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Brands as a unique and special stimulus class: Bridging the gap between face and object processing

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Brands as a unique and special stimulus class: Bridging the gap between face and object processing

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Declaration

Yr wyf drwy hyn yn datgan mai canlyniad fy ymchwil fy hun yw'r thesis hwn, ac eithrio lle nodir yn wahanol. Caiff ffynonellau eraill eu cydnabod gan droednodiadau yn rhoi cyfeiriadau eglur. Nid yw sylwedd y gwaith hwn wedi cael ei dderbyn o'r blaen ar gyfer unrhyw radd, ac nid yw'n cael ei gyflwyno ar yr un pryd mewn ymgeisiaeth am unrhyw radd oni bai ei fod, fel y cytunwyd gan y Brifysgol, am gymwysterau deuol cymeradwy.

I hereby declare that this thesis is the results of my own investigations, except where otherwise stated. All other sources are acknowledged by bibliographic references. This work has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree unless, as agreed by the University, for approved dual awards.

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Summary

The necessity for studying brands as a unique stimulus class is becoming ever more relevant in today's society. We are surrounded by a commercialised world and there is a lack of research into the cognitive components of brand processing and, instead, previous research often looked at why we buy one brand over another. It is useful to know how we recognise brands through implicit memory (familiarity priming), which this thesis aimed to do through a series of experiments and the design of a hierarchical stage model. Three groups of stimuli (brands, objects, and faces) were evaluated for perceived familiarity and were used in subsequent experimental series, investigating differences between processing the three stimuli groups at one level of the brand model. Following this, a series of experiments investigated the likelihood of strategy use being the reason for differences in responses to stimuli categories. Language features of brands were then isolated to try and rule out the reason for the differences being a reading effect.

The thesis demonstrates evidence that brands are special. The differences in recorded response times and accuracy are unlikely to be due to strategies in processing or maybe a reading effect, but due to a specific set of features that brands have over other stimuli (e.g., our expertise, their stability, and so on). Moreover, there was a linear effect of stimuli category, familiarity recognition in that objects were the easiest and faces were the hardest to respond to. Thus, in a continuum of difficulty for recognising familiarity, brands bridge the gap between faces and objects. The results will be discussed in reference to how cognitive and consumer research could use other dimensions to investigate brand memory.

CHAPTER ONE: GENERAL INTRODUCTION

Scrolling through Facebook, a post came up (Figure 1). The post suggested that although we are easily able to name all the brands in the picture, we struggle to name the types of leaves. It insinuated that ‘this is what is wrong with the world today’, insofar that we know commercial branding, but not natural aspects of our world. However, there is another way to think about this. We, in fact, have an expertise effect of brands in the Western world. We are constantly surrounded by brands and we need to know what they are - we may have our favourites or need to know how to interact with specific brands. This is a pure example of familiarity through exposure and expertise, rather than lack of knowledge of the natural world. Many people would not know the names of leaves unless they took an interest or had learnt them for a particular reason. Also, we do not need to know an individual leaf type, to know what type of common object category it belongs to, e.g., leaves, tree species, inanimate objects, living objects etc.

Figure 1. Post on Facebook (uncredited)

As we move around our worlds, we are constantly experiencing items such as faces, words, objects, and brands. These items are being stored in our memory, and our existing memories of such items are updated as and when required (Nadel, Hupbach, Gomez & Newman-Smith, 2012). All of these items share some commonalities in the processing steps taken to remember them successfully, but equally, they differ in their design. For example, some objects, words and brands are artificial in nature and design (da Silveira, Lages & Simões, 2013), whereas some common objects (such as an apple) and faces occur more naturally in the world and are relatively stable. We engage with stimuli, whether natural or artificial, and we show an expertise effect equally for a variety of these item types.

The main interest of this thesis is with brands, due to the expertise we show in interacting with them appropriately and how common they are in everyday experiences. It is important to look at processing brands, as our memories for them are as equally practised as those for faces, objects, and words, but they also have different features. Overall, some of the most useful research aspects of brands can be summarised as follows: 1) being stable upon repetition and consistent in their representation, which happens even more than for faces, as they can change expression, aesthetics, age, etc., and even some common objects, like an apple which can change colour, shape, or texture; 2) being categorisable like object exemplars are (Tanaka & Taylor, 1991), for example, Coca Cola belongs to soft drinks and, therefore, the category of food and drink brands, and finally 3) brands are individual, as faces and people are, and they have a unique identity. Furthermore, as with objects and faces, brands have different types of cognitive input, including advertisements: seeing the name, seeing the logo, and hearing the brand name. Therefore, it is likely that although the pathways through which the recognition of brands follow are the same, functionally, there are differences in the way that brands are processed.

Advertisers pay teams of people to design brands that are both memorable and likeable. Designing brands in this way is done to increase sales via a consumer's choice being favourable towards a particular brand. In fact, art and marketing directors look at the sales likelihood based on the 'face' of a brand and how consumers appear to process brands holistically like the faces of individuals (Phillips, McQuarrie & Griffin, 2014). Consumers may choose a brand based on its visual appeal, similarity to other brands and their memory of it. People will look for similarities between brands in order to create relations and a scale for how much they like something; thus influencing choice (Miceli & Pieters, 2010). However, creating similarities between brands disrupts recall. Kent and Kellaris (2001) found that competition for choice can occur even in well-known brands, but is more prominent in those that are less or completely unfamiliar. The interference from our existing knowledge creates competition for our memory for advertisement information and well as this brand choice effect. This occurs for names as well as other details (e.g. slogan); and was tested through intraexperimental learning of familiar or newly created brand information such as name, logo and the advertisements. Previous exposure to the familiar or novel brands was measured post-experimentally to ensure category effects were distinct. This measure was also used in how much of a competition effect each similar, interfering brand had on one another. This is suggestive that being dependent upon similarities in features, such as shape and colour, could hinder or help someone's choice or memory for competing brands.

Memory models have described different functions of memory types along latency and retrieval (Baddeley & Hitch, 1974); for example, stating that long term memory and short term memory are distinct. Nadel et al. (2012) suggested that short term memory is the updating and creation of something currently being ‘worked upon’ and that long term memory is where all our information is stored from the encoding of a memory in short term memory. These models of memory suggest a feedback-feedforward effect, where memories are remembered and move from long term to short term memory to be updated, or first memorised, moving from short term to long term memory stores (Nadel et al., 2012).

Memory goes through a neurobiological model of processing steps for encoding, consolidating, storing, retrieving, and reconsolidating traces (Kandel, Schwartz & Jessell, 2000). A stimulus is first perceived via a primary processing route for a particular modality (e.g., visual pathway to the occipital cortex), whilst a signal is simultaneously processed by the medial temporal lobes through the perirhinal and entorhinal cortices to the hippocampus (Brown & Aggleton, 2001; Bussey & Saksida, 2005). Following its consolidation and stabilisation action, the storage of this memory will take place in the area it was first processed (e.g., visual cortex). This process is fast in nature to aid perceptual recognition as well as to interconnect nodes of information into networks of experiences.

The first distinction in long term memory is between declarative and non-declarative memory. Baddeley and Hitch (1974) stated declarative memory is comprised of memories above the conscious level and is broken into episodic (memory for events within our lifetime) and semantic (memory for general information and facts). Paller (2009) suggested that our declarative memory lasts a lifetime as fragments of information are linked together to create stable memories. However, memory is susceptible to changes (reconsolidation) and deletion (extinction), especially if the individual suffers a traumatic brain injury leading to amnesia. Romero and Moscovitch (2015) showed amnesics to have large deficits in declarative memory tasks, but close-to-normal levels of non-declarative memory (e.g., learning and retention; Reber, Knowlton & Squire, 1996). This is seen in the famous case of patient H.M (Scoville & Milner, 1957), who was severely impaired for declarative memory, but retained his non-declarative memory. Non-declarative memory is stored, retained and retrieved below consciousness. It is composed of implicit memory (measured, for example, through priming) and procedural memory (learning and retention of motor actions). Buffalo and Squire (2012) argued that non-declarative memory is not a brain system per se, but rather is a group of memory and neural systems working together. This could explain why temporal lobe damage, causing amnesia, does not automatically lead to loss of non-declarative memory, because alternative systems and networks compensate for the damage.

As previously mentioned, non-declarative memory contains a feature of implicit memory as tested through priming. Priming is known as a facilitation in responses, typically showing benefits through reduced response times and increased accuracy, from activation of similar or repeated presentations. This is further categorised into two priming types. The first is perceptually driven priming, which is a facilitation of reprocessing something that a perceptual representation has been created for, such as repetition priming (Logan, 1990). The second is conceptually driven priming, which is a facilitation of processing something with commonalities with a perceptual representation. Conceptually driven priming further involves associative priming which is the facilitation of something related to another. Explicit memory processes aid the amount of priming that can be measured. If familiarity judgements are used, this can aid repetition in perceptually driven priming (Sheldon & Moscovitch, 2010). If semantic judgements are used, this aids associative and conceptually driven priming (McKone & Slee, 1997).

Finally, response priming is a distinct facilitation from repeating task types under various circumstances, e.g., task similarity. Task similarity between priming and testing phases shows a small but consistent priming effect that is separate from processing the content of the task (Franks, Bilbrey, Lien & McNamara, 2000; Xiong, Franks & Logan, 2003). Any sharing of a common processing route will lead to facilitation and priming, but to varying degrees. Motor repetition (response priming) has the smallest effect, categorical repetition is a replicable but small effect, and perceptual repetition has the most robust effect. As categorical and perceptual repetition priming is strongly influenced by higher-order common processing, motor responses are short lasting and thus add a lower level processing facilitation (Dennis, Carder & Perfect, 2010).

There are a few factors that affect how fluent we are at brand processing, which are based on prior exposures. The Berlyne's (1970) two factor theory suggests that a multitude of prior exposures build up fluency of interacting with stimuli, for example in brands this two factor theory would also correlate with positive influences on fluency – as measured by habituation to stimuli; and negative influences on fluency- as measured through attitudes towards stimuli. These negative influences can reach saturation, where continuing exposure will lead to manipulations making fluency worse. These results are consistently corroborated by Campbell and Keller (2003). Furthermore, this fluency effect is related to the type of learning involved: incidental, or intentional (Janiszewski & Mevris, 2001). Incidental learning is a by-product, where an orthogonal set of features is learned from a task unrelated to what has been intentionally retrieved (Tresselt & Mayzner, 1960). This is also a facet of non-declarative memory types. The intentional learning type occurs when a participant is instructed to learn features that are later retrieved, which would be used in declarative memory studies (Rugg et al., 1997). The dual process model by Groves and Thompson (1970) states that the perceptual and semantic characteristics of a stimulus (e.g., primary features), and the task type or decision needed from a participant is what modulates fluency of subsequent decisions. For example, if a decision is the same between first and later presentations then we become more fluent upon later processing.

Familiarity is a feature of memory exposure, the more exposure we have to a stimulus, the stronger our memory representation is. Familiarity also brings comfort to humans (Johnson & Russo, 1984) because items we recognise require less processing and hold significant semantic information. If this semantic information is positive, then we subsequently feel more positive about it because in our brain, the limbic system is responsible for our emotional centre. This includes the amygdala, where emotions are processed, and the hippocampus, which is responsible for encoding new memories. Therefore, as these memory and emotion centres are connected, one influences the other.

As with priming of faces (Ellis, Young, Flude & Hay, 1987) and objects (Warren & Moreton, 1982), brands show a similar pattern of priming and fluency (Campbell & Keller, 2003), insofar that increased exposure makes it easier to process, recognise and respond to stimuli (Lee & Labroo, 2006). There are a few factors that modulate the ease of recognition and processing in brands. Exposure, for example, modulates how quickly someone would perform a response to stimuli, such as ‘Do I know this?'. Primary features of a brand logo (colour, shape, etc.) would make a stimulus easier to process if they are recognisable or as expected, then we become more fluent as we standardise a brand to a 'template' in our brains. In the case of unfamiliar stimuli, there is a lack of a long-term memory representation and, therefore, processing requires more time and effort (Hulme, Maughan & Brown, 1991).

The plethora of factors that modulate how well we remember things can include, but not be exclusive to, choice and emotional valence, ease of processing, and relatedness of stimuli. Choice and emotional valence influence priming of brands. If people feel positively about a brand, then they are more likely to respond more fluently on first and subsequent repetitions (Chang, 2007). Interestingly, there are also a series of factors within this concept of 'choice and liking' that lead to fluency of processing. The more 'liked' a brand is, the easier it is to process and respond to, even if the response task is unrelated to emotional valence or liking. Chung and Szymanski (1997) found that modality presentation could be responsible for this effect. People can either feel close, or not, to a brand based on how it is presented to them. For example, in the Chung and Szymanski paper, visual presentation was more potent than auditory presentation. It could be argued that this potency was also due to an effect of familiarity, as we are more experienced at seeing logos than hearing or seeing the written names of brands. Chung and Syzmanski also demonstrated that the type of modality processing did not affect choice or feelings towards a brand.

The salience for brands follows the same theoretical structure as for other items (e.g., common objects), but it is unlikely that we are as attached to other items as we are to brands. Karjalainen and Snelders (2009; Karjalainen, 2004) looked at feature processing in brands affecting how much we like a brand. They stated that brand philosophy is part of the design process of a brand, which in turn affects how we interpret their values and our choice of them. This was also supported by van Rompay and Pruyn (2011) who found that the symbolism of brands is heavily in-built to the design of the logo and therefore, ultimately, appearance affects our choice.

Ha and Perks (2005) discussed three factors that influence our trust for brands, with the thinking that our trust influences choice. The three factors were familiarity, experiences with the brand, and emotional factors towards the brand. This suggested that the relationship between familiarity and choice is positive and linear, and that all of these factors build up to modulate how we choose a brand. For brands, we have an expertise effect that has been investigated throughout this thesis. There is plenty of evidence that familiarity and choice are highly related (Axelrod, 1968). Some research suggests that familiarity in brands is what pushes us to choose our favourites; the more familiar a brand is, the more dominant our choice for it is (Baker, Hutchinson, Moore & Nedungadi, 1986; Monroe, 1976). Sundaram and Webster (1999) looked at choice as a factor of positive or negative marketing on familiar and unfamiliar brands. Negative reviews can influence our choice for familiar brands more as they have ‘more to lose’ than unfamiliar brands, but there is an equal effect for positive marketing on all brand types (familiar and unfamiliar), suggesting that familiarity can influence choice rather than the other way around.

When considering the differences in memory contextual information over memory content, content is the information about an item itself. Contextual information includes multiple other constructs: intrinsic or extrinsic details of the experiment, features of an item; and spatial and temporal learning (Wilding, Doyle & Rugg, 1995). In the case of brands, content information would include the brand name, but the contextual information would also include the colour, typography, and any shape that makes up the holistic brand logo. We do, however, have the ability to remember the content of a brand without its context (Holden & Vanhuele, 1999). Yet, visual appeal and the overall look and feel of a brand will understandably affect the choice of a brand (Labroo, Dhar & Schwartz, 2008). The ease of visual encoding makes a brand more 'liked' than one which is more difficult to visually process (both with component features and holistically, e.g., colour and typography).

Anthropomorphism and semanticism also act as fluency factors for processing brands. If a brand has a particular humanistic feature (e.g., healthy), we are more likely to view other brands that have the same anthropomorphised feature as more related and therefore, they become primes for one another. This priming is seen across brands: for example, any classed as 'healthy' could prime other 'healthy' brands with faster response times, even in tasks unrelated to the feature 'health' (Aggarwal & McGill, 2012). Equally, how we view brands with regards to 'trustworthiness', another anthropomorphised feature, positively influences how we feel about brands, thus affecting whether we would choose them over another competing brand (Erdam & Swait, 2004). Subsequently, our existing views of a brand create habits for how we interact with brands (Verwijmeren, Karremans, Stroebe & Wigboldus, 2011). In fact, Verwijmeren et al. suggested that these habits, and the brand personality (Goldsmith & Goldsmith, 2012) affect choice by further increasing the likelihood of purchase.

Semanticism and relatedness also play a role with how fluently we respond to brands (Lee & Labroo, 2004). For example, if a brand is viewed as related conceptually to a previously exposed brand, there is an additional priming effect. Thus, if a repetition priming paradigm is used, there is also conceptual priming effects influencing response speed and accuracy. These perceptual aspects may be deciding colour of brands, with an additional priming effect from conceptually driven priming (e.g. ketchup brands to prime mayonnaise brands). Lee and Labroo highlighted two forms of relatedness where this occurs: these are predictive contexts (e.g., coffee to Café Nero) and related constructs (e.g., Heinz to Hellmans). Brands show subliminal priming effects, but exposure, our associative factors, and our prior knowledge modulate how much we would spend on a brand and how positive our feelings are towards it (Laran, Dalton & Andrade, 2011). Finally, there is a dichotomy between top-down and bottom-up processing which could be suggested to be present in brand perception and responses to tasks. Theeuwes (2010) stated that top-down processing is directed by the intentions of the participant and is led by expectancies. The bottom-up processing, on the other hand, is based on feature properties and is led by the stimuli or task itself. In this study, participants were required to perform a visual search task, the researcher successfully isolated time periods from electrophysiological data to distinguish how we sweep through a visual search. Early processing looks at quicker bottom-up priming, with top-down priming following after when direction from a participant's attentional span looks for specific features; e.g. colour or shape.

The following series of studies will investigate familiarity effects of brands compared to those of faces and objects. This will include comparing the unique language effect of brands where context and content can compare against faces and objects. The present research will also look at the modulatory effects of top-down and bottom-up processing by using designs of random presentation versus blocked presentations. This series of studies will aim to provide relevance for research into the neural pathways of processing brands although, at this early stage, no direct links will be made because experiments will only consider behavioural responses. The findings of this thesis also have consequences for research in theories of consumer experimental psychology (e.g., brand design and marketing strategies) as well as theories of object and face recognition.

CHAPTER TWO: GENERAL INTRODUCTION - Introducing a Brand Model

As we are experts in various stimuli (faces, objects, and brands), we go through similar processing steps in order to recognise any of these stimuli. Therefore, the following chapter will discuss a pinnacle model that was one of the starting points in face, and later object, recognition (Bruce & Young, 1986). This chapter will introduce the idea of a new brand model (Figure 2) to compare against the Bruce and Young model, in upcoming chapters, to see if there are similarities and/or differences in processing steps between stimuli types (brands, faces, and objects). Furthermore, the key areas of the brand model that will be investigated in the following experiments will be highlighted, as such an extensive model cannot be fully investigated for the purpose of this thesis.

One key model in person recognition is the Bruce and Young (1986) model. The model describes the steps we go through to access and remember a person from looking at their face. There are various codes for recognising faces. Firstly, there are pictorial codes, which is the descriptive information that distinguishes one face from another and includes viewpoint variations. Recognition is adaptable despite these viewpoint variations. It is then at the level of the structural codes that a recognition decision from memory is involved. Next is the visually derived semantic codes, which includes information on gender, personality, and similarities between other faces with similar visual information. Identity specific semantic codes include information about a person, following recognition, which is not visually derived; for example, occupation or associations with other people. Name codes are independent from identity information and not needed at the identification or recognition level but rather is knowledge that can be accessed later. Next are the expression codes, which are related to the different postures and changeable features of the face and how analysing these allows you to understand a facial expression. Finally, there is one more factor for recognition which is the facial speech codes. Facial speech codes are the movements of the face and lips for speech production. Furthermore, within this model there are a series of units known as Face Recognition Units (FRUs) which are the level at which familiar individuals can be recognised. The FRUs are independent of expression codes but contain structural codes. At the level of the FRUs, recognition can also be primed by expectancy from associated people as well as recency effects from repetition. Finally, perceptual priming is at this earlier stage of processing (Bajo, 1988) at the level of Face Recognition Units (FRUs).

Following on from the Bruce and Young (1986) model, Burton (1994) argued that full recognition occurs after activation at the level of the Person Identity Nodes (PINs) and can be elicited by a series of different multimodal stimuli rather than faces alone. Bruce and Valentine (1985) agreed with Burton by suggesting that faces can be primed from lots of different information at the level of the PINs; e.g., alternate images of the same person (also related to structural codes), or even by their names. However, different types of stimuli or cross modal repetition is not as successful for retrieval as a pure repetition (Ellis, Flude, Young & Hay, 1987). The number of presentations maximises the activation in the PIN and, therefore, has greater facilitation to reach the threshold for recognition (Lewis & Ellis, 1999). There is also a long-term facilitation with spaced or multiple representations, however, with intervening images facilitation is limited at this level of the PIN (Lander, Bruce, Smith & Hancock, 2009).

At this stage, a low-level semantic representation is reached which is a singular platform rather than multiple representations of different modalities (Vanderwart, 1984). This example demonstrates how priming levels would work for faces (or objects;

Schneider, Engel & Debener, 2008) but brands are somewhat different, in the fact that they have multiple levels of input at one point (often the name and logo together). This could suggest that there could be an additive priming effect from different types of priming working together.

There are a few factors to be discussed which influence the level of conceptual priming strength. Brown, Neblett, Jones and Mitchell (1991) found that conceptual priming is consistent, like perceptual level priming, and the effects are more robust in blocked tasks than mixed trial tasks. This suggests that a change in task causes a deficit in processing, but that priming will still be present. If the study and test phase tasks are identical or similar, then all priming is boosted; but if using a cross modal design is used, the congruence between stimuli modality types in the study and test phases influence the strength of the priming effect (Stenberg, Radeborg, & Hedman, 1995). Further to this, Stenberg et al, discussed that generally, pictures prime better than words or names. In fact, picture to word priming is the strongest conceptual effect, rather than that seen for word to picture priming. This concept was supported by Carr, McCauley, Sperber and Parmalee (1982); where there was greater facilitation from pictures than words. We are more automatised and fluent processing visual images rather than words as the semantic bank is easier to access at this level. However, the benefit from seeing within-modality stimuli is more than for cross-modality stimuli, as this is modulated by attention.

Semantic or associative priming, and recognition also occurs in the PINs, where the same individual presented across domains has the largest facilitatory effect (this only needs to activate the PIN); followed by associated people in the same domain or modality presentation. However, this requires activation of the semantic information units (SIUs) and a summation of the shared associations between individuals activating a different PIN (Young, Flude, Hellawell & Ellis, 1994). The difference between categorical and associative priming is that those which are associated are more easily activated, due to sharing more common links in the SIUs, than those that are unrelated; but sharing a category can inhibit other category exemplars due to only commonalities between a specific category (Brennan & Bruce, 1991; Bruce & Valentine, 1986). Categorical priming does occur in a similar way to associative priming, but its effects are marginal and slower in comparison due to the initial inhibitory effect, and they also require more primes of that category as it is a weaker priming form (Carson & Burton, 2001; Vitcovitch, Patton, Bakogianni & Kinch, 2006). Despite this, category information and person specific information is still quicker to retrieve than name codes as these are not always necessary and, therefore, not always retrieved (Johnston & Bruce, 1990; Yovel & Paller, 2004).

Logothetis and Sheinberg (1996) suggested there were different systems for various processes when considering object recognition. In fact, research has discussed the key processes involved in common object and novel object recognition, which in some ways link to those in face processing. The object research that is similar to face research includes, but is not limited to: recognising objects despite viewpoint changes (Gauthier & Tarr, 2016); recognising objects by constituent parts (Felzenszwalb & Huttenlocher, 2005); and how we aim to liken an exemplar to our previous representations through shape and appearance (Biederman, 1987).

Based on the original Bruce and Young (1986) model, an original brand model has been designed for the purpose of this thesis (Figure 2). At input, there are a greater number of factors that act at the perceptual level (e.g., name, logo, advert, slogan). In some cases, the name and logo coincide, and this means that the difference between face and object recognition could also be a language factor. There is a written name that would act as the input to brand processing (the content of the brand logo) and the logo which would simultaneously act as the input (context of the brand name within the logo). At the input level, perceptual priming can occur without deeper processing. The Name Recognition Units (NRUs) are the next level of processing from the name input or name/logo combination input. There are also the Other Recognition Units (ORUs; mirrored to the FRUs from the Bruce and Young model) which can lead from the independent logo, the advert, the slogan or any other perceptual input. This aspect of the model will be investigated in Chapters Five, Six, and Seven. Following the recognition unit levels (NRUs, ORUs), there would be a level where response priming would occur. This would include: picture and logo codes; identity nodes; and name codes without the logo itself; and would involve switching or repeating responses intra-experimentally. Conceptually driven priming could occur at the identity nodes because this node is a multimodal representation of the brand itself. Finally, as seen in the face model (Bruce & Young), the SIUs in the brand model would contain the category the brand belongs to (which could be tested through a categorical semantic priming paradigm); the association with other brands, and endorsements (which could be tested through associative priming paradigms); and visually derived semantic codes and identity specific semantic codes, which would hold information specific to that brand and could be investigated through semantic priming. Suggestions for how to look at and investigate other levels of this model will be discussed as an option for further research in the general discussion (Chapter Eight).

The initial aim of these upcoming studies was to run a conceptual paradigm as well as the standard repetition perceptual priming paradigms (as seen in Chapter 5, 6, and 7), as well as the study in the appendix (A) used perceptual versus conceptual priming. This, however, became impossible due to the restrictions of testing during COVID19. A perceptual crossed conceptual design was used in the second half of the brand name study (Chapter 7.2 and can be seen in Appendix A). This design relied upon repetition but whilst using cross modal priming effects to look at additional priming of a concept (brand identity as seen through either the written name, or the logo). The purely perceptual design saw the first prime as either name or logo (dependent upon condition and counterbalance) and probed or tested as in the same modality (name to name, or, logo to logo). However, the second block used the cross modal priming with the prime being the opposite stimuli to the probe (word to logo, or, logo to word). This design had interesting results showing repetition priming as more robust than the conceptual priming. But the additive priming of concept and repetition was strongest. This effect could be described as making a stronger memory trace from even more primes being presented, despite not showing a ceiling effect, or alternatively, due to the more well-rounded memory trace being created and the access to the semantic memory bank for multiple input stimuli. It is likely that the effect of multiple presentations was additive until no more learning could occur for that particular testing episode. It is also likely from the results that this effect is linear until a ceiling effect is reached, with the benefit upon response times and accuracy being shown after each presentation, until no more benefit can occur. This design (Appendix A) saw purely perceptual, purely conceptual, and a combination of the two types of priming being compared through analysis.

Alongside the above conceptual versus perceptual design, the plans for a conceptual paradigm would have seen a repetition of the stimuli with alternating, orthogonal conceptually driven questions being asked of the participants, on only the most, previously-rated, familiar stimuli. These questions would have been firstly ‘Is this a food and drink brand?’ and then secondly ‘Could this be considered a luxury brand?’. With counterpart questions for faces and objects also. Finally, this design would involve a short questionnaire afterwards to check each participants’ personal knowledge of the pre- categorised ‘familiar’ only stimuli. This could be used to remove data from those trials unknown as the questions would become redundant or purely guesswork. This design would have hopefully seen strong conceptual priming with regards to finding that although two questions were used, the concepts were activated neurally and crossover priming occurred. It could be argued that some repetition priming could occur if the same image was used, this had been discussed but for the purposes of accessing the semantic units, it would have been possible to change pictures of brands, unlike faces or alternating objects. In our real-world, on a conceptual level, it is impossible to control the natural relations or associations we make between concepts or stimuli. Therefore, this bit of fluctuation in responsiveness to the stimuli in an experimental setting, would mimic the natural world. The dissociation between perceptual and conceptual priming is always difficult to disentangle for this reason.

Using perceptual repetition priming would allow us to test at the level of the ‘Combination Name and Logo’ of the model (Chapters 5, 6, and 7). Chapter 7 also saw the perceptual repetition priming at the level of the ‘Name Recognition Units (NRUs)’ of the model. Repetition priming was selected as it is the most robust form of priming, as previously mentioned, and therefore, it was used in all experiments as a method to measure fluency at its highest available level. This fluency could be measured from different types of stimuli (e.g. brands, which had not been looked at before) with relatively low exposure levels. From the subsequent studies, fluency has been seen in the familiar object category, with extremely high levels of accuracy and low response times. This repetition priming for the experiments was chosen for its robustness, a measure of fluency, and the measure of implicit retrieval of a memory trace without explicit instructions to remember. Finally, for brand exposure, the ecological validity of these measures is beneficial as it is unlikely that we are asked to remember brands and instead, are more likely to experience them implicitly through exposure. This represents consumer behaviour, and again, due to COVID19 it was impossible to further measure choice and 'likability' of the brands which would have added another dimension and covariate to measure the effects of real-life consumer behaviour e.g., picking something you are familiar with and like.

As mentioned, repetition priming is the most robust way or getting a replicable effect across different stimuli whilst testing specific exemplars and multiples of them. It was initially used in the blocked design (Chapter 5) as a starting point for measuring a type and amount of priming in different stimulus types, with particular interest in how we respond and remember brands. From there, it was decided that although the initial blocked design was a good measure of repetition or perceptual priming, people could be using strategies to process the stimuli they experienced. Therefore, the random presentation designs were used (Chapter 6) to avoid the chances of these category-specific strategies and expectancies being used. Making the design harder due to it's two step decision rather than a simple forced-choice two option decision. Therefore, repetition priming was used again to match the designs for a comparison between

Chapter's 5 and 6. Thus, due to the type of decision used in the random design (Chapter 6), we could isolate the expectancies and measure the benefits of familiarity and repetition priming alone. The words studies (Chapter 7) were matched for repetition priming, again, for the purpose of isolating the reading effects in brand names from Chapters 5 and 6. This experiment also used repetition priming, but as mentioned above, the brand experiment also initially had a conceptual, cross-modal side avenue to be explored. It would not have been possible to change the parameters between experiments as the aim was to disentangle the process of brand recognition in depth rather than through breadth, with the pattern of are brands difference from faces and objects. The blocked design suggested that they are, so the next questions arose with looking at is this due to strategies being different for brands than faces and objects. Finally, looking at whether these differences are due to reading the brand name from the logo.

Regarding the current work, previous electrophysiological designs had been used but not included, as there were three options for this work. To use the work completed on my previous PhD; adapt it; or start again. For the purposes of my current work, it was decided that starting again and looking at purely behavioural measures would be the most appropriate, after a period of being out of the University. This next section will give an overview of the designs and measures in repetition priming used for the previous work.

Repetition priming is a powerful tool for measuring neural correlates of memory such as the Early and Late Repetition effects (ERE [N250r], LRE [N400]; Neumann & Schweinberger, 2009). Again, during previous work under a previous supervisor, not included in my PhD, studies were run with EEG measures of the N250r, N400 and signatures of episodic memory (FN400 & P600; Curran, 2000). The behavioural paradigm for the repetition effect experiments saw a similar setup to those used in this current thesis. This saw implicit measures of memory being tested through repetition priming, including measures of response priming. However, the episodic memory experiments were planned to be both within- and between-modality Old/New Effect experiments. The within-modality experiment would see a participant answer a question of familiarity of brand names firstly and then secondly to whether they had seen them intra-experimentally in the learning sessions. But with no instruction given to remember them from the learning sessions. The between modality experiment would split learning blocks; one where the brand name would be written, and the second where the brand name would be spoken. The first learning phase questions would be on perceived familiarity. In the test phase, participants would be answering questions about the intra-experimental experience with the brands as either seen, heard, or new (not witnessed in the experiment).

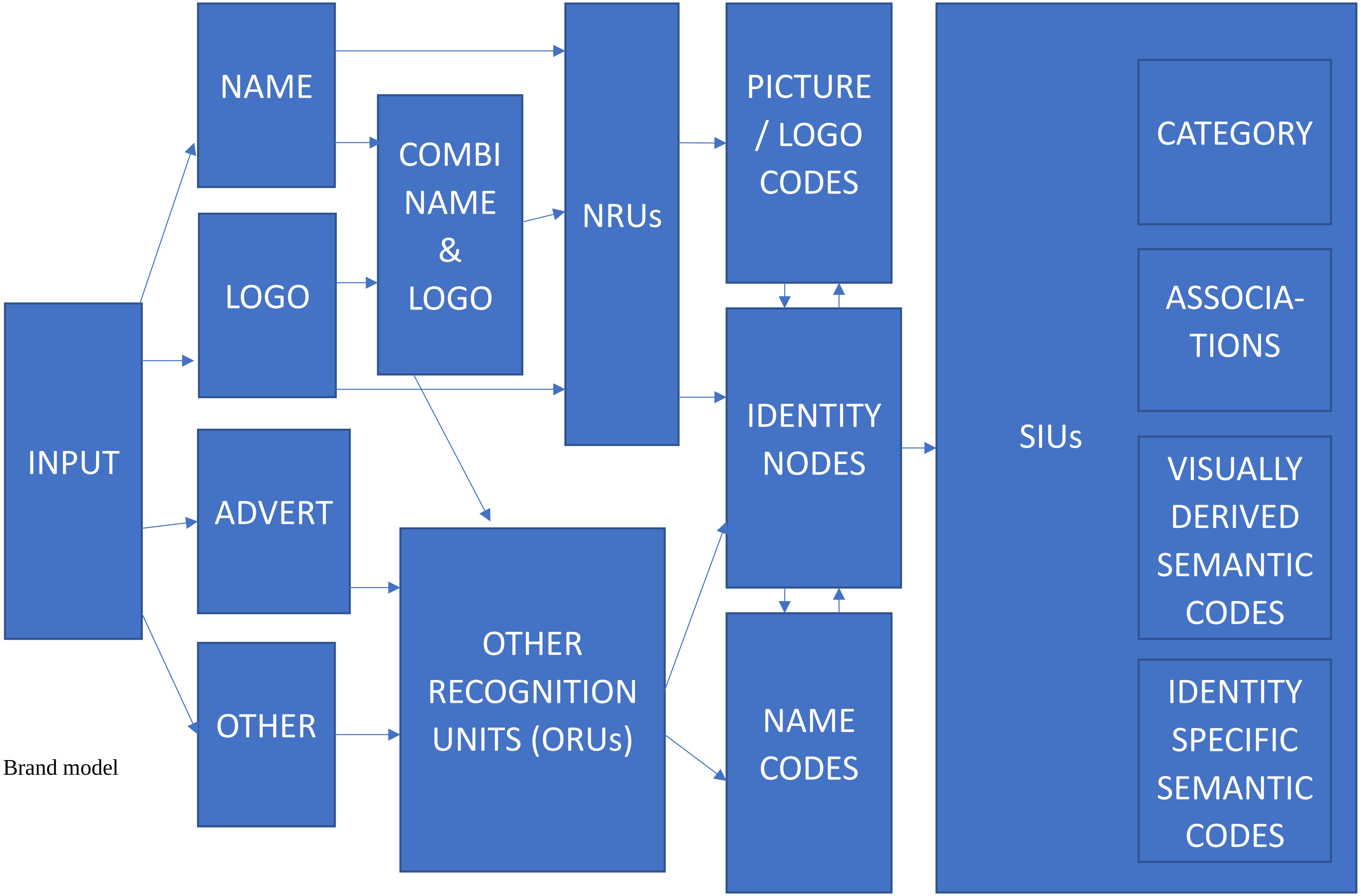

Figure 2. Brand model

CHAPTER THREE: THESIS AIMS

The aims of this thesis were to look at whether brands are a unique stimulus type and have distinct processing. To do this, brands were compared to common objects and faces because, as stated in the general introduction, brands are both categorisable like objects and individualistic like faces and people. It is also necessary to note that brands, although similar with some features of other categories, differ because they are more stable than other stimuli types, we are experts in them, and there is multimodal input. The structure of this thesis will see a series of studies conducted to determine whether the proposed brand model (Figure 2, Chapter Two) is appropriate for testing a unique stimuli type, such as brands, through perceptual priming, at the level of the recognition units. Also, whether brands do in some sense bridge the gap between faces and object processing in memory signatures.

