in processing style.

2.7 Gap in the Literature

To outline the scope of research in product placement literature, Balasubramanian et al (2006) developed an integrative conceptual model that outlines the effects of product placement, given several independent variables most commonly researched in the area. The model is made up of four components: execution/stimulus factors, individual-specific factors, processing depth and outcomes that reflect placement effectiveness. Together, these four components outline the main elements of product placement in research, which the authors organized in such a way that no main effect be left unexamined. Execution/stimulus factors are variables that pertain to the placement itself but not the individual, such as program type, execution flexibility, opportunity to process, placement modality and placement priming. Individual-specific factors are variables that pertain to the individual but not to the product placement, such as brand familiarity, judgment of placement fit, attitudes toward placement, involvement/connectedness with the program. Essentially, the first component consists of aspects that the firm has control over, and the second
component consists of aspects that the firm does not have control over. Processing depth is a continuous measure (high/low) and refers to the degree of conscious processing. This area was vital to the effectiveness of product placement because the individual’s ability to recall the placement can influence his or her cognition, affect and conation towards the product or brand. These last three terms comprise the majority of outcome measures of product placement effectiveness, and exist on a Hierarchy-of-Effects (HoE) (Barry, 1987). In other words, cognitive effects are the most widely measured effects of product placement.

In light of the fact that this model encompasses much of what is studied in product placement literature, it omitted sex differences in product placement effectiveness. Research conducted on sex differences in product placement is limited (Distefan, Pierce, & Gilpin, 2004; de Gregorio & Sung, 2010; Gupta & Gould, 1997; Matthes, Wirth, Schemer, & Kissling, 2011). Plot connection has been explored in product placement effectiveness (d’Astous & Chartier, 2000; Cholinski, 2012; Fontaine, 2002a, 2002b; Gupta & Lord, 1998; Lehu & Bressoud, 2008; Russell, 1998, 2002), but it had not been explored from a sex differences in spatial abilities angle. This was an important area of exploration to the product placement literature as it went beyond main effects into underlying processes which may account for a particular stimulus’ effectiveness.

Although the literature has suggested some proximate explanations for product placement effectiveness, and has looked at gender differences from a demographic standpoint, it was surprising that the literature had not yet looked at the area in a deeper, more ultimate approach. Sex differences in visuospatial abilities may be helpful in explaining what is effective in product placement deliveries. The extant literature did not provide information regarding the individual
difference factor of sex differences in spatial abilities to determine product placement’s effectiveness in movies and television. More specifically, given what is known about sex differences in visuospatial abilities, perhaps there was an effect of sex differences on the effectiveness of product placement in terms of retention from a sex differences in spatial abilities perspective. Research in this area would help inform what we know about efficiency and effectiveness in advertising segmentation.
Chapter 3: Hypotheses

To bring together the review of the literature, it was apparent that male and female segmentation is important in advertising practice, as the quest to obtain greater market share is conducive to various segmentation strategies. As product placement is a form of advertising, it was surprising that research in product placement effectiveness did not discuss sex differences with greater rigor. Furthermore, in both areas of the reviewed literature, that is, sex differences in visuospatial abilities, as well as effectiveness of product placement, the most commonly measured outcome variables were recall and recognition. Additionally, if males and females evolved distinct spatial abilities (Silverman & Eals, 1992), and as humans, motion perception influences our ability to detect, recognize, and/or identify an object (Hubel & Wiesel, 1979), and that these objects are processed differently as sex influences processing style (Hunt & Einstein, 1981); it should follow that, in the context of product placement, males and females would retain (in memory) stimuli differently, depending on their processing styles and ability to track motion.

Theory suggests that males and females process information differently. In processing information differently, this includes the processing of objects differently. As product placement in movies can be considered objects, the processing of these objects suggests differences in recall by males and females. It is therefore suggested that, males and females, depending on respective processing styles, would process various product placement differently (for example, dynamic versus static or plot-connected), affecting their respective recall of these placements. It was believed that different processing styles between the sexes were what drive these differences in product placement recall (Meyers-Levy, 1994). This thesis used one study to explore three hypotheses pertaining to the research question. The study adopted product placement dependent
variables specific to retention, such as recall and recognition. Recognition is a form of recall, and to emphasize the function of the recognition memory test that is used in this study (Snodgrass & Corwin, 1988), the term recognition was used in place of recall when referring to this test.

This thesis explored whether sex differences in spatial abilities transfer from hunter-gatherer societies to modern day movie viewing, specifically in product placement settings. Drawing from the evolutionary psychology paradigm and the research described above, it appeared evident that there were differences in male and female behaviour that have evolved over time and that influence human cognition, which in turn affect retention. The study in this thesis used a dynamic and a plot-connected product placement to compare to a static control product placement to evaluate sex differences in retention using three comprehensive hypotheses. The purpose of the static control product placement is to serve as a benchmark not only to measure spatial abilities in males from the dynamic condition, but also to measure spatial abilities in females from the plot-connected condition. Without the static control, the manipulation of the dynamic and the plot-connected conditions would be confounded as there would be no benchmark measurement to distinguish female and male spatial abilities. The only shared characteristic between the three stimuli was that the plot-connected and control placements were both static, but distinguishable by plot-connectedness.

Research has shown that males are better at mental rotation tasks and females are better at object location memory tasks. Therefore, it was predicted that males will be better at recalling a dynamic product placement because it proxies mental rotation (in hunting), whereas females will be better at recalling static (plot-connected) product placement because it proxies object location memory (please refer to Figures 1 and 2 in Appendix D for conceptual and statistical
models). This would happen because males and females have evolved different visuospatial abilities as a result of these tasks (Silverman & Eals, 1994). Furthermore, prior work has shown that males and females process information differently (Hunt & Einstein, 1981). Therefore, a second hypothesis was proposed, which introduced processing style as a mediator. It was believed that individual differences in processing style drove the anticipated moderated effect. Thus, females would recall product placement as a result of a relational processing style, suggesting that they connect components of a scene and incorporate them into a particular context in which these items are related, and would recall components (i.e. product placement) as part of the context. Similarly, males would recall product placement as a result of an item-specific processing style, suggesting that they would track the movement of an object in a scene (i.e. product placement), regardless of its context, and be able to recall it as a result of this ability. This was tested such that females, due to a relational processing style, recall a (static) plot-connected product placement relative to a non-connected product placement (static control) (please refer to Figures 3 and 4 in Appendix D for conceptual and statistical models). Finally, a hypothesis for increased purchase intention, outlined below, was proposed based on these theories discussed about sex difference (please refer to Figures 5 and 6 in Appendix D for conceptual and statistical models).

Therefore, first, given that males show superior spatial ability in mental rotation, and that females show superior ability for object location memory, the formal moderation hypothesis was as follows:
**H₁:** Males will show superior *recall* when a product placement is *dynamic* as opposed to static (*control*). Conversely, females will show superior *recall* when a product placement is *plot-connected* as opposed to static (*control*).

Second, in order to explain these sex differences in product placement recall in terms of processing style the formal mediated moderation hypothesis was stated as follows:

**H₂:** There will be a conditional indirect effect of *product placement type* on *recall* through *processing style*, such that *relational processing* will mediate the relationship between *plot-connected placements* and *recall* for females, whereas *item-specific processing* will mediate the relationship between *dynamic placements* and *recall* for males.

To summarize thus far, the current research aimed to explore whether processing style would have an effect on recall and recognition of product placement in movies. Perhaps, due to a relational processing mindset in females, they would elaborate on product placement when it was integral to the scene, and in males, an item-specific processing style would drive them to track the attributes of the dynamic product placement, irrespective of its surroundings. Furthermore, previous research has shown that recall of a product placement increases liking and purchase of a brand or product (Matthes et al., 2011). Therefore, a third hypothesis was introduced using *purchase intention* as the outcome variable in a serial mediation model. The third formal two-part hypothesis was stated as follows:
H₃ᵃ: For plot-connected product placement, there will be a serial mediation effect of relational processing through increased recall on purchase intent for females, but not for males.

H₃ᵇ: For dynamic product placement, there will be a serial mediation effect of item-specific processing through increased recall on purchase intent for males, but not for females.
Chapter 4: Methodology

Previous studies have examined the use of product placement using excerpts from movies, short movies or complete movie screenings, in which participants were later asked about their recognition of the brands in the movie (Brennan & Babin, 2004; Lehu & Bressoud, 2009). However, due to time and budgeting restrictions, this study used short movie excerpts instead of short movies or feature films.

4.1 Participant Characteristics and Research Design

Upon receipt of ethics approval via the Research Ethics Board (REB #13JN022, Appendix A) at the University of Guelph, in exchange for monetary compensation, North American participants ($N = 347; M_{age} = 31, 48.7\%$ Female) were recruited using Amazon’s Mechanical Turk (MTurk). These participants must have been qualified as “Masters” (i.e., a performance-based distinction given to elite groups of Workers who must regularly pass statistical monitoring tests) to participate in the survey, in order to ensure higher quality responses (due to their high degree of accuracy across specific types of tasks among researchers). G-Power software was used to calculate sample size. The parameters used for G-Power calculation were a small effect size ($f = .20$), standard power for social sciences ($\beta - 1 = .80$), and standard alpha ($\alpha = .05$). In order for these parameters to be fulfilled, there needed to be 55 participants per cell in the $2 \times 3$ between-subjects factorial design. A small effect was chosen due to prior research obtaining small effects when exploring gender differences in visuospatial processing (Matthes et al., 2011; Noseworthy et al., 2011; Russell, 2002; Yang & Roskos-Ewoldsen, 2007). The study used a 2 (sex: male vs. female) $\times$ 3 (product placement type: dynamic vs. plot-connected vs. control) between-subjects factorial design, in which an equal
ratio of males to females were randomly assigned to one of three conditions. Qualtrics (an effective tool used for participant-based data collection) software used an automated function to ensure that each condition was presented evenly between each sex.

4.2 Stimuli

In collaboration with a professional multimedia editing company (Concept to Completion, also known as CtoC Productions), located in Kitchener, ON, three short video clips were adapted from existing movie scenes for use in the study. Each video clip was approximately one minute in length, which is approximately as long as a typical movie scene (Bordwell, 2006). Each video clip was edited such that there was a sex-neutral product placement (an Oscar Mayer logo) digitally integrated into it with four (4) seconds of exposure time in each video (prior research indicates placement exposure times ranging from two (2) to 74 seconds; Yang & Roskos-Ewoldsen, 2007). For the sex-neutral pretest, the Oscar Mayer logo was classified as masculine, feminine, or neutral on the logo ratings of 20 undergraduates who made their judgments on seven-point scales ranging from “1, predominantly purchased or consumed by males” to “7, predominantly purchased or consumed by females” – the midpoint was labeled “4, equal number of male and female purchasers/consumers” (Schmitt, Leclerc, & Dube-Rioux, 1988). A one-sample t-test revealed that mean rating of sex-neutrality ($M = 3.95, SD = .945$) was not significantly different for the Oscar Mayer logo than the population “normal” score of 4.0 ($t(19) = -.237, p = .815$). Oscar Mayer was chosen because it is a well-known American processed meats company, specializing in hot dogs and luncheon meats, and is not strongly targeted at one particular sex, as is a brand such as MAC Cosmetics (Makeup Art Cosmetics, which targets females), or AXE body spray (a deodorant brand which targets males). Therefore,
careful selection of the movie and its scenes was undertaken in order to ensure that the scenes that could be used would include the following criteria: that the Oscar Mayer logo could appear as the same size in all three video clips, and that the logo could appear in a scene as dynamic (not related), as plot-connected (static), and as a control.