A sub-study was conducted to evaluate stimuli to create a stable set of images in each of the following six categories for this thesis: 1) familiar brands, 2) unfamiliar brands, 3) familiar objects, 4) unfamiliar objects, 5) familiar faces and 6) unfamiliar faces (Chapters Five and Six). The stimuli in each of these categories were used in subsequent studies. The only study using different stimuli, which had not been directly evaluated, was a name study where the written names of stimuli were used alongside the use of images (Chapter Seven). These were not evaluated as words because their image form was evaluated instead.

Following the stimuli evaluation, there are three main experimental sections and aims to this thesis: 1) the differences between brands, objects and faces; 2) whether these differences are because of strategies in processing; 3) whether the presence of language in brands is the reason for the differences.

The first aim looked at whether our memory processing for brands is similar to that of objects, faces, both or neither. To achieve this, two different perceptual priming experiments were conducted to compare brands to faces, and brands to objects. Four conditions were used in each experiment: familiar and unfamiliar stimuli of each stimulus type. Finally, a comparative analysis was conducted to look at all the different brands, objects, and faces which were carried out as two separate experiments due to experimental runtime.

The second aim was to disentangle whether the differences in processing were due to expectancies of stimuli groupings or the task itself (familiarity decision). For the purpose of this experimental series, a task-dependent, perceptual priming paradigm was used. This was because there could be strategic task effects from top-down processing from the first experimental series (Chapter Five). This next experimental series aimed to look at bottom-up effects by randomly presenting stimuli from the two stimuli types and familiarity types (Chapter Six). This was carried out across two experiments with the same structure as Chapter Five (i.e., objects vs brands; faces vs brands; and a comparative analysis).

The final aim of this thesis was to look at whether the difference in priming effects of brands were because of having the brand name present in the logo. Objects and faces, mostly have corresponding names that are subsequently accessed through memory processing at the name codes level (Bruce & Young, 1986), rather than at an input level when images are presented. For the purpose of these study comparisons, these three experiments are within stimulus class (object vs object name; face vs person name; brand logo vs brand name). These thesis aims and the results will be discussed in reference to the use of a model and future directions.

CHAPTER FOUR: STIMULUS EVALUATION

4.1 Abstract

Three categories of stimuli were assessed for their perceived familiarity - brands, faces and objects. Each were rated, without timings, to a scale between most and least familiar by 45 participants (*n*= 15 in each stimulus type). The stimuli at the most polar ends of these scales were selected to be used for the experimental series in Chapters Five, Six and Seven. Eighty full colour image stimuli were selected for each of the six evaluated categories; familiar and unfamiliar brands, objects and faces. The initial aim was to match the groups on familiarity ratings for later experiments and analyses. However, this was not possible as it appeared harder to recognise familiar faces, with a lower mean rating (3.25-5.00) than the other familiar categories (objects 5.00-5.00; brands 4.57-5.00), and it may be easier to distinguish unfamiliar objects due to their commonalities in design which need to be considered in later chapters. Furthermore, because of the mismatching in categories, too many stimuli of each category would have had to be removed which may have influenced subsequent results. Therefore, it was decided that instead, alongside the standard subject analyses (ANOVA) in Chapter Five and Six, an item analysis and ANCOVA will be conducted using the familiarity ratings from the current participants as a covariate factor.

4.2 Introduction

The purpose of this research study was to analyse the functional characteristics of brand representations by comparing them with other types of stimuli, such as objects and faces. Among these characteristics, we investigated their perceived familiarity. In order to create separate stimuli banks for familiar and unfamiliar items, we first ran a stimulus evaluation study where participants rated perceived familiarity of the following categories: common versus novel objects, familiar versus unfamiliar faces, and familiar versus unfamiliar brands. The aim of the study was to have a series of stable stimuli that could be used across later series of experiments. It was anticipated that collecting the most and least familiar stimuli within each category would provide the most consistent results when testing the main experimental series (Chapters Five, Six, and the images in Chapter Seven).

As part of the amendments, it was necessary to put in a note about this coming chapter. The initial analyses in chapters 5, 6 and 7, used a pre-classified set of stimuli for the familiar and unfamiliar categories as reported by the results from this chapter. Analyses one will therefore be the initial analysis using the stimuli classifications, Analysis two will be the covariate response analysis in the initial version of this thesis. Analysis three will be the amended re-analysis, as per the requested corrections. This third analysis will include all responses from participants within the time cut-off and will not be filtered for ‘correct’ or ‘incorrect’ responses. The stimuli were still, in some sense, pre-classified, insofar that they had previously been decided as the most or least familiar to match stimuli groups for numbers presented in the experimental chapters.

By removing the error rates, it was possible to calculate the response times as if people had answered their own knowledge correctly and did not take into account if they had incorrectly button pressed etc. This would mean that all data is included in response time measures apart from those that were misses (outside of the time threshold) and there would be no way to measure between actual errors and knowledge differences between participants, each would act as their own baseline between prime and probe. A decision on familiarity was chosen because it would give an indication of learning new stimuli versus having a pre-existing exemplar or semantic node for a particular stimulus. Other decisions considered required access to conceptual representations and no longer looked at perceptual priming, which as discussed, was the most robust form of priming for investigating early stages in a new field of brands. This approach has been previously used to test other peripheral representations in brand, such as those required in motor priming of familiar only brands (Boehm et al, 2018). As part of some piloted testing, previous to the current PhD work, eight Undergraduates collected over 200 familiar stimuli into the categories of food and drink, I then collected a matched amount of unfamiliar stimuli in these categories. These were then evaluated on a likert scale of familiarity by 15 participants to obtain a stable set of stimuli. As mentioned, the brand stimuli were selected from high exposure advertised and familiar to the UK stimuli as rated by two independent samples (one from previous work and one from current work). The most familiar 176 (as matched with faces and objects) were selected as a basis for these new studies. Real-world examples were chosen because you can ask a familiarity decision on brands that have been made up by the experimenter (Ferreira & Ribeiro, 2016), and this has been done in the relatively small field with familiar national and unfamiliar foreign brands. To collect my initial stimuli set, I anecdotally asked international colleagues for their knowledge of their own local brands from countries using Latin alphabetical letters (mostly Australia and Canada).

These were then selected into food and drink categories and evaluated twice for their 'unfamiliarity'. Again, naturally selected brands were chosen over 'invented' brands for their consistency with the familiar real-world brands.

When considering faces for these current experiments, the same approach was adopted with international colleagues selecting unfamiliar but foreign famous faces and controlling for race by using all Caucasian faces, and comparing them against internationally and nationally famous faces to the UK. Again, the evaluation for the stimuli in the current work was used as a basis for the most and least familiar to make the decision easier for future participants to choose between. The key factor in controlling faces, was to use famous people (even at risk of some people knowing these) because celebrities have a different 'look' compared with standard unfamiliar face stimuli sets available (no makeup, cropped hair, etc.). In papers with familiar face priming (for example, Bruce & Valentine, 1985) only the experimenters selected the stimuli, for my research I felt an independent sample was also required to control for differences in my knowledge compared to others', as this could have confounded the results. In many papers with memory old/new effects for familiar and unfamiliar faces (where the literature is more full, than with brands) it has been common practise for researchers to evaluate their own stimuli, rather than have an independent sample and categorise these as familiar or unfamiliar for correct and incorrect responses from their samples (Klatzky & Forrest, 1984).

To protect against experimenter selection when comparing across different stimulus classes – and to make sure our differences in classes do not reflect individual differences amongst items - two separate analyses were initially run. The subject analysis looked at differences in conditions against the noise coming from variation across participants (considering knowledge of an independent samples' pre-categorised stimuli bank). A second item analyses tested the same differences in conditions against the noise coming from variation from items. This second analysis provides an estimation of how much individual difference in selected items may account from the observed effects in the subject analysis. This strategy has been long used when comparing items belonging to different categories as I am doing here (González-Alvarez & Cervera-Crespo, 2022; Rayner & Duffy, 1986). There was consistency across items with the main data, the categories were found to be homogenous in the items that were chosen from our stimuli evaluation, whilst using subject as a random factor. The standard deviations were similar across the results in the item analyses. As requested by the examiners, a third analysis was conducted assuming no errors were committed and therefore using everyone's knowledge as their own baseline for familiarity specific decisions, these are now reported in full as per this request.

4.3 Methods

Participants

Forty-five undergraduate and master's students were recruited via opportunity sampling for course credit from the School of Psychology's participant panel. There were 15 participants in each subsection of the experiment (faces, objects or brand logos). One participant in the brand sub-experiment was removed due to reporting pressing the wrong buttons on a reversal of the specified scale.

Participants (*n*= 15) in the face sub-experiment were aged between 18 and 51 (*M*= 21.27 years, 13 female, 15 right-handed). Participants (*n*= 14) in the brand sub-experiment were aged between 18 and 41 (*M*= 20.93 years, 8 female, 15 right-handed). Participants (*n*= 15) in the object sub-experiment were aged between 18 and 21 (*M*=

19.13 years, 13 female, 13 right-handed). Participants were required to have normal or corrected-to-normal vision. All participants gave fully informed consent and were all debriefed upon completion of the experiment. Ethical approval for the study was granted by the School of Psychology's ethics board of Bangor University.

Stimuli

Stimuli were in distinct categories for the three subsections of the evaluation experiment (faces, objects, and brand logos). The total number of stimuli in each category was: 240 faces, 240 objects and 352 brand logos. The categories were split into the unfamiliar and familiar stimuli types, with 50% of the stimuli in each familiarity group. The brand logos had a greater number of exemplars due to previously using them in another stimuli evaluation (also evaluated for the most and least familiar). The images were presented in full colour set to a black background square, on a black coloured display screen (13.67° x 13.67°, Estimated Visual angle, Width x Height)

Familiar faces and brand logos were collected from the UK and USA to achieve maximum exposure from the Western world media. The unfamiliar faces and brand logos were collected from countries across Europe, Australia, Canada and South Africa. The face stimuli were all Caucasian individuals. Some of the brand names were in languages other than English, but all used Latin alphabetic letters (Carte D'or (familiar), Delavuida (unfamiliar). Object stimuli were everyday items, in the familiar category, and novel 3D shapes for the unfamiliar items (Leek, Reppa, Rodriguez & Arguin, 2009)

Figure 3. Example of familiar brand logo

Figure 4. Example of unfamiliar brand logo

Figure 5. Example of familiar face

Figure 6. Example of unfamiliar face

Figure 7. Example of familiar object

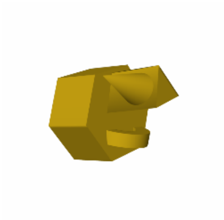

Figure 8. Example of the unfamiliar object

Design

The evaluation experiment was a between groups design with three distinct sub-experiments of stimuli types (faces, objects, and brand logos). The three sub-experiments were run in parallel, with participants being randomly assigned to one. All response options were the same across all the experiments, therefore, there were no counterbalances used.

Stimuli were presented once, and presentation order was randomised across all familiar and unfamiliar stimuli. In the face and object sub-experiments, there was a total of 240 trials, split into two blocks, with an untimed break after 120 stimuli for participants to have a rest. Due to the larger number of brand logo exemplars, there was a total of 352 trials, split into two blocks, with an untimed break after 176 stimuli.

Procedure

Participants were seated approximately 50cm from the screen and had a standard keyboard mounted on a desk. Each participant had a prompt card with a reminder of their response options (Not at all familiar = 1; Somewhat unfamiliar = 2; Neither familiar nor unfamiliar = 3; Somewhat familiar = 4; Completely familiar = 5). Stimuli appeared centrally on the screen, presented until the participant responded, followed by an inter-stimuli interval of a black screen for 1000ms. Participants were instructed to respond as soon as they had decided on a rating score. Participants were instructed to respond accurately, and informed that their response times were not being recorded.

Following the study, participants in the face and brand logo experiments were asked to give an estimated proportion of how many stimuli they were familiar with in the experiment. Participants were also asked to give an overview of their travel time spent in the target areas where the unfamiliar stimuli (faces and brand logos) were retrieved from. The debrief information was collected, in case it was needed for participants who showed any biased responses to either familiar or unfamiliar stimuli.

Analyses

Stimuli to be used in subsequent experiments were taken from this study based on participant's ratings of familiarity from one to five. The item-based analysis selected exemplars with the highest rating (most familiar) and the lowest rating (least familiar) in each stimuli category (faces, objects and brand logos). The rating scope for unfamiliar stimuli was measured from the lowest rated item and ranged to item number 80 in each category of stimuli. Familiar stimuli were selected from the highest rated item to item number 80 within in each category.

4.4 Results

The item evaluation for brand logos used a total of 352 stimuli (176 familiar) and ended with 80 brand logos that were considered unfamiliar (average rated range: 1.00 – 1.29) and 80 brand logos that were considered familiar (average rated range: 4.57 – 5.00). The item evaluation for objects used a total of 240 stimuli (120 familiar) and ended with 80 objects that were considered unfamiliar (average rated range: 1.00 – 1.47) and 80 objects that were considered familiar, all of which were rated as 'Completely Familiar' (average rated range: 5.00 – 5.00). The item evaluation for faces used a total of 240 stimuli (120 familiar) and ended with 80 faces that were considered unfamiliar (average rated range: 1.00 – 1.33) and 80 faces that were considered familiar (average rated range: 3.25 – 5.00).

When considering the distributions of each of the three stimuli types (faces, objects and brand logos), it is necessary to note the crossover in average ratings. For the object stimuli the familiar and unfamiliar items were rated as distinct, with no crossover in scoring to the groups of stimuli. For the brand stimuli, there were two deviations in the rating lists. One brand that was pre-experimentally categorised as familiar had a lower familiarity rating than some other unfamiliar items, and one brand that was pre-experimentally categorised as unfamiliar had a higher familiarity rating than some of the familiar items. Finally, the face stimuli ratings showed there to be a much higher variability in the ratings than the other stimuli types (objects and brand logos) and showed no distinct pattern in the ratings. Many faces pre-experimentally categorised as familiar, were rated as unfamiliar, and many of the faces that were pre-experimentally categorised as unfamiliar, were rated as familiar. These items with crossover in scores were not included in the final experiment, thus, there was no crossover in the 80 selected from most and least familiar.

The new categories resulting from this evaluation phase were then analysed through a 2 (Familiarity: Familiar, Unfamiliar) x3 (Category: Brand, Face, Object) between group analysis of variance (ANOVA). As expected, by the induced manipulation and the results shown from the descriptive statistics, familiar items across categories were rated an average of 4.7, which was significantly higher, with a large effect size, than the unfamiliar ones with a 1.2 rating overall ($F(1,474)= 32196.32$; $p< .001$; $\eta p^2= .99$). In addition, the different categories demonstrated differences in familiarity ratings with a large effect size ($F(2,474)= 170$; $p< .001$; $\eta p^2= .420$), where objects were perceived overall as more familiar (average 3.1) than the brands (3.0, $p< .001$) and the faces (2.7, $p< .001$). More importantly, there was a significant interaction between familiarity and stimulus category, with a strong effect size ($F(2,474)= 127.28$; $p< .001$; $\eta p^2= .34$). For the unfamiliar items, the objects were perceived as more familiar (1.25) than the brands (1.15, $p< .001$) and faces (1.17, $p< .001$), but there were no differences between brands and faces ($p= 1$). With familiar items, the objects were again perceived as more familiar (5) than the brands (4.85, $p= .003$) and faces (4.23, $p< .001$). In addition, brands were perceived as more familiar than faces ($p< .001$).

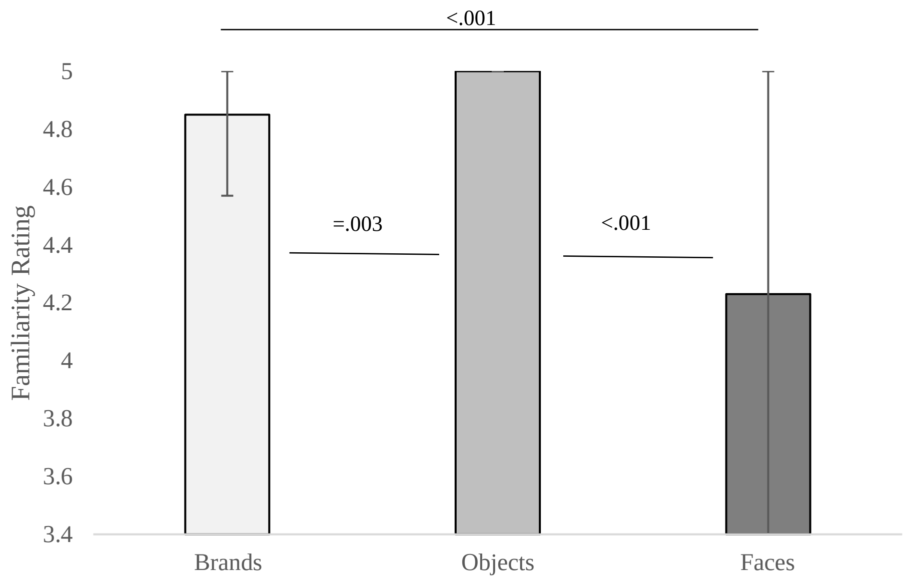

Figure 9. Average rating for familiar categories on a scale of 1-5, error bars represent the range of scores

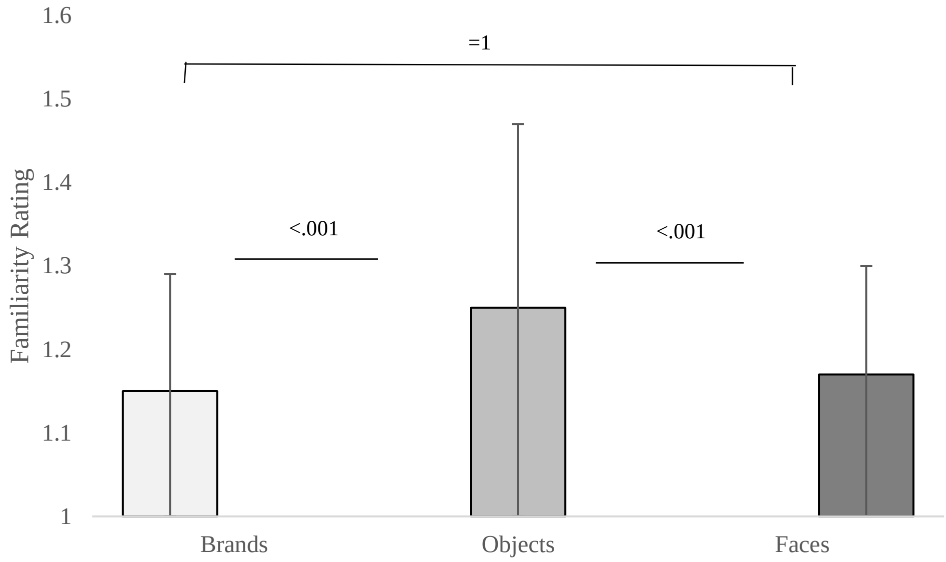

Figure 10. Average rating for unfamiliar categories on a scale of 1-5, error bars represent the range of scores

Initially it was intended that a matched rating design would be used for the other experiments (Chapters Five, Six, and Seven), where the averages for each of the familiar categories and unfamiliar categories were the same by excluding some. As this was not possible it was decided that, instead of using the matching design, an item analysis would be used for the subsequent experiments. Therefore, using an ANCOVA for the empirical chapters as an additional analysis with the ratings acting as a covariate. The item analysis will use the ratings from the separate samples in the stimulus evaluation as a covariate for the analyses. [1]

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[1] The initial aim was to have the unfamiliar stimuli (all three categories) to be similar to one another (rated as low as possible), and the familiar stimuli (all three categories) to be similar to one another but rated as high as possible. This was not successful as too many would be removed to have group averages the same, especially in the familiar categories, reducing overall power.

As stated before, there were significant differences between all three group means (brands, faces and objects) for the unfamiliar stimuli. Therefore, we attempted to match groups by removing 21 stimuli

4.5 Discussion

The familiar object stimuli showed the most consistency in participant's ratings. All 80 chosen exemplars were rated as 'Completely Familiar' by all participants. It could be suggested that this is due to the objects being highly recognisable as common objects and the categories of familiarity were more distinct. Equally, with the stimuli in the unfamiliar object category, there was a consistent difference, insofar that they all presented similarly (yellow, novel objects) and they were distinguishable by these commonalities rather than being 'recognised' as unfamiliar. This was unavoidable because it was difficult to find a large enough stimuli bank with unfamiliar items, that could be rated as such, when objects could be recognised for their usefulness alone. Thus, items that could be classed as unfamiliar could still be recognised as something familiar. Work by Takahashi and Watt (2012; 2014; 2017) discussed affordances of items, such as surgical tools, leading participants to explain their knowledge of tools they do not know, through what participants associate the tools' uses to be. Affordances can be seen through humans interacting with stimuli in the world appropriately, this is especially present in objects (familiar: sitting on a chair rather than standing on it; or

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from each category of 80 stimuli, leaving *n*=59, to match the groups with their rating means. After matching, the means for unfamiliar brands (*M*= 1.19, *SE*= .01), unfamiliar faces (*M*= 1.20, *SE*= .01), and unfamiliar objects (*M*= 1.20, *SE*= .01) were no longer significantly different ($F(2, 174)= .031$, $p= .969$, $\eta p^2 < .001$). The familiar matching analysis was not quite so simple. It was only possible to attempt and match between brands and faces as the familiar object average was 5, therefore it would be impossible. This time 48 of the 80 items would need to be removed to match the two categories (familiar brands and familiar faces) leaving *n*= 32 remaining in each category- a substantially larger amount removed than the 21 in the unfamiliar matching.

unfamiliar: knowing and using an unusual pair of scissors with your fingers through the holes and making a cutting motion – despite not knowing the name of that tool). Therefore, with the use of a familiarity judgement, this innate familiarity with affordances could have influenced how people would respond to whether they knew something or not. For this reason, it was agreed to continue with the novel objects as a control task but to proceed with caution, as no other appropriate options were available.

The familiar face stimuli, however, showed large variability in participant's familiarity ratings. This could be due to individual differences in exposure to the media creating different knowledge of famous faces. In the paper by Berlyne (1970), the concept of familiarity and fluency for stimuli e.g., faces, objects, and, brands (Lee & Labroo, 2006) Alternatively, it could be to do with the unstable, changeable nature of faces between one picture and another. Bruce and Young (1986) describe viewpoint invariance pictorial and structural codes, as part of their model, for the recognition of faces. Finally, when considering brands - they are consistent and relatively unchangeable, unlike faces, but there would also be an effect of exposure. Brands are deliberately the same across colour schemes and designs unless they go through a re-brand. The effect of exposure would create a different knowledge base for familiar and unfamiliar stimuli.

In order to account for these differences in knowledge, the debrief questions were asked to see if people had travelled to the target countries or had not been in the UK long enough to be familiar with the UK/USA stimuli. No participant had travelled to the target countries for more than a two-week holiday. However, some had spent as little as six months in the UK. Ultimately, their scoring added variability, but was not different from the others consistently

CHAPTER FIVE: DIFFERENCES BETWEEN BRANDS, OBJECTS AND FACES

5.1 Abstract

There are differences in how humans process varying stimuli such as objects and faces. It was hypothesised that brands may bridge the gap between these two types of stimuli, as it is suspected that humans would use common steps and pathways like those for processing images of objects and faces, to process brands. In Experiment One, a comparison between faces and brands used a perceptually driven priming paradigm with a familiarity judgement. Twenty-four participants were included in the subject analysis which found a response time priming effect, as well as differences between stimuli types (brands, faces) and familiarity types (familiar, unfamiliar). An item analysis used the familiarity ratings from the stimulus evaluation (Chapter Four) as a covariate. The item analysis found an additional effect of the ratings on response times and accuracy. Twenty-four participants in Experiment Two compared familiarity on objects and brands. The subject analysis of response times again showed main effects of stimuli type, familiarity type and priming. The item analysis however, only showed an effect on accuracy. The results from both experiments were then compared and it was found that objects were the easiest stimuli to decide on familiarity, followed by brands, with faces being the most difficult. Brands seem to act as a midpoint with there being a sense of automatisation in responding to them, when compared with other stimuli. This ease of processing has implications for further research into the cognitive representations of brands in memory and what features that brands hold, that aid their recall e.g., stability of identity.

5.2 Introduction

Human memory is both stimuli and task dependent. The literature is suggestive of distinct behavioural signatures for different stimuli, such as faces and objects (Farah, 1996). It is believed that faces are encoded and recognised holistically, whereas objects are viewed more as a make-up of component parts (Curby & Gauthier, 2007). Common objects are also mostly viewed at different viewpoints and are recognised despite this (Biederman, 1987). We show a greater inversion effect for faces than for objects, which is suggested to be due to this holistic processing (Boutet & Faubert, 2006). Finally, we demonstrate an expertise effect for faces (Robbins & McKone, 2006) which we do not have in the same way for other common objects (Sato & Yoshikawa, 2004). Considering all these factors of recognition and perception of faces and non-face objects, it is expected we would have different memory traces for these different types of face and object exemplars, and therefore, brands.

As mentioned, human memory is stimuli dependent (McBride & Dosher, 2002), the differences between faces and objects lead to different memory processing, and also include the lability of the stimuli; faces move and change; some objects also do this (e.g., from age and use). However, generally, objects are more stable than faces, but not as stable as brands. Brands rarely change, even with viewpoint, and are highly familiar for this reason. Faces are also unique in their identity (despite faces being categorisable e.g., gender; this is not how we recognise an individual) which is not as important for objects; instead, objects are categorisable (Zachariou, Del Giacco, Ungerleider & Yue, 2018). Brands fit both of these characteristics; they have their own identity, but they also are parts of categories. Finally, faces are naturally occurring in our world, as are some objects, but brands are all artificial in our surroundings.

Memory for faces is more robust than for other memory traces (e.g. scenes; Sato & Yoshikawa, 2004) suggesting that different cognitive processes could account for these variations. However, some research has suggested that there are not dissociations in cognitive processes between memory for faces and other objects (Gauthier, Behrmann & Tarr, 1999), suggesting that it is the task type which plays a greater role in making face recognition more robust.

There are many hierarchical memory models that suggest we go through a series of processing steps, from where distinct memory effects can be recorded (Bruce & Young, 1986; Rosch, 1975). It could be that to elicit effects of repetition priming we go through the initial perceptual processing from input and then access to the name codes, for example (Bruce & Young). This would mean that a second presentation of the input would facilitate the access to the name codes, and faster and more accurate responses could be made at this behavioural level. For brand recognition, this is relevant because often the names are present in the visual input for faces and objects. However, the access to the pure name codes, in brands without the name, comes after the access to the Other Recognition Units (Figure 2). Thus, it is possible to see how brands are different at the initial stages of processing.

As stated above, memory is also task dependent. Barragan-Jason, Lachat and Barbeau (2012) conducted a study using three distinct familiarity tasks using faces, to look at the speed and latency of different perceptual level tasks. The three tasks used were: categorising familiar over unfamiliar faces; animal face versus human face distinctions; and finally, gender categorisation. The quickest decision was a gender distinction task, probably because it can be decided via low-level perception, e.g., hair length. The second task, distinguishing between animal and human faces, showed the next quickest response. As configuration is only roughly the same, this level of processing is a little easier than at the recognition level of distinguishing between familiar and unfamiliar faces. The familiarity categorisation was deemed the hardest with requiring a somewhat deeper level of processing, at the level of the FRUs (Bruce & Young, 1986) than the other types of task.

The aim of the current series of investigations is to look at the behavioural differences in memory for faces and objects, and whether brands can bridge the gap in processing variations for these stimuli types. For example, familiar faces can be recognised mostly individualistically, whilst familiar objects are recognised mostly through categories (e.g., animate, inanimate). It could be suggested that in order to recognise familiar brands, we use both strategies for remembering. Thus, we remember the category of product the brand sells (e.g., food and drink brands), as well as remember what individual items belong to that group of products (e.g. Coca Cola versus Pepsi).

By using a standard perceptually driven priming paradigm, similar to those used for faces and objects (Ellis et al., 1987; Ramon, Caharel & Rossion, 2011), the effects recorded for brands could be similar to those for faces or objects; or alternatively, a combination of the two, or neither. These effects would be demonstrated through response time and accuracy patterns by measuring repetition priming. Furthermore, it is expected that famous faces, and familiar brands and common objects, will show faster response times than those that are considered unfamiliar, due to the existence of a long-term memory trace (Hulme, Maughan & Brown, 1991). The reactivation of an existing memory would mean that the node could be found as opposed to continued searching for something that has no current trace. The search would end with a correct recognition. It is expected that the primed stimuli will have quicker response times than stimuli responses on the first presentation, due to facilitation of these long-term memory traces. It is anticipated that priming will still occur for unfamiliar stimuli but that, as there is more to gain in a poorer memory trace, this will be shown through reduced response times and a steeper effect than for the familiar. Additionally, due to the nature of the feature processing in each type of stimuli, familiar brands should be differentially recognised to familiar faces or familiar objects. This is because our long-term memory nodes for the identity of a brand are more intact to their stability over faces, and their expertise and uniqueness over objects. Finally, it is hypothesised that a decision of unfamiliarity with a brand would be easier than that for a face because it is more automated and the features of a brand (colour, shape, language) are more distinct than the similarities and consistencies within face exemplars.

5.3 Experiment 1: Brands logos and faces

5.3.1 Rationale and Hypothesis

This experiment looks to compare the first stimuli class of faces against those for brands. The aims are to look for similarities in processing unique identities in both brands and faces. This will be done by using a perceptually driven priming paradigm with a familiarity judgement. It is expected that familiar faces and brands will elicit faster responses upon the second presentation (prime versus probe). However, there should be more priming for unfamiliar stimuli collapsed across stimuli. It is further anticipated that we will find an effect of brand responses being quicker than those for faces. This is expected, as our memory traces for brands are less subject to change than faces are.

5.3.2 Methods

Participants

Twenty-four undergraduate and master's students were recruited from the School of Psychology's participant panel and were participating to gain course credit. One participant was removed and replaced with a new one, for having extremely low accuracy in the brand categories (below 17% correct responses). A posteriori G* power analysis was calculated on this sample of 24 in a 2x2x2 repeated measures design. A post-hoc G*power target of .8 was set, for an effect size of .5 with a *p* value of .05 and below. This was based on previous electrophysiological studies that were run prior. G*power was calculated on the most stringent measure of a repeated measures t-test as it is not suggested as successful when run on a repeated-measures ANOVA. The calculation showed with the current sample size that G*power of .77 was reached, which is suggestive that the sample size was adequate, but future replications or verifications would consider a larger sample.

For the power analysis, should the series of experiments be run again, I would use a larger sample as required by the a-priori power analysis, as it shows that a minimum of 33 participants were required for reaching power. As only 24 participants were chosen this is underpowered, and typically tests should not be run if the data is underpowered. However, there is a large number of stimuli, which is not considered in a power analysis, and this makes for more data per participant strengthening the results.

The participant age range was 18 and 26 (M= 19.95), 19 were female and 22 were right-handed. Participants were required to have normal or corrected-to-normal vision. All participants gave fully informed consent and were all debriefed following the completion of the experiment. This study was granted ethical approval from the School of Psychology's ethics board at Bangor University.

Stimuli

A stimuli evaluation was conducted prior to the experiment (Chapter Four). Participants rated how familiar or unfamiliar they were with exemplars of the categories of stimuli (faces and brand logos). The exemplars of each category that were chosen for the current experiment, were the 80 most and 80 least familiar faces and brand logos from the participant ratings.

A total of 160 target brand logos (*n*= 80 familiar) and 160 target faces (*n*= 80 familiar) were used in Experiment One. A practise section consisted of five familiar and five unfamiliar brands, as well as five familiar and five unfamiliar faces which were not repeated in the main experiment. The face stimuli consisted of only Caucasian faces. Images were presented centrally in full colour set upon a black background (13.67º x 13.67º visual angle, width x height). The unfamiliar brand logos and faces were collected from countries across Europe, Australia, Canada, and South Africa. Some of the brand names were in languages other than English, but all used Latin alphabetic letters (Carte D'or [familiar], Delavuida [unfamiliar]).

Design

A study-test-study-test, priming experiment was used. This experiment used a factorial, repeated measures design with priming, familiarity and stimuli type as variables. Participants were randomly assigned to one of four counterbalances - with six participants in each counterbalance. There were two task order counterbalances (brand logo blocks first, or face blocks first) and two button response counterbalances (button one = familiar, or button two = familiar). The experiment consisted of four blocks: first presentation of stimuli type one; repeated presentation of stimuli type one; first presentation of stimuli type two; repeated presentation of stimuli type two. All stimuli were presented in a random order within each block.

Procedure

Participants were seated 50cm from the screen and had a standard keyboard mounted on a desk. Each participant had a prompt card with a reminder of their response options. Stimuli appeared centrally on the screen for 1000ms, followed by a black inter-stimulus interval that was presented for 1000ms. Participants in counterbalance one used the F button for familiar stimuli and the J button for the unfamiliar stimuli. They also had two face blocks first. Counterbalance two used the face tasks first as well, but a reversal of the buttons from counterbalance one. Counterbalance three used the same button responses as counterbalance one, but presented the brand logo blocks first. Counterbalance four used the same task order as counterbalance three, but the same button responses as counterbalance two. All stimuli were repeated in both the study and the test (primed) block.

Participants were instructed to answer as quickly and accurately as possible to whether the stimuli were familiar to them or not. The response period timed out after the black inter-stimulus interval screen; and if the participants were too slow in making a response then the trial would be recorded as a miss.

Prior to the main experiment, a practise task was used to familiarise the participants with the procedure. This practise included 10 trials in each block (five stimuli were familiar) and stimuli from the practise were not repeated in the main experiment.

Following the study, participants were asked to give an estimated proportion of how many stimuli they were familiar with in the experiment. Participants were also asked to give an overview of their travel time spent in the target areas where the unfamiliar stimuli (faces and brand logos) were retrieved from. The debrief information was collected to analyse for any participants who showed biased responses to either familiar or unfamiliar stimuli. However, this data was not analysed as the only participant that showed less than 50% in the familiar category was replaced for scoring below the chance threshold.

Analyses

The exclusion criteria for the analysis was that every category was responded to with above 50% accuracy for each of the pre-set categories (familiar and unfamiliar; brands and faces). It was difficult to set more stringent accuracy criteria because, technically, there are no right or wrong answers so it is not possible to look at a measure of response bias.

A subject analysis was conducted through looking at effects of priming - first and second presentation; familiarity - familiar and unfamiliar stimuli; and stimuli type - faces and brand logos. These factors were analysed with a 2 (familiarity: familiar unfamiliar) x2 (stimuli type: faces brands) x2 (priming: unprimed primed) ANOVA to make a comparison of each factor affecting response times (averaged across correct responses only) and accuracy percentage rates.

Additionally, an item analysis was used to compare against the subject analysis. This used the familiarity ratings (between 1-5) from the stimuli evaluation as a covariate for an ANCOVA. Response times were measured across correct responses only, and accuracy counts were used.