The movie selected for this study was *The Great Outdoors* (1988), starring John Candy and Dan Aykroyd. This movie is a feel-good, campy movie that has simple dialogue to understand and a fairly straight-forward plot. It was important to select a movie that was fairly dated so as to reduce media bias or recency effects. The scene used for the dynamic condition depicted events during a boating outing, with a hot air balloon soaring through the sky (this was digitally embedded into the scene) with the Oscar Mayer logo superimposed onto the hot air balloon. The logo placement had no relation to the scene whatsoever, which was confirmed with the operationalization pretest (discussed below). The control condition used the same scene as the dynamic condition, but the Oscar Mayer logo was superimposed onto a canoe that was sitting on the sand in the background of a shot. It was neither in motion, nor related to the plot/scene, which was also confirmed by the operationalization pretest. In the plot-connected condition, the product placement was related into the plot (confirmed in the operationalization pretest), in which a different scene from the same movie was used. The Oscar Mayer logo was superimposed on a stationary hot dog stand, with the main character ordering hot dogs from the vendor while having a conversation with his son. Thus, one video clip contained a dynamic product placement that was not related to the scene (the dynamic condition); one video clip contained a static product placement that was related to the scene either via dialogue or surrounding props (the plot-connected condition); and another video clip contained a static
product placement that was not related to the scene (the static control condition). Each participant only viewed one video. Please see Appendix B for sample screenshots of the movie clips.

4.3. Pretest

The core objectives of this thesis were a) to find an effect of product placement type on recall through sex; b) to find out whether this effect was due to processing style differences between males and females which lead to greater recall; and c) if these processing styles lead to greater recall, and a greater recall leading to greater purchase intention. A pretest (n = 115) was conducted at the University of Guelph research lab in which participants were asked to watch a short movie clip. Following the video clip, participants were asked recall and recognition memory questions. This was done in order to make sure the videos correctly measured the desired sex effect between static and dynamic displays of product placement. The pretest also ensured the operationalization of product placement type worked as intended – that is, whether the product placement was in fact in motion (dynamic), or related to the scene (plot-connected) or neither dynamic nor plot-connected (control).

A test using chi-squares revealed that overall, 61% of participants recalled seeing the Oscar Mayer logo ($\chi^2 (1, N = 114) = 2.295, p = .317, \phi = .142$). Of the participants who recalled the Oscar Mayer logo, 85.2% claimed it to be in motion in the dynamic condition (relative to 14.8% in the static control; $\chi^2 (1, N = 48) = 20.10, p = .001, \phi = .661$). Furthermore, 86.7% claimed the Oscar Mayer logo to be related to the scene in the plot connected condition (relative to 13.3% in the control; $\chi^2 (1, N = 43) = 12.05, p = .002, \phi = .529$) (Please refer to Table 1 in
Appendix E). These results show that our conditions have been perceived as intended and operationalization of dynamic and plot connected conditions was upheld.

### 4.4 Procedures, Measures & Methodological Details

Qualtrics software was used to build the study and present it to participants. Once participants accessed the survey via MTurk, they were led through an informed consent form and told that by clicking the arrow to proceed is akin to providing consent to participate in the study. The following sections describe each task encountered by participants.

#### 4.4.1 Instructional Manipulation Check.

Following the informed consent form, participants were displayed with text describing an overview of what they will be doing. They were then told to select “no” if they had read the instructions (coded: 1 = yes; 0 = no). Those who selected “yes” were displayed the question again with red font indicating to re-read the question before continuing. Those who did not read the message in its entirety were likely to click “yes” and thus were excluded from the analysis if identified as individuals who may respond to questions without thinking about the answer. This is known as an Instructional Manipulation Check (IMC; Oppenheimer, Meyvis, & Davidenko, 2009) and is done in order to minimize noise as well as maintain the validity of the data (Oppenheimer et al., 2009). Participants who responded correctly passed the IMC, whereas participants who responded incorrectly failed the IMC. Removing these participants can prevent noise, as well as a decrease in Type II error (Oppenheimer et al., 2009). This step was particularly important when collecting data from MTurk, as there is often much variance associated with participants who did not pay full attention to the tasks (Goodman, Cryer, & Cheema, 2013).
4.4.2 Movie Scene Clip. Following the IMC, participants then viewed one of the three product placement types in video format at their computers in a private setting (e.g. at home). The experiment was designed so that each of the three groups had the same sample size. Participants were instructed to view a movie scene (unknowingly containing a product placement), under the guise that they would just be evaluating a scene from a movie (“We want to know what you think of this movie scene” was the description used when recruiting participants). The concept of product placement was not brought up prior to displaying the movie clip so as to not bias the participants and subsequently affect recall and recognition on the questionnaire. Following the movie clip, participants responded to a short questionnaire consisting of the measures described below.

4.4.3 Retention (Recall and Recognition). The order of the outcome and dependent measures was very important for the purpose of this research. In order not to bias any participant, the questionnaire first asked a free recall question asking to recall everything that the individual saw in the video clip (Lehu & Bressoud, 2009; Meyers-Levy, 1989). The results were coded into a binary dependent variable, coded as 0 if Oscar Mayer was not mentioned in the response and 1 if Oscar Mayer was mentioned in the response. The next question was a prompted recall question, asking to recall any or all brands that appeared in the video clip (coded 1: yes, Oscar Mayer was mentioned; 0: no, Oscar Mayer was not mentioned) (Malaviya, Meyers-Levy & Sternthal, 1999). Free recall was analyzed using binary logistic regression and chi-squared tests to determine the significance of the broad moderation model. Prompted recall was not included in the analysis because the data did not further inform the free recall data.
Next, participants were administered a recognition memory test in the form of “yes-no” response choices; coded as 1 for “yes” and 0 for “no”. The test included a list of several brands and objects that both did appear (called “old” targets) and that did not appear (called “new” targets) in the scene (Yang & Roskos-Ewoldsen, 2007). Participants were required to respond to each question with a “yes” if they believed they saw the target object in the scene, or a “no” if they believed they did not see the target object in the scene. The responses were analyzed using the threshold theory of recognition memory, adopted from signal detection theory (SDT) (Snodgrass & Corwin, 1988). The measurement of recognition memory was accounted for by hits (“yes” to an “old” target), misses (“no” to an “old” target), correct rejections (“no” to a “new” target) and false alarms (“yes” to a “new” target; Snodgrass & Corwin, 1988). Signal detection theory is based on the probability that an observer will successfully detect an “old” target (Baird & Noma, 1978; Coren & Ward, 1989; Egan, 1975; Gillund & Shiffrin, 1984; Green & Swets, 1966; Snodgrass & Corwin, 1988; Tulving & Thompson, 1971). If a participant is unsure of whether a stimulus was detected, a guess may occur. These guesses are reflected in false alarms. The interesting component of a recognition memory test is that a decision about whether a stimulus was absent or present must be made at each question.

The threshold at which a signal is detected at 50% separates a guess from an accurate decision (denoted as $A'$ – the discrimination index; Pollack & Norman, 1964). The discrimination index, which shows the relationship between hits and false alarms, is displayed as a likelihood of signal changes (Coren & Ward, 1989). $A'$ is the nonparametric measure (Gillund & Shiffrin, 1984; Tulving & Thompson, 1971), and its calculation varies depending on the relationship between the number of hits (H) vs. false alarms (FA), exhibited with the following equations:
If $H > FA$: $A' = \frac{0.5 + [(H - FA)(1 + H - FA)]}{[4H](1 - FA)}$ \[1\]

If $FA > H$: $A' = \frac{0.5 - [(FA - H)(1 + FA - H)]}{[(4FA)(1 - H)]}$ \[2\]

The two equations were computed using hit/false alarm rates (Grier, 1971). Isomemory functions describe the equal discrimination across biases (Snodgrass & Corwin, 1988, p.25). On the other hand, the isobias function yields equivalent bias across all levels of discrimination (Snodgrass & Corwin, 1988, p.25). The discrimination index ($A'$) ranges from 0.5 to 1, with 0.5 indicating a weak ability to discriminate between a hit and a false alarm. Conversely, an $A'$ score of 1 indicates that a participant’s ability to discriminate between a hit and a false alarm is perfect. A bias index ($B''$; Grier, 1971) is defined as “the difference in the two areas $A1$ and $A2$, divided by their sum”. This value explains the frequency with which a participant selects “yes” between both new and old signals. The bias index ($B''$) ranges between -1 and +1. A score of +1 indicates a liberal bias (tendency to select “no” across all responses), such that the ability to discriminate between a miss and a correct rejection is very weak. A score of 0 indicates a neutral bias, and a score of -1 indicates a conservative bias (tendency to select “yes” across all responses). The bias index has two computing formulas; depending on the number of hits ($H$) vs. false alarms (FA). They are denoted by the following equations:

If $H \geq FA$: $B'' = \frac{[H(1-H)-FA]}{[H(1-H)+FA(1-FA)]}$ \[3\]

If $FA > H$: $B'' = \frac{[FA(1-FA)-H(1-H)]}{[FA(1-FA)+H(1-H)]}$ \[4\]
Research in product placement effectiveness often uses these techniques for recall and recognition (Homer, 2009; Meyers-Levy, 1989; Noseworthy et al., 2011). Given that the distribution of recognition memory data is often not normal, nonparametric testing, such as the one described above, is commonly used.

4.4.4 Thought listing task. Following the recognition memory test, participants were asked to complete a thought listing task (Brock, 1967; Greenwald, 1968) in order to evaluate processing style as the mediator in H$_2$ and H$_{3a}$ and H$_{3b}$ (Cacioppo & Petty, 1981; Malaviya, 2007; Malaviya, Kisielius, & Sterntal, 1996; Noseworthy et al., 2011). This task is appreciated for its non-restrictive and private characteristics, which encourages participants to write down any and all thoughts freely. It is also said to be most helpful in hypothesis testing for this type of measure (Cacioppo & Petty, 1981). The question requested participants to list all thoughts they had about Oscar Mayer brand and products in general, not specific to the movie scene (Greenwald, 1968; Peterman, 1940). Participants’ thoughts were then sorted into relational and item-specific thoughts (Hunt & Einstein, 1981; Hunt & Elliott, 1980; Lockhart, Craik, & Jacoby, 1976; Nelson, 1979). Thoughts were sorted by punctuation that implied a pause, or the indication of a complete idea (Cacioppo, 1979). If the thoughts pertained specifically to Oscar Mayer products and the brand, such as attributes, or the famous “Oscar Mayer Wiener” song, they were categorized as item-specific (Noseworthy et al., 2011). The thoughts were categorized as relational if they pertained to anything that can be done with the product, such as “I think of barbecues” (Kim & Meyers-Levy, 2008). These thoughts were then calculated as an overall continuous index, by subtracting total relational thoughts from item-specific thoughts, and dividing this number by the total number of thoughts. The resulting index, which was computed
from the individual scores, ranged from +1 (item-specific processing style) to -1 (relational processing style) and the index was used as the main mediator in the mediated moderation model (Model 8 in PROCESS for SPSS) and as the first mediator in the serial mediation model (Model 6 in PROCESS for SPSS).