In order to account for effect size magnitude, the paper by Norouzian and Plonsky (2018) was used to explain the SPSS results of partial eta squared. This paper suggests that fore a within-group, repeated-measures design that the effect size measure is as follows: Small**:** .01; Medium: .06; Large: .14. In the literature due to the confusion around this measure there is errors in reporting (Cohen, 1973; 1988; Levine & Hullett, 2002). Therefore, by using partial eta squared as the measure of effect size in a repeated-measures, within-group design, the above values will be considered to explain the effect sizes of results, rather than the less appropriate between groups Cohen's d measures of effect size.

With regards to response time parameters, the literature suggests that detection of a stimulus occurs at 110ms (Hsu, 2005; Jensen, 2006) with a choice or selection being made as early as 250ms. Due to this cut off there is a chance that as part of the experiments in this thesis, it would be possible to cut the lower level at 250ms. However, there were few to no examples of this in my datasets and therefore according to mental chronometry there is no way to make a decision before 250ms but possible to take longer than 2000ms (the cut-off selected for this PhD). The reason this 2000ms cut-off was due to accessing incidental retrieval rather than intentional retrieval. For the purposes of this thesis, it was necessary test below consciousness (incidental retrieval), as priming occurs without the contamination of active consciousness. To allow longer than one second presentation, and one further second for response, would possibly lead to qualitatively measuring something different.

With regards to the use of parametric tests, the use of ANOVAs for response times, appears consistently within literature, due to being robust against the rule of normality, but not variance (Blanca et al., 2017). Sphericity cannot be violated on a 2 level

ANOVA, thus, variance is upon equal for response time data. This being the case, the use of parametric tests for response time data is still viable. It is possible to cut the tail at 250ms and below for impossibly quick responses, but this occurred so rarely in the data, there was not a risk of contamination of the variance.

5.3.3 Results

Accuracy results demonstrated that participants were significantly more accurate, with a large effect size, for unfamiliar (*M*= 92.40, *SE*= 1.93) over familiar stimuli (*M*= 82.98, *SE*= 2.04; *F*(1,23)= 10.772, *p*= .003, ηp^2= .319). The main effect of stimuli type was also significant with a large effect size (*F*(1,23)= 47.503, *p*< .001, ηp^2= .674), as brands (*M*= 93.32, *SE*= 1.21) were 11% more accurate than faces (*M*= 82.06, *SE*= 1.91). There was also a significant main effect of priming between presentations (*F*(1,23)= 8.872, *p*= .007, ηp^2= .278) - the unprimed were less accurate (*M*= 86.60, *SE*= 1.56), than the primed (*M*= 88.79, *SE*= 1.27), showing a large effect size. When looking at the interactions, the familiarity x stimuli type interaction was significant with large effect (*F*(1,23)= 25.723, *p*< .001, ηp^2= .528 - Figure 11). This interaction showed the familiar faces to be the lowest in accuracy and the other categories to be relatively similar. Stimuli type x priming interaction was also significant, showing a large effect (*F*(1,23)= 5.583, *p*= .027, ηp^2= .195 – Figure 12) as the unprimed stimuli were less accurate than the primed stimuli upon the second presentation. The last two way interaction between familiarity type and priming was not significant (*F*(1,23)= 2.936, *p*= .100, ηp^2= .113. Finally, the three way interaction was not significant (*F*(1,23)= .387, *p*= .540, ηp^2= .017

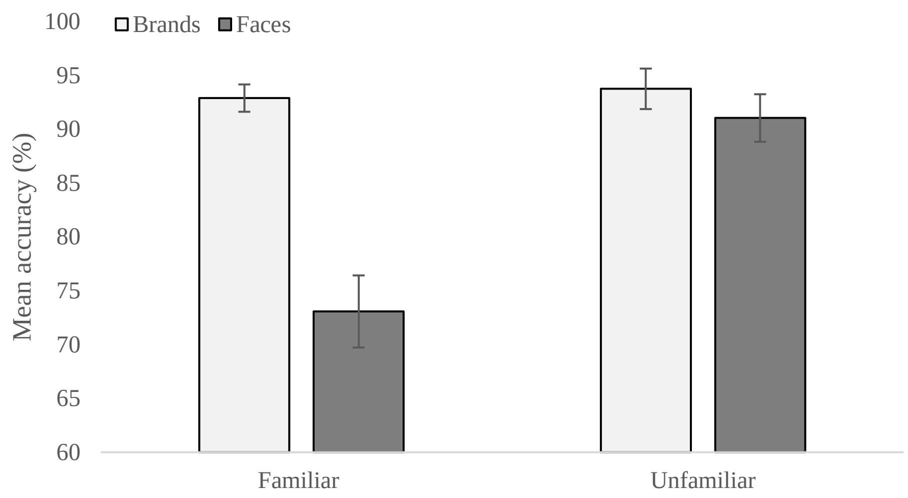

Figure 11. Mean accuracy percentage rates in the familiarity type x stimuli type interaction between faces and brands. Error bars represent Standard Error

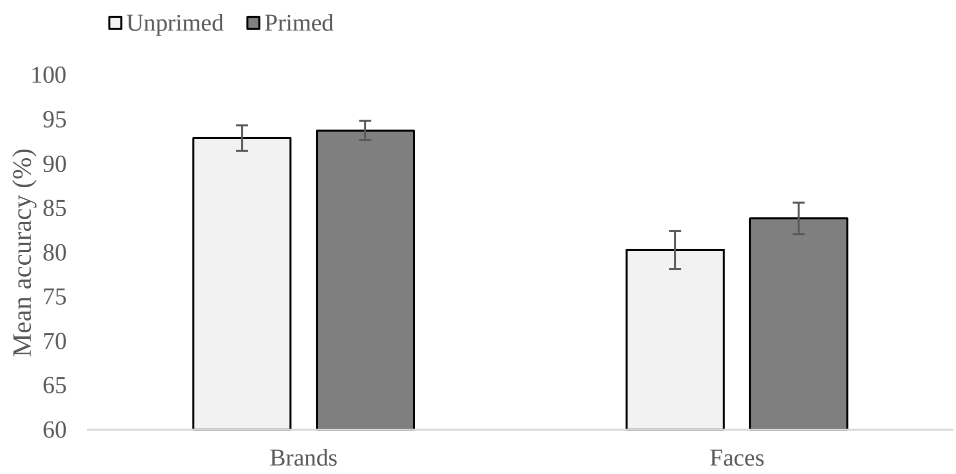

Figure 12. Mean accuracy percentage rates in the stimuli type x priming interaction between faces and brands. Error bars represent Standard Error

Response times were measured in milliseconds (ms) and only correct responses were included in analyses. Participants were 40ms faster at responding to familiar stimuli (*M*= 568.60 ms, *SE*= 7.66), than unfamiliar (*M*= 608.47 ms, *SE*= 9.27) showing a main effect with a large effect size of familiarity (*F*(1,23)= 20.769, $p < .001$, ηp^2= .475). When considering response times between brands and faces, participants were 64ms faster at responding to brands (*M*= 563.19 ms, *SE*= 8.54 ms) over faces (*M*= 614.24 ms, *SE*= 8.67 ms). This equated to a significant large main effect of stimuli type (*F*(1,23)= 31.711, $p< .001$, ηp^2= .580). The conditions of priming (first presentation [*M*= 609.61 ms, *SE*= 7.35 ms] and second presentation [*M*= 567.81 ms, *SE*= 8.33 ms]) also showed a significant large main effect (*F*(1,23)= 53.131, $p< .001$, ηp^2= .698) with primed condition responses being 42ms faster than the unprimed responses. The interaction between familiarity and priming was significant showing a large effect size (*F*(1,23)= 5.937, $p= .023$, ηp^2= .205 – Figure 13). The interaction between stimuli type and priming was non-significant (*F*(1,23)= .172, $p= .682$, ηp^2= .007). The interaction between stimuli type and familiarity was not significant (*F*(1,23)= .319, $p= .578$, ηp^2= .014). Finally, the three way interaction between priming, stimuli type and familiarity, was not significant (*F*(1,23)= 1.561, $p= .224$, ηp^2= .064 – Table 2).

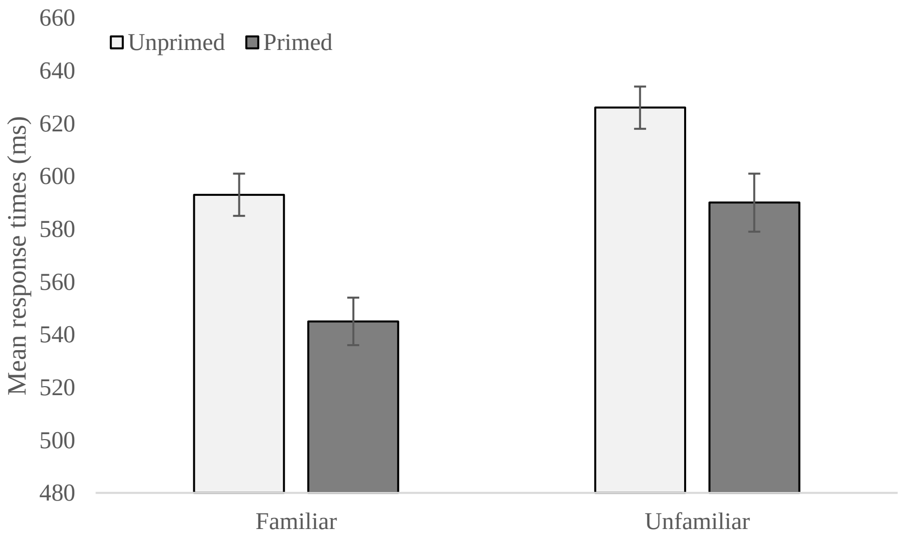

Figure 13. Mean response times for the familiarity type x priming interaction in faces and brand experiment. Error bars represent Standard Error

In the item analysis, accuracy count was used. A similar pattern of results was found to the subject analysis. But, additionally, there was a main effect of the familiarity rating covariate on the results ($F(1,315)= 232.038$, $p< .001$, $\eta p^2= .424$) and a significant interaction between priming and familiarity rating ($F(1,315)= 9.103$, $p= .003$, $\eta p^2= .028$). [Accuracy: Stimuli type main effect ($F(1,315)= 40.798$, $p< .001$, $\eta p^2= .115$); Familiarity type main effect ($F(1,315)= 293.757$, $p< .001$, $\eta p^2= .483$); Priming main effect ($F(1,315) = 13.404$, $p< .001$, $\eta p^2= .041$); Stimuli type x familiarity type ($F(1,315)= 11.364$, $p= .001$, $\eta p^2= .035$); Priming x familiarity type ($F(1,315)= 10.429$, $p= .001$, $\eta p^2= .032$); Priming x stimuli type interaction ($F(1,315)= .827$, $p= .364$, $\eta p^2= .003$); three way interaction ($F(1,315)= .668$, $p= .414$, $\eta p^2= .002$).]

For the response times, again only accurate responses were included in the item analysis. There was a significant main effect of familiarity rating ($F(1,315)= 38.372$, $p< .001$, $\eta p^2= .109$); but no effect of priming and familiarity rating interaction ($F(1,315)= .012$, $p= .911$, $\eta p^2< .001$). [Response times: Stimuli type main effect ($F(1,315)= 253.769$, $p< .001$, $\eta p^2= .446$); Familiarity type main effect ($F(1,315)= 21.856$, $p< .001$, $\eta p^2= .065$); Priming main effect ($F(1,315)= 6.124$, $p= .014$, $\eta p^2= .019$); Stimuli type by familiarity type interaction ($F(1,315)= .349$, $p= .555$, $\eta p^2= .001$); Priming and stimuli type interaction ($F(1,315)= 9.539$, $p= .002$, $\eta p^2= .029$); Priming by familiarity type interaction ($F(1,315)= .100$, $p= .753$, $\eta p^2< .001$); Three way interaction ($F(1,315)= 7.378$, $p= .007$, $\eta p^2= .023$).]

In the third analysis, only response times were considered for the current sample, and these were collapsed across ‘correct’ and ‘incorrect’ with regards to familiarity, with all responses being treated as correct for every participant's own knowledge. Responses that exceeded the 2000ms threshold were removed as a 'missed' response. Mean response times between brands and faces showed a main effect of stimuli type ($F(1,23)= 58.327$, $p< .001$, $\eta p^2= .717$). There was also a main effect of response times in priming conditions ($F(1,23)= 25.351$, $p< .001$, $\eta p^2= .524$); and no significant main effect of familiarity ($F(1,23)= .141$, $p = .711$, $\eta p^2= .006$). The interactions were not significant: familiarity x stimuli type ($F(1,23)= .963$, $p = .367$, $\eta p^2= .040$); stimuli type by priming ($F(1,23)= .519$, $p = .478$, $\eta p^2= .022$); three way interaction ($F(1,23)= .034$, $p = .855$, $\eta p^2= .001$); familiarity by priming interaction ($F(1,23)= .020$, $p = .899$, $\eta p^2= .001$).

5.3.4 Discussion

The main aim of this study was to look at whether brands are unique and different from other types of stimuli. In this study, a comparison was made between faces and brand logos. The results of this study suggest that there are differences in the way faces and brands are processed. The question is, whether this makes brands a unique entity like in face processing? A strong effect was found showing that brands are more quickly processed in general than faces, this is seen through response times collapsed across familiar and unfamiliar, both primed and unprimed brands versus faces. This could be because the features and designs of brands are more easily distinguished than in faces. Theeuwes (2010) discussed that detection of colour and shape are the quickest in a visual detection task. Although these results are in early response making, this is below consciousness as priming also is. Familiar brands are also more accurately recognised than familiar faces which could be because of the aforementioned, configural similarities between face exemplars. In response to the type of task affecting how participants respond to face stimuli, Barragan-Jason, Lachat and Barbeau (2012) found gender discrimination tasks to be a lot easier than other tasks such as familiarity judgements.

An unexpected result from the current research was that the unfamiliar stimuli were more accurately decided as unfamiliar than the familiar stimuli were as decided as familiar. There could be two explanations for recognising stimuli as familiar or unfamiliar. The first, looks at searching through identity nodes, once one has been correctly matched, you stop looking. If this is the case, then familiar would be more accurately responded to than unfamiliar. Equally, it could be a factor of being easier to reject the unfamiliar as not known, then search through memory banks for those that are stored as familiar. If this is the case, then this gut feeling that you do not know something would be faster than the known stimuli. Johnson and Russo (1984) found familiar stimuli responses to be quicker than unfamiliar ones. This is because the accessing of an existing memory trace is easier than creating a new one (Hulme, Maughan & Brown, 1991).

As expected, there was a large main effect of priming with the first presentation was significantly slower across categories than the second primed condition. This is a well-documented facet of processing (Logan, 1990), as after a memory trace is created unconsciously for a stimulus and subsequent repetitions of the stimuli will lead to faster and more accurate processing. Despite it being expected that the familiar stimuli will be faster than the unfamiliar ones(Johnson & Russo, 1984), there is the opportunity for larger effects of priming for unfamiliar stimuli due to saturation effects and ceiling effects (Campbell & Keller, 2003).

We have different neural and cognitive processes for responding to different stimuli types - for example, faces have the same configuration and therefore the process is distinctive for recognising individuals from similar structures. Gauthier, Behrmann & Tarr (1999) suggested that the effects of differences between stimuli are usually task-modulated rather than stimuli modulated. Brands, however, have individualistic features, but also identities like faces. Faces and brands are both categorisable (e.g., actor or food brand), but is this how we recognise faces and brands or is this specific to other stimuli types (e.g., objects)? We need to know how to respond to individuals independently and correctly - knowing your mother is different from your teacher, as you would show affection differently; or treating a food and drink brand differently to a cleaning brand (e.g., knowing your favourite meal to order from your favourite restaurant chain).

Additionally, the results from this study will need to be compared against the object study to look at whether brand processing is consistent across experiments (which it should be) and whether there are more similarities to face processing or object processing. This will also give a chance to run a face/object comparison to look at where brands fit in. Also, it would be useful to look at random presentation designs of the image presentation to distinguish whether there is an influence of strategies being used for top-down processing in this experiment. This could be because participants have a strategy for the brand block which was different to the strategy for the face block. It is impossible to know from this experiment whether this elicited an effect upon the differences seen in brand and face processing. Therefore, the next experimental chapter will investigate the differences between bottom-up and top-down processing to remove the likelihood and ability of using strategies by presenting the order of faces to brands randomly. Research by Theeuwes (2010) suggested that different strategies are often task-led and is to do with searching for specific features in a mass of stimuli to ensure the targets pop-out quicker for someone. This participant search-led strategy also corresponds to the work of Barragan-Jason, Lachat and Barbeau (2012) who suggested that task decisions require varying degrees of focus on features e.g., distinguishing hair length for a gender decision.

One of the differences in stimuli between brands, which could have an effect on the differences in processes compared to faces, is that brand logos often contain the written name of the brand, so the effect could be modulated by reading as well as processing the features of the brands (Holden & Vanhuele, 1999). For this experiment, all brands contained the names so that they were consistent throughout the experiment. Future experiments are needed to rule out that the effects seen in brand processing being easier than face processing, is due to reading as opposed to a visual featural process. Finally, it would have been useful in future to look at whether how ‘liked’ a brand was could influence the faster brand processing for the familiar brands.

The results from the subject analysis looked at the brand and face averages across participants, but this experiment also ran an item analysis to use the familiarity rating from the stimuli evaluation (Chapter Four) as a covariate to check that the effects were not due to mismatching in the stimuli categories. For example, the average rating of the familiar faces was significantly lower than the brand familiar stimuli in the stimulus evaluation experiment. It could be argued that the more familiar rated stimuli would be more quickly responded to (brands over faces). However, in the current research, it is unlikely to be a modulating factor for differences in familiar versus unfamiliar faces and brands. This is demonstrated through the subject and item analysis showing similar patterns and directions of results, but some effects were recorded with the covariate effect being significant.

Alongside the subject and item analysis, a third analysis was conducted to include all of the 'errors' so this pre-classification could not interfere with the results.It could be argued that levels of familiarity with the stimuli could have influenced these effects. For the initial subject analysis, an independent sample average was used to formulate the familiar and unfamiliar stimuli categories, therefore, participants may have been answering their own knowledge which varied from the stimuli evaluation categories. For future research it would be useful to run a confidence judgement following the familiarity decision, to look at how accuracy levels could be modulated by confidence in a decision. It is impossible to measure beta bias or d'prime from the current results as it is not known what is familiar and unfamiliar to each of the participants. Therefore, another future suggestion would have been to run a post-task, untimed, familiarity decision, per participant to measure against their own experimental accuracy scores. This would allow for a measure of false alarms and hits to look at whether this influenced why unfamiliar stimuli were faster in response times.

5.4 Experiment 2: Brands logos and objects

5.4.1 Rationale and Hypothesis

This experiment looks at the other stimulus category in question, objects, and compares them against brands. Similarly to Experiment One, it is expected that there will be a priming effect recording faster response times on a familiarity judgement upon a repeated presentation. However, following Chapter Four (Stimulus evaluation) it is expected that the reverse pattern will be found for unfamiliar objects; that these will have faster response times than familiar ones. This is because the unfamiliar stimuli are highly distinguishable at a featural or perceptual level and, therefore, it is expected that participants will be quickest at identifying the unfamiliar objects as pre-experimentally unfamiliar. It is therefore expected that objects will be quicker to be decided upon than brands, as the rejection of the unfamiliar, within blocks, will be easier than in brands.

5.4.2 Methods

Participants

Twenty-five undergraduate and master's students were recruited from the School of Psychology's participant panel and were participating to gain course credit . One participant was excluded from analyses due to no responses being made for one category. Of the remaining 24 participants the age range was 18 and 39 (*M*= 21.63), 19 were female and 22 were right-handed. Participants were required to have normal or corrected-to-normal vision. All participants gave fully informed consent and were all debriefed following the completion of the experiment. This study was granted ethical approval from the School of Psychology's ethics board at Bangor University.

Stimuli

A stimuli evaluation was conducted prior to the experiment (Chapter Four). A practise of the main familiarity decision task was used, as seen in Experiment One - but using objects (common-familiar, and novel-unfamiliar) instead of faces. A total of 160 target brand logos (*n*= 80 familiar) and 160 target objects (*n*= 80 familiar) were used in Experiment Two (Leek et al., 2009)

Design

The object and brand logo sub-experiment used the same parameters as in experiment one but replaced the face stimuli with object stimuli.

Procedure & Analysis

The procedure and analysis parameters for Experiment Two were identical to that seen in Experiment One.

5.4.3 Results

For the subject analysis response times (milliseconds [ms]) on the correct responses, there were significant main effects of familiarity type, stimuli type and priming. The familiar stimuli were significantly faster (*M*= 508.59ms, *SE*= 11.72ms) than the unfamiliar stimuli (*M*= 525.58ms, *SE*= 12.11ms; $F(1, 23) = 5.390$, $p = .029$, $\eta p^2 = .190$), showing a large effect size. The main effect of stimuli type ($F(1,23) = 113.929$, $p < .001$, $\eta p^2 = .832$) showed the object responses (*M*= 469.41 ms, *SE*= 12.09 ms) to be faster than brands (*M*= 564.76 ms, *SE*= 12.28 ms) with a large effect size. Finally, the priming main effect was also significant with a large effect size($F(1,23) = 30.298$, $p < .001$, $\eta p^2 = .568$) with the unprimed stimuli being responded to more slowly (*M*= 529.97 ms, *SE*= 11.61 ms), than primed stimuli (*M*= 504.20 ms, *SE*= 12.07 ms). In terms of the interactions, for familiarity by stimuli type there was a significant interaction ($F(1,23) = 27.129$, $p < .001$, $\eta p^2 = .541$ – with a large main effect - Figure 14). The unfamiliar object responses were the fastest, with them being 15ms faster ($p = .225$) than the familiar objects. The brands were slower, with the familiar brands 49ms faster ($p < .001$) than the unfamiliar brands. The familiarity x priming interaction was not significant ($F(1,23) = .527$, $p = .475$, $\eta p^2 = .022$). The stimuli type by priming interaction was significant ($F(1,23) = 15.999$, $p < .001$, $\eta p^2 = .410$ – Figure 15) again, with the object responses faster than the brand responses as seen by a large effect size. Brand priming showed a 40 ms difference which was significant ($p < .001$). Furthermore, object priming only showed an 11ms difference ($p = .081$). Finally, the three-way interaction of familiarity x stimuli type x priming ($F(1,23) = 6.322$, $p = .019$,

ηp^2= .216 – Table 3) was significant and had a large effect size. The paired samples t-tests showed mean differences of 38ms between familiar brand unprimed vs primed (*p*< .001). They also showed a 17 ms difference between familiar object unprimed vs primed (*p*= .032). There was a 43ms difference between unfamiliar brand priming (*p*< .001) and only a 4 ms difference between unfamiliar object priming (*p*= .459).

Table 3. *Means for three-way interaction in response times (Brands vs Objects)*

Stimuli type	**Familiarity type**	**Priming**	**Mean response time/ms (*SE*)**
Brand	Familiar	Unprimed	559.24 (*12.50*)
		Primed	521.03 (*11.28*)
	Unfamiliar	Unprimed	610.79 (*12.59*)
		Primed	567.97 (*14.61*)
Object	Familiar	Unprimed	485.87 (*13.40*)
		Primed	468.21 (*14.17*)
	Unfamiliar	Unprimed	463.96 (*13.84*)
		Primed	459.59 (*14.48*)

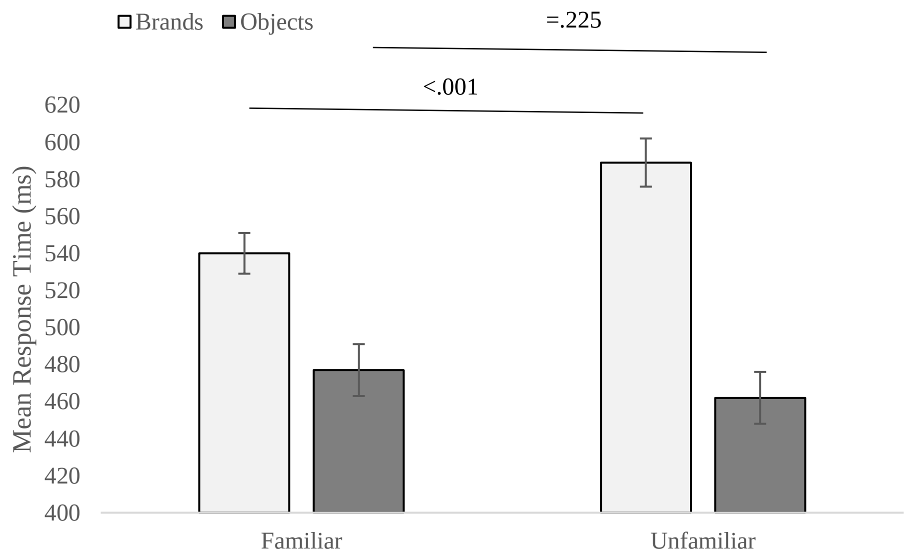

Figure 14. Mean response times in milliseconds for the familiarity type x stimuli type interaction for the brands and objects. Error bars represent Standard Error

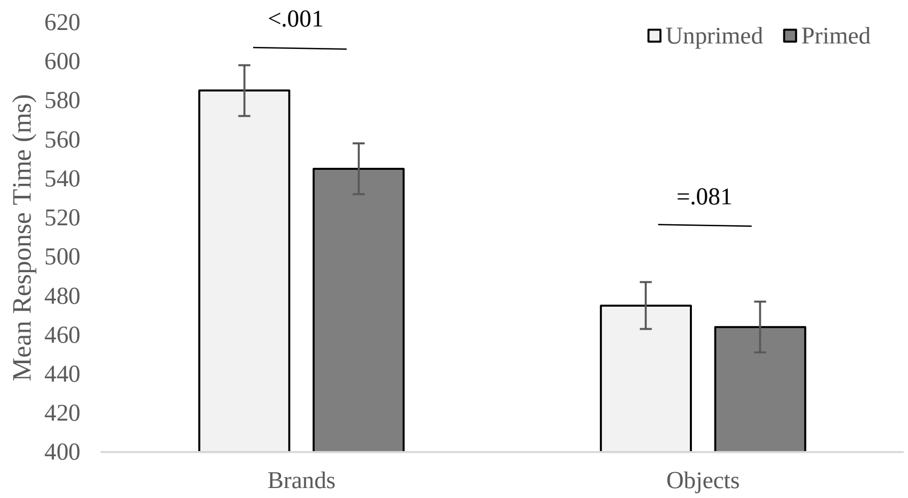

Figure 15. Mean response times in milliseconds for the stimuli type x priming interaction for the brands and objects. Error bars represent Standard Error

The percentage accuracy results across subjects are as follows. Unlike in the response time data, there was no significant main effect familiarity type in the stimuli

(F(1,23)= .049, p= .826, ηp^2= .002). The main effect of stimuli type (brand or object) was significant with a large effect size (F(1,23)= 5.806, p= .024, ηp^2= .202) with brands having a mean accuracy of 89.48 (*SE*= 1.63), and objects having an average of 93.72 (*SE*= .69). Unlike the response time data, there was also no main effect of priming (F(1,23)=.003, p= .959, $\eta p^2 < .001$.. For the interactions, there was a significant interaction between familiarity type and stimuli type (F(1,23)= 7.053, p= .014, ηp^2= .053 – Figure 16). Follow up t-tests showed that unfamiliar brands were 3.28% more accurate than familiar brands (t(23)= -1.781, p=.088), but familiar objects were 2.81% more accurate than unfamiliar objects (t(23)= 2.316, p= .030). Familiarity x priming was not significant (F(1,23)= 1.282, p= .269, ηp^2= .053) The stimuli type by priming interaction just reached significance (F(1,23)= 4.363, p= .048, ηp^2= .159 – Figure 17). and saw that the unprimed brands were less accurate than primed brands (t(23)= -1.438, p= .164) and unprimed objects were marginally more accurate than primed objects (t(23)= 1.468, p= .156) but these did not reach significance. Finally, the three way interaction was non-significant (F(1,23)= .875, p= .359, ηp^2= .037 – Table 4).

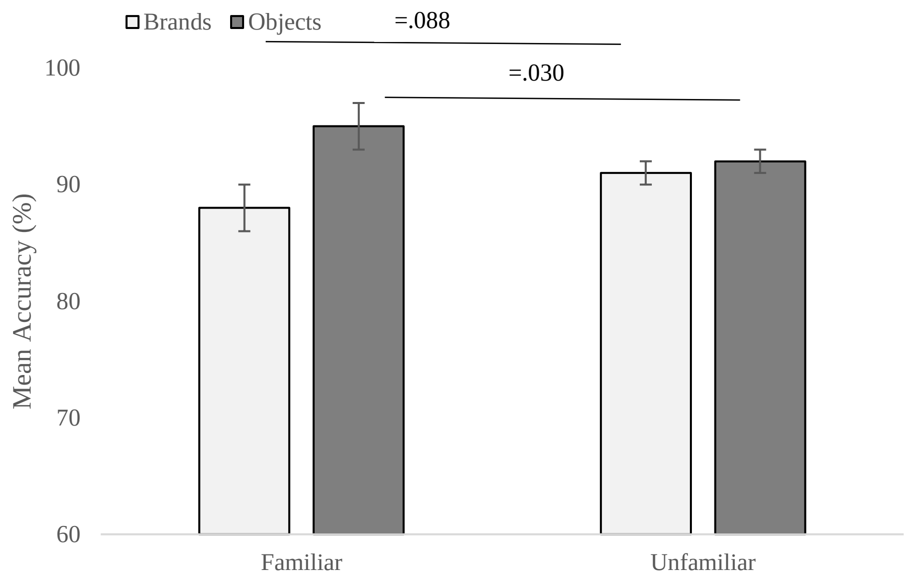

Figure 16. Mean percentage accuracy in the familiarity type x stimuli type interaction in brands and objects. Error bars represent Standard Error

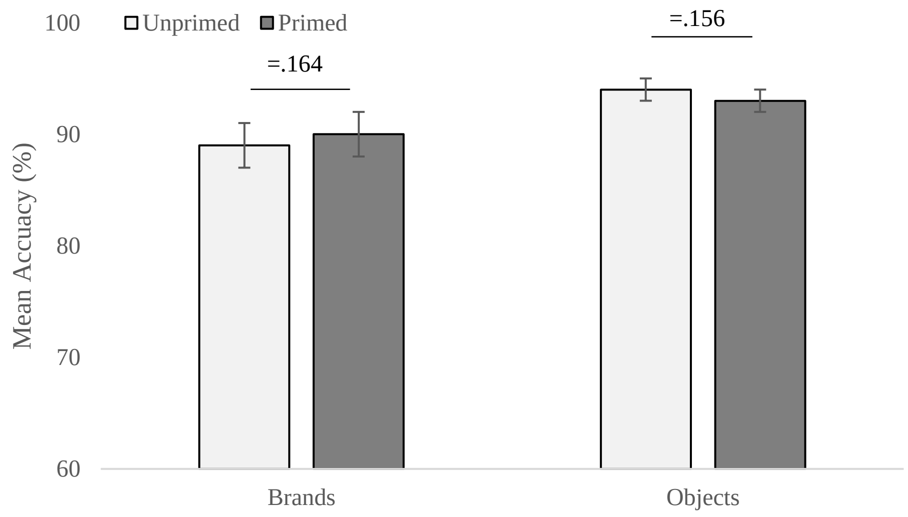

Figure 17. Mean percentage accuracy for the stimuli type x priming interaction in brands and objects. Error bars represent Standard Error

In the item analysis for response times the main effect of familiarity rating was not significant (F(1,315)= 2.521, p= .113, ηp²= .008). The priming by familiarity rating interaction was non-significant (F(1,315)= .509, p= .476, ηp²=. 002). [Response times:

Priming main effect (F(1,315)= 1.451, p= .229, ηp^2= .005); S there was a stimuli type main effect (F(1,315)= 722.181, p< .001, ηp^2= .696); Familiarity type main effect (F(1,315)= 1.716, p= .191, ηp^2= .005); Stimuli type x familiarity type interaction (F(1,315)= 127.148, p< .001, ηp^2= .288); Priming by stimuli type interaction (F(1,315)= 55.627, p< .001, ηp^2= .150); Priming x familiarity type (F(1,315)= .564, p= .453, ηp^2= .002); Three-way interaction (F(1,315)= 7.087, p= .008, ηp^2= .022).]

The item analysis for accuracy used the count. The main effect for the familiarity rating for accuracy was shown to be significant (F(1,315)= 10.495, p< .001, ηp^2= .032) and priming by familiarity rating result was not significant (F(1,315)= 1.627, p= .203, ηp^2= .005). [Accuracy: Priming effect (F(1,315)= 1.630, p= .203, ηp^2= .005); Stimuli type (F(1,315)= 13.557, p< .001, ηp^2= .041); Familiarity type (F(1,315)= 16.824, p< .001, ηp^2= .051); Stimuli type by familiarity type interaction (F(1,315)= 16.824, p< .001, ηp^2= .051); Priming by familiarity type (F(1,315)= 1.813, p= .179, ηp^2= .006); Priming by stimuli type (F(1,315)= 1.692, p= .194, ηp^2= .006); Three way interaction (F(1,315)= 1.431, p= .233, ηp^2= .005).]

For analysis three the main effect of familiarity was not significant (F(1,23)= .003, p = .957, ηp^2< .001). The main effects of stimuli type was significant (F(1,23)= 28.584, p< .001, ηp^2= .554), as was the priming main effect (F(1,23)= 46.339, p< .001, ηp^2= .668). None of the interactions were significant - familiarity x stimuli type (F(1,23)= .466, p = .501, ηp^2= .020); familiarity x priming (F(1,23)= .284, p = .672, ηp^2= .008); stimuli type x priming (F(1,23)= .312, p = .502, ηp^2= .013); three way interaction (F(1,23)= .141p = .712, ηp^2= .006).

5.4.4 Discussion

There is a consistent difference between stimuli types (brands and objects) in this experiment, which was expected, because of the differences in stimuli types. As in the face and brand experiment, there are distinct patterns for each (brands and objects) and this could be for a number of reasons. On a data driven level, this could be to do with objects being a unique category from brands, with common objects being highly recognisable automatically (Gauthier & Tarr, 1997. Equally, it could berelated to the unfamiliar objects being systematically similar to one another: as previously discussed in the stimulus evaluation (Chapter Four). This could make the objects easier to distinguish through other means than the familiarity decision e.g., strategies and feature search (Theeuwes, 2010).

For the effects of familiarity in this experiment, the familiar stimuli were significantly faster (and slightly more accurate) than the unfamiliar stimuli. This was the opposite result to that seen in the face study, but it is as expected with regards to the hypothesis. The comparative analysis should shed light on whether this is due to correct identification being quicker once it is matched with a memory bank exemplar, rather than keep searching for a stimulus through our semantic systems.

Interestingly, in this experiment, priming was not as clear cut as expected. There was only a clear main effect of priming in the response times of the subject analysis- this was the most important of the results and replicates and standard repetition priming effect as seen in Logan (1993). There is also a consistent interaction by stimuli type x priming, which could mean that the cognitive benefit from repeated presentations is only present in the brand stimuli, similarly to that seen in the face experiment. However, for objects this is maybe due to a ceiling effect, as there is a really high level of accuracy and low response times for objects.

Comparing the item analysis to the subject analysis, it is necessary to mention that the familiarity ratings as a covariate in the item analysis generally did not show an effect in response times, but did in the accuracy measures. This could be due to the items not being matched for familiarity levels, which suggests that for response times, the rating fluctuations from the stimuli themselves (as seen in the stimuli evaluation, Chapter Four) did not have an effect on how people recognise and respond to the stimuli. Instead, it is more of a forced choice decision of familiarity (similar to this experiment) rather than influenced by a continuum of familiarity (e.g., rating one to five). However, for the accuracy, this was not the case; there was a main effect of the familiarity rating covariate. This is an interesting result to take in conjunction with the analysis three (errorless analysis). However, accuracy is less important for the overall result pattern than the response times. Also, in the comparison between the item analysis and subject analysis the response time results showed that the patterns were consistent between the two analyses, but additionally there were main effects of priming and familiarity type in the subject analysis. For the accuracy data, this was less clear and there were more fluctuations in the two analyses. However, this could be influenced by the covariate of familiarity rating being significant.

For this reason, it is necessary to look at the comparative analysis to see whether brands are the same, despite experiment type and also compare faces and objects to give a clearer picture. So, the question remains as to why objects are different from brands. On a theoretical level, it is expected that the reason for the differences is because brands are distinct and may be more like faces in that they are recognised individualistically, whereas objects are implicitly decided upon and maybe it is due to the categorisable nature of objects.

Equally, there could be a systematic approach to using a different strategy for brands compared to objects, such as visual searching for specific feature detection e.g., colour (Theeuwes, 2010). It is necessary, therefore, to test for whether there is an effect of blocking the stimuli together by type, resulting in the opportunity for top-down strategies to be used. Also, it is necessary to again mention the fact that there could be a language effect of the brand names in the logo, whereas there is no reading effect in the object category. The effect of reading means that there is an added benefit towards a strategy for the brands over the objects (Holden and Vanhuele, 1999). As this will be tested later in the thesis, it is not necessary to speculate further on this idea, at this point.

5.5 Comparison Analysis

5.5.1 Rationale and Hypothesis

The aim of the comparative analysis was to look at differences and similarities between processing of faces and objects as opposed to comparing each against brands alone. Ideally, an intra-experimental comparison would be conducted, but with the number of stimuli in each of the six categories (familiar brands, unfamiliar brands, familiar faces, unfamiliar faces, familiar objects and unfamiliar objects), this experiment would have been too long for participants and would have faced testing issues such as fatigue, drop out and boredom. Thus, it was decided to split the experiments instead. The aim was also to look at how brands are processed in each experiment, with the aims of checking that there are no differences in brand processing in each experiment, as apart from the other blocks of stimuli types (faces, objects) it was identical.

For the current, blocked design series of experiments it is not expected that there will be differences between faces and objects, in regards to anything other than what is usually seen in the literature. Furthermore, we do not expect any transference between blocks from the brand processing. Thus, the effects seen are not from any part of processing the brands in tandem. Nor is it expected that brands will have a different baseline across the two experiments, where there is influence from what type of stimuli is surrounded by the brand blocks. For this sub experiment, comparative analysis, it was necessary to draw more attention to the null results here, as they are theoretically relevant insofar that the aim was to have baselines matching, and the experimental conditions differing.

5.5.2 Results

A 2 (Stimuli Type: Objects, Faces) x2 (Familiarity Type: Familiar, Unfamiliar) x2 (Priming: Unprimed, Primed) mixed ANOVA (on response times in milliseconds only) was conducted to compare the effects of objects versus faces between experiments. The main effects showed there was a difference between objects and face responses ($F(1,46)= 94.762$, $p< .001$, $\eta p^2= .673$) with objects being faster (*M*= 469.41 ms, *SE*= 10.52 ms) than faces (*M*= 614.24 ms, *SE*= 10.52 ms), and a large effect size. For familiarity, familiar stimuli were consistently faster (*M*= 535.06 ms, *SE*= 8.02 ms) than the unfamiliar stimuli (*M*=548.58 ms, *SE*= 8.96 ms [$F(1,46)= 2.706$, $p= .107$, $\eta p^2= .056$]). The priming effect was significant ($F(1,46)= 33.68$, $p< .001$, $\eta p^2= .423$) with unprimed stimuli (*M*= 555.53 ms, *SE*= 7.80 ms) being slower than the primed stimuli (*M*= 528.11 ms, *SE*= 7.81 ms), with a large effect size. The familiarity by priming interaction ($F(1,46)= 11.836$. $p< .001$, np2= .205) was significant showing the unprimed stimuli to have similar response times (Familiar unprimed 552.77 ms, *SE*= 8.66 ms; Unfamiliar unprimed 558.30 ms, *SE*= 9.44 ms, and a large effect size) with different response times for the familiar primed (*M*= 517.36 ms, *SE*= 8.37 ms) compared to unfamiliar primed (*M*= 538.37 ms, *SE*= 9.09 ms). There was also a significant interaction between familiarity and experimental stimuli type (*F*(1,46)=

12.66, *p*= .001, ηp²= .211), showing a large effect size. The objects familiar stimuli (*M*= 477.04 ms, *SE*= 11.34 ms) were slower than the unfamiliar (*M*= 461.77 ms, *SE*= 12.66 ms) and for the faces - the familiar stimuli (*M*= 593.08 ms, *SE*= 11.34 ms) were faster than the unfamiliar faces (*M*= 635.39 ms, *SE*= 12.66 ms). The priming by experimental stimuli type (*F*(1,46)= 12.057, *p*= .001, ηp²= .208) was significant, with the object experiment having unprimed stimuli (*M*= 474.92 ms, *SE*= 11.03 ms) slower than primed stimuli (*M*= 463.90 ms, *SE*= 11.05 ms) with a large effect size; and for the faces the same pattern was shown but to a greater extent (unprimed *M*= 636.15 ms, *SE*= 11.03 ms, primed *M*= 592.32 ms, *SE*= 11.05 ms). Finally, the three way interaction (*F*(1.46)= 335, *p*= .565, ηp²= .007 - Table 5) was not significant.

Table 5. *Means for three-way interaction in response times (comparative analysis objects, faces)*

Stimuli type	**Familiarity type**	**Priming**	**Mean response time/ms (*SE*)**
Object	Familiar	Unprimed	485.87 (*12.24*)
		Primed	468.21 (*11.84*)
	Unfamiliar	Unprimed	463.96 (*13.35*)
		Primed	459.59 (*12.85*)
Face	Familiar	Unprimed	619.66 (*12.24*)
		Primed	566.50 (*11.84*)
	Unfamiliar	Unprimed	652.64 (*13.35*)
		Primed	618.15 (*12.85*)

Another 2 (Stimuli: Brand [object experiment], Brand [face experiment]) x2 (Familiarity: Familiar, Unfamiliar) x2 (Priming: Unprimed, Primed) ANOVA was conducted on the brand versus brand stimuli from the two experiments showed very little difference. There were significant main effects of familiarity (F(1,46)= 65.319, p< .001, ηp^2= .587; familiar 542.48 ms [SE= 7.17 ms]; unfamiliar 585.46 ms [SE= 8.64 ms]) and priming (F(1,46)= 67.575, p< .001, np2= .595, with a large effect size; unprimed 584.05 ms [SE= 7.79 ms] and primed 543.90 ms [SE=7.95 ms]). However, between the experiments there was no difference between the brands baselines (F(1,46)= .011, p= .917, np2< .001; brands from object experiment 564.76 ms, SE= 10.58ms; brands from face experiment 563.19 ms, SE= 10.58 ms). There were no significant interactions (familiarity x experiment, F(1,46)= 1.391, p= .244, ηp^2= .029; priming x experiment, F(1,46)= .006, p= .939, ηp^2< .001; familiarity x priming, F(1,46)= .000, p= .983, ηp^2< .001; three way interaction, F(1,46)= .669, p= .417, ηp^2= .014 - Table 6; [familiar unprimed 562.53 ms, SE= 7.99 ms; familiar primed 522.44 ms, SE= 7.34 ms; unfamiliar unprimed 605.56 ms, SE= 8.68 ms; unfamiliar primed 565.36 ms, SE= 9.50 ms]; [object experiment brand unprimed 585.02 ms, SE= 11.02 ms; primed 544.50 ms, SE= 11.24 ms; face experiment brand unprimed 583.07 ms, SE= 11.02 ms; primed 543.31 ms, SE= 11.24 ms]; [object experiment brand familiar, 540.13 ms, SE= 10.14 ms; unfamiliar, 589.38 ms, SE= 12.22 ms; face experiment brand familiar 544.84 ms, SE= 10.14 ms, unfamiliar, 581.54 ms, SE= 12.22 ms].

Table 6. *Means for three-way interaction in response times (comparative analysis brands, brands)*

Stimuli type	**Familiarity type**	**Priming**	**Mean response time/ms (*SE*)**

Object Exp Brand	Familiar	Unprimed	559.24 (*11.31*)
		Primed	521.03 (*10.38*)
	Unfamiliar	Unprimed	610.79 (*12.28*)
		Primed	567.97 (*13.44*)
Face Exp Brand	Familiar	Unprimed	565.82 (*11.31*)
		Primed	523.86 (*10.38*)
	Unfamiliar	Unprimed	600.33 (*12.28*)
		Primed	562.75 (*13.44*)

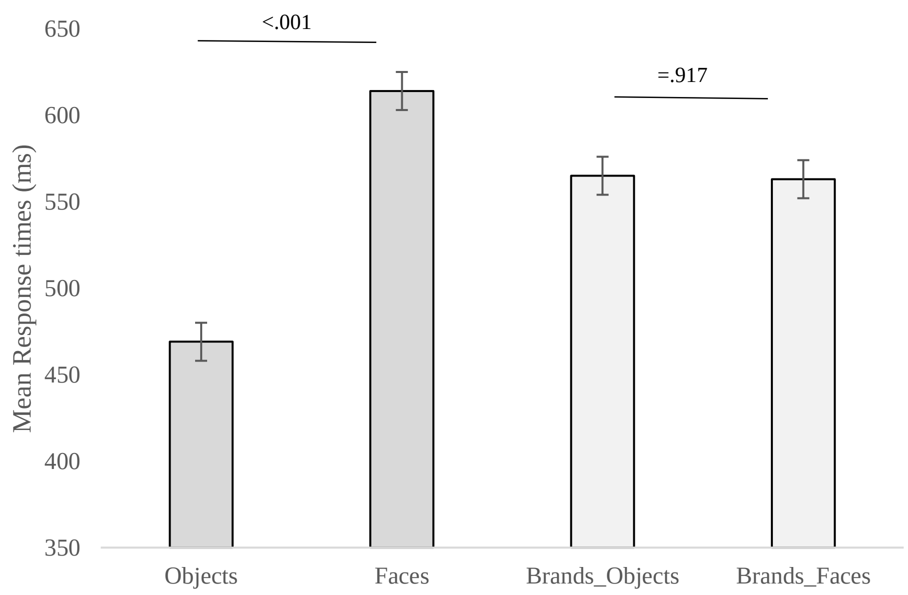

Figure 18. Mean Response time category data for comparative analysis between all stimuli conditions. Error bars represent Standard Error

5.5.3 Discussion

From the results, it is possible to see that there are no differences between processing brands dependent on which experiment they were experienced in. This is interesting because the participant pools were entirely independent between experiments. Thus, it is clear to say that recognising brands from memory is stable and consistent. Further, that there is no residual effects dependant on what stimuli blocks surround it (objects, faces). This might be because brands are highly recognisable; we are experts in our familiarity with them, but also, they are not influenced by other stimuli that surround them in our worlds, as they stand out. This could be a top-down process where we look for them, or a bottom-up process where they pop-out and will be investigated in Chapter Six further, by isolating the effect of strategies in pop-out to look at whether this visual processing strategy is having an effect on the comparison in how we are processing each stimulus category (Theeuwes, 2010).

For the objects versus faces analysis there were significant differences between the two categories of stimuli, as expected. Research by Sato & Yoshikawa (2004) suggested that there is a difference in how we process faces and objects such as scenes. They found that faces are quicker to recognise than other objects. With this is mind, alongside research from Gauthier, Behrmann and Tarr (1999; that suggested it is differences in the task demands rather than the stimuli themselves), it may be possible to conclude these differences are stimuli-driven as the familiarity task was the same. Or, alternatively, as the task strategies may have been different this was task-led.

Also, from the results with regards to the faces versus objects analysis, there was no main effect of familiarity type. This is probably because faces showed an effect of familiarity and the objects did not (as seen in the previous experiments). The interactions were all significant, which could be argued to be influenced by the object intra-experimental similarity in the unfamiliar stimuli category. In the previous experiments, there was a directional effect of unfamiliar faces being faster than familiar, also seen for the objects (although this difference was not significant).

It seems that the three types of stimuli may run on a continuum for how easily familiarity is processed - with objects being the easiest, brands next, and the faces as the most difficult. What is interesting about this, is that in the world, we are experts in recognising faces, brands, and familiar objects. It could be an intra-experimental effect for objects, whereby the rejection of the unfamiliar stimuli was easier for objects because they had similarities, as described in the stimulus evaluation (Chapter Four). Therefore, a forced-choice decision is very easy in objects. However, equally, it could be a true effect as modulated by accepting familiar items rather than the unfamiliar rejections. The reason that faces may be the hardest to recognise could be due to the configurational similarities between stimuli, whereas, objects have distinct patterns. To be noted, however, is that if the effect is elicited by configuration similarities being difficult to distinguish, then the faces should be as difficult as the unfamiliar object stimuli that hold a lot of similarities. Brands seem to be the middle ground with response to reaction times in these analyses and they are configurationally different but also, we are experts in recognising them.

5.6 General Discussion

Based on the series of the analyses in this experimental set, it appears that all the three categories of stimuli are distinct, with different ease for the participants in the forced choice familiarity decision. It seems that objects are the most easily recognised as familiar and unfamiliar; then brands; and then faces being the hardest based on their response times being the longest (and accuracy the lowest). From the literature by Farah (1996) it is suggested that stimuli are distinct in their features which could explain why there are differences between the response patterns for each category of stimuli.

The aims of this thesis were to look at whether brands acted like objects or faces in recognition, both or neither. From this first experimental series, it could be argued that brands are distinct and bridge the gap in difficulty of responses, and they are consistently recognised between experiments (as seen in the comparative analysis). Thus, it could be suggested to liken the brand logo stimuli to face stimuli, which are recognised as individuals, and objects, which in this case it is suggested are categorised (Zachariou et al., 2018). In the two experiments brands are distinct and the response times sit in the middle of the others. Research by Gauthier, Behrmann and Tarr (1999) suggested that we use the same cognitive processes for recognising different categories of stimuli but that, instead, differences in response patterns are to do with task type: conceptual versus perceptual levels of tasks. Therefore, in contrast to Gauthier, Behrmann and Tarr (1999), as the task was the same for all experiments, it could be suggested that there is greater specificity with regards to the stimuli differences rather than task differences.

The main facets of brands are that they are: configurationally different; they are made up of component features (colour, typography); they have an identity but are categorisable; they are stable, and artificial. Some of these facets are shared by objects and faces, and some are unique to brands. But from the current data it is possible to suggest that brand processing acts like neither face nor object processing but does, in fact, bridge the gap for difficulty in familiarity responses.

It was previously mentioned that we have an expertise for recognising faces (Robbins & McKone, 2006) and in this case it could be argued that the same could be said for brands. Equally, Sato and Yoshikawa (2004) stated that faces are more easily distinguished than other stimuli, but in this research we have found that brands are as easily (if not more easily) recognised as familiar or unfamiliar. Furthermore, common objects are also well recognised in this study.

It is necessary to mention again, that as the object category in the current research showed fast and accurate responses throughout, this could be due to the different stimuli features in the object category. As stated in the stimuli evaluation (Chapter Four), the object stimuli that were unfamiliar were consistently different from the common, familiar objects by their basic appearance. This could account for some of the main effect and interactions between stimuli type and familiarity. Also, there was a possible ceiling effect of object recognition in the unfamiliar stimuli so very little priming effects were seen here. It is also necessary to highlight that in the item analysis all of the ratings for the common objects were at five on a scale of 1-5. As this covariate had a significant effect in some of the item analyses, it could have influenced the ceiling effect of object processing.

From the stimuli evaluation (Chapter Four), the familiarity ratings were collected from an independent sample for the covariate in the item analyses from Experiments One and Two. It could be argued that faces are more easily perceptually recognised as faces, but it is not necessarily the identity of faces being recognised. The lower mean score for these, in the stimuli evaluation for the familiar faces, could have had an effect on the overall results of these experiments.

As covered in the experiment discussions, two factors need to be further investigated to distinguish where the differences in brand recognition arises. Brands could be a distinct category because they contain the written names and this, therefore, could be a reading effect that makes brands recognisable. This is not the case for objects and faces and, therefore, the reading effect needs to be isolated to subtract from the effects of overall brand familiarity. For brands, although languages other than English were used, many familiar brands were also in other languages to control for these differences. Additionally, this experimental series used a blocked design where all objects or faces were seen in one block and then the same for brands. Because of these blocks, a strategy could be used for the familiarity decisions. For example, in the objects this would highlight the issue with the unfamiliar stimuli group: participants could reject all yellow or geometric stimuli as unfamiliar because the majority fit these descriptions. It is impossible, from this experimental series, to know what strategies someone is using, but if participants used a strategy that could not be controlled for, then this could be arguably a top-down process (e.g., specifically looking for a colour or shape). Therefore, it is necessary to remove the opportunity to use strategies and make the process more bottom-up and data driven. This could be done by mixing the blocks with both categories of stimuli being presented randomly and simultaneously.

Overall, this experimental series has shown that there are different cognitive processes to deciding on the familiarity of exemplars; brands are different from other classes of stimuli such as objects and faces. There are some further experiments that need exploring such as language effects of reading brand names; and whether strategies are being used; but, if brands consistently show to be different from other stimuli, the applications of this could be used for marketing as well as in cognitive memory system research. In marketing research, it could be useful to know that brands stand out and are easily processed and automatic. This would help with the designing of brands showing that as brands are stable, they are more easily recognised, so to keep a robust template of the brand is most important. It could also be suggested that brands need this identity in order to be highly recognisable and, in fact, this is more apparent than for faces.

Cognitively, the research helps in understanding stimuli-dependent memory systems and dissociate them from task-dependent differences in memory.

CHAPTER SIX: USING RANDOM PRESENTATION DESIGNS- BOTTOM-UP VERSUS TOP-DOWN PROCESSING

6.1 Abstract

The previous chapter has shown linear differences in three groups of stimuli: brands, faces, and objects. Our response to brand familiarity seems to be stable and demonstrates strong significant effects. The layout of the two sub-experiments for this chapter were the same as in the previous chapter (Chapter Five): brands versus faces, and brands versus objects. In this chapter, a random presentation of stimuli within blocks with mixed stimuli categories was presented and used a repetition priming paradigm with familiarity judgement. This chapter looked at bottom-up effects in comparison to the previous chapter where top-down strategies could be implemented. Experiment One compared brands and faces (*N*= 24) showing that there were consistent differences between stimuli type, familiarity type, and priming. Experiment Two compared brands and objects (*N*= 24), finding similar results to Experiment One. The item analyses in Experiments One and Two found significant influences of the familiarity ratings upon the effects found. The comparative analysis found that there were minimal differences between brands dependent on which other stimuli type was experienced around them, as well as consistent differences between faces and objects (the same pattern as in Chapter Five). It is thought that although we use strategies for processing some stimuli (e.g., faces), we are such experts for brands that decisions regarding them are raw and automatic and driven by the stimulus itself. The results could be applied to how brands are selected, through ‘pop out’ features rather than entirely by goal-directions.

6.2 Introduction

Naturally, we are quick at detecting an object as a face or non-face (Barragan-Jason, Lachat & Barbeau, 2012). This raw decision involves bottom-up processing driven by the stimuli presentation itself, and feature processing led by attentional focus. Top-down processing is goal oriented and modulated by the intentions of the participants (Connor, Egeth & Yantis, 2004; Theeuwes, 2010). Faces are similar to one another and have a consistent composition. We are quicker at recognising something as a face rather than other stimuli (objects or maybe even brands; Sato & Yoshikawa, 2004; Tanaka & Farah, 1993). Identity decisions understandably take longer to make. These are made at a deeper level of processing, as seen in hierarchical models such as the Bruce and Young (1986) model. In this model, identity decisions could be made at the Person Identity Nodes rather than a decision distinguishing one face as different from another at the pictorial codes. In fact, we recognise features of faces best when they are part of the faces as a whole (Maurer, Le Grand & Mondloch, 2002); and this is unique to upright faces, not inverted and not for other objects (Tanaka & Sengco, 1997). Furthermore, inverted faces show a benefit of feature processing preceding the processing of a face wholly (Carbon & Leder, 2005). It could be argued that the features (colour, shape) we use to recognise faces, objects and brand logos are comparable, but we generally recognise faces as holistic entities over a make-up of component features. Equally, Phillips, McQuarrie and Griffin (2014) suggested that the holistic processing for brands could be similar to that seen for faces. However, there are arguments for familiar faces being recognised by features efficiently if these are presented out of context (e.g., inverted). Consequently, an argument for facilitated upright and detrimental inversion processing being a facet of expertise rather than featural or configural processing, comes from the study of ‘Greebles’ (which are non-face objects with consistent configurations designed to be comparable, cognitively, to faces; Gauthier & Tarr, 1997; Gauthier, Williams, Tarr & Tanaka, 1998). Moreover, when considering familiar brands and object stimuli, these are not only made up of unique component parts, but also are visually different from one another (Curby & Gauthier, 2007). Therefore, it could be suggested that object and brand processing may be at a more featural level made up of constituent parts compared to facial recognition.

Van Boxtel, Tsuchiya and Koch (2010) described top-down processing as being manipulated by higher order strategies, and bottom-up processing as manipulated by the physical stimulus input. Also, generally, bottom-up and top-down processing are distinct, but can work together (Delorme, Rousselet, Macé & Fabre-Thorpe, 2004). More recently, it has been suggested that alongside strategies and stimulus input, a third factor of previous choices or responses modulate the processing of stimuli (Awh, Belopolsky & Theeuwes, 2012). Strategies for processing can include how you spread goal-directed attention. If both attentional and sub-attentional processes are present in a task (for example, a task that requires subliminal processing and a priming task that is intentionally attended to), then repetition priming can be boosted (van den Bussche, Hughes, van Humbeeck & Reynvoet, 2010). Priming is often suggested to be independent of attentional processes, but there has been research which suggested that the two are interconnected, with repetition priming diminishing when attention is drawn from a masked priming task (Naccache, Blandin & Dehaene, 2002; Valdés, Catena & Marì-Beffa, 2005).

Research by Macrae and Martin (2007) found that in face processing, features such as hair could prime the processing of expectations of a gender categorisation, suggesting that we are constantly using strategies to make our subsequent decisions easier. Equally, in the paper by Delorme et al., (2004) it is suggested that, in visual search, if we are looking for a pre-set category of stimuli (or a feature of an object) this assists attentional and visual processing. Therefore, mixing these categories or features will have an inhibitory effect. Research by Olshavsky (1994) suggested that brand recognition is modulated by top-down processing because we are guided by our goals and intentions of brand searching and choice.

For the purpose of this chapter, expectancies were removed by presenting stimuli in a random order. This would make any familiarity decisions more difficult via a two-step process. Following on from Chapter Five, it is clear brands are somewhat unique in our processing abilities. The experiments using the blocked designs investigated the differences between faces, objects and brands and showed that brands act like a midpoint, in difficulty, between faces and objects. This suggested that our memory for them is somewhat distinct in the nature of ease of responses. However, this blocked design series of experiments used a top-down processing model for responding to stimuli. As participants could have expectancies of what stimuli would appear next, there were two choice options of the next decision - familiar or unfamiliar. The current aim of this next experimental series was to run experiments that remove this expectancy from top-down processing. This is done via using a random presentation design instead of blocks of stimuli types. This would leave four options for the next stimuli: familiar stimuli type one; familiar stimuli type two; unfamiliar stimuli type one; unfamiliar stimuli type two. This means that the participants have one task (familiar versus unfamiliar) but that the stimuli types can change throughout the experiment. The expectancies for these studies are that there will be a deficit from multiple steps, when compared with the results from Chapter Five.

6.3 Experiment 1: Brands logos and faces

6.3.1 Rationale and Hypothesis

The aims of this experiment are to distinguish top-down from bottom-up processing effects. This method will see a random order of faces and brands rather than blocks of one of the stimuli types. This removes the opportunity for expectancies and strategies for recognising brands or faces and makes the experiment more robust at measuring perceptual level processing in this priming paradigm. The priming between first and second presentation will occur in blocks (unprimed and primed blocks) as previously seen in Chapter Five, but the order of faces to brands will be randomised. The hypotheses for the blocked design face and brand study would be expected to stand true for this experiment also: that familiar stimuli will elicit faster responses than unfamiliar ones; brands will be faster and more accurate to respond to than faces; and there will be a perceptually driven priming effect across all stimuli. There would also be an effect of unfamiliar stimuli exhibiting more priming due to a worse memory trace and more facilitation to make them better. As well as familiar brands being the fastest and most accurate category.

6.3.2 Methods

Participants

Twenty-four undergraduate and master’s students were recruited, via opportunity sampling, from the School of Psychology for course credit. Seven participants performed less than chance on at least one of the conditions and were therefore replaced. The participants were aged between 18 and 32 years (*M*= 21.46

years; 21 were right-handed and 19 females took part). Participants were required to have normal or corrected-to normal vision. All participants gave fully informed consent and were debriefed following the study. The study was granted ethical approval from the School of Psychology's ethics board at Bangor University.

Stimuli

The stimuli set were the same as in Chapter Five (section 5.3) as evaluated in Chapter Four.

Design

The experiment was made up of four blocks using a study-test-study-test design with a perceptual priming familiarity decision. There were four counterbalances with six participants in each counterbalance. The counterbalances were split by the button presses (either F for positive familiarity or J for positive familiarity, dependent on counterbalance) as well as the order of which stimuli list was used in the first study-test cycle. A randomisation seed was used to present the stimuli from the lists in a random order, but the same stimuli were used in each list and the lists were pseudo-randomly designed. As well as the presentation order being randomised, the presentation of faces and brand logos was intermixed (brand, face, face, face, brand, face, brand, brand and so on).

Procedure

Participants were seated 50cm from the computer screen with a standard English keyboard mounted on the desk in front of them. Participants were given a button reminders card in front of them. Participants were reminded to respond as quickly and as accurately as they could throughout. Participants were randomly assigned to a counterbalance where button order was reversed. For counterbalances one and three, button F was used for familiar stimuli and J for unfamiliar stimuli; for counterbalances two and four, button J was used for familiar stimuli and F for unfamiliar stimuli.

Stimuli were presented on the screen for 1000ms, and then the screen turned black for an inter-trial interval of 1000ms before the next stimulus was presented. The inter-trial interval screen had a small white fixation cross presented. Participants were able to respond at any point from the onset of the target image, to the end of the black inter-trial interval screen. Any responses after this period were recorded as a miss.

Before completing the main experiment, participants were given a chance to practise the task with stimuli independent from the main experiment. The practise consisted of four blocks of 10 stimuli each, with the same study-test-study-test design as the main experiment. All stimuli in the practise and the main experiment were shown once in the study (prime) condition and once in the test (probe) condition. As the experiment was split into four blocks, there were untimed breaks in between the blocks (after approximately five minutes for each block) for participants to rest.

Analysis

The exclusion criteria for the analysis was that every category was responded to with above 50% accuracy for each of the pre-set categories (familiar and unfamiliar; brands and faces). It was difficult to set more stringent accuracy criteria because, technically, there are no right or wrong answers so it is not possible to look at a measure of response bias. Analysis three considered all responses correct and discounted error rates apart from misses (outside of the threshold for responding on each trial).

Effects of priming (study [first] and test [second] presentation); familiarity (familiar and unfamiliar stimuli); and stimuli type (faces and brands) were analysed via a 2 (Familiarity Type: Familiar, Unfamiliar) x2 (Stimuli Type: Brands, Faces) x2

(Priming: Unprimed, Primed) ANOVA for main effect for response times (averaged over correct responses only) and accuracy rates. Interactions were calculated between factors (priming, two levels; familiarity, two levels; and stimuli type, two levels). As well as the subject analysis, another item analysis (ANCOVA) was conducted using the same parameters and also using the covariate of familiarity rating from a between groups sample (Stimulus Evaluation, Chapter Four).

6.3.3 Results

The subject analysis on accuracy was conducted first and the main effects of familiarity type, stimuli type and priming, were all significant. The familiar stimuli (*M*= 87.25, *SE*= 1.44) were significantly less accurate than unfamiliar stimuli (*M*= 91.64, *SE*= 1.28; $F(1,23)= 6.392$, $p= .019$, $\eta p^2= .217$) with a large effect size. The brand stimuli (*M*= 92.86, *SE*= .86) were significantly more accurate than face stimuli responses (*M*= 86.04, *SE*= 1.46; $F(1,23)= 35.723$, $p< .001$, $\eta p^2= .608$) with a large effect size. The unprimed stimuli (*M*= 88.70, *SE*= 1.10) were less accurate than the primed stimuli (*M*= 90.20, *SE*= 1.06; $F(1,23)= 10.926$, $p< .001$, $\eta p^2= .608$) this showed a large effect size. For the interactions, the familiarity type by stimuli type ($F(1,23)= 3.811$, $p= .063$, $\eta p^2= .142$) was non significant. The unfamiliar brands were the most accurate (*M*= 93.36, *SE*= 1.27), followed by the familiar brands (*M*= 92.34, *SE*= .89), whereas faces were lower in accuracy, in general, but also show the same pattern with unfamiliar faces being more accurately rejected (*M*= 89.92, *SE*= 89.92) than familiar faces were correctly identified (*M*= 82.16, *SE*= 2.63). There was an interaction between familiarity and stimuli type interaction (familiar, $F(1,23)= 14.557$, $p< .001$, $\eta p^2= .385$ which was a large effect size; unfamiliar $F(1,23)= 8.193$, $p= .009$, $\eta p^2= .263$ as well, a large effect size). The familiarity type x priming interaction showed there to be a significant effect (F(1,23)= 17.384, p< .001, ηp²= .430 - Figure 19) of the influence familiarity has on first and second presentation responses which is a large effect size. Unfamiliar stimuli again were more accurate than familiar stimuli; despite the effects of priming being larger in the familiar stimuli (familiar F(1,23)= 38.012, p< .001, ηp²= .623 which has a large effect size; unfamiliar F(1,23)= .407, p= .530, ηp²= .017). Finally, for the two way interactions, stimuli type by priming was not significant (F(1,23)= .259, p= .615, ηp²= .011). The three way interaction was also significant (F(1,23)= 6.511, p= .018, ηp²= .225 - Table 7) with the familiar being influenced by the other two factors (F(1,23)= 8.976, p= .006, ηp²= .281) whilst the unfamiliar was not (F(1,23)= 1.857, p= .186, ηp²= .075) – showing a large effect size

Table 7. *Means for three-way interaction in accuracy data (Brands vs Faces)*

Stimuli type	**Familiarity type**	**Priming**	**Mean response accuracy % (*SE*)**
Brand	Familiar	Unprimed	91.56 (*1.05*)
		Primed	93.13 (*.95*)
	Unfamiliar	Unprimed	92.92 (*1.68*)
		Primed	93.80 (*1.03*)
Face	Familiar	Unprimed	79.48 (*2.66*)
		Primed	84.84 (*2.66*)
	Unfamiliar	Unprimed	90.83 (*1.44*)
		Primed	89.01 (*1.91*)

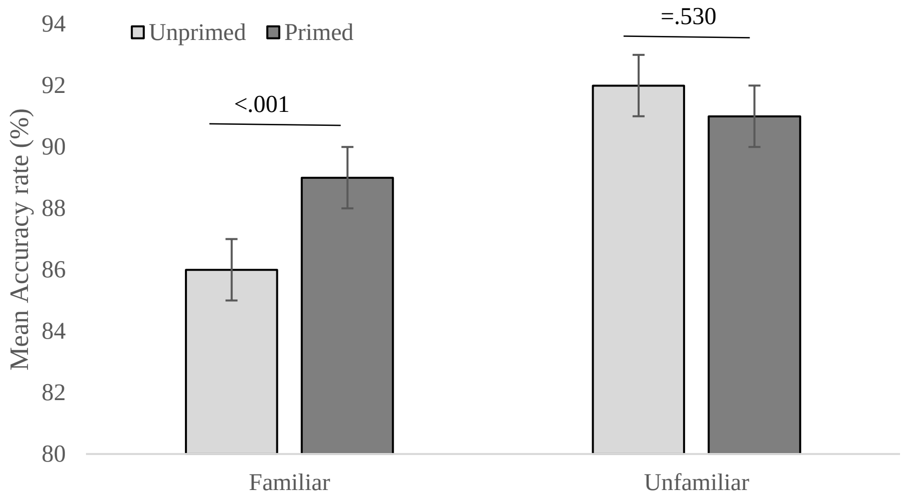

Figure 19. Mean percentage accuracy for the familiarity type x priming interaction in brands and faces experiment. Error bars represent Standard Error

The reaction time pattern for the main effects was the same in the accuracy analysis, with all main effects being significant. Familiarity type (F(1,23)= 20.908, p< .001, ηp²= .476) as familiar stimuli were quicker (M= 597.43ms, SE= 9.39ms) than unfamiliar stimuli (M= 642.14ms, SE= 9.86ms) and this effect was large. Stimuli type showed the brands to be significantly quicker (M= 594.87ms, SE= 9.06ms) than faces (M= 644.70ms, SE= 8.61ms; F(1,23)= 66.532, p< .001, ηp²= .743) with a large effect size. Priming effects were also significant (F(1,23)= 114.186, p< .001, ηp²= .832) as there was a benefit of responding to stimuli upon the second presentation (M= 593.98ms, SE= 8.58ms) than the first (M= 645.59ms, SE= 8.70ms) again, with a large effect size. The familiarity type x stimuli type interaction was not significant (F(1,23)= .616, p= .441, ηp²= .026The familiarity type x priming interaction was significant with a large effect size (F(1,23)= 7.987, p= .010, ηp²= .258 - Figure 20; familiar priming effect, F(1,23)= 123.262, p< .001, ηp²= .843; unfamiliar priming effect, F(1,23)= 69.773, p< .001, ηp²= .752) both with large effect sizes. Familiar unprimed, versus primed had the same directional pattern as the unfamiliar unprimed and unfamiliar primed. The stimuli type by priming interaction was also significant ($F(1,23)= 8.596$, $p= .007$, $\eta p^2= .272$ – Figure 21) with a large effect size. Brand unprimed stimuli were slower than the brand primed, and the face unprimed stimuli were slower than the face primed stimuli. The three-way interaction for response times was significant ($F(1,23)= 15.421$, $p= .001$, $\eta p^2= .401$ – Table 8) with a large effect size. For the familiar category, the stimuli type by priming interaction was significant ($F(1,23)= 37.972$, $p< .001$, $\eta p^2= .623$) with a large effect size and in the unfamiliar category, the interaction was not significant ($F(1,23)= .072$, $p= .790$, $\eta p^2= .003$).