4.4.5 Purchase intention. Research has shown that product placement recall enhances brand liking (Matthes et al., 2011), therefore, purchase intention questions were also asked for the purpose of exploring H₃ₐ and H₃₈. The purchase intentions questions were adopted from Baker and Churchill (1977) and included four questions. These questions lay on a seven point Likert scale ranging from yes, definitely (1), to no, definitely not (7). The questions were “Would you like to try Oscar Mayer products?”, “Would you buy Oscar Mayer products if you happened to see it in a store?”, “Would you actively seek out Oscar Mayer products (in a store in order to purchase it)?” and “Would you patronize this product?” The responses to these questions were given a composite purchase intention score, by averaging the scores across all four items. This composite score was used in the serial mediation model as the dependent variable.

4.4.6 Sex. Participants were asked to indicate their sex. This variable was used as the moderator throughout H₁ and H₂ to indicate individual differences between participants, and was used as the main independent variable in H₃ₐ and H₃₈, the serial mediation model. This variable was also used to load the cells such that, for example, once the desired sample of males was captured, MTURK then solicited only females.

4.4.7 Debriefing. Following the completion of the survey, participants were asked if they had previously seen the movie and if they knew the title of the movie. If they had seen the movie, their recall results would have compromised the integrity of the data, as the Oscar Mayer
logo might have stood out for someone who was already familiar with the film. Participants were also asked to write what they thought the purpose of the study was. This question was important in identifying whether participants were able to guess the hypothesis of the study. If participants guessed correctly, the data might not have been useful. Finally, they were asked permission to include their data in the analysis. Participants who did not wish to be included were excluded from the analysis. Please see Appendix C for the full questionnaire.
Chapter 5: Results

The core objectives of the study were a) to find an effect of product placement type on recall through sex; b) to find out whether this effect is due to processing style differences between males and females, leading to greater recall; and c) if these processing styles lead to greater recall and thus increased purchase intention. This was conducted with a 2 × 3 between-subjects factorial design using moderation, mediated moderation, and serial mediation. The factors were sex (male vs. female) and a 3-condition product placement type (dynamic vs. plot-connected vs. control). Processing style, recall, and purchase intention were the outcome measures in this study, and were analyzed using SPSS with the help of PROCESS Models 8 and 6 (Hayes, 2012; Please see Figures 1 through 8 for conceptual and statistical models for hypotheses). The results of this study, which were heavily based on sex differences in visuospatial abilities, aided in the contribution to theory by bringing together disparate literature in a way that had not yet been explored, as well as by providing the opportunity to implement new strategies for product placement in order to increase efficiency and effectiveness of the technique.

This research used SPSS version 21 to conduct the analysis for each hypothesis. Different PROCESS Macros were used for each hypothesis in which Analysis of Variance was used to test the variables in question (Hayes, 2012). Preliminary results of free recall, prompted recall, and operationalization questions were explored with the Crosstabs function of SPSS.

5.1 Pairwise Comparisons

The data was analyzed by running the interaction and breaking down pair-wise comparisons, crossing the two core manipulations (e.g., dynamic and plot-connected) against a
static control. In other words, the dynamic condition was compared to the static control, and static-plot connected condition was compared to the static control. Significant differences was determined using the CONTRAST=SPECIAL sub-command syntax in SPSS within the broad moderation design. As opposed to splitting the file with two or more unique error terms, this syntax pooled the error term from the full-factorial ANOVA. Hence, the degrees of freedom shown in text for each comparison represented a pooled error term (thus showing inflated denominator degrees of freedom). The degrees of freedom should not be mistaken for indication of how many individuals made up the comparison. The value of using this syntax extended not only to increased power, but also to allow for an a priori planned comparison to take place instead of running multiple different post hoc tests, which would have significantly inflated Type I error (if not correcting for multiple comparisons).

5.2 Assumptions

There are several assumptions to be mindful of when using ANOVA. One assumption of ANOVA is independence of observations. This was ensured for all hypotheses using random assignment to conditions. Importantly, because the data was collected online, the “prevent ballot box stuffing” option was selected in Qualtrics in order to ensure that participants could not retake the survey after previously completing it.

A second assumption of ANOVA is homogeneity of variance, which means that the variances of the scores are the same across all conditions. A Levene’s test confirmed that for the discrimination index $A'$, the variances were significantly different for product placement type ($F(2,335) = 6.611, p = .002$). This assumption had been violated, and therefore was not upheld. For the processing style measure, the variances were not significantly different for product
placement type \( F(2, 332) = 1.161, p = .328 \). This assumption had not been violated, and therefore was upheld. For *purchase intention*, the variances were not significantly different for product placement type \( F(5, 340) = 1.820, p = .108 \). This assumption had not been violated, and therefore was upheld.

A third assumption of ANOVA is that errors are normally distributed. A Shapiro-Wilk test revealed that for the *discrimination index* \( A' \), the distribution of residuals were not normally distributed in either the dynamic \( F(112) = .809, p < .001 \), plot-connected \( F(113) = .814, p < .001 \), or the control \( F(113) = .910, p < .001 \). However, given that the shape and distribution of recognition data is often non-normal, the \( A' \) index was transformed using Arcsine transformation. This transformation is used with negatively skewed data ranging from 0.0 to 1.0 (“Transforming Variable to Normality for Parametric Statistics, 2010”). This procedure corrected hit and false alarm rates (Snodgrass & Corwin, 1988). Similarly, as was expected, a Shapiro-Wilk test revealed that the distribution of residuals for the bias index, \( B'' \), were not normally distributed in either the dynamic \( F(113) = .669, p < .001 \), plot-connected \( F(117) = .884, p < .001 \), or control \( F(115) = .864, p < .001 \) conditions. These data were power transformed. A power transformation is used for negatively skewed data (“Transforming Variable to Normality for Parametric Statistics, 2010”). This thesis attempted to address non-normality, due to negative skewness, with the use of arcsine and power transformations for the discrimination index and the bias index, respectively.

As with the recognition data, thought task data is also known for a skewed distribution. For *processing style*, a Shapiro-Wilk test revealed that the distribution of residuals were not normally distributed in either the dynamic \( F(111) = .809, p < .001 \), plot-connected \( F(109) = \)
.807, \( p < .001 \), or control (\( F(112) = .832, p < .001 \)) conditions, therefore violating the assumption of normality. For purchase intention, the Shapiro-Wilk test determined that the distribution of residuals were not normally distributed in either the dynamic (\( F(113) = .936, p < .001 \)), plot-connected (\( F(117) = .931, p < .001 \)), or control (\( F(116) = .917, p < .001 \)) conditions, therefore violating the assumption of normality. Both variables were subsequently power transformed in order to address the negatively skewed data.

Despite the efforts to transform the data to approximate normality, the considerable negative skew left some of the data still skewed, if only slightly. Nevertheless, it is worth noting that the \( F \) test in ANOVA is robust against many of these violations if they are minor (Glass, Peckham, & Sanders, 1972) and it is common practice to continue testing hypotheses with non-normally distributed data (McGuinness, 2002; Schmider, Ziegler, Danay, Beyer, & Buhner, 2010; Siegel, 1957). This is not to dismiss the assumption. Indeed, several authors have noted the issues with taking ANOVA assumptions for granted without even checking (Glass et al., 1972; McGuinness, 2002; Oehlert, 2000; Underwood, 1981). Thus, the transformations were critical where it was appropriate to do them. In other instances, this thesis used nonparametric testing for recall memory, such as chi-squared tests, for which there are not many assumptions about the population (McGuinness, 2002; Siegel, 1957). Nonparametric tests do not have as much power as parametric tests, but are still suitable for use in concluding general information (Siegel, 1957). Due to the non-normal nature of the nonparametric data, the \( A' \) and \( B'' \) variables were transformed as a common practice for recognition-based data (Snodgrass & Corwin, 1988). It is possible to transform nonparametric data into parametric data in order to meet the assumption of normality, but this process runs the risk of compromising the desired effect of the experiment.
Furthermore, transforming data involves much trial and error, which can introduce results that are not better off than using the original raw scores (Field, 2009). Therefore, it is not always recommended to transform nonparametric data and the researcher must decide which direction to take in terms of testing. For the mediation analyses, bootstrapping served as a sufficient resampling strategy as it does not make assumptions about the normality of the sample distribution (Field, 2009). Central limit theorem also serves to reinforce the assumption that the sampling distribution was normal, as the sample used in this thesis is large (over 30 participants per cell) (Wilcox, 2005). However, due to severely negatively skewed data, transformations were applied.

5.3 H₁: Moderation

To reiterate, it was hypothesized here that males would show superior recall when a product placement is dynamic as opposed to static (control). Conversely, females would show superior recall when a product placement is plot-connected as opposed to static (control). This was the first hypothesis and was intended to show the preliminary effects of product placement type and sex on recall. Please see Appendix D, Figures 1 and 2 for conceptual and statistical models.

5.3.1 Free Recall. A binary logistic regression showed an overall main effect of product placement type, such that, regardless of sex, males and females both better freely recalled the Oscar Mayer logo in the dynamic condition relative to the control (B = 1.281, SE = .311, p = .001, OR (Odds Ratio) = 3.6), meaning that participants were almost four times more likely to recall the dynamic product placement than the control product placement. This main effect was qualified by a significant Product Placement Type (PPT) × Sex interaction (Wald = 21.253, p <
The nature of the interaction was such that of the males who recalled the Oscar Mayer logo, 55% recalled the dynamic placement and 8% recalled the control placement ($\chi^2 (1, N = 229) = 29.365, p < .001, \phi = -.505$), suggesting that males were significantly greater at recalling the dynamic placement than the control placement (Please refer to Table 2 in Appendix E). Therefore, the free recall results support the male component of the first hypothesis.

Of the females who recalled the Oscar Mayer logo, 47% recalled the dynamic placement relative to 4% in the control placement ($\chi^2 (1, N = 229) = 28.905, p < .001, \phi = -.504$), suggesting that females were also significantly greater at recalling the dynamic placement than the control placement. Of the males who recalled the Oscar Mayer logo, 14% recalled the plot-connected placement relative to 8% in the control ($\chi^2 (1, N = 234) = 1.013, p = .399, \phi = -.091$), whereas females recalled the Oscar Mayer logo 13% of the time in the plot-connected condition versus 4% in the control condition ($\chi^2 (1, N = 234) = 3.219, p = .091, \phi = -.170$), suggesting that females showed marginally greater recall for the plot-connected placement than control placement, therefore partially supporting the female component of the first hypothesis, as results were headed in the predicted direction (Please refer to Table 2 in Appendix E). The recognition memory data discussed below may provide further insight to this preliminary data.

### 5.3.2 Recognition Memory

Exploring further, a two-way between-subjects factorial ANOVA was conducted using Sex and PPT as predictors on the $A'$ discrimination index (recognition memory, also referred to as recall). There was a significant main effect of PPT, on discrimination ($F (2,309) = 9.447, p < .001, \eta^2 = .001$). Pairwise comparisons revealed that the nature of the main effect was such that participants were more discriminant in the plot-connected placement.

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1. Raw data reported here
2. Transformed data is reported for the remainder of the analyses ($H_1$, $H_2$, $H_{3a}$, $H_{3b}$)
condition (M = .779) than in the control (M = .767; F(1, 309) = 18.56, p < .001, η² = .001).

Similarly, participants were marginally more discriminant in the dynamic condition (M = .782) than in the control (M = .767; F(1, 309) = 2.98, p = .085, η² = 0.001) (Please refer to Table 3 in Appendix E). This suggests that, regardless of sex, both the plot-connected and the dynamic product placements were better recalled than the control product placement, as perhaps the control product placement was not as salient as the other two. The main effect of sex on discrimination was not significant (F(1,309) = .346, p = .557). The PPT × Sex interaction was also not significant (F(2, 309) = .969, p = .381). Nevertheless, a follow-up planned contrast revealed that females significantly discriminated the plot-connected condition (M = .826) relative to the control (M = .769, F(1,309) = 16.16, p < .001, η² = .001), whereas males, although better able to discriminate the dynamic condition (M = .798) than the control condition (M = .787), did not have a significant difference (F(1,309) = .6, p = .439) (Please refer to Table 4 in Appendix E). Although not significant, the pattern of the results for sex was still headed in the hypothesized direction. Therefore, given the results for the discrimination index, the first hypothesis is partially supported (for females).

Using arcsine transformation on the discrimination index, A′, a two-way between-subjects factorial ANOVA was conducted using Sex and PPT as predictors on the arcsine transformed A′ discrimination index.² There was a significant main effect of PPT, on discrimination (F(2,309) = 10.111, p < .001, η² = .001). Overall discrimination of product placement was similar with the dynamic (M = .926) and control (M = .902) conditions. Hence, pairwise comparisons revealed that the significant main effect was likely to reflect the increased discrimination of the plot-

² Transformed data is reported for the remainder of the analyses (H₁, H₂, H₃a, H₃b)
connected product placement (M = .975). This finding seemed to indicate that participants were better able to discriminate plot-connected placements over dynamic or control product placements (Please refer to Table 5 in Appendix E). That is, they had a greater tendency to say they saw a target stimulus in the plot-connected scene. The main effect of sex on discrimination was not significant (F(1, 309) = .238, p = .626), suggesting that males and females did not differ in ability to discriminate among target stimuli. The PPT × Sex interaction was also not significant (F(2, 309) = 1.22, p = .297). Nevertheless, a follow-up planned contrast revealed that females significantly discriminated the plot-connected condition (M = .985) relative to the control (M = .886; F(1, 305) = 14.79, p < .001, η² = .001), whereas males, although better able to discriminate the dynamic condition (M = .93) than the control condition (M = .918), did not have a significant difference (F(1, 309) = 1.3, p = .255) (Please refer to Table 6 in Appendix E). Furthermore, in the interest of comparing conditions, although not part of the hypotheses, a pairwise comparison of the dynamic and plot-connected conditions revealed an increased discrimination in the plot-connected condition (M = .969) than in the dynamic condition (M = .926). A follow-up planned contrast revealed a significant difference in discriminating the plot-connected versus the dynamic conditions (F(1, 305) = 7.47, p = .007, η² = .001). This comparison provided us further insight about the conditions, revealing that the plot-connected condition was most salient in the recognition memory test.

The bias index was power transformed and a two-way between-subjects factorial ANOVA was conducted using Sex and PPT as predictors on the transformed B′′ index. There was a significant main effect of PPT on bias (F(2, 339) = 4.664, p = .01, η² = .002). Overall bias of product placement was similar with the plot-connected (M = 1.396) and control (M = 1.409)
conditions. Pairwise comparisons revealed that the significant main effect was likely to reflect the increased bias (tendency to say “no” to having seen target stimuli) of the dynamic product placement (M = 1.535). This finding seemed to indicate that individuals were more biased for dynamic placements over plot-connected or control product placements (Please refer to Table 7 in Appendix E). The main effect of sex on bias was not significant (F(1,339) = .051, p = .821), suggesting that males and females do not differ in tendency to say “no” to target stimuli. The PPT × Sex interaction was also not significant (F (2,339) = .064, p = .938). Nevertheless, a follow-up planned contrast revealed that females were not significantly more biased in the plot-connected condition (M = 1.398) relative to the control (M = 1.406; F(1,339) =.01, p = .915). Similarly, males, although more biased in the dynamic condition (M = 1.52) than the control condition (M = 1.412), did not have a significant difference (F(1, 339) =2.33, p = .128) (Please refer to Table 8 in Appendix E). Although these results suggest that participants had a more liberal bias (a higher tendency) to respond “no” to target stimuli/product placement in the recognition memory test for the three conditions, the control condition was least liberal, suggesting that manipulation of the product placement logo may influence this bias. Again, in the interest of comparing conditions, although not part of the hypotheses, a pairwise comparison of the dynamic and plot-connected conditions revealed an increased bias in the plot-connected condition (M = .1.396) than in the dynamic condition (M = 1.535). A follow-up planned contrast revealed a significant difference in bias for the plot-connected versus the dynamic conditions (F (1, 339) = 7.74, p = .006, η² = .001). This comparison provided us further insight about the conditions, revealing that the plot-connected condition was the most salient of the three during the recognition memory test. Noting that in the free recall analysis, the dynamic condition was
greater recalled than the plot-connected condition, but in the recognition memory analysis, the plot-connected condition had greater discrimination and bias than the dynamic condition, suggesting that participants were more discriminant and biased for target stimuli (both new and old) in the plot-connected scene. This scene was different from the dynamic and control conditions, which used the same scene. Therefore, this hypothesis was only partially supported.

5.4 H2: Mediated Moderation

Given that males generally recalled dynamic placements more than control placements, and that females generally recalled plot-connected placements more than control placements, building on the first hypothesis, it was predicted that males, due to an item-specific processing style, would greater recall dynamic product placement, relative to a control placement, and that females, due to a relational processing style, would greater recall plot-connected product placement, relative to a control placement.

5.4.1 Recognition Memory. Recognition memory was analyzed following the calculation of the $A'$ index (Snodgrass & Corwin, 1988). The mediated moderation model explored the indirect effect of $PPT \times Sex$ through processing style (relational processing for females; item-specific processing for males), which was the difference between the total and direct effects of $PPT \times sex$ on recognition. Model 8 in PROCESS was used as a tool with SPSS to analyze the moderation (“when”) and two mediator (“how”) effects (Hayes, 2012), by generating the direct and indirect effects of the mediated moderation model. PROCESS assumed that recognition was a continuous dependent variable (i.e., the $A'$ index), that product placement type and sex were dichotomous, and that coefficients in the model were estimates calculated based on available data (Hayes, 2012). The assumption that product placement type was
dichotomous was a problem for the current data, due to the variable’s multicategorical (3 categories) characteristic. Therefore, PPT was coded using indicator coding in order to create variables that suggest results for each manipulated condition relative to the control, called *dynamic vs. control* and *plot-connected vs. control* (Hayes, 2013).

In this model, PPT was the independent (manipulated) variable (with three levels, *static control, dynamic, and plot-connected*), sex was the moderator, and *processing style* was the mediator of the model. Sex interacted with *product placement type* in order to predict recognition, the dependent variable.

The magnitude of the overall PPT effect on recognition depended on sex. Mediated moderation was concerned with the mediating process that is responsible for the moderation of sex differences. The effects of the PPT × sex interaction involved the mediating variable, *processing style*. This mediation analysis was conducted to assess the degree to which *processing style* explains the impact of PPT × sex interaction on recognition.

### 5.4.2 Processing Style

Processing style was measured using the thought listing task. Two judges who were unaffiliated with the research were used to code the data for this task. Accurate thoughts were sorted into item-specific and relational thoughts. The total number of relational thoughts were subtracted from item-specific thoughts, and this number was then divided by the total number of accurate thoughts, resulting in a processing style index ranging from -1 (*relational processing style*) to +1 (*item-specific processing style*). Zero indicated a processing style that is equal between relational and item-specific.

### 5.4.3 Mediated Moderation Results

Using arcsine transformed discrimination index and processing style variables, in the *dynamic vs. control* condition, the model estimating
coefficients for processing style was not significant \(F(5,297) = .263 \ p = .932\). Sex did not have a significant effect on processing style \(B = .098, SE = .125, p = .434\), indicating that males and females did not differ in processing styles when recalling the Oscar Mayer logo. Recognition memory was not significantly affected by processing style \(B = -.009, SE = .007, p = .54\), indicating that differences in processing style did not produce a different recognition memory outcome. The conditional indirect effect of dynamic relative to the control condition on discrimination was not significant for males \(B = .001, SE = .002, 95\% \text{ BootCI:} -.001, .01\) or females \(B = -.001, SE = .002, 95\% \text{ BootCI:} -.002, .007\). The results for the power transformed bias index, \(B''\), that is, the bias for responding “no” to stimuli, revealed that the model estimating coefficients for processing style was not significant \(F(5, 291) = .502, p = .775\). Sex did not have a significant effect on processing style \(B = .096, SE = .125, p = .771\), indicating that males and females did not differ in processing styles with a bias toward saying “no” to recognizing stimuli in the dynamic relative to the control condition. However, the model estimating coefficients for bias was significant \(F(6, 290) = 11.323, p < .001, \eta^2 = .001\), revealing a significant effect of dynamic relative to the control condition on bias \(B = .106, SE = .052, p = .043, \eta^2 = .001\). Results also showed that processing style did not have a significant effect on bias to say “no” to stimuli \(B = .012, SE = .019, p = .626\). The conditional indirect effect of the dynamic vs. control condition on bias was not significant for males \(B = -.002, SE = .004, 95\% \text{ BootCI:} -.018, .003\) or females \(B = -.001, SE = .004, 95\% \text{ BootCI:} -.013, .004\). Therefore, this component of the hypothesis was not supported.