Table 8. *Means for three-way interaction in response time data (Brands vs Faces)*

Stimuli type	**Familiarity type**	**Priming**	**Mean response time/msec (*SE*)**
Brand	Familiar	Unprimed	596.92 (*10.24*)
		Primed	551.41 (*9.79*)
	Unfamiliar	Unprimed	638.64 (*12.57*)
		Primed	592.51 (*10.29*)
Face	Familiar	Unprimed	655.86 (*10.51*)
		Primed	585.54 (*10.57*)
	Unfamiliar	Unprimed	690.94 (*11.14*)
		Primed	646.47 (*10.53*)

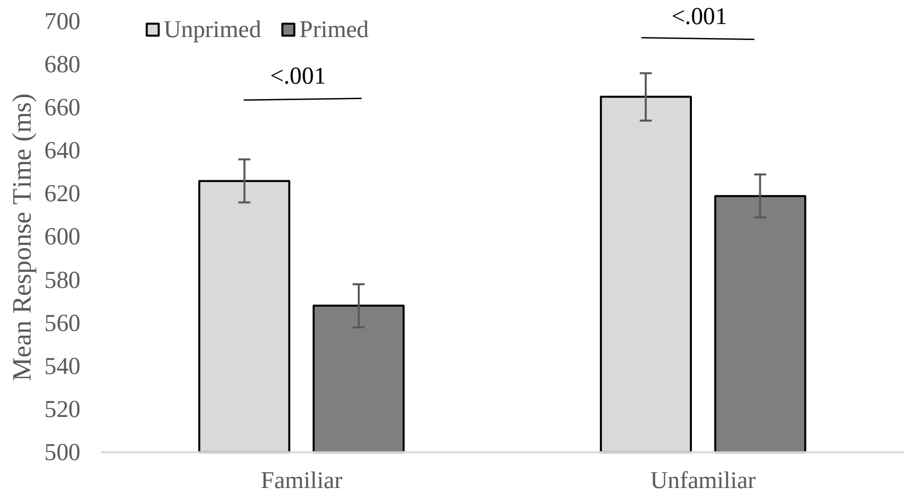

Figure 20. Mean response times in milliseconds for the familiarity type x priming interaction in brands and faces experiment. Error bars represent Standard Error

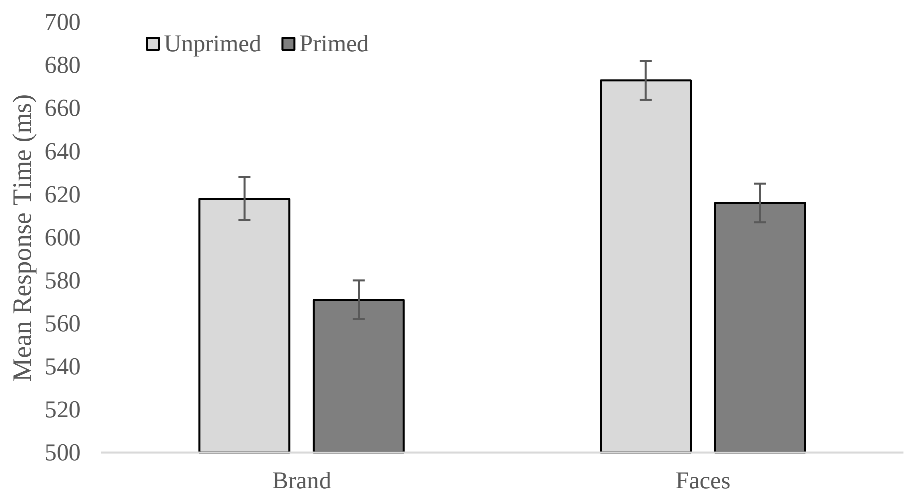

Figure 21. Mean response times in milliseconds for the stimuli type x priming interaction in faces and brands experiment. Error bars represent Standard Error

The item analysis used the familiarity rating from the stimulus evaluation experiment, as a covariate for accuracy and response times. The between-subject factorial analysis had a main effect of familiarity rating (F(1,315)= 58.733, p< .001, ηp^2= .157) and the priming x familiarity rating interaction was marginally significant (F(1,315)= 3.794, p= .052, ηp^2= .012). [Accuracy: Priming main effect (F(1,315)= 5.087, p= .025, ηp^2= .016); Familiarity type main effect (F(1,315)= 70.090, p< .001, ηp^2= .182); Stimuli type main effect (F(1,315)= 9.964, p= .002, ηp^2= .031); Priming by familiarity type interaction (F(1,315)= 6.860, p= .021, ηp^2= .021); Priming by stimuli type interaction(F(1,315)= .204, p= .652, ηp^2= .001); Familiarity type x stimuli type interaction (F(1,315)= 2.137, p= .556, ηp^2= .001); Three-way interaction (F(1,315)= 5.081, p= .025, ηp^2= .016)].

For the response time item analysis data, the pattern of results was similar. This time with an additional main effect of familiarity rating as significant, as also seen in the accuracy data (F(1,315)= 22.672, p< .001, ηp^2= .067); and the priming by familiarity rating interaction was non-significant (F(1,315)= .961, p= .328, ηp^2= .003). [Response Times: Priming main effect (F(1, 315)= 12.159, p= .001, ηp^2= .037); Stimuli type main effect (F(1,315)= 86.399, p< .001, ηp^2= .215); Familiarity type main effect (F(1,315)= 7.027, p= .008, ηp^2= .022); Priming by familiarity type interaction (F(1,315)= 3.189, p< .075, ηp^2= .010); Priming by stimuli type interaction (F(1,315)= p< .001, ηp^2= .043); Stimuli type x familiarity type interaction (F(1,315)= 21.550, p< .001, ηp^2= .064); Three way interaction (F(1,315)= 14.034, p< .001, ηp^2= .043).]

For analysis three (errors included) there was a main effect of stimuli type (F(1,23)= 58.327, p< .001, ηp^2= .717); and a main effect of priming (F(1,23)= 25.351, p< .001, ηp^2= .524). There was no main effect of familiarity (F(1,23)= .141, p = .711, ηp^2 = .006). No interactions were significant, familiarity x stimuli type (F(1,23)= .936, p = 337, ηp^2= .040); familiarity x priming (F(1,23)= .020, p = .889, ηp^2= .001); stimuli type x priming (F(1,23)= .519, p = .478, ηp^2= .022); 3 way interaction (F(1,23)= .034, p = .855, ηp^2= .001).

6.3.4 Discussion

It was expected that the differences between stimuli types in this experiment would show brands to be easier (faster and more accurate) to process than faces, which could be an effect of automaticity towards brands. Olshavsky (1994) suggested our search in brands was goal-directed and processed top-down, however, these results suggest that after one way of processing has been taken away, it is still possible to be familiar with brands relatively automatically.

It was also expected that there would be a perceptually driven priming effect across categories. In the results, it was possible to see that there was more of a priming effect for faces than for brands. Thus, the benefit of the repeated presentations was more for faces than brands. This could be because faces are harder to recognise and access the recognition units, whereas brands again are more automatised. This agrees with the work of Logan (1999), who suggested that priming occurs more where more learning can occur (e.g. on harder items). Therefore, there is the possibility of more benefit for the faces. Finally, it was expected that familiar stimuli should be easier to recognise than unfamiliar stimuli. Through the data it is possible to see the main effect of familiar being faster than unfamiliar, but accuracy showed the reverse pattern. Awh, Belopolsky and Theeuwes (2012)suggested that repetition between decisions in tasks could also add to priming effects, this could be an explanation for the current results, but does not explain the mismatch between amount of priming and benefit from previous decisions, in faces versus brands.

The main feature of this experiment was to look at removing or controlling any strategy that a participant might use to respond to stimuli. It is impossible here to know what participants are doing to process stimuli before a response is made, so, therefore, the blocking was removed and there was random presentation of stimuli. By doing this, participants would have to use a more bottom-up, data-driven approach to their cognitive processing. There is a chance that in Chapter Five, participants were using top-down and bottom-up processes to accept or reject stimuli as familiar, as in the work by Delorme, Rousselet, Mace & Fabre-Thorpe (2004). Despite a hierarchical process for recognising stimuli (first the type of stimuli; and then whether they know the stimuli or not) participants were still accurately deciding who or what they recognised. This timeline fits in with the psychophysical detection versus decision-making abilities on a 0-2000ms scale (Jensen, 2006). It is important to run the comparative analysis between the face and object studies in this random design experimental series. By using a hierarchical process decision, there may be an influence on brands, depending on which stimuli type were experienced around it.

When comparing the item versus the subject analysis, it is necessary to mention that, although the patterns are similar in this experiment, the familiarity rating main effects are both significant in accuracy and response times. This suggests that there is an influence on the responses made, based on how familiar an item is. Although, this is not outlined in the hypotheses, there is a clear pattern on the subject analyses which was expected. The priming effect had both accuracy and response times as faster and more accurate in the primed than unprimed stimuli. The familiarity type influence showed unfamiliar to be more easily responded to than familiar, but the pattern was the same for both accuracy and response times. And finally, for the stimuli type, brands are easier to respond to than faces in the accuracy and response times. This deviates from the research by Carbon and Leder (2005; see also Tanaka & Farah, 1993), who suggested that face detection is a stand out process- however, these experiments did not consider against brands.Further, as brands are made up of component parts (like greebles (Gauthier, Williams, Tarr & Tanaka, 1998), but faces are processed holistically (Curby & Gauthier, 2007; Gauthier & Tarr, 1997). Although the main effects had the same pattern between accuracy and response times, the interactions and, therefore, the influence of multiple factors, showed different patterns.

6.4 Experiment 2: Brands logos and objects

6.4.1 Rationale and Hypothesis

This experiment also aimed to separate the top-down and bottom-up processing effects using objects instead of faces. The hypotheses for this experiment were similar to those for Chapter Five (section 5.4): that unfamiliar objects will have the fastest response times due to being categorically perceptually different from the other three categories (familiar objects, familiar faces, unfamiliar faces); that there will be a priming effect; and finally, that the familiar brands will have quicker responses than familiar objects, due to our expertise with recognising them and their unique identity and their consistency in representations.

6.4.2 Methods

Participants

Twenty-four undergraduate and master’s students were recruited via opportunity sampling, from the School of Psychology and participated for course credit.Five participants performed at less than chance on at least one of the conditions and were replaced. The remaining 24 participants were aged between 18 and 35 (*M*= 20.08;

twenty-two were right-handed and 18 were females). Participants were required to have normal or corrected-to-normal vision. All participants gave fully informed consent and were debriefed following completion of the study. The study was granted ethical approval from the School of Psychology's ethics board at Bangor University.

Stimuli

The stimuli set were the same as in Chapter Five (section 5.4)

Design

The design of Experiment Two was the same set-up as Experiment One (6.3) but used objects instead of face stimuli.

Procedure

The procedure of Experiment Two was the same as seen in Experiment One (6.3).

Analysis

The analysis of Experiment Two was the same as in Experiment One (6.3).

6.4.3 Results

Starting with the subject accuracy analysis; the main effect of familiarity type was not significant ($F(1,23) = .686$, $p = .415$, $\eta p^2 = .029$) The main effect of stimuli type was, however, significant with a large effect size ($F(1,23) = 18.885$, $p < .001$, $\eta p^2 = .451$) with the objects ($M = 94.26$, $SE = .79$) being more accurate than brands ($M = 89.60$, $SE = 1.36$). The priming effect was non significant (unprimed [$M = 91.43$, $SE = 1.01$], primed [$M = 92.42$, $SE = 1.00$]; $F(1,23) = 3.377$, $p = .079$, $\eta p^2 = .128$). The familiarity type by stimuli type interaction was significant ($F(1,23) = 18.156$, $p < .001$, $\eta p^2 = .441$ – Figure 22) with a large effect size and the familiar stimuli being matched; but with the differences lying within the unfamiliar stimuli. The familiarity type x priming effect was not significant (F(1,23)= 1.334, p= .260, ηp^2= .055. The stimuli type by priming effect was also not significant (F(1,23)=1.620, p= .216, ηp^2= .066; brand unprimed [M= 88.88, SE= 1.37]; brand primed [M= 90.31, SE= 1.45]; object unprimed [M= 93.98, SE= .87]; object primed [M= 94.53, SE= .77]). Finally, the three-way interaction was significant (F(1,23)= 4.779, p= .039, ηp^2= .066 – Table 9) with a moderate effect size.

Table 9. *Means for three-way interaction in accuracy data (Brands vs Objects)*

Stimuli type	**Familiarity type**	**Priming**	**Mean response Accuracy % (*SE*)**
Brand	Familiar	Unprimed	91.51 (*1.39*)
		Primed	92.76 (*1.23*)
	Unfamiliar	Unprimed	86.25 (*2.01*)
		Primed	87.87 (*2.27*)
Object	Familiar	Unprimed	91.77 (*1.25*)
		Primed	93.80 (*1.02*)
	Unfamiliar	Unprimed	96.20 (*.78*)
		Primed	95.26 (*.88*)

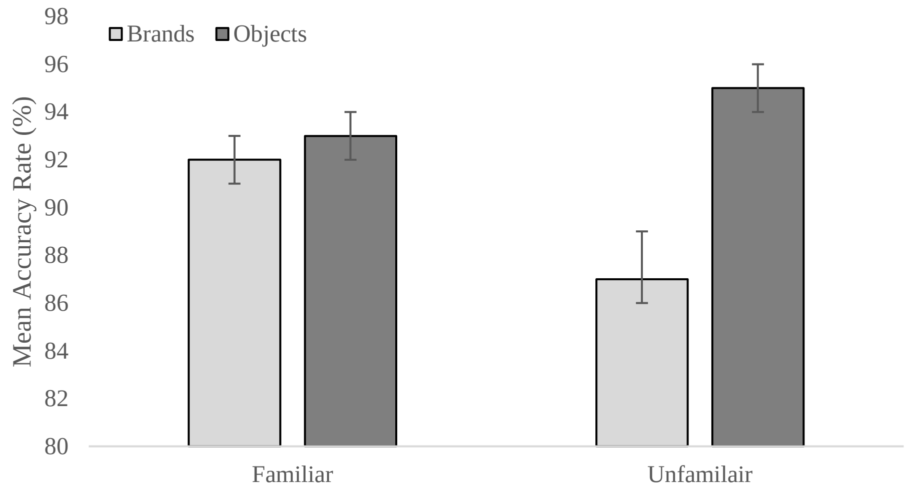

Figure 22. Mean accuracy percentage rates for the stimuli type x familiarity type interaction in object and brand experiment. Error bars represent Standard Error

Next, it is necessary to look at the response time data for the subject analyses. The familiarity type main effect was significant (F(1,23)= 6.273, p= .020, ηp^2= .214) with the unfamiliar stimuli slower (M= 574.26ms, SE= 9.18ms) than the familiar stimuli (M= 556.22ms, SE= 9.00ms) and had a large effect size. The stimuli type main effect was also significant (F(1,23)= 89.81, p< .001, ηp^2= .796) where the object responses were quicker (M= 537.91ms, SE= 8.95ms) than brands (M= 592.58ms, SE= 8.71ms) with a large effect size. For the priming main effect there was a significant difference (F(1,23)= 54.687, p< .001, ηp^2= .704) between the unprimed (M= 578.31ms, SE= 8.94ms) and primed (M= 552.17ms, SE= 8.10ms) categories, with the effect being large. The familiarity type x stimuli type interaction (F(1,23)= 227.455, p< .001, ηp^2= .908 – Figure 23) wassignificant with a large effect size. The interaction between familiarity type and priming was also significant (F(1,23)= 14.291, p= .001, ηp^2= .383 – Figure 24), with a large effect size. There was more of a priming effect for brands than objects (F(1,23)= 34.659, p< .001, ηp^2= .601 - Figure 25) and had a large effect size.

The three way interaction between familiarity type, stimuli type and priming was also significant (F(1,23)= 11.755, p= .002, ηp^2= .338 – Table 10) with a large effect size.

Table 10. *Means for three-way interaction in response time data (Brands versus Objects)*

Stimuli type	**Familiarity type**	**Priming**	**Mean response time/ms (*SE*)**
Brand	Familiar	Unprimed	569.38 (*8.77*)
		Primed	531.79 (*9.55*)
	Unfamiliar	Unprimed	652.42 (*12.33*)
		Primed	616.72 (*10.54*)
Object	Familiar	Unprimed	578.03 (*10.33*)
		Primed	545.70 (*9.87*)
	Unfamiliar	Unprimed	513.39 (*9.35*)
		Primed	514.49 (*9.79*)

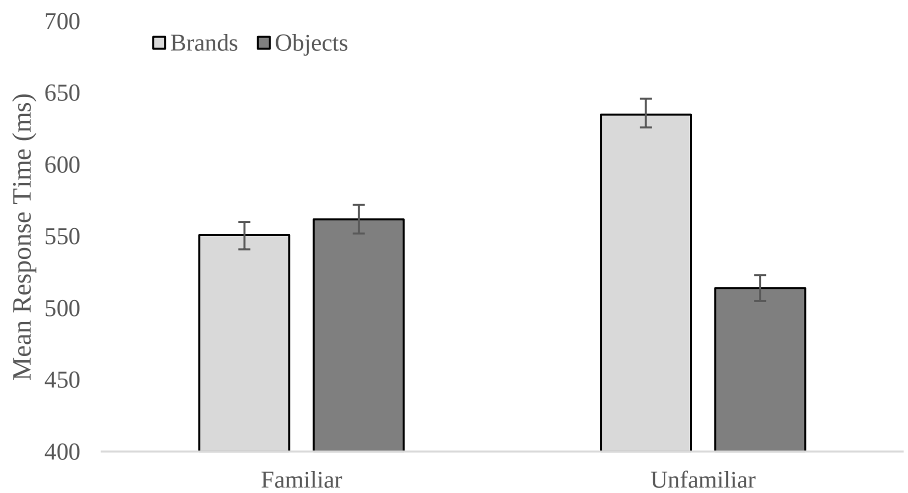

Figure 23. Familiarity type x stimuli interaction

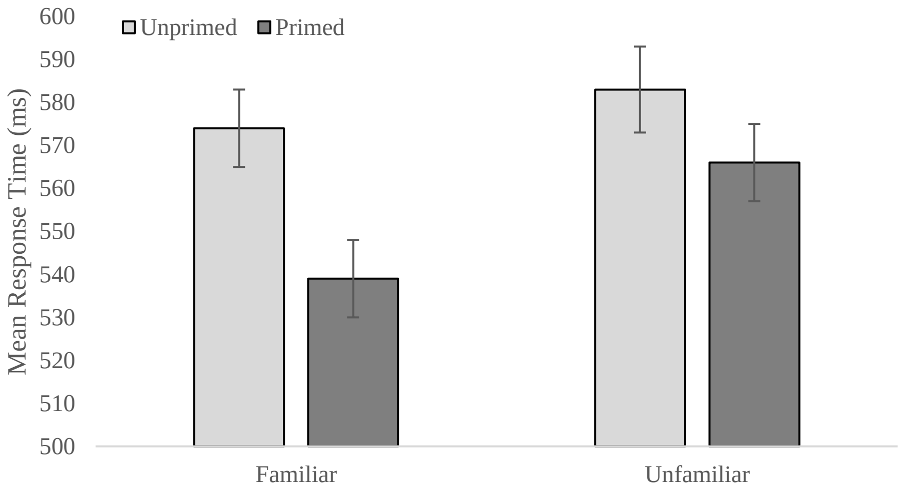

Figure 24. Mean response time in milliseconds for the familiarity type x priming interaction in objects and brand experiment. Error bars represent Standard Error

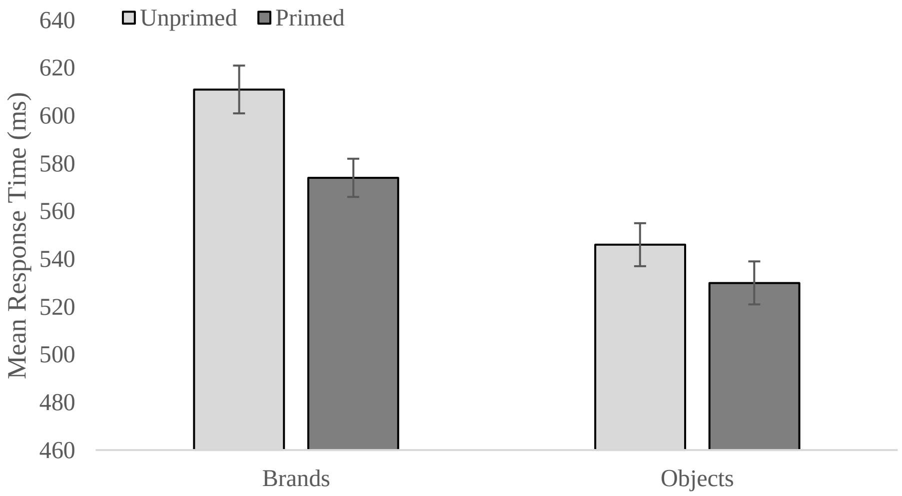

Figure 25. Mean response time in milliseconds for the stimuli type x priming interaction in the objects and brands experiment. Error bars represent Standard Error

The item analysis for accuracy data showed there to be a main effect of the familiarity rating (F(1,315)= .083, p= .774, $\eta p^2 < .001$). The priming x familiarity rating interaction was also not significant (F(1,315)= 2.280, p= .132, $\eta p^2 = .007$). [Accuracy:

Priming main effect ($F(1,315) = 2.529$, $p = .113$, $\eta p^2 = .008$); Familiarity type main effect ($F(1,315) = .037$, $p = .875$, $\eta p^2 < .001$; S stimuli type main effect ($F(1,315) = 40.445$, $p < .001$, $\eta p^2 = .114$); Priming x stimuli type interaction ($F(1,315) = .026$, $p = .872$, $\eta p^2 < .001$); Priming by familiarity type ($F(1,315) = 2.546$, $p = .112$, $\eta p^2 = .008$), Stimuli type x familiarity type interaction ($F(1,315) = 43.103$, $p < .001$, $\eta p^2 = .120$); Three way interaction ($F(1,315) = 5.195$, $p = .023$, $\eta p^2 = .016$).]

The item analysis for response time data showed the main effect of familiarity rating was not significant ($F(1,315) = 1.035$, $p = .310$, $\eta p^2 = .003$) and the priming x familiarity rating interaction was also not significant ($F(1,315) = .015$, $p = .903$, $\eta p^2 < .001$). [Response Times: Priming main effect ($F(1,315) = .338$, $p = .561$, $\eta p^2 = .001$); Familiarity type main effect ($F(1,315) = .486$, $p = .486$, $\eta p^2 = .002$); stimuli type main effect ($F(1,315) = 237.229$, $p < .001$, $\eta p^2 = .436$); Priming by stimuli type interaction ($F(1,315) = 22.777$, $p < .001$, $\eta p^2 = .067$); Stimuli type x familiarity type interaction ($F(1,315) = 503.435$, $p < .001$, $\eta p^2 = .615$); priming by familiarity type interaction ($F(1,315) = .136$, $p = .713$, $\eta p^2 < .001$); Three way interaction ($F(1,315) = 16.676$, $p < .001$, $\eta p^2 = .050$).]

For the error inclusive, analysis three, there was a main effect of stimuli type ($F(1, 23) = 28.584$, $p < .001$, $\eta p^2 = .554$); and a priming main effect ($F(1,23) = 46.339$, $p < .001$, $\eta p^2 = .668$). There was no main effect of familiarity type ($F(1,23) = .003$, $p = .957$, $\eta p^2 < .001$). There was also no significant interactions – familiarity x priming ($F(1,23) = .184$, $p = .672$, $\eta p^2 = .008$); familiarity x stimuli type ($F(1,23) = .466$, $p = .501$, $\eta p^2 = .020$); Stimuli type by priming ($F(1,23) = .312$, $p = .582$, $\eta p^2 = .013$); three way interaction ($F(1,23) = 1.074$, $p = .311$, $\eta p^2 = .045$).

6.4.4 Discussion

The results of this study showed all effects in the subject analysis for response times to be significant, in line with the hypothesis. The objects were again faster that the brands. The familiar stimuli were faster than the unfamiliar and there was a priming effect. For the accuracy data however, the data was not so clear cut; with only a stimulus type main effect and the expected interactions, including the three-way interaction. The interaction is likely modulated by the unfamiliar stimuli. The stimuli type main effect where objects were better than brands, was likely because of the ease of common object processing and rejection of the unfamiliar stimuli being easier due to the stimuli differences.

When comparing the item versus subject analyses it is possible to see that the response time data is influenced by the covariate, without finding a main effect of the covariate itself (familiarity rating); but the accuracy data pattern is the same between the two analyses (item and subject), and there is also no main effect of the covariate. This all suggests that the initial stimulus evaluation ratings of the objects and brands are not as influential to the data pattern here, as seen in the face study where this was the case.

This experimental series aimed to look at the bottom-up processing of brands and objects; and at the differences and similarities between the stimuli types. The hypotheses expected perceptually driven priming effect, with objects, in general, being quicker and more accurately categorised than brands for a number of reasons. For some of these same reasons, there would be interactions between the stimuli type and familiarity. As previously noted, the unfamiliar stimuli were consistently different, so it was expected that these would interact as part of the three-way interaction.

6.5 Comparison Analysis

6.5.1 Rationale and Hypothesis

This comparative analysis was conducted to look at differences in face and object processing, as well as whether faces and object stimuli had any effect on the two brand sections. However, this time we are also expecting some influence of brand processing and mixing the trials within blocks and vice versa. By mixing the trials we are removing the chance for strategies being used in processing creating a more bottom-up approach. When considering a blocked design, a single identity familiarity judgement is made; but when the blocks are mixed, as in the current experimental series, two decisions must be made: the first on stimuli type and category; the second would then be an identity familiarity decision. This hierarchy of decisions means we can investigate how separating categories affects transference from brands to faces or objects, as well as the effect of faces and objects upon the brands. It is expected that there will be an overall increase in response times from the data in Chapter Five, but it is not clear at this stage whether objects or faces will have more of an effect on brands when compared to Chapter Five results.

6.5.2 Results

Firstly, a brand to brand comparison on response times was analysed. This was comparing the effects of the brand stimuli responses from the object experiment and the face experiment. There was no main effect of experiment type on brand responses ($F(1,46)= .033$, $p= .856$, $\eta p^2= .001$) as there was no significant difference between the two brand means (experiment one, object study, $M= 592.58$ms, $SE= 8.89$ms; experiment two, face study, $M= 594.87$ms, $SE= 8.89$ms). The familiarity type effect was significant ($F(1,46)= 81.309$, $p< .001$, $\eta p^2= .639$) with a large effect size; with the familiar stimuli (*M*= 562.37ms, *SE*= 6.57ms) being faster to respond to than unfamiliar (*M*= 625.07ms, *SE*= 7.74ms). The familiarity type x experiment type interaction was also significant ($F(1,46)$= 9.374, p= .004, ηp^2= .169)and also had a large effect size; with the object experiment familiar brands (*M*= 550.58ms, *SE*= 9.29ms) being faster than the unfamiliar (*M*= 634.57ms, *SE*= 10.95ms) and the face experiment having the same directional effects (familiar, *M*= 574.16ms, *SE*= 9.29ms; unfamiliar, *M*= 615.58ms, *SE*= 10.95ms). The priming effect was significant ($F(1,46)$= 148.922, p< .001, ηp^2= .764) as the unprimed responses (*M*= 614.34ms, *SE*= 6.94ms) were slower than the primed responses (*M*= 573.11ms, *SE*= 6.05ms) with a large effect size. The priming by experiment type effect was not significant ($F(1,46)$= 1.842, p= .181, ηp^2= .039) and the same pattern was seen for brands in the object experiment (unprimed, *M*= 610.90ms, *SE*= 9.81ms; primed, *M*= 574.25ms, *SE*= 8.55ms) and the face experiment (unprimed, *M*= 617.78ms, *SE*= 9.81ms; primed, *M*= 571.96ms, *SE*= 8.55ms). The familiarity type by priming interaction was also not significant ($F(1,46)$= .016, p= .181, ηp^2< .001). The familiar unprimed stimuli (*M*= 583.15ms, *SE*= 6.74ms) were slower than the primed stimuli (*M*= 541.55ms, *SE*= 6.84ms) and the unfamiliar unprimed stimuli (*M*= 645.53ms, *SE*= 8.80ms) were slower than the unfamiliar primed stimuli (*M*= 604.62ms, *SE*= 7.37ms). Finally, the three-way interaction was not significant ($F(1,46)$= .063, p= .803, ηp^2= .001 – Table 11).

Table 11. *Means for three-way interaction in response times (comparative analysis, brands, brands)*

Stimuli type	**Familiarity type**	**Priming**	**Mean response time/ms (*SE*)**
Brands (obj exp)	Familiar	Unprimed	569.37 (*9.53*)

		Primed	531.79 (*9.67*)
	Unfamiliar	Unprimed	652.42 (*12.45*)
		Primed	616.72 (*10.42*)
Brands (Face exp)	Familiar	Unprimed	596.92 (*9.53*)
		Primed	551.41 (*9.67*)
	Unfamiliar	Unprimed	638.64 (*12.45*)
		Primed	592.51 (*10.42*)

Secondly, a comparison between response times of the objects and faces, in the two experiments, was conducted. This time, the experiment type main effect was significant (F(1,46)= 73.952, p< .001, ηp²= .617); the objects were faster (M= 537.90ms, SE= 8.78ms) than the faces (M= 644.70ms, SE= 8.78ms). The familiarity type main effect was not significant (F(1,46)= .000, p= .995, ηp²< .001) as the results were matched between categories (familiar, M= 591.28ms, SE= 7.02ms; unfamiliar, M= 591.32ms, SE= 7.05ms). The familiarity by experiment type effect was significant (F(1,46)= 52.585, p< .001, ηp²= .533 with a large effect size; object familiar, M= 561.86ms, SE= 9.93ms; object unfamiliar, M= 513.94ms, SE= 9.97ms; face familiar, M= 620.70ms, SE= 9.93ms; face unfamiliar, M= 668.70ms, SE= 9.97ms). The priming main effect was significant (F(1,46)= 132.812, p< .001, ηp²= .743 - a large effect size) with the unprimed stimuli being slower (M= 609.55ms, SE= 6.37ms) than the primed stimuli (M= 573.05ms, SE= 6.45ms). The experiment type by priming interaction showed there to be an influence of the stimuli type in the experiment on priming (F(1,46)= 43.491, p< .001, ηp²= .486) with a large effect size. For the object study, the unprimed (M= 545.71ms, SE= 9.01ms) were slower than the primed (M= 530.09ms, SE= 9.12ms); and for the face experiment, the unprimed (M= 673.40ms, SE= 9.01ms) were also slower than the primed (*M*= 616.00ms, *SE*= 9.12ms). Finally, for the two-way interactions, the familiarity type x priming effect was significant ($F(1,46)= 71.976$, $p< .001$, $\eta p^2= .610$) with a large effect size. The familiar unprimed were slower (*M*= 616.95ms, *SE*= 7.37ms) than the primed stimuli (*M*= 565.62ms, *SE*= 7.23ms); and the unfamiliar unprimed were slower (*M*= 602.16ms, *SE*= 7.27ms) than the primed stimuli (*M*= 580.48ms, *SE*= 7.19ms). The three way interaction was not significant ($F(1,46)= 1.178$, $p= .284$, $\eta p^2= .025$- Table 12).

Table 12: *Means for three-way interaction in response times (comparative analysis, objects, faces)*

Stimuli type	**Familiarity type**	**Priming**	**Mean response time/ms (*SE*)**
Object exp	Familiar	Unprimed	578.03 (*10.42*)
		Primed	545.70 (*10.23*)
	Unfamiliar	Unprimed	513.39 (*10.28*)
		Primed	514.49 (*10.17*)
Face exp	Familiar	Unprimed	655.86 (*10.42*)
		Primed	585.54 (*10.23*)
	Unfamiliar	Unprimed	690.94 (*10.28*)
		Primed	646.47 (*10.17*)

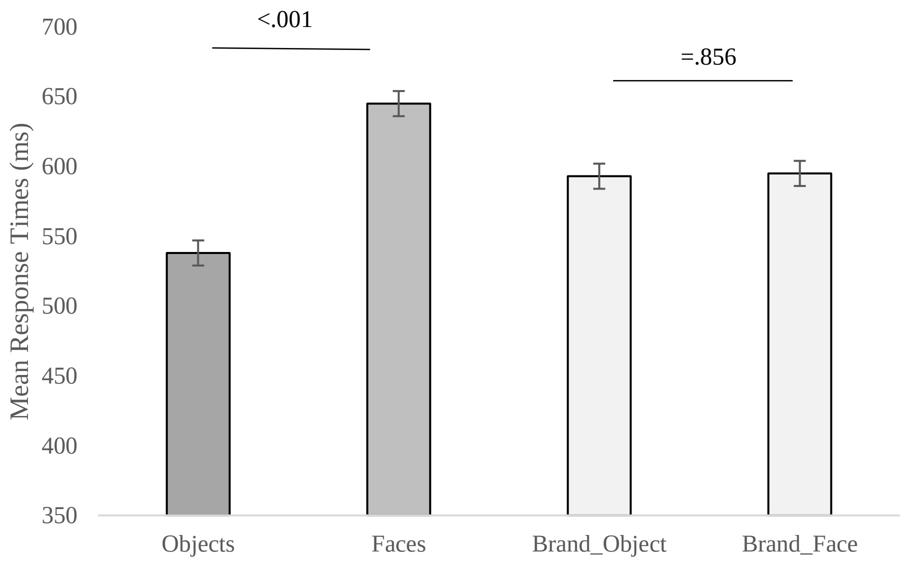

Figure 26. Mean response time category data for comparative analysis between all stimuli conditions. Error bars represent Standard Error

6.5.3 Discussion

With this experimental series, it was more difficult for a decision on familiarity to be made, as it has become a two-step hierarchical process. Firstly, a decision needs to be made for which type of stimuli it is, and then whether it is known or not. The two comparative analyses were the same as those seen in the blocked design experimental series. Starting with the differences between faces and objects, the effects in this current comparison were identical to the effects recorded in the blocked design (Chapter Five) object to face comparison. This suggests that, irrespective of the experiment type and strategies someone may be using, there are consistent and real differences between faces and objects, disagreeing with the research by Gauthier, Behrmann and Tarr (1999), but supporting research by Tanaka and Farah (1993); our processing facets are not task-dependent but rather stimuli-dependent. . In fact, faces are more difficult to process than objects due to the nature of their differences in lability (. Brands are the most stable of the three categories of stimuli, and they are recognised configurationally, via component parts and we have great expertise for them (Gauthier & Tarr, 2016). However, priming effects for both are stable and present, but are larger for faces. With the priming effect being seen, it could be argued that this is entirely a perceptually driven priming effect where there is more facilitation from something that has ‘more to gain’. On the other hand, however, it could be some influence from semantic priming across the face and brand categories; where semantic similarities between two stimuli e.g., Heinz and Hellmans or Brad Pitt and Angelina Jolie, mean that one primes the other, despite them not being the same image or exemplar (Lee & Labroo, 2006). This cross-group priming effects can explain how perceptual and conceptual priming interlink, and it is necessary to compare these effects in tandem and independently

Brand to brand comparisons present a similar story to that seen in the blocked design comparative analysis (Chapter Five), but there was an effect of experiment type by familiarity which was not seen in the blocked design counterpart. This means that the familiarity effect which is seen (familiar being generally quicker than the unfamiliar) is an effect modulated by experiment type from Chapters Five and Six. This could also be an effect of the stimuli type as it appears to be more prominent in faces than the other stimuli. Ultimately, there was an underlying effect, affecting the responses of brands from the residue of either objects or faces preceding and following the image of a brand. This could be an effect of contextual biasing; either the objects, faces, or both, influence how difficult the next brand decision may be. However, from the rest of the results there were only marginal differences between the brands experienced in both experiments suggesting that memory for brands is consistent and stable. We have an expertise for brands as they stand out, and because they stand out, we are less influenced by other items that surround them (both in the processing stage, Theeuwes, 2010; and the retrieval stage, Berlyne, 1970).

As previously discussed, it seems from the comparison analyses that objects are the easiest to process and respond to; brands are the next easiest; and faces are the hardest. It could be suggested that the configural similarities or differences between exemplars of the stimulus types is what makes them easier or harder to respond to. It is possible that the reason objects are the easiest is because of the stand-out differences between the familiar (highly recognisable) and unfamiliar (easily rejectable). With brands being the next easiest because of their stability and similarities to both faces and objects; bridging the gap in difficulty. With faces as the hardest due to their configurational similarities, a decision is the most difficult at this recognition level.

6.6 General Discussion

There are three main features to the analyses in this chapter: the priming effects, the familiarity effects, and the stimuli effects. Firstly, considering the priming effects: initially the aim from all the experiments in this thesis was to look at perceptually driven priming. However, it has become apparent that other types of priming may also be in play in the results of these experiments. The raw perceptually driven priming can be seen from the unfamiliar stimuli only. The familiar stimuli could also have effects from an identity level priming and semantic associative priming at the Person Identity Nodes or Semantic Information Units (Bruce & Young, 1986; Lee & Labroo, 2004). Van den Bussche et al. (2010) found the influence of other processing levels boosting priming effects; especially if attention drawn to the repetitions, or decisions regarding semantic level processes, are in play (Naccache, Blandin & Dehaene, 2002). The priming effects in this chapter were strong and consistent especially for brands and faces, the objects still had a replicable priming effect, but there was less priming shown, possible due to a ceiling effect. An additional priming effect could have contributed to the familiarity by priming interactions, as mentioned previously, at a deeper level of processing, where the different types of priming were influencing the stimuli types.

Unlike the first experimental series with the blocked designs (Chapter Five), this randomised experimental presentation seems to have influenced perceived familiarity in two ways. The first is the presence of a significant covariate in the ratings from the evaluation having a relationship to the results from the present studies. Also, there is a reverse of the pattern seen in the familiar versus unfamiliar stimuli in the previous chapter, where previously the unfamiliar stimuli were sometimes faster than the familiar stimuli overall. However, this has not been the case in this set of results. In fact, consistently, the familiar have been significantly faster and more accurate throughout, with the exception of the object unfamiliar category. The issues with this stimulus category have been discussed previously (Chapters Four and Five), thus there is no further need to discuss why this category may be different.

Thirdly, the stimuli type effects are, as suggested in the comparative analysis discussion, that objects are the easiest to distinguish ‘known’ from ‘unknown’, with brands bridging the gap between the objects and faces along a continuum of difficulty. However, it is not possible to say whether brand processing acts like either face or object processing, but can be argued to be distinct and likened to both. It is more likely that they are unique and a separate category of stimuli. There are some similarities to faces with their complexities of identity, but they are configurationally different, like objects. Ultimately, they are their own distinct category using its own processing. Furthermore, the features of brands are different with regards to their stability, which is why the familiarity effect is purer and stronger in brands than other categories, although it is difficult to compare to the objects stimuli, for the above reasons.

The final feature of this experimental series aim was to see if participants were naturally using a strategy to distinguish between familiar and unfamiliar. Therefore, a random presentation experiment was used to isolate the possibility of some strategic effects. In the blocked design experiments (Chapter Five), participants could use either bottom-up or top-down processes (Theeuwes, 2010), but these top-down processes would be difficult in the current random presentation design. This is due to the increased difficulty in the responding, and the likelihood of hierarchical two step decisions of processing. As there are differences in how brands are responded to when compared with objects and faces, it is necessary to discuss why this may be with regards to processing types. Van der Lans, Pieters and Wedel (2008) suggested that we have bottom-up and top-down processes for recognising and responding to brands in our selection or choice of them, or by previously choosing a stimulus (Awh, Belopolsky & Theeuwes, 2012). Bottom-up processing would involve looking at the branding itself, and the top-down processing would involve external features e.g., our memories for advertisements. Van der Lans, Pieters and Wedel further suggest that, although both have modulatory effects, we have biased attention and are more influenced by the bottom-up features than top-down strategies.

The applications for these results could be suggested to be useful in cognitive research to further distinguish the effects between stimuli types in memory systems.It could also be a starting point for research into different strategies with different paradigms. It would be expected that we could manipulate how brands stand out more than faces (and maybe some objects) and whether we recognise them holistically as well as from component parts. With this in mind, it is possible to see how some features of brands and their component parts could be investigated by breaking down the whole of a logo into parts (language effects). This will be looked at in the next Chapter (Seven) to see if reading is a strategy used in brand processing. For commercial and consumer research, the applications of this could be looking at what ‘pops-out’ with brands, and how we can make them more visually appealing to direct attention for selection, and for recognition, rather than relying on goal directed, top-down processes for selection alone.

CHAPTER SEVEN: LANGUAGE EFFECTS OF BRANDS

7.1 Abstract

From previous chapters, the data suggest that brands are different from other stimuli classes. Brands often have dual-input (logo and name together), whereas faces and objects do not. Objects and faces have the names retrieved at a deeper level of processing. Brands have two different facets: content of the name; and context of the name in its setting (colour, typography). Participants saw blocks of either pictures (as evaluated in Chapter Four) or corresponding names. A familiarity decision, using a perceptually driven priming paradigm, was adopted. Experiments One (objects) and Two (faces) acted as comparison baselines for the target stimulus population of brands (Experiment Three). For Experiment One (*N*= 48), there was a main effect difference between stimuli type (as well as priming and familiarity effects). As seen in Chapters Four, Five and Six, differences may have been due to object stimuli issues. In Experiment Two (*N*= 48), there were also effects of priming and familiarity, but no significant effect of stimuli type. For faces, the pattern showed names to be decided upon significantly earlier than faces. This could be a configuration concept, or it could be a reading effect. The same patterns of data were found in Experiment Three (*N*= 48). For brands, the opposite was found: the names were slower than the logos (with the names combined), but this did not reach significance. Therefore, suggesting that brands are recognised more readily at a contextual level rather than a content level. Thus, the effect found in brands is not entirely due to reading, as reading would elicit the quickest effects, as seen in faces. This research could lead to further cross-modality (name versus name as part of logo) priming research.

7.2 Introduction

We experience stimuli such as faces, objects, and brands in our everyday lives. Knowing how to interact with such stimuli is vital so that we behave appropriately with them, and distinguishing between one stimulus to another. For example, recognising your mother and greeting her properly; knowing to sit on a chair rather than stand on it; and remembering your favourite food order when you enter McDonalds. One feature that makes brands unique from seeing common objects or faces, is the language aspect of brands. Often the brand name is interconnected to the logo and, in fact, only a small proportion of brands, common to the UK, are seen without their written name accompanying the logo. This double presentation of name and logo means that we are processing the lexical content of the brand name alongside the context of the brand logo. Therefore, this would make brands different despite the other features that are distinctive to either objects and faces, such as their categorisation and unique identity.

Referring back to the differences in stimuli surrounding us in the world, it has been previously mentioned that brands are both recognisable through their categorisation of exemplars (such as that seen in object recognition) and through their unique identity (as seen in face recognition). The brand names alone, however, are memorised through both categorisation (Park, Lawson & Milberg, 1989) and through their unique identities (Aaker, 1997; Klink & Athaide, 2012). Klink and Athaide suggested that the brand name itself acts as a ‘building block’ to build the personality of the brand, whilst Aaker first outlined a series of ‘Big 5’-type personalities for brand names: sincerity, excitement, competition, sophistication and ruggedness.

Our memory for word processing is related to the depth and type of encoding at the raw featural stage (Craik & Lockhart, 1972; Lockhart & Craik 1990). Furthermore, it is believed that the low level featural processing of words occurs implicitly and is not at semantic level recognition (Schacter, 2012; Schacter & Addis, 2007). Any words considered high frequency are processed more fluently than those considered low frequency (Scarborough, Cortese & Scarborough, 1977). This could include brands as they are highly familiar and we are surrounded by brands. The effect maybe seen even over some other proper nouns. However, Schulman (1967) found it was easier to distinguish between rare words that have been presented before or not, and old and new common words. In the case of familiar versus unfamiliar brands, this could include rejecting an unfamiliar brand faster than accepting a familiar brand as known.

Concerning brand names, at low-level processing of names, spelling has been seen to have an effect on how fluently we can process a brand name. Thus, if the spelling is unfamiliar or less familiar than another brand, we are not as good at recognising it later on (Lowrey, Shrum & Dubitsky, 2003). Further, lexical relations between brand names make a name easier to recall than semantic relations between brand names. Therefore, when retrieving a brand name from memory, if the low-level features (e.g. letters) are consistent between two brands, they are more easily retrieved (Schmitt, Tavassoli & Millard, 1993). If the brand name is familiar, the word is considered familiar itself and therefore it is easier to encode the full brand content and context (Meyers-Levy, 1989). This is likely because there is more information available to speed up processing. Following this, if the name is considered useful or meaningful, we view this more favourably and are more likely to remember the brand well (Kohli, Harich & Leuthesser, 2005). As well as how meaningful and useful a name can be considered, if a brand name is considered to be linked to a product it makes that brand more preferable than if the name is unrelated (Rangaswamy, Burke & Oliva, 1993).

Taking these factors into account, it could be argued that a brand's name (content) is more important than the context that the name is presented in. However, a pure familiarity effect would argue that, as we are more practised and fluent at recognising the whole brand as opposed to part of it, the full context of the brand logo coinciding with the name would be more easily recognised. This is often seen in a picture superiority effect (McBride & Dosher, 2002) with pictures priming more than words (Carr et al., 1982; Stenberg, Radeborg & Hedman, 1995). The next series of experiments will investigate the feature of language within a brand name being the reason that brands are remembered differently. In order to do this, brands will be seen as logos containing the written name or names in text only. It is expected that, due to using a familiarity judgement task, the familiarity effect will be the most prominent; that we are more used to seeing a brand within context, therefore it will be more primed than the text name itself.

7.3 Experiment 1: Objects and written names

7.3.1 Rationale and Hypothesis

The aim of this study was to provide a baseline comparison for the upcoming brand vs name study. The use of corresponding names to the common objects meant that a comparison to the brands could be made. The same participants were used for the object name and face name studies, for economical testing reasons.

For the unfamiliar objects, non-words were used to act as a 'name' description for the novel objects. These non-words were the common object names reordered, but still theoretically pronounceable to match for word length consistency and letter frequency, for the purpose of this study. It was expected that common names of objects would be responded to faster than the novel words, due to the difficulty in reading them and familiarity with the flow of the words. It was also expected that the names would be responded to slower than the images of the objects; because of not having to read a word serially, the full image could be processed, and because the access to name codes is later.

As seen in the other object studies, it was anticipated that unfamiliar objects could be responded to faster because they were categorically different, unless there is a reading effect in objects, which would mean that the jumbled words would be harder to process. Finally, primed conditions would have faster response times than unprimed conditions.

7.3.2 Methods

Participants

Forty-eight undergraduate and master's students were recruited from the School of Psychology's participant panel and were participating to gain course credit. Four participants were removed and replaced for having accuracy below 50% in one of the four conditions. Power calculations for chapters five and six saw a G* power calculation for 24 participants in a 2x2x2 analysis. There is half as many stimuli in these categories, therefore twice as many participants were used. The participants were aged between 18 and 48 (*M*= 21.73). Thirty-seven were female and 42 were right-handed, five were left-handed and one was ambidextrous for writing. Participants were required to have normal or corrected-to-normal vision. All participants gave fully informed consent and were all debriefed following the completion of the experiment. This study was granted ethical approval from Bangor University ethics board.

Stimuli

A stimuli evaluation (Chapter Four) was conducted on the object images, to evaluate for knowledge of the most and least familiar stimuli. The written names were matched with those seen as common objects. The unfamiliar novel objects were assigned an arbitrary name for the sake of this experiment. These assigned names were rearranged versions of the common object names, but that remained pronounceable. This was to control for letter and word length consistency.

A practise of the main familiarity decision task was used, as seen in Chapter Five and Six- but using two different presentation domains of the target objects (object images and written name) which were not used elsewhere in the experiment.

Figure 27. Example of familiar object name in typeface

Figure 28. Example of unfamiliar object name in typeface

Design

Only half of the 160 stimuli (*n*= 80, 40 familiar) were shown as object images and the other half as names (*n*= 80, 40 familiar), rather than as both objects and names, as seen in the previous experimental chapters. This was to control for additive or cumulative priming and practise effects. The chances of the names or objects appearing within each modality was randomised and the blocks of whether objects or names were seen first, were counterbalanced. Also, as the same participants took part in both the object and face experiment, the experiment order was counterbalanced. Finally, the buttons for familiar and unfamiliar (F and J) were counterbalanced between participants. All other features of the design were the same as in the previous blocked design experiments.

Procedure

Most parameters remained the same for this experiment as in previous experiments in Chapter Five. However, there were only two blocks of 80 stimuli each. There was also a second experiment, using faces (section 7.4), completed by the same participants.

Analysis

The exclusion criteria for the analysis was that every category was responded to with above 50% accuracy, for each of the pre-set categories (familiar and unfamiliar; brands and faces). It was difficult to set more stringent accuracy criteria because, technically, there are no right or wrong answers so it is not possible to look at a measure of response bias.

A 2x2x2 mixed ANOVA was conducted on three factors; familiarity (familiar, unfamiliar), stimuli type (image, name), and priming (unprimed, primed).

Alongside the main analysis, an additional analysis was run mirroring those seen in the previous chapters five and six. The additional analyses three, sees the response times being analysed irrespective of how someone responded whether ‘correct’ or ‘incorrect’ by a pre-classification of stimuli.

7.3.3 Results

Starting with the main effects of the response times (ms; using correct responses only), there was a significant effect of familiarity (F(1,47)= 11.222, p= .002, ηp^2= .193) with a moderate effect size, when the familiar stimuli were quicker (*M*= 525.95ms, *SE*= 7.04ms) than unfamiliar stimuli (*M*= 540.74ms, *SE*= 8.01ms). Stimuli type differences were also significant (F(1,47)= 94.797, p< .001, ηp^2= .669) and had a large effect size: the object images were significantly faster (*M*= 489.55ms, *SE*= 7.98ms), than the object names (*M*= 577.14ms, *SE*= 8.99ms). The main effect of priming showed the unprimed stimuli (*M*= 550.55ms, *SE*= 8.24ms) to be slower than the primed stimuli (*M*= 516.14ms, *SE*= 7.14ms; F(1,47)= 39.539, p< .001, ηp^2= .457), with a large effect size. For the interactions, the familiarity by stimuli type effect was significant (F(1,47)= 78.159, p< .001, ηp^2= .624) as seen through a large effect size. The unfamiliar objects were fastest (*M*= 478.96ms, *SE*= 9.69ms) followed by the familiar objects (*M*= 500.13ms, *SE*= 7.52ms); the familiar words were faster (*M*= 551.77ms, *SE*= 8.73ms) than the unfamiliar words (*M*= 602.51ms, *SE*= 9.91ms). The remaining interactions were not significant (familiarity x priming, F(1,47)=.566, p=.455, ηp^2= .012; stimuli type x priming, F(1,47)= 1.395, p= .244, ηp^2= .029 three way interaction, F(1,47)= .705, p= .405, ηp^2= .015 – Table 13).

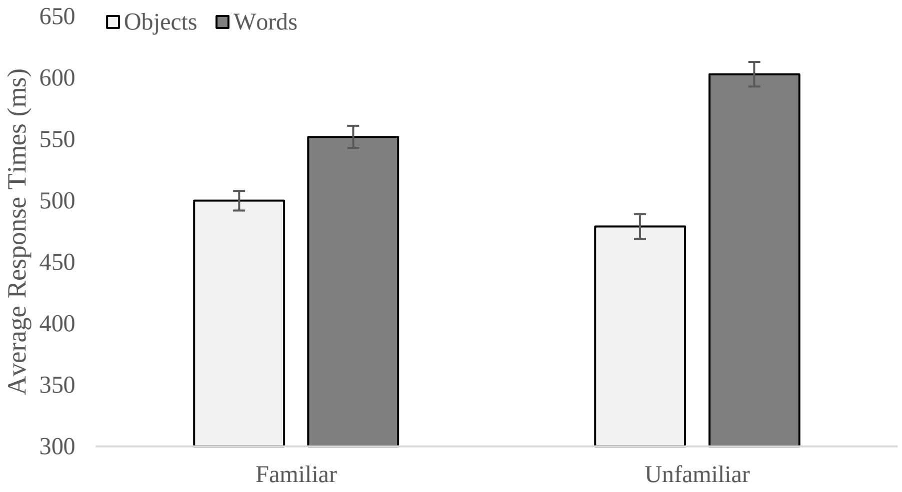

Figure 29. Mean response times in milliseconds in the familiarity type x stimuli type interaction between objects and word names. Error bars represent Standard Error

Accuracy data was the average percentage accurate of all responses. Familiarity main effect was not significant (F(1,47)= 1.514, p= .225, ηp²= .031). The priming main effect was also not significant (F(1,47)= 1.762, p= .191, ηp²= .036). Only the stimuli type main effect was significant (F(1,47)= 28.252, p< .001, ηp²= .375) with object images being more accurate (M= 94.36, SE= .55) than the object names (M= 89.34, SE= 1.04) and this can be seen through a large effect size. There were no significant interactions in the accuracy data (familiarity x stimuli type, F(1,47)= .010, p= .919, ηp²< .001familiarity x priming, F(1,47)= .043, p= .837, ηp²= .001stimuli type x priming, F(1,47)= 3.247, p= .078, ηp²= .065. Finally, the three way interaction for accuracy was not significant (F(1,47)= .819, p= .370, ηp²= .017

For the additional analyses, including all trials, except those considered misses outside of the window for responding. The main effects were again all significant; familiarity (F(1,47)= 4.758, p= .034, ηp²= .092); stimuli type (F(1,47)= 87.161, p< .001, ηp²= .650); priming (F(1,47)= 41.453, p< .001, ηp²= .469). None of the interactions were significant familiarity x stimuli type (F(1,47)= 1.803, p=. 186, ηp^2= .037);familiarity x priming (F(1,47)= .569, p = .455, ηp^2= .012); stimuli type x priming (F(1,47)= 1.240 , p = .271, ηp^2= .026); 3 way interaction (F(1,47)= .002, p = .697, ηp^2 < .001).

7.3.4 Discussion

Starting with the response time discussion, all main effects were significant as was the stimuli type main effect in accuracy data. The object images were quicker and more accurate than the words, and the familiar were faster than the unfamiliar, despite the influences from the unfamiliar object image stimuli. Also, the priming effects were directional towards a facilitation from repeated presentation in the response times, but this did not reach significance in the accuracy data. In the response time data, there was also a significant interaction between familiarity and stimuli type. When looking more closely at the data, it seems that the effect could be caused by the stimuli type features. This is because unfamiliar objects were faster and unfamiliar words slower than the two familiar categories. Thus, it could be suggested that, as previously mentioned, the unfamiliar object stimuli were categorically similar, and therefore easier to reject. The unfamiliar words, however, could be described as more difficult to decide, due to the time taken to try and read non-words that are unfamiliar in the English language. Schulman (1967) suggested rare words were harder to process despite reading being the same. If non-words are even more difficult to process, this effect is expected, thus we see rejecting the unfamiliar as unknown, as slower than accepting the familiar as known. Therefore, it could be argued that this slowing is an attempt at reading. This processing of fluency of easy words to read was also supported by Lowrey, Shrum and Dubistky(2008).

Changes to the stimuli could have affected these results, e.g., matching non-words from a database for familiarity ratings may have helped the reading effect, but the difficulty with this is that the words would then not have been matched with the length and number of words in the common object names. It is not necessary to repeat why the novel object images could have been different, and their effect on this experiment.

Finally, as objects were easier to recognise than words overall in accuracy and response times, the reading task seems harder than the picture discrimination task at a perceptual level. A picture superiority effect was seen throughout (McBride & Dosher, 2002), with more priming seen in pictures than words also (Carr et al., 1982; Stenberg, Radeborg & Hedman, 1995). This would also corroborate the findings from models like the Bruce and Young (1986) model, where in a perceptual level task, the 'Face' Recognition Units (FRUs) were accessed prior to the name codes, before coming together and accessing the Personal Identity Nodes (PINs).

7.4 Experiment 2: Faces and written names

7.4.1 Rationale and Hypothesis

The aim of the face versus name study was, again, to provide a baseline comparison to the brand name versus logo study. The face stimuli were only either seen as a word name or an image, and the set up for this study was the same as for the object name study. The same participants were used for economical testing reasons. However, due to the number of replacements needed for this sub-experiment, some only participated in this face experiment. It was expected for this study, that images of familiar and unfamiliar faces would be responded to quicker than the names of people. Furthermore, both familiar faces and familiar names would elicit faster response times than unfamiliar faces and names, because of their existing FRUs, name codes, and PINs (Bruce & Young, 1986). Finally, that primed (second presentation) stimuli would have faster response times than the first priming presentation.

7.4.2 Methods

Participants

Forty-eight undergraduate and master's students were recruited from the School of Psychology's participant panel and were participating to gain course credit. The power calculation was based on the post-hoc measure for half as many stimuli as in chapter's five and six. Eleven were removed and replaced for having less than 50% in any one of the four conditions. Remaining participants were aged between 18 and 48 (*M*= 21.85). Thirty-eight were female, 41 were right-handed, four were left-handed and three were ambidextrous for writing. Participants were required to have normal or corrected-to-normal vision. All participants gave fully informed consent and were all debriefed following the completion of the experiment. This study was granted ethical approval from Bangor University ethics board.

Stimuli

A stimuli evaluation (Chapter Four) was conducted on the faces, to evaluate for knowledge of the most and least familiar stimuli. The written names were matched with those seen as faces, thus had already been evaluated for knowledge of the faces only.

A practise of the main familiarity decision task was used, as seen in Chapter Five and Six, but using two different presentation domains of the target people (faces and written name), and these stimuli were not used again in the main experiment.

Figure 30. Example of familiar name in typeface

Figure 31. Example of unfamiliar name in typeface

Design

Again, only half of the full 160 stimuli set (*n*= 80, 40 familiar) were shown as faces and the other half as names (*n*= 80, 40 familiar), rather than as both faces and names. The chances of the stimuli occurring as names and faces were randomised and the blocks of whether faces or names were seen first, were counterbalanced. Also, as the same participants took part in both the object and face experiment, the experiment order was counterbalanced. Finally, the buttons for familiar and unfamiliar (F and J) were counterbalanced between participants. All other features of the design were the same as in the previous experiment (objects versus names).

Procedure

Most parameters remained the same for this experiment as in previous experiments, however there were only two blocks of 80 stimuli each. Additionally, as in Experiment One (7.3), participants also took part in the object study, with the order of these experiments being counterbalanced across participants.

Analysis

Most of the key parameters for the analysis were the same in this experiment as Experiment One (7.3). A 2x2x2 mixed ANOVA was conducted on three factors: familiarity (familiar, unfamiliar); stimuli type (face, name); and priming (unprimed, primed). With an additional analysis for the 'errorless' response time rates.

7.4.3 Results

For the response time data, only correct responses were included in the analyses. The familiarity main effect was significant (F(1,47)= 67.654, p< .001, ηp²= .590) with the familiar stimuli (M= 604.86ms, SE= 7.73ms) being faster than unfamiliar (M= 645.34ms, SE= 7.70ms), and a large effect size. The face stimuli were not significantly slower than the word stimuli F(1,47)= 2.975, p= .091, ηp²= .060). The priming effect was significant (F(1,47)= 50.731, p< .001, ηp²= .841); with the primed stimuli (M= 597.14ms, SE= 7.32ms) 56ms faster than the unprimed (M= 653.06ms, SE= 7.73) as seen through a large effect size. All interactions were significant: familiarity by stimuli type (F(1,47)= 50.731, p< .001, ηp²= .519 – Figure 32 - with a large effect size), with the familiar names faster than the familiar faces, and the unfamiliar faces faster than the unfamiliar names. The familiarity by priming interaction was also significant (F(1,47)= 9.256, p= .004, ηp²= .165 - Figure 33, with a moderate effect size). As stated before, the stimuli type x priming interaction was also significant with a large effect size (F(1,47)= 11.954, p= .001, ηp²= .203 – Figure 34); as was the three-way interaction (F(1,47)= 5.832, p= .020, ηp²= .110 – Table 15, with a moderate effect size).

Table 15. *Means for three-way interaction in response times (Faces)*

Stimuli type	**Familiarity type**	**Priming**	**Mean response time/ms (*SE*)**
Face image	Familiar	Unprimed	656.35 (*7.76*)

		Primed	579.08 (*8.07*)
	Unfamiliar	Unprimed	670.40 (*7.92*)
		Primed	614.83 (8.39)
Face name	Familiar	Unprimed	615.66 (*10.00*)
		Primed	568.36 (*8.75*)
	Unfamiliar	Unprimed	669.83 (*9.94*)
		Primed	626.29 (*8.98*)

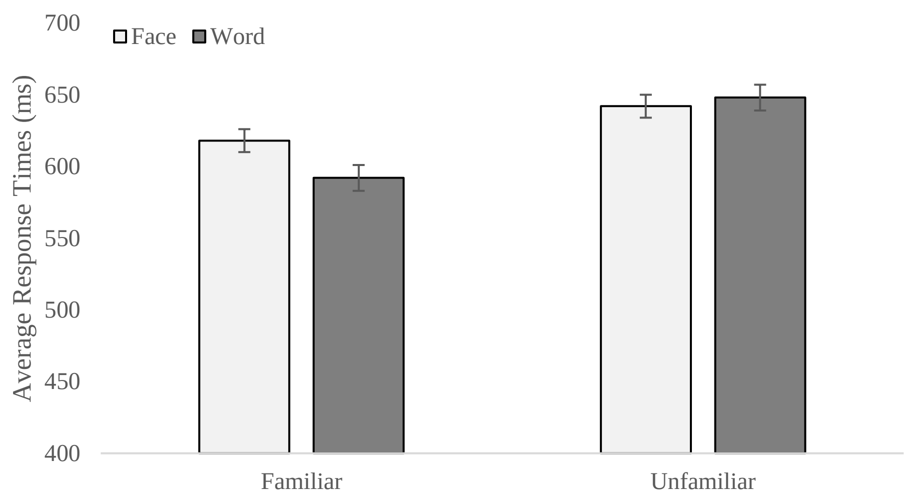

Figure 32. Mean responses times in milliseconds for the familiarity type x stimuli type interaction for the face and name words experiment. Error bars represent Standard Error

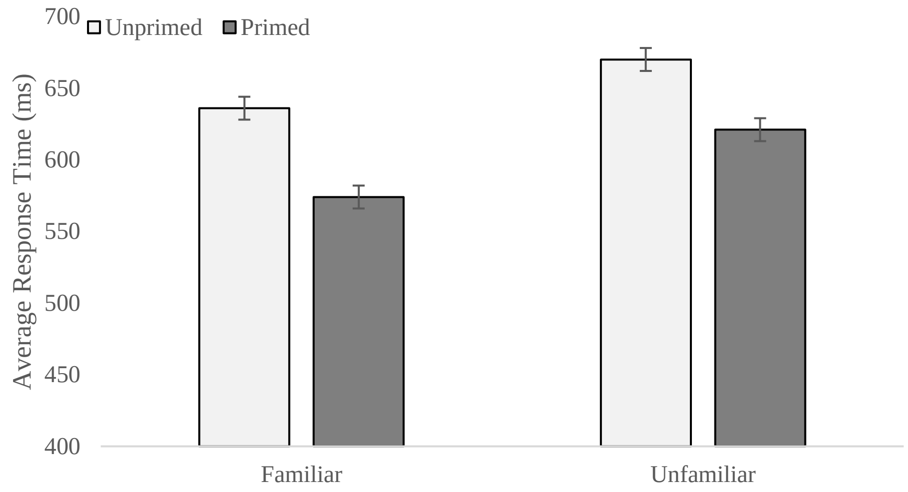

Figure 33. Mean response times in milliseconds for the familiarity type x priming interaction for the face and name words experiment. Error bars represent Standard Error

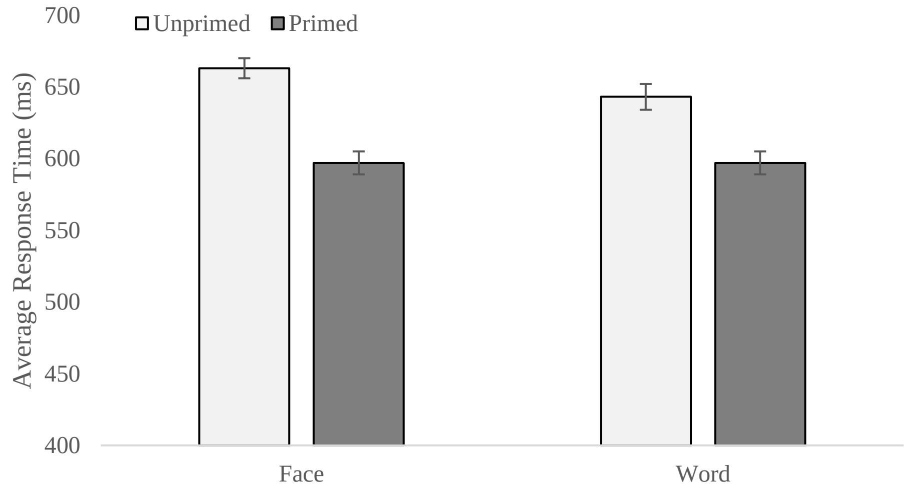

Figure 34. Mean response times in milliseconds for the stimuli type x priming interaction for the face and name words experiment. Error bars represent Standard Error

For post-hoc tests, the analysis was split by familiarity and the familiar analysis will be discussed first. Stimuli type effects were significant ($F(1,47)= 16.610$, $p< .001$, $\eta p^2= .261$). Priming was also significant ($F(1.47)= 265.692$, $p< .001$, $\eta p^2= .850$), and the interaction between stimuli type and priming was also significant ($F(1,47)= 26.867$, *p*< .001, ηp²= .364), both with large effect sizes. Next, the unfamiliar analysis saw the stimuli type effect as non-significant (*F*(1,47)= .767, *p*= .386, ηp²= .016); the priming effect was, again, significant (*F*(1,47)= 127.217, *p*< .001, ηp²= .730) with a large effect size. Finally, the stimuli type by priming interaction for the unfamiliar stimuli was not significant (*F*(1,47)= 2.128, *p*= .151, ηp²= .043).

The accuracy results demonstrated that the main effect of familiarity was significant (*F*(1,47)= 20.948, *p*< .001, ηp²= .308) as seen through a large effect size; when the unfamiliar stimuli were more accurate (*M*= 91.12, *SE*= .77) than familiar stimuli (*M*= 84.75, *SE*= 1.41). The faceand word stimuli responses were similar, so the effect was not significant (*F*(1,47)= .438, *p*= .511, ηp²= .009). The main effect of priming was significant (*F*(1,47)= 49.774, *p*< .001, ηp²= .514, seen through a large effect size) with unprimed stimuli responded to less accurately (*M*= 86.42, *SE*= 1.00) than to the second primed presentation (*M*= 89.45, *SE*= .84). The familiarity by stimuli type interaction was significant, showing the familiar stimuli (familiar face [*M*= 83.65, *SE*= 1.70], familiar word [*M*= 85.86, *SE*= 1.41]) to be less accurate than unfamiliar (unfamiliar face [*M*= 92.87, *SE*= .99], unfamiliar word [*M*= 89.38, *SE*= 1.00]; *F*(1,23)= 25.723, *p*< .001, ηp²= .520 - Figure 35) with a large effect size. Also, the familiarity by priming effect was significant (*F*(1,47)= 4.966, *p*= .031, ηp²= .096 - Figure 36; familiar unprimed [*M*= 82.68, *SE*= 1.54]; familiar primed [*M*= 86.82, *SE*= 1.35]; unfamiliar unprimed [*M*= 90.16, *SE*= .88]; unfamiliar primed [*M*= 92.08, *SE*= .80]) with a moderate effect size The interaction between stimuli type and priming showed the unprimed stimuli to be similar (*F*(1,47)= .259, *p*= .613, ηp²= .005). Finally, the three way interaction was also not significant (*F*(1.47)= 2.825, *p*= .099, ηp²= .057 - Table 16).

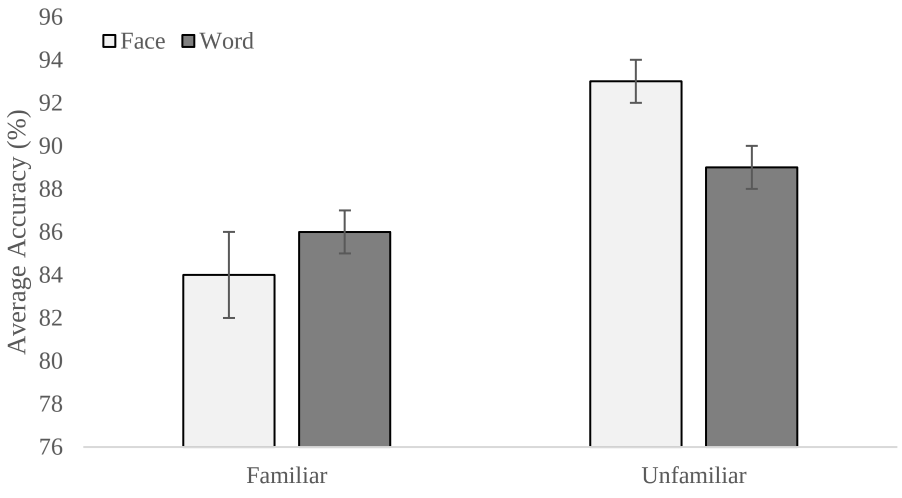

Figure 35. Mean percentage accuracy rates for the familiarity type x stimuli type interaction in the face and name words experiment. Error bars represent Standard Error

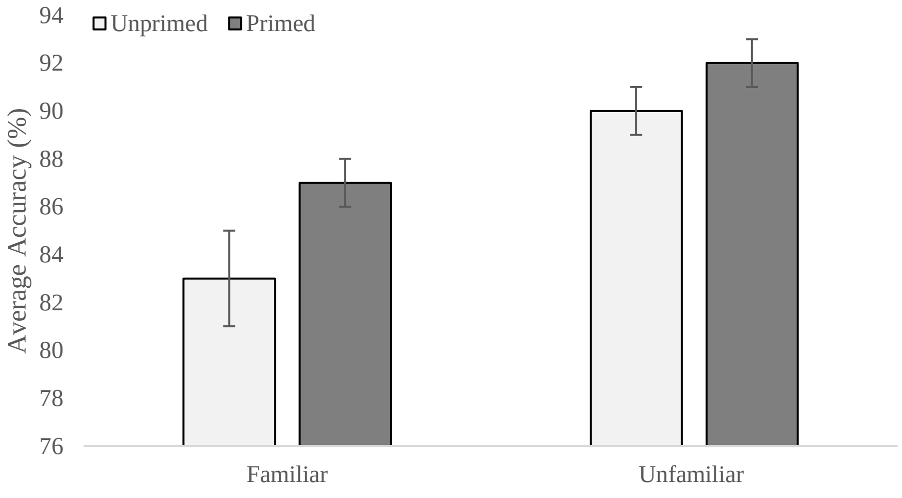

Figure 36. Mean percentage accuracy for the familiarity type x priming interaction in the face and name words experiment. Error bars represent Standard Error

The additional analyses showed there to be a main effect of stimuli type (F(1,47)= 3.684, p= .061, ηp^2= .073); and priming (F(1,47)= 252.571, p< .001, ηp^2= .843); but not familiarity (F(1,47)= .649, p= .425, ηp^2= .014). None of the interactions were significant, priming x familiarity (F(1,47)= .037, p= .848, ηp²= .001); familiarity x stimuli type (F(1,47)= .205, p= .653, ηp²= .004); priming x stimuli type was significant (F(1,47)= 10.676 , p= .002, ηp²= .185); and the three way interaction was not significant(F(1,47)= 3.536, p= .066, ηp²= .070).