Using arcsine transformed discrimination index and processing style variables, in the plot-connected vs. control condition, the model estimating coefficients for processing style was
not significant ($F(5, 291) = .235, p = .947$). Sex did not have a significant effect on processing style ($B = .054, SE = .122, p = .443$), indicating that males and females did not differ in processing styles when recalling the Oscar Mayer logo. Recognition memory was not significantly affected by processing style ($B = -.009, SE = .07, p = .21$), indicating that differences in processing style did not affect ability to discriminate new and old stimuli. There was a significant effect on discrimination between the plot-connected relative to the control condition ($B = .098, SE = .02, p < .001$), indicating that participants better discriminated objects in the plot-connected condition than in the control condition. The conditional indirect effect of condition on discrimination was not significant for males ($B = .0002, SE = .002, 95\% \text{ BootCI}: -.003, .006$) or females ($B = .001, SE = .002, 95\% \text{ BootCI}: -.002, .007$). The results for the power transformed bias index, $B''$, the model estimating coefficients for processing style was not significant ($F(5, 291) = .474, p = .795$). Sex did not have a significant effect on processing style ($B = .058, SE = .122, p = .637$), indicating that males and females did not differ in processing styles with a bias toward saying “no” to recognizing stimuli. The model estimating coefficients for bias was significant ($F(6, 290) = 11.435, p < .001, \eta^2 = .001$), with the dynamic vs. control covariate having a significant effect on bias ($B = -.14, SE = .057, p = .012, \eta^2 = .001$). Results also showed that processing style did not have a significant effect on bias to say “no” to stimuli ($B = .012, SE = .019, p = .535$). The conditional indirect effect of plot-connected vs. control condition on bias was not significant for males ($B = .0001, SE = .004, 95\% \text{ BootCI}: -.007, .01$) or females ($B = -.0003, SE = .004, 95\% \text{ BootCI}: -.011, .005$). Therefore, this component of the hypothesis was not supported.
Overall, most of the participants tended to have a more relational processing style, and a lack of data for item-specific processing style may indicate that there was not enough power in the data to support this hypothesis. However, if most of the participants had a relational processing style, this may give insight as to why the plot-connected condition was most salient, regardless of sex.

5.5 H₃₅: Serial Mediation (Plot-Connected Condition)

Following the second hypothesis, which explored processing style as a mechanism for recall, we further built on the processing style mechanism and recall variables to learn more about behavioural changes as a result of product placement type and sex. Overall, it was predicted that product placement type would influence processing style, which would affect recognition, which would ultimately affect purchase intention. It was predicted that in the plot-connected condition, females (not males), due to a relational processing style, would show greater recall relative to a control placement, and will therefore show increased purchase intention for the target brand. In the next section, H₃₅ predicted that in the dynamic condition, males (not females), due to an item-specific processing style, would show greater recall relative to a control placement, and will therefore show increased purchase intention for the target brand.

Serial mediation explored whether processing style influenced purchase intention indirectly through recall. Specifically, whether participants with a relational processing style recalled the plot-connected product placement and were more likely to purchase the product. Such a serial mediation process, from product placement type to processing style to recall to purchase intention, corresponded to Figure 7 in Hayes’ (in press) article on serial mediation. PROCESS Model 6 (conceptual and statistical models) specified the serial multiple mediator
model, and the sequence of variables in the list following m= specifies the causal ordering of the mediators (i.e. the syntax had m = processing recall). The equations are displayed below, including equations for conditional specific indirect effects through M1, M2, and as functions of W (equations 8, 9, 10):

\[ M_1 = i_{M1} + a_1X + e_{M1} \]  \[ 5 \]

\[ M_2 = i_{M2} + a_2X + a_3M_1 + e_{M2} \]  \[ 6 \]

\[ Y = i_Y + c'_{1}X + b_1M_1 + b_2M_2 + b_3W + b_4M_1W + b_5M_2W + e_Y \]  \[ 7 \]

\[ \omega_{M1} = a_1(b_1+b_4W) = a_1b_1 + a_1b_4W \]  \[ 8 \]

\[ \omega_{M2} = a_2(b_2+b_5W) = a_2b_2 + a_2b_5W \]  \[ 9 \]

\[ \omega_{M1M2} = a_1a_3(b_2 + b_5W) = a_1a_3b_2 + a_1a_3b_5W \]  \[ 10 \]

**5.5.1 Serial Mediation Results (H3a).** This hypothesis was tested using PROCESS Model 6 in SPSS (Hayes, 2012). Product placement type was dummy-coded into plot-connected vs. control, and dynamic vs. control conditions, as X must be dichotomous or continuous. The multcategorical product placement type issue was solved by dummy coding two variables (k-1) against the control and running the analysis twice, using the other dummy variable as a covariate. In the plot-connected vs. control condition, the overall model for processing style was not significant \(F(3,294) = .352, p = .788\). The overall model for discrimination was significant \(F(4, 293) = 6.062, p < .001, \eta^2 = .001\). The results indicated that the plot-connected vs. control condition had a significant effect on discrimination of the Oscar Mayer logo \(B = .078, SE = .016, p < .001, 95\% \text{ CI: } .045, .11\). The dynamic vs. control covariate also had a marginally
significant effect on discrimination ($B = .032, SE = .016, p = .046, 95\% \text{ CI: } .001, .064$). The overall model for purchase intention was not significant ($F(5,292) = 1.381, p = .231$). The overall indirect effect for the plot-connected vs. control by processing style on purchase intention was not significant ($B = -1.226, SE = 4.648, 95\% \text{ BootCI: } -17.301, 4.276$). The overall indirect effect for the plot-connected vs. control by processing style and recognition memory on purchase intention was also not significant ($B = .028, SE = .305, 95\% \text{ BootCI: } -.207, 1.586$). The overall indirect effect of the plot-connected vs. control condition on recognition memory on purchase intention was not significant ($B = 5.389, SE = 14.243, 95\% \text{ BootCI: } -21.009, 36.831$).

Significance tests were based on bias-corrected bootstrapped confidence intervals (95\%) with 5000 bootstrap samples.

Following an overall summary of serial mediation, the data was split by sex in order to further analyze the serial mediation separately for males and females. Using transformed variables, for females ($n = 154$), the overall model for processing style was not significant for the plot-connected relative to the control condition ($F(3,150) = .128, p = .943$). The overall model for recognition memory was significant ($F(4,149) = 12.358, p < .001, \eta^2 = .001$). The results indicated that processing style did not have a significant effect on recognition memory ($B = -.008, SE = .01, p = .426, 95\% \text{ CI: } -.029, .012$), such that those with an item-specific processing style did not show greater recall than those with a relational processing style for the Oscar Mayer logo. The overall model for purchase intention was not significant ($F(5,148) = .607, p = .695$). The overall indirect effect for the plot-connected vs. control by processing style on purchase intention was not significant ($B = .092, SE = .6.875, 95\% \text{ BootCI: } -13.259, 16.721$). The overall indirect effect for the plot-connected vs. control by processing style and recognition memory on
purchase intention was also not significant (\(B = .139, SE = 1.101, 95\% \text{ BootCI}: -.767, 5.386\)).

The overall indirect effect of the plot-connected vs. control condition on recognition memory on purchase intention was not significant (\(B = 44.289, SE = 34.346, 95\% \text{ BootCI}: -11.223, 127.354\)). Significance tests were based on bias-corrected bootstrapped confidence intervals (95%) with 5000 bootstrap samples.

For males (\(n = 143\)), the overall model for processing style was not significant in the plot-connected vs. control condition (\(F(2,140) = .074, p = .928\)). The overall model for recognition memory was not significant. The overall model for purchase intention was not significant (\(F(4,138) = 1.118, p = .351\)). Processing style did not have a significant effect on purchase intention (\(B = 56.168, SE = .33.652, p = .097\)), indicating that those with an item-specific processing style did not have increased purchase intention toward the Oscar Mayer brand in the plot-connected condition relative to the control. The overall indirect effect for the plot-connected vs. control by processing style on purchase intention was not significant (95% BootCI: -17.697, 27.202). The overall indirect effect for the plot-connected vs. control by processing style and recognition memory on purchase intention was also not significant (95% BootCI: -1.001, 3.835). The overall indirect effect for the plot-connected vs. control by recognition memory on purchase intention was not significant (95% BootCI: -58.051, 11.532). Significance tests were based on bias-corrected bootstrapped confidence intervals (95%) with 5000 bootstrap samples. Therefore, this hypothesis was not supported. A lack of data on item-specific participants may suggest a possible reason for this.
5.6 H3b: Serial Mediation (Dynamic Condition)

5.6.1 Serial Mediation Results (H3b). This hypothesis was tested using PROCESS Model 6 in SPSS (Hayes, 2012). Cases were filtered by sex and the model was run for males and females separately, using the dynamic vs. control independent variable. In the dynamic vs. control condition, the overall model for processing style was not significant ($F(3,293) = .234, p = .872$). The overall model for discrimination was significant ($F(4, 292) = 18.55, p < .001, \eta^2 = .001$). The results indicated that the dynamic vs. control condition did not have a significant effect on discrimination of the Oscar Mayer logo ($B = .016, SE = .015, p = .288, 95\% CI: -.014, .046$). The plot-connected vs. control covariate had a significant effect on discrimination ($B = .085, SE = .015, p < .001, 95\% CI: .055, .116$). The overall model for purchase intention was not significant ($F(5,291) = .401, p = .847$). The overall indirect effect for the dynamic vs. control by processing style on purchase intention was not significant ($B = -1.226, SE = 4.648, 95\% BootCI: -17.301, 4.276$). The overall indirect effect for the dynamic vs. control by processing style and recognition memory on purchase intention was also not significant ($B = -2.603, SE = .5.328, 95\% BootCI: -22.179, 2.892$). The overall indirect effect of the dynamic vs. control condition on recognition memory on purchase intention was not significant ($B = .08, SE = .39, 95\% BootCI: -.138, 2.364$). Significance tests were based on bias-corrected bootstrapped confidence intervals (95%) with 5000 bootstrap samples.

For females, the overall model for processing style was not significant ($F(3,150) = .128, p = .943$). The overall model for recognition memory was significant ($F(4,149) = 12.358, p < .001, \eta^2 = .001$). The results indicated that processing style did not have a significant effect on recognition memory ($B = -.008, SE = .01, p = .426$), such that those with an item-specific
processing style did not show greater recall than those with a relational processing style for the Oscar Mayer logo in the dynamic condition relative to the control condition. The overall model for purchase intention was not significant ($F(5,148) = .607, p = .695$). Processing style did not have a significant effect on purchase intention ($B = -2.384, SE = .39.865, p = .952$), indicating that those with an item-specific processing style did not have increased purchase intention toward the Oscar Mayer brand in the dynamic condition relative to the control. The overall indirect effect for the dynamic vs. control by processing style on purchase intention was not significant ($B = .174, SE = 7.034, 95\% \text{ BootCI}: -12.723, 17.427$). The overall indirect effect for the dynamic vs. control by processing style and recognition memory on purchase intention was also not significant ($B = .262, SE = 1.144, 95\% \text{ BootCI}: -.471, 6.456$). The overall indirect effect of the dynamic vs control by recognition memory on purchase intention was not significant ($B = 6.347, SE = 11.832, 95\% \text{ BootCI}: -6.61, 45.503$). Significance tests were based on bias-corrected bootstrapped confidence intervals (95\%) with 5000 bootstrap samples.

For males, the overall model for processing style was not significant ($F(3,139) = .245, p = .865$). The overall model for recognition memory was significant ($F(4,138) = 6.916, p < .001, \eta^2 = .001$). The overall model for purchase intention was not significant ($F(5,137) = .892, p = .488$). Results showed that processing style did not have a significant effect on purchase intention ($B = 55.877, SE = 33.83, p = .101$), indicating that an item-specific processing style does not to increased purchase intention for the Oscar Mayer brand in the dynamic condition relative to the control condition. The overall indirect effect for the dynamic vs control by processing style on purchase intention for males was not significant (95\% BootCI: -46.396, 7.72). The overall indirect effect for the dynamic vs. control by processing style and recognition memory on
purchase intention was also not significant (95% BootCI: -6.869, .351). The overall indirect
effect of the dynamic vs control by recognition memory on purchase intention was not
significant (95% BootCI: -39.523, 6.253). Significance tests were based on bias-corrected
bootstrapped confidence intervals (95%) with 5000 bootstrap samples. Therefore, this hypothesis
was also not supported.
Chapter 6: General Discussion

Overall, it was found that when participants were asked to freely recall items from the video clips, the Oscar Mayer logo was recalled most often in the dynamic condition than in the plot-connected or control conditions. Furthermore, males showed greater free recall in the dynamic condition than in the control condition, but females showed only marginally greater free recall in the plot-connected than the control condition. Recognition data showed that overall, the plot-connected condition had significantly greater discrimination than the control condition, and the dynamic condition had only marginally greater discrimination than the control condition. Ability to discriminate among target stimuli did not depend on sex. However, planned contrasts revealed that females showed significantly greater discrimination in the plot-connected than the control condition, and males showed only marginally greater discrimination in the dynamic than the control condition. Recognition data for bias revealed that the plot-connected condition was the most salient of the three in terms of participants showing greater discrimination of target stimuli as well as bias among stimuli. Given differences in recall and recognition data, the first hypothesis was only partially supported for males and females.

Recognition data also revealed that, in terms of processing style, the dynamic condition did not have greater discrimination than the control. Similarly, the plot-connected condition did not have greater discrimination than the control. Overall, in this study, sex differences in processing styles did not affect recognition of any product placement conditions, revealing that the second hypothesis was not supported.

Although the second hypothesis containing processing style was not supported, it was hypothesized a priori that processing style would influence recognition and purchase intention in
a serial model. Overall results did not show any significant effects for increased purchase intention, and splitting the data by sex and running separate models in dynamic vs. control and plot-connected vs. control conditions did not show any differences in recognition, processing style, or purchase intention. Therefore, the third hypotheses were not supported.

However, the statistical significance on the manipulation check shows that audiences are able to discriminate between different levels of product placement modality. Discrimination among logos that are static, dynamic, plot-connected, not plot-connected, or a combination of movement and relatedness, indicates attentiveness to action and plot or storyline, which translates positively to recall of events of a movie scene. These findings show that the modality of the product placement does not interfere with understanding of a storyline and does not negatively affect attitudes toward the movie, as accurate recall of entire scenes was shown from the majority of participants. Not only were participants able to recall the Oscar Mayer logo, but they were able to recall minute details from the scenes, as shown through vivid descriptions in the free recall question, regardless of sex.

Given that the majority of findings were not significant, and that the level of attentiveness of the participants was high, several possible reasons for non significant findings may be a need for more power, or that the plot-connected condition is highly salient compared to the dynamic or control conditions, as the plot-connected scene is a completely different scene from the other two. This saliency may be due to the nature of the task, such that recall questions were asked without any distraction tasks or time delay upon watching the scene, resulting in the scenes as more memorable than would be with a distraction or a delay. Furthermore, the saliency of the plot-connected condition was therefore observed, perhaps due to the majority of participants
showing a tendency for a relational processing style. However, the thought listing task is known to be a robust measure of processing style (Cacioppo & Petty, 1981). A robust measure of the mediator may suggest that there is a limitation with the manipulation as a whole which must be addressed.

In terms of the manipulations, the way the scenes were displayed might lend further insight as to why the hypotheses were not supported. In addition to the differences in scenes used, the stimuli themselves were displayed differently in each scene, bringing to light other variables such as exposure time and logo choice. These variables are discussed below in further detail in the limitations section.

To add, it is apparent that there is a lot of noise in the data. For instance, males and females both showed relatively high ability to discriminate between stimuli, but because this study was not replicated, there is no way to isolate specific reasons as to why the means were close to one another. Using scene type as an example, without controlling for the scene type, it is difficult to conclude why the plot-connected condition produced more significant results for discrimination and bias in overall findings.

Important to reiterate, however, is that the data for sex differences was headed in the predicted direction, suggesting that the conceptual development of this thesis may be aligned with theory, but executing this in an experimental design may need to be re-evaluated in terms of operationalization of hypotheses, design development, and stimuli choice, among other factors. It is anticipated that the limitations discussed below will lend insight to the improvement of this type of research in future experiments.
6.1 Limitations & Future Research

The research herein is not without limitations. If future research can replicate the present study and show that males and females differ between these processing styles and thus recall product placement differently, literature in product placement will have an avenue to explore new research in terms of a visuospatial approach.

6.1.1 Theory. A limitation of the theory discussed in this thesis is that it only used the evolutionary lens. Perhaps it would have been useful to expand on the Hunter-Gatherer theory to one that may be more robust or recent. Furthermore, mental rotation may be operationalized differently from what it is taken to mean in this thesis. Emphasis was placed on tracking a moving object, but perhaps this definition was not specific enough for the characteristics of the stimuli used in this thesis.

6.1.2 Design. Although there may be multiple ways to approach the research questions in this thesis, the 2 x 3 factorial ANOVA was chosen for data collection and analysis. In this study, there was only one product placement logo used across three movie clips. Previous research in product placement has used repeated measures designs with multiple movie clips and achieved successful results. It is suggested that future research may explore repeated measures designs, or a simpler design format to mitigate error in analyses.

6.1.3 Stimuli. The stimuli used in this study were beneficial in extracting information about plot-connected and dynamic product placements, but might benefit from a few alterations. First, only two of the three movie clips originated from the same scene. Future research would benefit by obtaining as much control of the environment as possible, by using the same scene in each condition. The challenge is to find the correct logo placement that fits all criteria without
compromising the operationalization of each factor level. Moreover, the logo that was chosen was of a processed meats brand, something that, depending on lifestyle choices, might not be of interest to many participants, regardless of recall or processing style. Several participants simply did not ever consume these types of products and thus were not influenced by the video clip, which would affect purchase intention. Future research could replicate the current study using a different neutral brand logo in a different context to see how results of processing style on purchase intention would be affected. Another limitation with the stimuli was the exposure time. The video clips were only approximately one minute in length, and the logo placements in each clip were approximately four seconds long. It is unknown if, had participants been made to watch the entire movie, their retention, processing style, and purchase intention responses would change. Future research may explore different exposure times with the same logo in the same movie scene to control for effects of time on these outcome measures. The logo used in this study was also not located in the movie scene at the exact same time in each one (i.e. beginning, middle, or end). Future research may benefit from including the logo in each scene at the same time. Ideally, participants would watch a movie in its entirety and respond to a questionnaire afterwards. However, this can become costly, both financially and time wise.

6.1.4 Procedure. A limitation of the procedure was inherent in subjects’ participation from locations that the researcher/experimenter could not supervise. It was unknown whether participants were multitasking while participating on surveys via MTURK. The IMC, as well as recruiting Master MTURK participants helped guard against these unknown variables.

6.1.5 Measures and Outcome Variables. The free recall question gave a lot of rich insight into how an individual described a movie scene, but the results of this task may have been
compromised by coding the response as “yes/no”. Future research may benefit from digging deeper into the types of richer insight that could have been obtained from this open-ended task. In addition, the mediation variable may not have been a strong enough measure of processing style to tease out any significant differences between the sexes. Future research may want to explore multiple processing style measures. In exploring the theoretical linkage, product placement type was empirically shown to affect recall and recognition (relative to a control), but not necessarily via individual processing style. Although prior research has shown that males and females process information differently, our data did not yield significant results to support our predictions.

Furthermore, our data did not support the prediction that recall leads to increased purchase intention, due to a large variance of this behavioural measure. In addition, the distribution of relational vs. item-specific participants was very skewed, as most participants exhibited a relational processing style, thus limiting our ability to draw insights from item-specific processing styles and subsequent behaviours. Future research would benefit from an equal pool of relational and item-specific processing styles in order to draw proper conclusions. However, given that most participants had a relational processing style, and that the plot-connected product placement was most salient of the three, this insight serves to support our prediction of the relationship between relational processing and plot-connected product placement. What this thesis is lacking, is the ability to suggest that item-specific processing styles also perceive plot-connected placements as more salient than dynamic or control placements.
6.2 Theoretical Contribution

The majority of the data for this thesis was not significant, thus, its contribution is limited. However, this study contributed to the literature on sex differences in visuospatial abilities by measuring male and female recall of dynamic and static objects in a product placement context. While previous research supported superior spatial abilities between males and females, the present findings were unable to reinforce the existing literature on superior male and female spatial abilities, mainly in the areas of processing style advertising, in which females process objects relationally, and in which males process objects in an item-specific manner. Previous research has shown that processing styles of males and females differ, which have implications for the effectiveness of advertisements (Meyers-Levy & Malaviya, 1999). Literature in product placement research may appreciate the findings of a replication of this study using enhanced operationalization of constructs and improved stimuli, in order to maintain the efforts to enhance this body of work in sex differences, which is currently limited.

In the same vein, although the findings were not significant, literature in sex differences in visuospatial abilities may provide insight to similar areas in advertising that have not yet been explored with these mechanisms, such as video games and other interactive forms of advertising that are emerging in the virtual world, such as online advertisements.

In light of the fact that the majority of these results were not significant, important to this thesis is the notion that perhaps simply viewing a manipulated product placement video does not increase higher recall for an individual with a particular processing style. A person with an item-specific processing style may not process a product placement more item-specifically if the item is dynamic or static. Conversely, a person with a relational processing style may not process a
product placement more relationally if the item is plot-connected or not. This is analogous to the claim that an extrovert will act more extroverted when interacting in a large group versus a small group (Gottlober, 1938). Research in the area of brain potential and personality may be useful in further understanding the processing style differences discussed herein, which can serve to better understand the reason behind why one particular product placement would succeed over another. This idea is also similar to the notion that compounding a manipulation with a trait may not always yield anticipated results in an experimental setting (Noseworthy, Di Muro, & Murray, 2014). Understanding the mechanics of these individual differences is important in furthering this type of research as experimental design in product placement can benefit from more meticulous and rigorous method for exploring these specific mechanisms.