7.4.4 Discussion

When considering the response time data, some main effects were significant (familiarity and priming effects). The priming effect is a standard effect seen throughout these experiments, with the second presentation being faster than the original presentation. For accuracy and response times there was no main effect of stimuli type, which suggests that the effect between name and face differences was not as strong.

After splitting by familiarity for the follow up analysis, it was possible to see consistently strong effects in differences in familiar stimuli. This is likely because of differences between faces and words; because of an effect of faces being configurally the same, and names being configurally different.. In the unfamiliar analysis, the effects were not seen as strongly, apart from the priming effect. Again, this is a standard effect seen across many experiments (if not a little less consistently in accuracy results) and is likely to occur in this context irrespective of stimuli differences, as seen also by the interaction data. From these original and follow-up analyses, it is possible to see that familiar stimuli were significantly easier to respond to than unfamiliar stimuli. It could be suggested that this is because of matching existing memory traces in our repertoire and accessing a memory node (Bruce & Young, 1986)

Ultimately, as there are differences between these results and the object experiment, this design is successful and sensitive to changes between stimuli to act as baselines for the brand image and brand name experiment.

7.5 Experiment 3: Brands logos and names

7.5.1 Rationale and Hypothesis

The aim of this study is to look at whether brand logos that contain the name, show their different effect of processing because of the language aspect, rather than that brands are a unique category of stimuli for memory processing. It is expected that a priming effect will occur for all first versus second presentations of stimuli, with the second presentation having faster response times than the first. It is also anticipated that familiar names and logos will elicit a faster response than the unfamiliar stimuli, due to an existing memory trace for them being reactivated. Finally, due to the nature of contextual processing in each type of stimuli, brand logos containing the names should be quicker to recognise than the written names. There are some differences between the set-up of Experiments One and Two, and this current experiment, insofar as all of the brands will be seen in blocks of either names or logos. The analysis will consider the counterbalancing as a factor to avoid an additive priming effect and practise effects for the sake of this current study.

7.5.2 Methods

Participants

Forty-eight undergraduate and master’s students were recruited from the School of Psychology’s participant panel and were participating to gain course credit. One participant was removed and replaced for low accuracy throughout. The number of participants was pre-determined by having half as many trials so needing twice as many participants to ensure power for the analysis. The remaining participants were aged between 18 and 40 (M= 21.52 years). Forty were female and 46 were right handed. Participants were required to have normal or corrected-to-normal vision. All participants gave fully informed consent and were all debriefed following the completion of the experiment. This study was granted ethical approval from Bangor University ethics board.

Stimuli

A stimuli evaluation (Chapter Four) was conducted on the brand logos to evaluate for knowledge of the most and least familiar stimuli. The written brand names were matched with those seen as logos (Figures 37 & 38) and so had already been evaluated for knowledge of the brands only.

A practise of the main familiarity decision task was used, as seen in Chapters Five, Six and Seven (7.3, 7.4), but using two different presentation domains of the target brands (logos and written name) rather than a comparison with faces or objects.

Figure 37. Example of familiar brand in typeface

Figure 38. Example of unfamiliar brand in typeface

Design

The brand name and brand logo sub-experiment used the same parameters as in Chapter Five, Experiments One and Two (5.3, 5.4), but replaced face and object items with the same evaluated brands, presented in typeface rather than as a contextual logo. There was counterbalancing of the button presses, order of word of brand blocks and randomisation of the stimuli presentations. These counterbalances were also used in the splitting of the analysis, so that only the within-modality presentation priming effect was measured.

Procedure

The procedure was the same as in experimental Chapter Five (experiments one [5.3] and two [5.4]). The differences between the object and face sub-experiments in this chapter (7.3, 7.4) were the number of stimuli experienced as both logos and names. All stimuli were seen as both brand logos and brand names, but the analysis was split to account for an additional priming effect as seen below. All other parameters were identical, after the change in stimuli banks.

Analysis

The analysis consisted of a 2x2x2 mixed ANOVA on subject data only. There were two levels of familiarity (familiar, unfamiliar), priming (unprimed, primed) and between-subjects factor of stimuli type (word, logo). The datafile was split to remove the second effect of repetition and cross-modal priming effects. Therefore, only block one and two (words only) of counterbalance one and three will be used for this within-modality priming experiment, and block three and four (brand logos only) of counterbalance two and four will be used.

7.5.3 Results

The response time results were calculated in milliseconds (ms) for correct responses only. The familiarity main effect was significant ($F(1,46) = 90.187$, $p < .001$, $\eta p^2 = .662$; familiar, *M*= 548.92ms, SE= 6.97ms; unfamiliar, *M*= 607.35ms, *SE*= 8.94ms) as seen through a large effect size. The stimuli type (logo, word) main effect was not significant ($F(1,46) = .252$, $p = .618$, $\eta p^2 = .005$). The unprimed stimuli (*M*= 594.20ms, *SE*= 7.66ms) were slower than the primed stimuli (*M*= 562.07ms, *SE*= 7.69ms), and this difference was significant ($F(1,46) = 62.945$, $p < .001$, $\eta p^2 = .578$) with a large effect size. The familiarity by stimuli type interaction was not significant ($F(1,46) = .025$, $p = .874$, $\eta p^2 = .001$). The same pattern of results was seen in the stimuli type x priming interaction ($F(1,46) = .024$, $p = .877$, $\eta p^2 = .001$. The familiarity by priming type interaction was also not significant ($F(1,46) = .083$, $p = .775$, $\eta p^2 = .002$). The three way interaction was also not significant ($F(1,46) = 3.390$, $p = .072$, $\eta p^2 = .069$).

Accuracy was calculated as the percentage of responses correct in total. Firstly, for stimuli type: brand logos were more accurate than names (($F(1,46) = 3.531$, $p = .067$, $\eta p^2 = .071$) with a moderate effect size. The familiarity effect was not significant ($F(1,46) = .784$, $p = .380$, $\eta p^2 = .017$) The main effect of priming was significant ($F(1,46) = 8.618$, $p = .005$, $\eta p^2 = .158$) with unprimed having lower accuracy (*M*= 90.29, *SE*= .81) than the primed (*M*= 91.77, *SE*= .73). The familiarity x stimuli type interaction was not significant ($F(1,46) = 2.435$, $p = .126$, $\eta p^2 = .050$). The familiarity by priming interaction ($F(1,46) = 6.745$, $p = .013$, $\eta p^2 = .128$) was significant with a moderate effect size (familiar unprimed [*M*= 90.31, *SE*= .97]; familiar primed [*M*= 92.84, *SE*= .90]; unfamiliar unprimed [*M*= 90.26, *SE*= 1.12]; unfamiliar primed [*M*= 90.70, *SE*= 1.03]). Finally, for the two way interactions, the stimuli type by priming interaction was not significant (*F*(1,46)= .130, *p*= .720, ηp^2= .003) The three-way interaction was also not significant (*F*(1,46)= 1.079, *p*= .304, ηp^2= .023

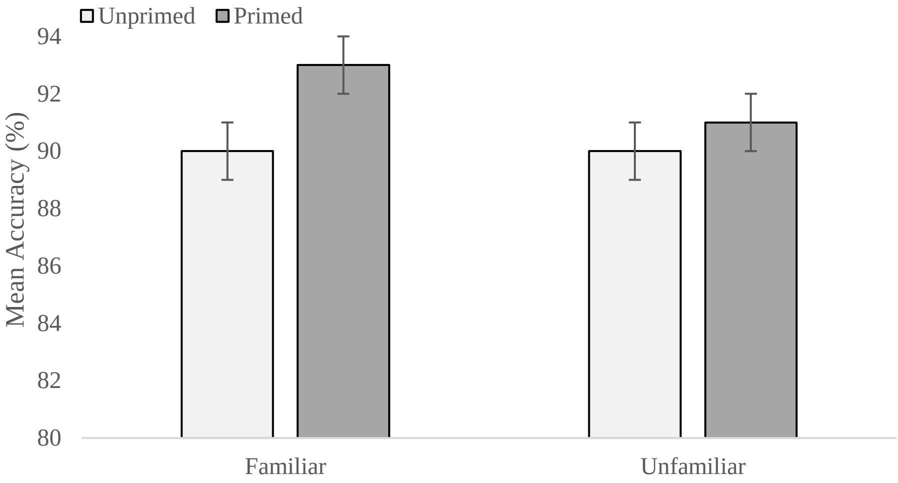

Figure 39. Mean percentage accuracy rates for the familiarity type x priming interaction in the brands and name words experiment. Error bars represent Standard Error

The additional analysis saw familiarity main effect as non-significant (*F*(1,47)= .156, *p*= .695, ηp^2= .003), the priming effect was significant (*F*(1,47)= 57.771, *p* <.001, ηp^2= .077), the main effect of stimuli type was (*F*(1,47)= .219, *p* = .642, ηp^2= .005). The interactions were as follows: familiarity x priming (*F*(1,47)= .006, *p* = .937, ηp^2= .001); familiarity x stimuli type (*F*(1,47)= .006, *p* = .939, ηp^2 <.001); priming x stimuli type (*F*(1,47)= .075, *p* = .786, ηp^2= .002), 3 way interaction (*F*(1,47)= .116, *p* = .735, ηp^2= .003).

7.5.4 Discussion

The response time data showed main effects of familiarity type and priming only. The perceptually driven priming effect of repetition was consistent across this experiment, as seen in other chapters and experiments (Chapters Five, Six and Seven; Experiments One and Two). Familiar were faster than unfamiliar, which again could be a facet of an existing node being accessed, as opposed to creating a new node in the semantic memory bank and then re-accessing it (Bruce & Young, 1986; and new model figure 2). The direction of stimuli type showed brands to be quicker than names. This suggests that we are quicker at recognising the familiarity of the name in context, rather than just the content of the name itself, but as these were about equal the competition between names and pictures show that it is easier to process both if they are similar to the previous (Schmitt, Tavassoli & Millard, 1993). There were also no significant interactions where one variable influenced another. This included no interaction between stimuli type and familiarity. This interaction would have links to conceptually driven priming in block two analyses only because, if familiar brands or words (where nodes exist) were faster than the unfamiliar (where no nodes exist), it would suggest there is a crossover effect between modalities (e.g., picture superiority effect, McBride & Dosher, 2002; more priming as seen in pictures over words, Carr et al., 1982; Sternberg, Radeborg, Hedman, 1995).

The accuracy data showed the same direction of effects for familiarity type (familiar more accurate than unfamiliar) and stimuli type (logos more accurate than names), but these effects did not reach statistical significance. There was a perceptually driven priming effect again, where the second presentation was more accurate than the first. This perceptually driven priming effect was also seen with a priming x familiarity interaction. This suggests that there is an uneven amount of priming per the type of familiarity. There was more priming for the unfamiliar because there was more to be gained from a new stimulus being repeated than an existing memory trace.

7.6 General Discussion

This chapter aimed to look at the language effects of reading a brand name as part of its corresponding logo. This was because most stimulus classes do not visually show the name and image together naturally, but rather, one is presented in isolation from the other. Brands, more often than not, have the name as part of the logo. The word making up part of the logo shows the colour, typography and layout to be factors in how the brand looks, but this did not reach significance. The design used was successful at finding different results as per different stimuli categories, meaning it was sensitive enough to detect these changes.

It was expected that in the object experiment, the objects would be faster. This was most likely because of the differences between the object words and non-words. This slowing is because of the unfamiliar word category as seen in the data. For faces, there seemed to be an effect of reading with the names being quicker than the faces. Alternatively, this effect could be because faces are configurally the same and words are not. Previous literature suggests, that people are recognised by faces before they are by their names, as per access to name codes after Face Recognition Units (Bruce & Young, 1986). Therefore, this model could suggest that if the name is presented at input, the access to the face is more automatic. When the faces are presented, the name would not be accessed at that point, and a familiarity decision could be made based on the face alone. Therefore, it could be argued that the effects seen in this experiment, with regards to the names being quicker than faces, is because: they are not configurally the same; reading is more automatic; and a deeper level of our cognitive system is accessed. This would also give standing for collapsing the name codes and NRU’s in the original model (Fugure 2). Despite literature suggesting we have a picture superiority effect (McBride & Dosher, 2002).

The argument for the brand experiment data (Experiment Three, 7.5), is whether they behave like objects or faces, both, or, neither? Also, whether there is an effect of reading or language in brand processing? Initially, the pattern of results between the faces and brands seem similar. However, this effect of priming and familiarity have been shown throughout this thesis but, although both brands and faces have no stimuli type effect in this chapter, this is likely to be for different reasons. Brand logos and brand names are similar and it is the configuration or context which separates them, as the content of them is the same (Holden & Vanhuele, 1999). Aaker (1997) suggested that it is the name that is important as this holds the personality to the brand. However, for this experiment the results showed the pure familiarity decision to be easiest for the brand logo, although this result was not statistically significant. Therefore, the current data propose that this effect may be due to having more information available, making it easier to process and make a familiarity decision for familiar stimuli (Meyers-Levy, 1989). The research by Scarborough, Cortese and Scarborough (1977) stated that familiar words are easier to process than unfamiliar words. In Experiment Three (7.5), this seems to be the case. Those that are familiar are easier to recognise as familiar, than to reject an unfamiliar stimulus as unknown.

As seen in the brand experiment (7.5), only half of the data was analysed because the other half would compare the within-modality (name to name, or, logo to logo) priming with an additional effect of cross-modality (name to logo, or, logo to name). There would also be an effect of cross-modal priming on its own. This effect and the cumulative and additional priming effect will be discussed in the future directions of the general discussion.

Ultimately, the results from these experiments suggest that brands are again different to face and object stimuli. It is believed that this is because brands have the name as part of the logo (context), but not purely a reading effect (content). It would be useful to test against logos without names, but this was not possible here because of statistical power and the amount of stimuli needed for each category. If the results still stood, with the brand logos containing names being the most potent, then it could be used by designers to make the most recognisable brands possible, so that people would purchase more readily.

CHAPTER EIGHT: GENERAL DISCUSSION

The aims of this thesis were to answer a series of questions about brands as a distinct stimulus class. Firstly, are brands unique, or is their processing like that for faces, or objects, or both? Do we show strategies for processing brands and is this what makes them unique? Are the differences in brand processing due to a reading or language effect? Finally, are the aspects of the adapted recognition model appropriate for brands?

Starting with a discussion of the designs used throughout this thesis, repetition priming is a facilitation from multiple exposure to the same item (Logan, 1990). A repetition priming paradigm was adopted because it has robust priming effects (Lewis et al., 1987) which increase as presentations increase (Lewis & Ellis, 1999). Until now, a familiarity judgement was used in conjunction with repetition priming (Sheldon & Moscovitch, 2010). In the past literature, there have been strong repetition priming effects from both faces (Ellis et al., 1987) and objects (Warren & Moreton, 1982). Equally in the literature, there were a few factors that increased fluency in recognition of brands which were: starting with increased exposure (Capbell & Kellar, 2003); our existing habits towards purchasing brands (Verwijmeren et al., 2011); whether we look favourably upon their brand ‘personality’ (Goldsmith & Goldsmith, 2012); exposure to related brands (Lee & Labroo, 2004); positive feelings towards a brand (Chang, 2007; Laran, Dalton & Andrade, 2011); and finally, visual appeal affecting choice (Labroo, Dhar, & Schwartz, 2008). There is also a reported effect in the literature of pure repetition priming being boosted by similarities in task type and responses between study and test phases (Dennis, Carder & Perfect, 2010; Franks et al., 2000; Groves &

Thompson, 1970; Xiong, Franks & Logan, 2003), which is representative of the design used in this thesis.

In relation to whether brands are unique, based on the data in the blocked design experiments (Chapter Five) and the two comparative analyses in Chapters Five and Six (5.5, 6.5), we do not appear to process brands the same as other categories of stimuli (faces and objects). Therefore, it could be possible to describe them as a unique stimulus class for reasons such as our familiarity with them, and our expertise with them exceeding those for faces as a stimulus class, but not objects. We are slower and less accurate at recognising brands as familiar than common objects, but we are more successful than we are with faces. Our judging of brand perceived familiarity appears to be automatic and quick. It is more effortful to remember and process stimuli that we do not know (Hulme, Maughan & Brown, 1991), than those we do (Johnson & Russo, 1984). This automaticity could be modulated by the stability of brands as they are not labile like faces or some objects.

Previously, brands have not been investigated for distinguishing the familiarity of them as opposed to similarly configured brands. However, there is research that recall is disrupted by similarities between brands (Kent & Kellaris, 2001), but this 2001), whereas the studies in this thesis look at incidental retrieval. Literature on faces shows how we can still distinguish familiarity easily amongst similar configurations as we process them holistically (Maurer, Le Grand, & Mondloch, 2002). This innate ability at recognising faces (Robbins & McKone, 2006) is different from that of other stimuli (Farah, 1996; Sato & Yoshikawa, 2004); we know who people are from their faces and it is important that we can recognise familiar individual faces quickly, despite similar configurations to other human faces (Tanaka & Farah, 1993). Faces hold a certain uniqueness: there are very few occasions where two or more faces are the same (e.g., twins), but we can experience many chairs at once, or see multiple different cola bottles or cola brands. Objects are also easily distinguishable (Curby & Gauthier, 2007) but, on the other hand, it is less important that we know individual exemplars and, instead, it is possible to categorise them (Tanaka & Taylor, 1991; Zachariou et al., 2018). Brands seem to be processed in both of these ways because, although they are artificial like some objects (de Silviera, Lages & Simões, 2013), they are recognised through categories (Park, Lawson & Milberg, 1989), and they are also recognised individualistically (Phillips, McQuarrie & Griffin, 2014), or through a unique identity (Aaker, 1997; Klink & Athaide, 2012).

Looking at strategies for processing brands by using a random presentation design compared to a blocked design, we can aim to isolate strategic effects of processing. Naturally, humans look for strategies to make our processing and decisions easier (Macrae & Martin, 2007), for example, through searching for commonalities of recognisable features (Delorme et al., 2004). Therefore, by mixing the blocks, a two-step decision is required (What stimuli category is this? Am I familiar with it?) rather than just deciding if something is familiar or not. The strategies for processing with the blocked design experiments could come from someone facilitating brand recognition alone (e.g., keeping familiar brands ‘in mind’). This would not be possible for the random mixed blocks as there is no guarantee which stimulus category will appear next. Therefore, it shows a more raw, bottom-up decision (Connor, Egeth & Yantis, 2004; Theeuwes, 2010; Van Boxtel, et al., 2010). Olshavsky (1994) suggested that brand recognition is driven by top-down processing, but our choice or selection of brands is driven by both top-down and bottom-up processing (van der Lans, Pieters & Wedel, 2008). Therefore, it is not clear whether a familiarity decision in brands specifically, would adopt one of or both of these methods.

When comparing the results from the blocked design experiments (Chapter Five) with the random design experiments (Chapter Six), across all stimuli groups there was approximately a 50ms deficit from having a two-step decision. As there is a deficit, including in brands, this suggests that when using a blocked design (Chapter Five) individuals were using some form of top-down strategies. Despite this, the pattern of easiest to hardest stimuli category of processing still stood between the two types of experimental design. The objects were the fastest to be responded to, then the brands, then the faces. This linear pattern of results was consistent across the two comparative analyses. Furthermore, the brand comparisons between Experiment One and Two in Chapter Six, showed there to be no influence of preceding and post ceding stimuli (faces or objects) on brand processing, as it is highly automatic, and stable.

The first two research questions had outcomes that suggest that brands are differentially processed, when compared to objects and faces. If brands are indeed a unique stimulus class, it is necessary to distinguish why this might be. When looking at language effects, brands often have dual-input, with the logo and name intertwined, but this is not always the case. Rarely, in brands familiar to the UK, there is an independent logo that is seen alone, but for the purpose of statistical power in this thesis, only brands with logos and names together were used for consistency. Therefore, it was necessary to eliminate reading or language effects as the reason for the differences. When comparing the content name of the brand to the context of the name within the logo, it is possible to show that there is some benefit of processing the brand within its context, despite this not reaching statistical significance. Therefore, just reading the name in typeface removes the facilitation of context, and therefore is more difficult and could suggest that it is not entirely a language processing facet. Processing brands through multiple input is different from that seen in faces and objects, as it is rare with faces and objects that the visual input of name/image combination occur visually in our everyday lives. Name codes (Bruce & Young, 1986) are often accessed independently (dependent on input type) or after specifications for the stimulus type (Johnston & Bruce, 1990). Thus, the face and object stimuli experiments acted as a baseline for this experimental series.

As directed by the literature, there are some features that make our processing of names of brands easier and more fluent. For example: if the spelling is easy to read (Lowrey, Shrum & Dubitsky, 2003); if the name alone is familiar (Meyers-Levy, 1989); or, if the name describes the product (Ranaswamy, Burke & Olivia, 1993) or something useful (Kohli, Harich & Leurthesser, 2005). There are two sides to whether familiarity in words makes them more easily distinguished (Scarborough, Cortese & Scarborough, 1977), or if the unfamiliar words stand out as unique, making them easier to distinguish (Schulman, 1967). However, there is agreement that word processing is, for the most part, implicit (Schacter, 2012; Schacter & Addis, 2007) and featural (Craik & Lockhart, 1972; Lockhart & Craik, 1990). For brand names, therefore, it would be expected that the reading effect of the content of the brand logos (names) would be the strongest (Holden & Vanhuele, 1999). However, it seems we process them holistically, in their own context (logo and name together).

This thesis has presented an original brand model (Figure 2) with an experimental series which has studied one main area within this model. Firstly, after the level of the ‘Combination Name and Logo’ input, Name Recognition Units (NRUs) would see perceptually driven priming. This repetition priming was investigated in

Chapters Five, Six, and Seven; and would be akin to the Face Recognition Units (FRUs) in the Bruce and Young (1986) model. Secondly, in the new brand model, after reaching the NRUs or Other Recognition Units (ORUs) the identity nodes would be reached and, at this stage, the conceptually driven or cross-modal priming could occur. These identity nodes would be similar to the Person Identity Nodes (PINs) in the Bruce and Young model, where activation is at a multi-modal level (Bruce & Valentine, 1985; Burton, 1994). The brand model was adapted from the Bruce and Young model for face recognition and, at the earlier stages of the brand model, this may be appropriate for priming level memory processes. However, under more scrutiny, it is not possible at this stage to conclude about the internal processes of the human cognition regarding brand recognition. Generally, the patterns for recognising brands could be argued to be similar to those for face models (e.g., Bruce & Young), we are just better at recognising familiar and rejecting unfamiliar brands. Therefore, the model is suitable, but account needs to be made for adaptions in stimulus category, as more information about brand processing is learned.

Looking forward with this brand model, it would be necessary to first, behaviourally, look at response priming (button changes and switch costs) to investigate early level processing as seen in multiple memory systems (Dennis, Carder & Perfect, 2010). This could include running a similar experiment but switching button presses between blocks, with familiarity and unfamiliarity crossing hand responses. The priming effect from responses is relatively small compared to that seen in perceptually driven or conceptually driven priming (Dennis, Carder & Perfect). However, isolating or manipulating this could again draw conclusions about the similairities or differences between brands, faces and objects at the picture, logo and name codes (Figure 2).

There is a consistent issue with the artificiality of running lab experiments and drawing conclusions of the appropriateness of results in real life. The standardisation in these experiments, with the use of estimated visual angle and the influence of the same size images selected, was used due to the lack of possibility of showing images in ecologically valid sizes, as the foveal and parafoveal vision is adaptable to how we perceive our world around us. Our exposure to brands in the real-world will always be different (e.g., size of brand presented on a coke bottle, or a billboard). This concept is the same for seeing objects and faces near or far. The changes in faces and objects (e.g., through aging) are different to that for brands - as unless a brand goes through a deliberate ‘re-branding’, the brand will stay the same, as it is a stable concept. Furthermore, when brands have attempted to do moderate changes for marketing purchases, it has affected their sales negatively (Hulme, Maughan & Brown, 1991; e.g. coca cola going ‘green’).

The present research suggests that brands are different to faces and objects. Furthermore, that brands are a mid-way point in responsiveness between faces and objects. This is likely due to their design by nature. From a utilitarian point of view, brands are identifiable and attract attention. This is, in fact, their purpose, they aim to stand out. If branding is done well, sales will increase (Kent & Kallaris, 2001) through repeated recognition (Verjimeren, Karremans, Stroebe & Wigboldus, 2011) and through emotional attachments being made (Chang, 2007). This emotional attachment is important when comparing brands responses with our feelings towards other manmade, artificial objects, such as, road signs. For example, road signs are designed to draw attention, but not necessarily evoke an emotion that leads to repeated brand purchasing. Therefore, brands are unique. This uniqueness can be seen by our fluency in learning them like other more naturally occurring stimuli, as seen through the current experiments in Chapter Five. Equally, it is important to acknowledge that these differences are not due to a reading effect (Chapter Seven), nor, a participant-driven strategy (Chapter Six) that differed for face or object recognition, from brand recognition.

In hindsight, there are a number of things to consider with this thesis. The first, is that there was consistency in the sizing and presentations of brand stimuli throughout, so that conclusions could be drawn without explanations from visual process residue, instead of a pure effect from memory. Whilst considering this, it is necessary to again mention the unreliability with the unfamiliar object stimuli. As mentioned previously, the affordances that people draw from any real-life unfamiliar objects made it difficult to use these as a stimuli bank, therefore these were chosen a s a control group. Therefore, it is necessary to hold conclusions drawn from the object data with caution as participants still had different ways of strategising when recognising and rejecting these stimuli on a familiarity basis.

From the data in Chapter Seven, with the brand model in mind, it is necessary to maybe collapse across the different nodes for identity nodes as these contain the content of the brand name and context of the logo. Therefore, this new proposed model for the purposes of these current studies, should combine the Name Recognition Units with the name codes (as these are purely content based, and further information from the Semantic Information Units can be accessed through these in the same way. Perceptually, these nodes act in the same way but have a reading aspect that has been disentangled in Chapter Seven.

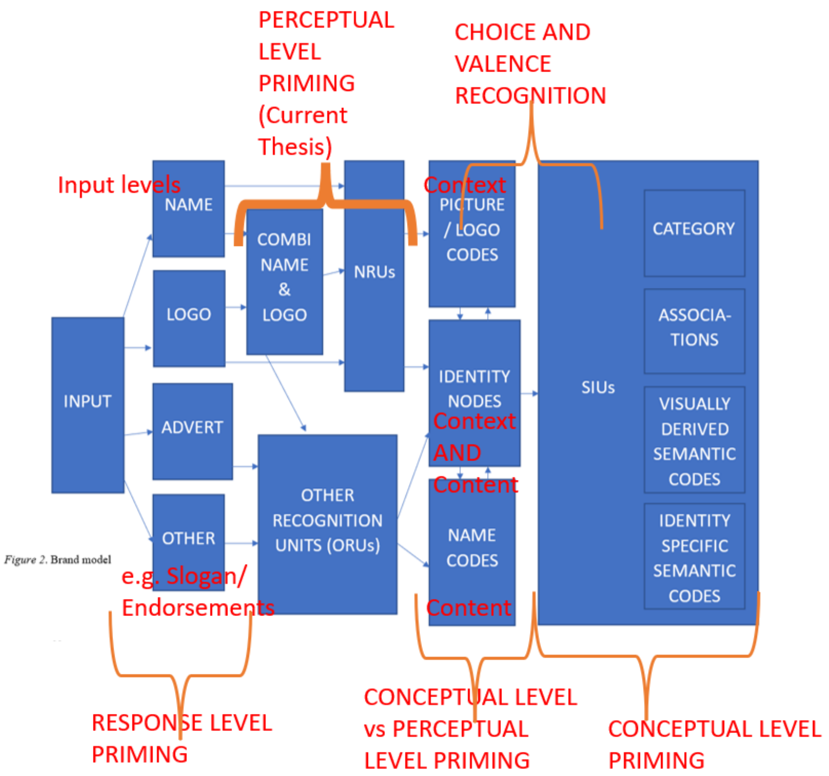

Figure 40. Annotated model with levels of priming highlighted. The perceptual level priming is the focus of the majority of these studies. The response level priming could be look at with button changing and switch costs. The conceptual level versus perceptual level priming is the focus of Part B- Chapter 10 (Appendix A). Finally, the plan for conceptual level priming and choice and valence recognition are also discussed in Appendix A and this General Discussion (Chapter Eight).

Finally, to investigate associative priming, it might be possible to look at when celebrities endorse or are ‘the face of a brand’. Could a person prime a brand with their associated adverts or endorsements? It would be difficult to match these with enough knowledge between participants and it would be culturally specific. This would see an individual person priming and activating the Person Identity Node (Bruce & Young, 1986) of another (Young et al., 1994). In the case of brands, this would be a person identity node from face processing, activating an inanimate brand identity node (Figure

2). This would be interesting because it could show a deeper associative priming level for brands, which has not been seen before.

When looking at changes that could be made to the current experiments, it is necessary to look for an alternative to the novel objects (and corresponding names). As discussed previously, there are difficulties with assessing these stimuli under familiarity decisions because of their consistent differences from other categories of stimuli. Equally, this concern could be expressed about the corresponding non-word names in the object word study. The results of the objects studies have been interpreted with caution for these above reasons, but they have, for the most part, acted as a baseline for the brand experiments. It would also be useful to have used a quantitative measure of participants’ time spent in the UK or the target countries, to assess whether this could be the reason for low accuracy in some participants who were excluded and replaced.

Following this, it could also have been possible to measure accuracy by what each participant responded, rather than by a pre-evaluated set of stimuli. By taking each response as intentionally correct and not accounting for error, it would be possible to distinguish if a participant’s existing memories made a difference to the pattern of familiarity type comparison results. Finally, it would also have been useful to have evaluation scores for the name/word stimuli, to validate them so the covariate of rating could have been used in the Chapter Seven analyses (to further look at familiarity of names influencing the main effects and interactions as in Chapters Five and Six).

For Chapters Five and Six, a subject analysis and an item analysis were conducted. This method was selected because there was a mismatch between rating averages and ranges from the stimulus evaluation (Chapter Four), in all the familiar and unfamiliar objects, faces, and brands. This mismatching had some effects on the data, as seen in the item analyses ANCOVAs of Chapters Five and Six. This method of using an independent pre-measure of a particular brand dimension, as a covariate, in future analyses has been seen in other brand research (Goh, Chattaraman & Forsythe, 2013). It would also have been possible to run a linear mixed effects model in these chapters, to account for full variability in the rating scores. This may be an analysis to consider for future research in this topic.

As mentioned in Chapter Seven (Experiment Three, Brands), the full design included visual presentation of the brands in logo and name form, with each stimuli type priming itself only. The analysis from Chapter Seven did not find a significant effect of stimuli type differences (names versus logos), but future research could expand on this by investigating mixed- and cross-modal priming effects and if brands can be cross-modally primed like faces (Ellis et al., 1987). Weldon (1991) found the priming effect to be made up of multiple processes with differences between lower and higher level processing (between or across-modality). Stenberg, Radeborg and Hedman (1995) suggested that there are multiple stages, firstly a perceptual familiarity distinction has to be made before a semantic or conceptual decision can be accessed. Although the majority of this thesis is concerned with perceptual level priming, the comparison between perceptually driven and conceptually driven priming could be investigated using the same paradigm, but by analysing block two data. This would see repetitions within and across modality at the level of the identity nodes, rather than the NRUs or ORUs (Figure 2). It would be expected that the within-modal, perceptually driven priming would be more robust than the cross modal, conceptually driven priming. This paradigm could also investigate auditory presentations of names and could be used for comparing between priming types.

At the level of conceptual priming, moving forward, it would be interesting to look at conceptual or semantic decisions for brands in isolation. A design for this could include categorising brands in multiple ways at a more conceptual level than familiarity (e.g., luxury/budget or food/drink). These decisions would require a deeper level of processing at the Semantic Information Units (SIUs; Bruce & Young, 1986; Figure 2), where a multiple input level store could hold a plethora of information about individual brands. At this level you could assess semantic priming: whether a decision regarding food/drink could prime a subsequent unrelated decision, when the stimulus is the same (e.g., luxury/budget). This could also be done with faces (e.g., actor/non-actor or male/female) and objects (e.g., animate/inanimate or large/small) as a direct comparison of stimulus categories. It would be expected that we could first find that conceptual level priming in brands occurs at the identity nodes and SIUs stage of the brand model in depth.

Our familiarity and expertise for brands could be related to the fact that humans have an affiliation for liking brands more than other stimuli. We are constantly surrounded by brands and, therefore, the repeated presentation increases our facilitation at recognising them (our familiarity). Literature has suggested that the more familiar a brand is, the more liked it is (Baker et al., 1986; Monroe, 1976). It would have been useful for the aims of this thesis to be able to create a scale of the most-to-least liked brands, through relative scaling techniques. This quantitative scale could have acted as a covariate for ANCOVAs, alongside the other analyses (Chapters Five and Six), or further, the data from a choice experiment could have been used with the stimulus evaluation data (Chapter Four), to look at whether choice is influenced by how much we like a brand, or vice versa.

The contribution of this thesis is predominantly showing that brands are special. We respond differently to various stimuli classes: brands, faces and objects. Previous research has concentrated on choice or familiarity of brands from a consumer journey perspective, but this thesis adds a cognitive perspective on the features of brand processing and recognition. There are a few features of brands that make them visually and conceptually different (language, context, expertise, and lots of exposure), but the current experimental series has given evidence that the reason brands are special is not a reading effect, but rather, that seeing the name in its context is what makes brands so easily recognised. Further, this suggests that seeing the written name out of context (without colour and typography), could possibly make the processing more difficult or less successful. The brand model is a starting point for a more refined model, looking at multi-level input to investigate other modalities of input (e.g., hearing the name or advert). With more research conducted into this field, it would be possible to adapt a model and make it more streamlined.

To conclude, much of the previous research covered topics in purchase choice of brands, whereas the focus of this thesis was regarding the processing or memory for brands. Brands are a special stimulus class, mainly for three reasons: they are individuals, like faces; they are categorisable, like objects; and the main feature of brands is their stability and lack of change. As well as these dimensions, literature suggests processing brands is done configurationally and via component parts, all of which theoretically bridge the gap between faces and objects. The model was created to outline, at a starting level, the stages we go through to cognitively process a brand. This behavioural research, where it was found that brands bridge the gap between faces and objects in processing difficulty, as well as the model, pave the way for future behavioural and neurophysiological research on brands, from both a consumer and a cognitive perspective.