It is also noteworthy to include here that this was a novel study which used multicategorical independent variables in a mediated moderation model in the context of product placement literature. This thesis therefore served as an example for other researchers who may use similar structures in the conceptual development of their research.

6.3 Managerial Contribution

The results of this study contribute minimally to managerial implications in terms of efficiency and effectiveness of the use of product placement in movies. However, as mentioned in the beginning of this thesis, male and female segmentation is one of advertising’s best practices (Darley & Smith, 1995). Since product placement advertising is different from traditional advertising, and is still relatively new compared to traditional advertising, the current research, although not significant, may, with instrument improvement and replication, boost the ability for product placement to become more efficient and effective for advertisers. If
advertisers can target males and females with products that are not only sex-specific, but also in a manner that is suitable for processing due to underlying spatial abilities with respect to the sexes, then marketers will have a more effective experience in displaying product placement to whom the intended audience is, and at precisely the right moment. Also, the display of a female-oriented product placement that is plot-connected is more likely to catch the attention of the intended target audience than is a neutral product placement that is not plot-connected. Simply plot-connecting stationary product placement to the correct audience could make the difference between low and high recall of a brand, resulting in increased recall and purchase intention by the respective audience as well as mitigating the likelihood of advertisers using more resources than necessary on ineffective product placement.

6.4 Conclusion

This conclusion brings the thesis into a full circle, linking particular advertisement strategies with evolutionary tendencies to inspire further thought on the topic at hand: the Surprise Attack. Surprise attacks are known in the field of evolutionary psychology as advanced behaviours exhibited by a predator on its prey in order to ensure successful capture (Tooby & DeVore, 1987). Surprise attacks are beneficial to predators as prey are unsuspecting of any predatory threat. If we put these evolutionary terms into advertisement strategy terms, the concept of product placement is analogous to a surprise attack. The advertiser is the predator, while the consumer is the unsuspecting prey. As many consumers use strategies to avoid unnecessary commercials and other push advertisements, such as fast-forwarding through commercials, downloading or streaming commercial-free programming, and the like, they are still susceptible to the surprise attacks of advertisers. The more avoidant consumers become, the
more creative and strategic advertisers must be in order to gain the attention and interest of its targeted consumer. Product placement in movies is an excellent example of a surprise attack, as it is introduced unexpectedly to the consumer and generally results in a satisfactory response for the advertiser. Understanding sex differences in processing styles is vital to the future of advertisement, if advertisers wish to create efficient and effective campaigns, in a way that consumers will react positively to what is shown to them. Although the findings of the current study did not support the hypotheses in this thesis, future research in the area of visuospatial sex differences could still help inform what we know about product placement effectiveness. In particular, this research could help develop strategies that achieve a balance between advertising effort and a positive consumer response.
References


Appendix A: REB Certificate

RESEARCH ETHICS BOARD – General
REB-G
Certification of Ethical Acceptability of Research Involving Human Participants

APPROVAL PERIOD: July 26, 2013 to July 26, 2014
REB NUMBER: 13JN022

TYPE OF REVIEW: Delegated Type 1

RESPONSIBLE FACULTY: Noseworthy, Theodore (noseword@uoguelph.ca)
DEPARTMENT: Marketing & Consumer Studies

SPONSOR(S): N/A

TITLE OF PROJECT: Sex Differences and Visual Acuity

The members of the University of Guelph Research Ethics Board have examined the protocol which describes the participation of the human subjects in the above-named research project and considers the procedures, as described by the applicant, to conform to the University’s ethical standards and the Tri-Council Policy Statement, 2nd Edition.

The REB requires that you adhere to the protocol as last reviewed and approved by the REB. The REB must approve any modifications before they can be implemented. If you wish to modify your research project, please complete the Change Request Form. If there is a change in your source of funding, or a previously unfunded project receives funding, you must report this as a change to the protocol.

Unexpected events and incidental findings must be reported to the REB as soon as possible with an indication of how these events affect, in the view of the Responsible Faculty, the safety of the participants, and the continuation of the protocol.

If research participants are in the case of a health facility, at a school, or other institution or community organization, it is the responsibility of the Principal Investigator to ensure that the ethical guidelines and approvals of those facilities or institutions are obtained and filed with the REB prior to the initiation of any research protocols.

The Tri-council Policy Statement, 2nd Edition, requires that ongoing research be monitored by, at a minimum, a final report and, if the approval period is longer than one year, annual reports. Continued approval is contingent on timely submission of reports.

Membership of the Research Ethics Board - General: B. Banerjee, Community Member; J. Cason, Community Member; S. Chuang, FRAN (alt); K. Choo, Graduate Student; J. Clark, Psychology (alt); J. Dywer, FRAN; M. Dywer, Legal; M. Eustace, OAC; B. Fergusson, OME (alt); H. Gilmour, Community Member (alt); J. Goods, OME; B. Gottlieb, Psychology; B. Gigante, Psychology (alt); S. Henson, OAC (alt); L. Kuczyński, Chair; A. Lavergne, OAC; R. Ragan, Legal (alt); V. Scalise, SOAN (alt); R. Stawasz, SOAN.

Approved:

Chair, Research Ethics Board - General

Date: __________________
Appendix B: Stimuli
Appendix C: List of Measures

1. Please describe everything you remember about the scene you just watched in as much detail as possible (Free Recall)
2. Please list all brands you remember seeing in the scene (Prompted Recall)
3. Please indicate whether the following brand appeared in the scene: Oscar Mayer (Recognition Memory)
   ○ Yes (1)
   ○ No (2)

   Answer If Yes to #3 Is Selected

   Was this brand, or the object that the brand was placed on, in motion (i.e. moving across, up, down, diagonally, rotating, etc., along the screen)? (operationalization – dynamic)
   ○ Yes (1)
   ○ No (2)

   Answer If Yes to #3 Is Selected

   Was this brand related to either the action in the scene or to the main characters? (operationalization – plot-connected)
   ○ Yes (1)
   ○ No (2)

   4. Please indicate whether the following brand appeared in the scene: McDonalds (Recognition Memory (RM) Test*, Snodgrass & Corwin, 1988)
      ○ Yes (1)
      ○ No (2)
   5. Please indicate whether the following brand appeared in the scene: Heinz (RM Test)
      ○ Yes (1)
      ○ No (2)
   6. Please indicate whether the following brand appeared in the scene: Bicks Pickles (RM Test)
      ○ Yes (1)
      ○ No (2)
   7. Please indicate whether the following brand appeared in the scene: Yamaha (RM Test)
      ○ Yes (1)
      ○ No (2)
   8. Please indicate whether the following object appeared in the scene: Hot Dog Stand (RM Test)
      ○ Yes (1)
      ○ No (2)
   9. Please indicate whether the following object appeared in the scene: Motor Boat (RM Test)
      ○ Yes (1)
      ○ No (2)
   10. Please indicate whether the following object appeared in the scene: Umbrella (RM Test)
       ○ Yes (1)
       ○ No (2)
   11. Please indicate whether the following object appeared in the scene: Motorcycle (RM Test)
       ○ Yes (1)
*Recognition Memory questions were randomized

12. Please indicate whether the following object appeared in the scene: Watch (RM Test)
   - Yes (1)
   - No (2)

13. Please indicate whether the following object appeared in the scene: Canoe (RM Test)
   - Yes (1)
   - No (2)

14. Please indicate whether the following object appeared in the scene: Seagull (RM Test)
   - Yes (1)
   - No (2)

15. Take a moment to think about Oscar Mayer brand/products. Please write down all your thoughts about Oscar Mayer brand/products in this box. (Thought Listing Task, Cacioppo & Petty, 1981)

   - No, Definitely Not 1 (1)
   - 2 (2)
   - 3 (3)
   - 4 (4)
   - 5 (5)
   - 6 (6)
   - Yes, Definitely 7 (7)
17. Would you actively seek out Oscar Mayer hot dogs (in a store in order to purchase it)? (Purchase Intentions)
   - No, Definitely Not 1 (1)
   - 2 (2)
   - 3 (3)
   - 4 (4)
   - 5 (5)
   - 6 (6)
   - Yes, Definitely 7 (7)

18. Would you like to buy Oscar Mayer hot dogs if you happen to see them in a store? (Purchase Intentions)
   - No, Definitely Not 1 (1)
   - 2 (2)
   - 3 (3)
   - 4 (4)
   - 5 (5)
   - 6 (6)
   - Yes, Definitely 7 (7)

19. Would you like to try Oscar Mayer hot dogs? (Purchase Intentions)
   - No, Definitely Not 1 (1)
   - 2 (2)
   - 3 (3)
   - 4 (4)
   - 5 (5)
   - 6 (6)
   - Yes, Definitely 7 (7)

20. Have you seen this movie before?
   - Yes 1 (1)
   - No 2 (2)

21. If you know the name of this movie, please write it in the text box below (otherwise, leave it blank)

22. What do you think is the purpose of this study? (Hypothesis Guessing)

23. Do you have any opinions about this survey? Your feedback is much appreciated!

24. Debrief
DEBRIEFING FORM

Evaluation of Movie Scenes

Thank you for participating in this study. Your time and effort are much appreciated.

This study used deception. In this study, you were told that we were looking for your evaluation of a movie scene. However, the true purpose of this study was to evaluate whether you noticed product placement in the movie scene. We apologize for the necessity but rest assured that the data that was collected can now be removed without any consequences.

The information that you have provided will help the researchers further the knowledge of how consumers react to different product placement techniques. Product placement in movies is defined as the practice in which firms pay to place branded products e.g. brand name/logo, package, signage, other trademarks, in the context of mass media programming (Homer, 2009). A character noticeably drinking a can of Coca-Cola in a movie scene is a good example. A product placement is successful when viewers watch it and later purchase and/or consume the product because of its salience in the viewer’s mind after watching the scene.

In this study you were in one of four experimental conditions and you were shown a product placement. You were either shown a product placement that was moving (driving by in the background) or that was stationary (parked in the background), and were placed in your corresponding male or female gender condition.

If you have any questions or concerns about your participation in this study, or if you would like a copy of the results of the study when it has been completed, please contact Dr. Theodore Noseworthy, Associate Professor – Marketing & Consumer Studies at 519-824-4110 Ext. 54887 or tnosewor@uoguelph.ca.