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APPENDIX A

PART B: FUTURE DIRECTIONS

Chapter 9: Relative scaling- Brand choice influences

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9.3 Methods

9.4 Analysis and Results

9.5 Discussion

Chapter 10: Cross-modality conceptual level priming of brands

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PART B: FUTURE DIRECTIONS

Part B of the thesis has been included to show more studies that were completed or designed to provide a different dimension of support for the proposed brand model. This includes a proposed study on choice of brands affecting familiarity in memory. This was unable to be tested on participants because of Covid-19 pandemic. Also included, the starting point for a series of conceptually driven priming experiments. This study was run as a pilot with the hopes of running a larger, more conclusive and comprehensive conceptual study later. Again, this was not possible to follow up because of the pandemic.

CHAPTER NINE: RELATIVE SCALING- BRAND CHOICE INFLUENCES

9.1 Abstract

Literature suggests a key feature of brand processing is the relationship between familiarity and choice. It is necessary to look at the influence of how much brands are liked and how familiar they are. Therefore, we propose a study that would create a scale of how liked all of the familiar brand stimuli were. The lowest scores would be the least liked and the highest as the most. This study was proposed to be conducted with 48 participants before the Covid-19 pandemic, this put a hold on the ability to run this study with participants, therefore proposed analyses and expected results will be discussed. Participants would undertake a forced choice task where they decide which of two stimuli they preferred. This forced choice decision would present each of the 80 familiar brands against each of the other 79 an equal number of times, so that a relative scale of paired comparisons could be created. It is expected that there would be a strong positive correlation between choice and familiarity. The outcomes of this study could lead to further research for distinguishing how the factor of valence and choice could influence familiarity and vice versa. It would also be possible to use this data to look further into the results from the other experimental chapters and use this data as a covariate as seen with the item analyses. Applications from the study could be used for marketing for why brands are chosen and liked.

9.2 Introduction

The salience for brands follows the same theoretical structure as for other items (e.g. common objects), but it is unlikely that we are as attached to other items as we are for brands. In chapter six (random presentation designs) we investigated bottom-up compared to top-down processing. Olshavsky (1994) suggested that our processing for brands is more goal oriented than for other objects and is, therefore, top-down. Furthermore, that our choice for brands is moderated by these top-down cognitive processes. Karjalainen and Snelders (2009; Karjalainen, 2004) looked at feature processing affecting how much we like a brand. They stated that brand philosophy is part of the design of a brand, which in turn affects how we interpret their values and our choice for them. This was also supported by van Rompay & Pruyn (2011) who found that the symbolism of brands is heavily in-built to the design of the logo, and therefore, ultimately, appearance affects our choice.

Ha and Perks (2005) discussed three factors that influence our trust for brands, with the thinking that our trust in brands influences choice. The three factors were familiarity, experiences with the brand, and emotional factors towards the brand. This would suggest that the relationship between familiarity and choice, is positive and linear and that all of these factors build up to modulate how we choose a brand. For brands, we have an expertise effect that has been investigated throughout this thesis. There is plenty of evidence that familiarity and choice are highly related (Axelrod, 1968). Some research suggests that familiarity in brands is what pushes us to choose our favourites - the more familiar a brand is, the more dominant our choice for it is (Baker, Hutchinson, Moore & Nedungadi, 1986; Monroe, 1976). Sundaram and Webster (1999) looked at choice as a factor of positive or negative marketing on familiar and unfamiliar brands. Negative reviews can influence our choice for familiar brands more as they have ‘more to lose’ than unfamiliar brands, but there is an equal effect for positive marketing on all brand types (familiar and unfamiliar), suggesting that familiarity can influence choice rather than the other way around.

The aim of the current study is to create a relative scale, using a pairing scaling technique, of the most-to-least liked brand logo. This, in turn, will allow us to use these scores as a covariate for the familiarity studies. The familiarity studies all use a forced choice decision of whether a participant knows, or does not know, a particular brand. Half of the brands were rated as familiar and half as unfamiliar, from an independent group of participants to those in the main studies. All the familiarity studies were conducted with logos and written brand names, but the current study will look exclusively at familiar logos. It is expected that, due to a modulating effect of brand choice on memory, those brands rated as most liked will also be the ones that are remembered most effectively in other studies.

9.3 Methods

Participants

It was planned that 48 participants from the School of Psychology participant panel at Bangor University, would take part for course credit.

Stimuli

Eighty full colour images of familiar brand logos - those used in Chapters five, six and seven, as decided from the stimulus evaluation (Chapter four).

Design

Two images would appear on the screen until a response was made (as no response times were being collected). The images would be spaced on the left and right of the screen around a white fixation cross in the centre of a black screen. All 80 images will be presented against all 79 others, excluding itself. Each stimulus would be presented against all others an equal number of times, and also be presented on each side of the screen an equal number of times. In total this makes 3160 pairings of trials which, unfortunately, would make the experiment too long for any one participant. Therefore, the experiment would be split into two sections - with each containing one half of the trials. Each participant would therefore complete 1580 trials split into four equal blocks of 390 trials each.

Procedure

Participants would be seated approximately 50cm from the computer screen mounted at eye level on a desk. Participants would be asked to make a response as soon as a decision was made, but that their response times were not being recorded. Participants would make keyboard responses as to which of the two presented stimuli the participants preferred - the left or the right. Standard keyboard presses would record accuracy responses, with F recording the left image, and J for the right.

Analysis

A paired scaling technique will be used to change over the qualitative feature of which stimuli is liked better (left or right) to create a quantitative continuum scale. As we are not good at estimating on a scale how much we like something (comparable to others), a method of selecting one item over another will be used and analysed. Therefore, we create a distribution of all the object pairs by calculating the proportion of times one brand is preferred to every other. For example, if out of 40 choices a brand is chosen three times, it will be lower in the distribution than an item chosen 38 times. Therefore, frequency can be transformed into proportions, and of that the probability can be calculated and the p value from a normal distribution can be transformed into z scores (e.g. z=1.5, or z=3). Then after the scale is made the rating can be used as a covariate.

9.4 Expected Results & Discussion

It is expected that there will be a correlation between familiarity ratings from the stimuli evaluation and the rating scale found in this study. This correlation will be strong and directional with the more familiar being more preferred.

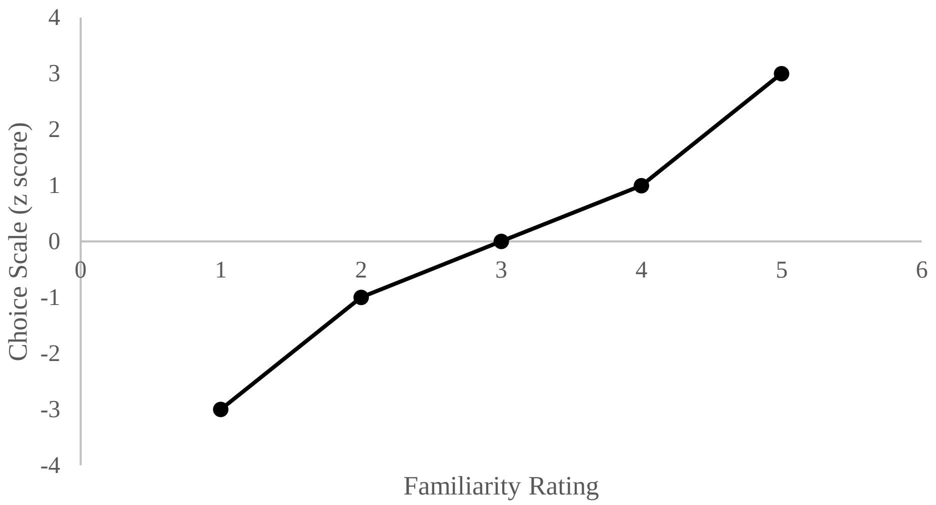

Figure 41. Expected results for familiarity rating by choice of brands

As seen in the stimuli evaluation study, the compatibility of matching the ratings between categories (faces and objects) was not available. But, by using z scores, if this study was repeated for faces and objects these would be comparable for a subject analysis without using an item analysis additionally. With this positive correlation it would be difficult to distinguish whether the familiarity effect caused the brand to be preferred or whether the preference caused them to be more familiar. However, from previous research it is suggested that we prefer items we are more familiar with, thus direction could be inferred loosely. It would also be possible to have a baseline of ‘liking’ by using the unfamiliar brands as a control group. This could again be correlated against the familiarity ratings and could also be useful to then distinguish if there are any particular similarities between the brands that we like - e.g. featural or holistic processing, colour, etc. Also, it would be possible to look at novel familiar priming by running the forced choice decision of what is most liked, multiple times (e.g. twice, 20 times, 40 times) and see if this effect of liking increases throughout with the increased familiarity.

CHAPTER TEN: CROSS-MODALITY CONCEPTUAL LEVEL PROCESSING OF BRANDS

10.1 Abstract

Previous experiments have investigated perceptually driven priming at the level of Face Recognition Units (Bruce & Young, 1986), Name or Other Recognition Units (Figure 2). This pilot experiment looked at conceptually driven priming at the level of identity (Person Identity Nodes, Bruce & Young; Identity Nodes, Figure 2). Block two data from Experiment Three, Chapter Seven (7.5) were used to formulate two analyses. The first, explored unprimed unfamiliar, where no node exists, and unprimed familiar, where there is a pre-existing node. The unprimed stimuli category is the first presentation of the opposite modality (logos or names) and can represent cross-modal priming. The second, looked at global analysis of familiarity type, stimuli type, priming effect, and effect of block (1= within-modality priming, 2= cumulative effect, and cross-modality priming). There were effects of cross-modality priming in brand logos, more than in words. This effect suggests that we cannot learn the combination of name to logo without first having some form of familiarity or name to anchor it to. Therefore, words do not prime brands, as much as brands prime words. Unfamiliar stimuli were also consistently slower in both stimuli types. There was also an interaction between familiarity and priming, where unfamiliar holds more benefit of multiple presentations (irrespective of modality) as there is less of a long-term memory representation in the semantic system. These results could lead to further studies, isolating conceptual level priming and allowing us to test memory processing in brands, at another section of the brand model (Figure 2).

10.2 Introduction

Conceptual level priming includes cross-modality priming where items from two modalities (e.g., words and images) prime each other. Despite conceptual level priming facilitation being a strong effect, it is still a weaker form of priming than pure perceptual level priming (or repetitions; Ellis et al., 1987). This is because perceptual priming is at an earlier stage of processing (Bajo, 1988; Bruce & Young, 1986) for example at the level of name recognition units (NRUs) or face recognition units (FRUs). Conceptual priming, however, is at a deeper level of processing within the person identity nodes (PINs) for example, where multimodal information about a specific person is stored. At this stage, a low-level semantic representation is reached which is a singular platform rather than multiple representations of different modalities (Vanderwart, 1984). This example demonstrates how priming levels would work for faces (or objects; Schneider, Engel & Debener, 2008) but, brands are somewhat different in the fact that they have multiple levels of input at one point (name and logo together). This could suggest that there could be an additive priming effect from different types of priming working together. As previously found in the words chapter there seems to be more of a priming effect of words priming brands, but not the other way around- suggesting there is more of an effect of the name in context rather than the reading effect of the content itself. This is contradictory to research on picture and visual word priming (Weldon, 1991) where the effects of different types of encoding saw visual word priming as more robust than for pictures. Further, Weldon suggests that priming is made up of multiple processes which is why there is a mismatch between lower level and higher level processing (between- or across-modality). Stenberg, Radeborg and Hedman (1995) suggested that there are multiple stages, firstly a perceptual familiarity distinction has to be made before a semantic or conceptual decision can be accessed.

There are a few factors, to be discussed, that influence the level of conceptual priming strength. Brown, Neblett, Jones and Mitchell (1991) found that conceptual priming is consistent like perceptual level priming and the effects are more robust in blocked tasks than mixed trial tasks. Suggesting that a change in task causes a deficit in processing, but that priming was still present. Secondly, if the study and test phase tasks are identical or similar then all priming is boosted, but if using a cross modal design, the congruence between stimuli modality types in the study and test phases, influence the strength of the priming effect (Stenberg, Radeborg, & Hedman, 1995). Further to this, Stenberg et al, discussed that generally, pictures prime better than words/names- in fact, picture to word priming is the strongest conceptual effect rather than that seen for word to picture priming. This concept was supported by Carr, McCauley, Sperber and Parmalee (1982) where there was greater facilitation from pictures than words, that we are more automatised and fluent to processing visual images than words as the semantic bank is easier to access at this level. But, the benefit from seeing within-modality stimuli is more than for cross-modality stimuli as this is modulated by attention.

In previous chapters, the priming concerned has been perceptual priming (within a modality, repetition priming) where the one image has primed the same images. In the words chapter, brand sub-experiment, a different design was used whereby, brands were seen as names and logos with the aim of isolating the reading effect of brand processing. The results compared only the perceptual-level priming (within-modality, name to name, or logo to logo) whereas, the aim for this study was to look at conceptual-level priming (across the modalities, name to logo and logo to name) and to investigate if there are differences between within- and cross-modality priming. Following on from previous research it is expected that a dampened effect will be found for conceptual when comparing perceptual and conceptual priming. This is because pure repetition priming is the strongest form of priming. Also, it is expected that there will be an interaction between the two types of priming.

10.3 Methods

The methods for the running of the experiment were described in Chapter 7 (7.5, brand names and brand logos), however, the analysis for this chapter varied. The 48 participants completed four blocks of familiarity decisions on logos and names. The first two blocks used the same modality of stimuli, the second two, used the alternate type of stimuli. This was counterbalanced along with the button presses. The full stimuli set were presented as both logos and as words, but there was a random order presentation in each block.

The analysis consisted of using the other two remaining blocks of data to: 1) look at conceptually driven priming from the facilitation in the familiar stimuli vs the unfamiliar stimuli, and 2) to run a comparison between the perceptual-level priming in Chapter Seven, and conceptual-level priming across the modalities. Cross-modal priming was achieved by running a 2 (familiarity type: familiar, unfamiliar) x2 (stimuli type: names, logos) x2 (priming: unprimed, primed) ANOVA, comparing only the second presentation type, with block two data. Thus, the stimuli had been seen before as the opposite stimuli type (either names or logos), in Chapter Seven, and therefore, it is possible to isolate the additive effect from the opposite stimuli type, compared to the same stimuli type (priming factor of the 2x2x2x2 Global ANOVA). The global ANOVA factors were: Familiarity (familiar, unfamiliar), Stimuli type (word, brand), global priming (within modality, cross modality), block (first [within-modality], second [cross-modality]).

10.4 Results

Analysis one looked at the second presentation blocks of data. Response times only included correct responses recorded in milliseconds (ms). Starting with the main effects, the familiarity type effect was significant (F(1,46)= 75.094, p<.001, ηp^2= .620) where the familiar (M= 532.50ms, SE= 6.83ms) were quicker than the unfamiliar (M= 584.04ms, SE= 8.27ms). There was no main effect of stimuli type (F(1,46)= .293, p= .591, ηp^2= .006). However, there was a main effect of block two cross-modal priming (F(1,46)= 23.473, p<.001, ηp^2= .338), with the primed (M= 548.34ms, SE= 6.84ms) being 20ms faster than the unprimed (M= 548.34ms, SE= 7.67ms). The familiarity type x stimuli type interaction was also significant (F(1,46)= 5.627, p= .022, ηp^2= .109). The priming by stimuli type interaction was also significant (F(1,46)= 6.517, p= .014, ηp^2= .124). The interaction between familiarity and priming was also significant (F(1,46)= 14.054, p<.001, ηp^2= .234). The familiar unprimed (M= 538.46ms, SE= 7.15ms), were slower than the familiar primed (M= 526.53ms, SE= 7.21ms). However, there was a larger priming effect for the unfamiliar unprimed (M= 597.92ms, SE= 9.30ms) to the primed (M= 570.15ms, SE= 7.85ms). Finally, there was no three-way interaction (F(1,46)= .307, p= .582, ηp^2= . 007).

Accuracy data, for analysis one, used percentage correct responses. There was no main effect of familiarity (F(1,46)= .341, p= .562, ηp^2= .007). The familiar stimuli (M= 91.55, SE= 1.04) were more accurate than the unfamiliar (M= 90.74, SE= 1.15). There was no main effect of stimuli type (F(1,46)= 2.138, p= .150, ηp^2= .044). The priming effect was non-significant (F(1,46)= .332, p= .568, ηp^2= .007) as there was very little difference between the unprimed (*M*= 91.26, *SE*= .89) and the primed (*M*= 91.03, *SE*= .87). The familiarity type by stimuli type interaction was significant ($F(1,46)= 4.697$, $p= .035$, $\eta p^2= .093$). The priming by stimuli type interaction was not significant ($F(1,46)= .037$, $p= .849$, $\eta p^2= .001$). The familiarity type by priming interaction was not significant ($F(1,46)= .113$, $p= .738$, $\eta p^2= .002$). This is because the familiar unprimed (*M*= 91.75, *SE*= 1.18) to primed (*M*= 91.35, *SE*= .98) was similar to the unfamiliar unprimed (*M*= 90.78, *SE*= 1.16) and primed (*M*= 90.70, *SE*= 1.24). The three-way interaction was again, not significant ($F(1,46)= 1.020$, $p= .318$, $\eta p^2= .022$).

Analysis two was the Global ANOVA comparing block two (cross-modal priming) with block one (within-modal priming). Response times, again, only included correct responses and were recorded in milliseconds (ms). The words were slightly slower (*M*= 568.17ms, *SE*= 7.19ms) than brand logos (*M*= 568.23ms, *SE*= 7.19ms) but this did not reach significance ($F(1,92)= .000$, $p= .995$, $\eta p^2< .001$). For familiarity, the familiar stimuli were significantly faster (*M*= 540.71ms, *SE*= 4.88ms) than the unfamiliar (*M*= 595.69ms, *SE*= 6.09ms; $F(1,92)= 165.144$, $p<.001$, $\eta p^2=.642$). The priming main effect was also significant ($F(1,92)= 81.41$, $p<.001$, $\eta p^2=.469$) with primed (*M*= 555.21ms, *SE*= 5.15ms) being faster than unprimed (*M*= 581.19ms, *SE*= 5.42ms). For the block priming effect, it almost reached significance ($F(1,92)= 3.816$, $p=.054$, $\eta p^2= .040$), where primed was again faster (*M*= 558.27ms, *SE*= 7.19ms) than unprimed (*M*= 578.13ms, *SE*= 7.19ms). The familiarity by stimuli type interaction was non-significant ($F(1,92)=3.109$, $p= .081$, $\eta p^2= .033$; word familiar [*M*= 536.91ms, *SE*= 6.90ms]; word unfamiliar [*M*= 599.44ms, *SE*= 8.61ms]; brand familiar [*M*= 544.51ms, *SE*= 6.90ms]; brand unfamiliar [*M*= 591.95ms, *SE*= 8.61ms]. The priming by block reached significance ($F(1,92)= 4.541$, $p= .036$, $\eta p^2= .047$) with the unprimed, block one category being slowest (*M*= 594.20ms, *SE*= 7.66ms) followed by the primed, block one category (*M*= 562.07ms, *SE*= 7.28ms), next the unprimed, block two (*M*= 568.19ms, *SE*= 7.67ms), and then the primed, block two category (*M*= 548.34ms, *SE*= 7.28ms). Block type vs stimuli type interaction was not significant ($F(1,92)= .542$, $p= .463$, $\eta p^2= .006$) and the means for this were as follows: (word block one, *M*= 581.85ms, *SE*= 10.17ms; word block two, *M*= 554.49ms, *SE*= 10.17ms; brand block one, *M*= 574.42ms, *SE*= 10.17ms; brand block two *M*= 564.04ms, *SE*= 10.17ms). The stimuli type x priming interaction was not significant ($F(1,92)= 2.913$, $p=.091$, $\eta p^2= .031$), with the means as follows: (word unprimed *M*= 583.62ms, *SE*= 7.67ms; word primed *M*= 552.72ms, *SE*= 7.28ms; brand unprimed *M*= 578.76ms, *SE*= 7.67ms; brand primed *M*=557.69ms, *SE*= 7.28ms). The block x familiarity interaction was non-significant ($F(1,92)= .648$, $p= .423$, $\eta p^2= .007$). The means were: block one familiar (*M*= 548.92ms, *SE*= 6.90ms); block one unfamiliar (*M*= 607.35ms, *SE*= 8.61ms), block two familiar (*M*= 532.50ms, *SE*= 6.90ms), block two unfamiliar (*M*= 584.04ms, *SE*= 8.61ms). The interaction for priming by familiarity was significant ($F(1,92)= 7.774$, $p= .006$, $\eta p^2=.078$). The familiar unprimed stimuli (*M*= 551.56ms, *SE*= 5.22ms) were slower than the familiar primed (*M*=529.86ms, *SE*= 4.99ms), the unfamiliar unprimed stimuli (*M*= 610.83ms, *SE*= 6.40ms) were slower than the unfamiliar primed stimuli (*M*= 580.56ms, *SE*= 6.27ms). The three-way interaction between block, familiarity and stimuli type was not significant ($F(1,92)= 2.352$, $p=.128$, $\eta p^2= .025$; Table 19). The three-way interaction between priming, familiarity and stimuli type was not significant ($F(1,92)=.912$, $p=.342$, $\eta p^2= .010$; Table 20). The three-way interaction between priming, block and stimuli type was not significant ($F(1,92)=3.705$, $p= .057$, $\eta p^2= .039$; Table 21). The three-way interaction between priming, block and familiarity was significant (*F*(1,92)= 5.618, *p*= .020, ηp^2=.058, Table 22). Finally the interaction between within modality priming, cross modality priming, stimuli type and familiarity type was not significant (*F*(1,92)= 2.949, *p*=.089, ηp^2= .031, Table 23).

Table 19. *Means for three way interaction between block, familiarity and stimuli type*

Stimuli type	**Block**	**Familiarity**	**Mean response time/ms (*SE*)**
Word	One	Familiar	552.14 (*9.76*)
		Unfamiliar	611.55 (*12.18*)
	Two	Familiar	521.67 (*9.76*)
		Unfamiliar	587.32 (*12.18*)
Brand	One	Familiar	545.70 (*9.76*)
		Unfamiliar	603.14 (*12.18*)
	Two	Familiar	543.32 (*9.76*)
		Unfamiliar	580.76 (*12.18*)

Table 20. *Means for three way interaction between priming, familiarity and stimuli type*

Stimuli type	**Familiarity**	**Priming**	**Mean response time/ms (*SE*)**
Word	Familiar	Unprimed	550.95 (*7.38*)
		Primed	522.86 (*7.06*)
	Unfamiliar	Unprimed	616.29 (*9.05*)
		Primed	582.58 (*8.86*)
Brand	Familiar	Unprimed	552.17 (*7.38*)

		Primed	536.85 (*7.06*)
	Unfamiliar	Unprimed	605.36 (*9.05*)
		Primed	578.54 (*8.86*)

Table 21. *Means for three-way interaction between priming, block and stimuli type*

Stimuli type	**Block**	**Priming**	**Mean response time/ms (*SE*)**
Word	One	Unprimed	597.60 (*10.84*)
		Primed	566.10 (*10.29*)
	Two	Unprimed	569.65 (*10.84*)
		Primed	539.34 (*10.29*)
Brand	One	Unprimed	590.79 (*10.84*)
		Primed	558.04 (*10.29*)
	Two	Unprimed	566.74 (*10.84*)
		Primed	557.35 (*10.29*)

Table 22. *Means for three-way interaction of priming, block and familiarity type.*

Block	**Familiarity**	**Priming**	**Mean response time/ms (*SE*)**
One	Familiar	Unprimed	564.66 (*7.38*)
		Primed	533.18 (*7.06*)
	Unfamiliar	Unprimed	623.73 (*9.05*)
		Primed	590.97 (*8.86*)
Two	Familiar	Unprimed	538.46 (*7.38*)

		Primed	526.53 (*7.06*)
	Unfamiliar	Unprimed	597.92 (*9.05*)
		Primed	570.15 (*8.86*)

Table 23. *Means for four-way interaction of priming by block by familiarity type by stimuli type*

Stimuli Type	**Block**	**Familiarity**	**Priming**	**Mean response time/ms (*SE*)**
Word	One	Familiar	Unprimed	569.62 (*10.44*)
			Primed	534.67 (*9.98*)
		Unfamiliar	Unprimed	625.57 (*12.80*)
			Primed	597.54 (*12.53*)
	Two	Familiar	Unprimed	532.28 (*10.44*)
			Primed	511.06 (*9.98*)
		Unfamiliar	Unprimed	607.02 (*12.80*)
			Primed	567.62 (*12.53*)
Brand	One	Familiar	Unprimed	559.70 (*10.44*)
			Primed	531.69 (*9.98*)
		Unfamiliar	Unprimed	621.89 (*12.80*)
			Primed	584.40 (*12.53*)
	Two	Familiar	Unprimed	544.65 (*10.44*)
			Primed	542.00 (*9.98*)
		Unfamiliar	Unprimed	588.83 (*12.80*)
			Primed	572.69 (*12.53*)

Following the response time data, is the percentage accuracy data was used for analysis two. The words were less accurate (*M*= 91.03, *SE*= .79) than brand logos (*M*= 91.15, *SE*= .79) and this reached significance (*F*(1,92)= 1.318, *p*=. 917, $\eta p^2 < .001$). For familiarity, the familiar stimuli were more accurate (*M*= 91.56, *SE*= .68) than the unfamiliar (*M*= 90.61, *SE*= .78) but this did not reach significance (*F*(1,92)= 1.052, *p*= .308, ηp^2=.011). The priming main effect was also approaching significance (*F*(1,92)= 3.708, *p*=.057, ηp^2=.039) with primed (*M*= 91.40, *SE*= .57) being more accurate than unprimed (*M*= 90.78, *SE*= .65). For the block, the effect was not significant (*F*(1,92)= 1.318, *p*= .917, ηp^2<.001), but primed was again slightly more accurate (*M*= 91.03, *SE*= .80) than unprimed (*M*= 91.15, *SE*= .80). The familiarity by stimuli type interaction was significant (*F*(1,92)= 7.053, *p*= .009, ηp^2= .071; word familiar [*M*= 92.73, *SE*= .97]; word unfamiliar [*M*= 89.32, *SE*= 1.09]; brand familiar [*M*= 90.39, *SE*= .97]; brand unfamiliar [*M*= 91.90, *SE*= 1.09]. The priming by block interaction was significant (*F*(1,92)= 7.011, *p*= .010, ηp^2= .071). Unprimed, block one had the lowest accuracy (*M*= 90.29, *SE*= .85), the other three categories were similar primed, block one [*M*= 91.77, *SE*= .80]; unprimed, block two [M= 91.26, SE= .85]; primed, block two [*M*= 91.03, *SE*= .80]). Block x stimuli type interaction was significant (*F*(1,92)= 5.436, *p*= .022, ηp^2= .056) and the means for this were as follows: (word block one *M*= 89.66, *SE*= 1.12; word block two *M*= 92.40, *SE*= 1.12; brand block one *M*= 92.40, *SE*= 1.12; brand block two *M*= 89.90, *SE*= 1.12). The stimuli type x priming interaction was not significant (*F*(1,92)= .026, *p*=.873, ηp^2< .001), with the means as follows (word unprimed *M*= 90.74, *SE*= .85; word primed *M*= 91.32, *SE*= .80; brand unprimed *M*= 90.81, *SE*= .85; brand primed *M*= 91.48, *SE*= .80). The block by familiarity interaction was non-significant (*F*(1,92)= .024, *p*=.878, ηp²<.001). The block one familiar (*M*= 91.58, *SE*= .97), block one unfamiliar (*M*= 90.48, *SE*= 1.09), block two familiar (*M*= 91.55, *SE*= .97), block two unfamiliar (*M*= 90.74, *SE*= 1.09). The interaction for priming by familiarity was not significant (*F*(1,92)= 2.083, *p*= .152, ηp²=.022). The familiar unprimed stimuli (*M*= 91.03, *SE*= .76) was less accurate than the familiar primed (*M*= 92.10, *SE*= .66), the unfamiliar unprimed stimuli (*M*= 90.52, *SE*= .80) was slower than the unfamiliar primed stimuli (*M*= 90.70, *SE*= .81). The three-way interaction between block, familiarity and stimuli type was not significant (*F*(1,92)= .332, *p*=.566, ηp²= .004; Table 24). The three-way interaction between priming, familiarity and stimuli type was not significant (*F*(1,92)= 2.083, *p*=.152, ηp²= .022; Table 25). The three-way interaction between priming, block and stimuli type was not significant (*F*(1,92)= .161, *p*= .689, ηp²= .002; Table 26). The three-way interaction between priming, block and familiarity was reaching significance (*F*(1,92)= 3.813, *p*= .054, ηp²=.040, Table 27). Finally the interaction between priming, block, stimuli type and familiarity type was not significant (*F*(1,92)= .007, *p*=.933, ηp²< .001, Table 28).

Table 24. *Means for three-way interaction between block, familiarity and stimuli type*

Stimuli type	**Block**	**Familiarity**	**Mean response time/ms (*SE*)**
Word	One	Familiar	91.17 (*1.37*)
		Unfamiliar	88.15 (*1.51*)
	Two	Familiar	94.30 (*1.37*)
		Unfamiliar	90.50 (*1.54*)
Brand	One	Familiar	91.98 (*1.37*)
		Unfamiliar	92.81 (*1.54*)

	Two	Familiar	88.80 (*1.37*)
		Unfamiliar	90.99 (*1.54*)

Table 25. *Means for three-way interaction between priming, familiarity and stimuli type*

Stimuli type	**Familiarity**	**Priming**	**Mean response time/ms (*SE*)**
Word	Familiar	Unprimed	92.01 (*1.08*)
		Primed	93.46 (*.94*)
	Unfamiliar	Unprimed	89.48 (*1.14*)
		Primed	89.16 (*1.14*)
Brand	Familiar	Unprimed	90.05 (*1.08*)
		Primed	90.73 (*.94*)
	Unfamiliar	Unprimed	91.56 (*1.14*)
		Primed	92.24 (*1.14*)

Table 26. *Means for three-way interaction between priming, block and stimuli type*

Stimuli type	**Block**	**Priming**	**Mean response time/ms (*SE*)**
Word	One	Unprimed	89.01 (*1.21*)
		Primed	90.31 (*1.13*)
	Two	Unprimed	92.47 (*1.21*)
		Primed	92.32 (*1.13*)
Brand	One	Unprimed	91.56 (*1.21*)

		Primed	93.23 (*1.13*)
	Two	Unprimed	90.05 (*1.21*)
		Primed	89.74 (*1.13*)

Table 27. *Means for three-way interaction of priming, block and familiarity type*

Block	**Familiarity**	**Priming**	**Mean response time/ms (*SE*)**
One	Familiar	Unprimed	90.31 (*1.08*)
		Primed	92.84 (.*94*)
	Unfamiliar	Unprimed	90.26 (*1.14*)
		Primed	90.70 (*1.14*)
Two	Familiar	Unprimed	91.75 (*1.08*)
		Primed	91.35 (.*94*)
	Unfamiliar	Unprimed	90.78 (*1.14*)
		Primed	90.70 (*1.14*)

Table 28. *Means for four-way interaction of priming by block by familiarity type by stimuli type*

Stimuli Type	**Block**	**Familiarity**	**Priming**	**Mean response time/ms (*SE*)**
Word	One	Familiar	Unprimed	89.79 (*1.53*)
			Primed	92.55 (*1.33*)
		Unfamiliar	Unprimed	88.23 (*1.61*)

			Primed	88.07 (*1.61*)
	Two	Familiar	Unprimed	94.22 (*1.53*)
			Primed	94.38 (*1.33*)
		Unfamiliar	Unprimed	90.73 (*1.61*)
			Primed	90.26 (*1.61*)
Brand	One	Familiar	Unprimed	90.83 (*1.53*)
			Primed	93.13 (*1.33*)
		Unfamiliar	Unprimed	92.29 (*1.61*)
			Primed	93.33 (*1.61*)
	Two	Familiar	Unprimed	89.27 (*1.53*)
			Primed	88.33 (*1.33*)
		Unfamiliar	Unprimed	90.83 (*1.61*)
			Primed	91.15 (*1.61*)

10.5 Discussion

The aims and expectations of this study were that by using a priming paradigm, with a familiarity decision, where stimuli were presented as both brands and logos; it would be possible to see if there was within- and cross- modality priming. The first two blocks were the prime and probe within the same modality (either brand logos or names). The second two blocks were of the alternate modality (either brand logos, previously names, or, names previously logos). Therefore, the first two blocks accessed perceptual level priming at the level of the Name Recognition Units (NRUs or Other Recognition Units (ORUs, Figure 2). The first presentation in the alternate modality would then access conceptual level, cross modality priming. The premise being, that the cross-modality priming takes place at the level of the PINs (Bruce & Young, 1986; Identity Nodes, Figure 2). The ‘unprimed’ presentation of block two would be the first instance of cross modal priming, and by the second presentation, the priming effect would start to diminish as each stimulus would have been seen in total four times. Priming effects start to diminish, in familiar stimuli, as the maximum facilitation is reached. The priming effects in the unfamiliar stimuli, have more capacity to facilitate as the node will have just been created and the facilitation starts from there. These effects were seen with the unfamiliar stimuli category having a steeper priming effect than the familiar category. This is most likely because there is a worse representation of the unfamiliar in our memory and therefore there is a greater ability to improve upon this. To conclude, the block one priming effect is within-modality priming (as seen in Chapter Seven, Experiment Three, 7.5), the first presentation of block two is conceptually driven priming, and the overall priming effect would be a cumulative effect of conceptually and perceptually driven priming. Finally, the variable of block would be a pre- or post- measure of priming.

The conceptual level priming was between the two categories of familiarity type in the second block, unprimed (first presentation). With the familiar having a pre-existing node that can be accessed and facilitated by priming, whereas, the unfamiliar it is the creation of the node and then later subsequent facilitation. However, this unfamiliar effect is the pure representation of the differences in conceptually driven priming. There were more facilitation priming effects seen for words than brands, suggesting that words do not prime brands as much as brands prime words. This transference effect between familiarity and priming shows that seeing a brand before, helps us in subsequent decisions more than seeing a word. Suggesting that there is not only a cumulative effect of priming, but also we can cross-modally prime brands like other stimuli (Burton, 1994). In faces, the name would prime the face, but you would not necessarily be able to access the name from the face at a perceptual, familiarity decision (Bruce & Young, 1986; Yovel & Paller, 2004). In this experiment, as the name is included, brands do improve from learning the words. Thus, it seems that brands are cross-modally primed, but less so for brands priming words. This adds more support for Chapter Seven, that the effect is not entirely a reading effect. When considering the overall priming effect, there seems to be a trail-off, of how much priming can occur. It is not possible to learn more about a stimulus, until you have some basic familiarity or a name to anchor it to.

This pilot experiment looked at the start of accessing a conceptual level, identity node, which it appears can, in fact, be accessed through different types of stimuli. So, for future studies instead of using any of the same information (name in content or brand in context) the aim would be to look at a conceptual decision with incidental learning. There would be repeated presentation but firstly, using a conceptual task (e.g., food/drink or non-food/drink) and secondly, with an orthogonal, conceptual task (e.g., luxury or budget). This would then be completed for all three stimuli types (Brands, Faces, Objects) so it would be possible to see how brands differ from the other stimuli. This would help build up more of an indication about how brand processing behaves when comparing and bridging the gap between faces and objects.