Thank you.
Appendix D: Conceptual and Statistical Models

**Figure 1.** Conceptual Moderation Model (H$_1$)

**Figure 2.** Statistical Moderation Model (H$_1$)
**Figure 3.** Conceptual Mediated Moderation Model ($H_2$)

**Figure 4.** Statistical Mediated Moderation Model ($H_2$)
Figure 5. Conceptual Serial Mediation Model (H₃)

Figure 6. Statistical Serial Mediation Model (H₃)
Appendix E: Tables

Table 1

*Operationalization of Conditions*

<table>
<thead>
<tr>
<th>Seen Oscar Mayer Logo</th>
<th>Yes (%)</th>
<th>No (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>61</td>
<td>39</td>
</tr>
<tr>
<td>In Motion in Dynamic (%)</td>
<td>85.2</td>
<td>86.7</td>
</tr>
<tr>
<td>Related in Plot-Connected (%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2

*H₁ Free Recall Data (percentages)*

<table>
<thead>
<tr>
<th>Logo Recall</th>
<th>Dynamic</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>55%</td>
<td>8%</td>
</tr>
<tr>
<td>Female</td>
<td>47%</td>
<td>4%</td>
</tr>
<tr>
<td>Plot-Connected</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>14%</td>
<td>8%</td>
</tr>
<tr>
<td>Female</td>
<td>13%</td>
<td>4%</td>
</tr>
</tbody>
</table>

Table 3

*H₁ A' Recognition Data (means), Pairwise Comparisons (untransformed)*

<table>
<thead>
<tr>
<th>Product Placement Type</th>
<th>Dynamic</th>
<th>Plot-Connected</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Means</td>
<td>.782</td>
<td>.779</td>
<td>.767</td>
</tr>
</tbody>
</table>
Table 4

$H_1 A'$ Recognition Data (means), Planned Contrasts (untransformed)

<table>
<thead>
<tr>
<th>Sex/PPT</th>
<th>Dynamic</th>
<th>Plot-Connected</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Females</td>
<td>--</td>
<td>.826</td>
<td>.769</td>
</tr>
<tr>
<td>Males</td>
<td>.798</td>
<td>--</td>
<td>.787</td>
</tr>
</tbody>
</table>

Table 5

$H_1 A'$ Recognition Data (means), Pairwise Comparisons (transformed)

<table>
<thead>
<tr>
<th>Product Placement Type</th>
<th>Dynamic</th>
<th>Plot-Connected</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Means</td>
<td>.926</td>
<td>.975</td>
<td>.902</td>
</tr>
</tbody>
</table>

Table 6

$H_1 A'$ Recognition Data (means), Planned Contrasts (transformed)

<table>
<thead>
<tr>
<th>Sex/PPT</th>
<th>Dynamic</th>
<th>Plot-Connected</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Females</td>
<td>--</td>
<td>.985</td>
<td>.886</td>
</tr>
<tr>
<td>Males</td>
<td>.93</td>
<td>--</td>
<td>.918</td>
</tr>
</tbody>
</table>

Table 7

$H_1 B''$ Recognition Data (means), Pairwise Comparisons (transformed)

<table>
<thead>
<tr>
<th>Product Placement Type</th>
<th>Dynamic</th>
<th>Plot-Connected</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Means</td>
<td>1.535</td>
<td>1.396</td>
<td>1.409</td>
</tr>
</tbody>
</table>
Table 8

*H_{1, B''} Recognition Data (means), Planned Contrasts (transformed)*

<table>
<thead>
<tr>
<th>Sex/PPT</th>
<th>Dynamic</th>
<th>Plot-Connected</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Females</td>
<td>--</td>
<td>1.398</td>
<td>1.406</td>
</tr>
<tr>
<td>Males</td>
<td>1.52</td>
<td>--</td>
<td>1.412</td>
</tr>
</tbody>
</table>
### Appendix F: Glossary of Terms

**Table 9**

*Terms and Definitions (in alphabetical order)*

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bias index (B”)</td>
<td>Explains the frequency with which a participant selects “yes” between both new and old signals</td>
</tr>
<tr>
<td>Discrimination index (A’)</td>
<td>Denotes an accurate decision in a recognition memory test (Pollack &amp; Norman, 1964)</td>
</tr>
<tr>
<td>Dynamic (product placement)</td>
<td>Object (product placement) that is moving/in motion</td>
</tr>
<tr>
<td>Explicit memory</td>
<td>Accessed using directed tasks for recall and recognition of information from a previous exposure (Krishnan &amp; Chakravarti, 1999; Shapiro &amp; Krishnan, 2001)</td>
</tr>
<tr>
<td>Female foraging hypothesis</td>
<td>Females searched for and collected food that was non-mobile in nature, such as vegetables. As such, they developed superior memory for identification and location of object arrays by gathering (Silverman &amp; Eals, 1992)</td>
</tr>
<tr>
<td>Free recall</td>
<td>The consumer can cite the brands seen in a film without additional prompting (Lehu &amp; Bressoud, 2009, p.10)</td>
</tr>
<tr>
<td>Gender</td>
<td>Psychological features frequently associated with biological states of male and female, that are assigned by an observer or by the individual (Deaux, 1985, p .51)</td>
</tr>
<tr>
<td>Hominization</td>
<td>Evolutionary biological process of becoming a human from ancestral primates (Tooby &amp; DeVore, 1987, p.202)</td>
</tr>
<tr>
<td>Hunter-gatherer theory</td>
<td>Linked to survival, in which males were primarily hunters of prey, while females were primarily gatherers of edible vegetation (Buss, 2008; Tooby &amp; DeVore, 1987)</td>
</tr>
<tr>
<td>Implicit memory</td>
<td>Characterized by a response bias that increases the likelihood that information from a recent stimulus exposure will be used to perform a subsequent task without conscious retrieval or even awareness of prior exposure to that</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Item-specific processing</td>
<td>Encoding of item-specific information (Hunt &amp; Einstein, 1981, p.497)</td>
</tr>
<tr>
<td>Item-specific thoughts</td>
<td>Pertained specifically to Oscar Mayer products and the brand, such as attributes, or the famous “Oscar Mayer Wiener” song (Noseworthy et al., 2011)</td>
</tr>
<tr>
<td>Male foraging hypothesis</td>
<td>Males had to hunt for food in locations farther away from their homes, leading to their superior spatial abilities in mental rotation and orientation (Silverman &amp; Eals, 1992)</td>
</tr>
<tr>
<td>Mental rotation</td>
<td>The ability to rotate mental images quickly and accurately (Auyeung, Knickmeyer, Ashwin, Taylor, Hackett, &amp; Baron-Cohen, 2012, p.1)</td>
</tr>
<tr>
<td>Natural selection</td>
<td>The major constructive and ordering force in evolution (Tooby and DeVore, 1987, p.193)</td>
</tr>
<tr>
<td>Object arrays</td>
<td>Groupings of visual objects (Noseworthy, Cotte, &amp; Lee, 2011, p.1)</td>
</tr>
<tr>
<td>Object identification</td>
<td>Knowing something about an object (Mandler, 1980)</td>
</tr>
<tr>
<td>Object Location Memory (OLM)</td>
<td>Superior memory for identification and location of object arrays (Silverman &amp; Eals, 1992, p.1)</td>
</tr>
<tr>
<td>Object recognition</td>
<td>Knowing that an object has been seen before (Mandler, 1980)</td>
</tr>
<tr>
<td>Object visualization</td>
<td>Forming the actual object itself comprised of its physical attributes (Campos, 2014)</td>
</tr>
<tr>
<td>Objects (product placement)</td>
<td>Stimuli (product placement)</td>
</tr>
<tr>
<td>Plot-connection</td>
<td>The product was involved in the action and/or was in contact with the main character (Galician &amp; Bourdeau, 2004; Lindstrom, 2008)</td>
</tr>
<tr>
<td>Product placement</td>
<td>The practice in which firms pay to place branded products e.g. brand name/logo, package, signage, other trademarks, in the context of mass media programming (Homer, 2009, p.21)</td>
</tr>
<tr>
<td>Prompted recall</td>
<td>The consumer cites brands seen with the help of product</td>
</tr>
<tr>
<td>Concept</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Recognition (recall)</td>
<td>The consumer cites brands seen with the help of a list (Lehu &amp; Bressoud, 2009, p.10)</td>
</tr>
<tr>
<td>Relational processing</td>
<td>Encoding of similarities among a class of events (Hunt &amp; Einstein, 1981, p.497)</td>
</tr>
<tr>
<td>Relational thoughts</td>
<td>Pertained to anything that can be done with the product (Noseworthy et al., 2011)</td>
</tr>
<tr>
<td>Retention</td>
<td>Immediate memory (Benton, 1945, p. 1)</td>
</tr>
<tr>
<td>Sex</td>
<td>The biologically based categories of male and female (Deaux, 1985, p .51)</td>
</tr>
<tr>
<td>Smooth-pursuit movement</td>
<td>The detection of a physically moving object with our retina and following it with our head (Coren &amp; Ward, 1989, p.389)</td>
</tr>
<tr>
<td>Spatial visualization</td>
<td>Forming the object in space, relative to other objects. (Campos, 2014)</td>
</tr>
<tr>
<td>Static (product placement)</td>
<td>Object (product placement) that is stationary/not in motion</td>
</tr>
<tr>
<td>Static control (product placement)</td>
<td>Serves as a benchmark not only to measure spatial abilities in males from the dynamic condition, but also to measure spatial abilities in females from the plot-connected condition.</td>
</tr>
<tr>
<td>Surprise attacks</td>
<td>Advanced behaviours exhibited by a predator on its prey in order to ensure successful capture (Tooby &amp; DeVore, 1987)</td>
</tr>
<tr>
<td>The Hunter-Gatherer Theory of Sex Differences in Visuospatial Abilities</td>
<td>The hypothesis that females have evolved to develop a stronger spatial ability for identification and object location memory than have males (Silverman &amp; Eals, 1992)</td>
</tr>
<tr>
<td>The selectivity model</td>
<td>In information processing, whereas females respond to subtle cues, males do not respond to subtle cues (Darley &amp; Smith, 1995; Meyers-Levy &amp; Sterntahl, 1991),</td>
</tr>
<tr>
<td>Thematic relation</td>
<td>A temporal, spatial, causal or functional relation between things that perform complementary roles in the same scenario or event (Estes, Golonka, &amp; Jones, 2011, p.250)</td>
</tr>
<tr>
<td>Thematically related scene</td>
<td>Plot-connected scene</td>
</tr>
<tr>
<td>Value</td>
<td>Based on the belief that something of worth can be exchanged between parties (Gangadharbatla &amp; Daugherty, 2013, p.23)</td>
</tr>
<tr>
<td>-------</td>
<td>-------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Visuospatial ability</td>
<td>The ability to keep in mind a definite configuration so as to identify it in spite of perceptual distractions (Steele, Walder, &amp; Herbert, 1992, p. 1066)</td>
</tr>
<tr>
<td>Visuospatial elaboration</td>
<td>The heightened ability to maintain several visual objects in memory (Barkley &amp; Gabriel, 2007; Eals &amp; Silverman, 1994)</td>
</tr>
</tbody>
</table>