2011

Psycholinguistic Investigations of Brand Names via Word Recognition and Memory Experiments

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PSYCHOLINGUISTIC INVESTIGATIONS OF BRAND NAMES VIA WORD RECOGNITION AND MEMORY EXPERIMENTS

By

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A Dissertation
Submitted to the Faculty of Graduate Studies
Through the Department of Psychology
In Partial Fulfillment of the Requirements for
the Degree of Doctor of Philosophy at the
University of Windsor

Windsor, Ontario, Canada

2011

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Abstract

Most research investigating brand names is aimed at understanding consumer-purchasing behaviours. Although there are a number of studies on brand names within the fields of marketing and advertising, there are relatively few within the field of psycholinguistics. Consequently, there is little knowledge about brand name representation, including how these representations become components of language. The psycholinguistic findings of the five experiments in this study are as follows: brand names have a lexicalized status, ambiguous brand names have a reaction time advantage over nonambiguous brand names, pronounceable nonwords benefit from high orthographic neighbourhoods of real English words, repeated exposure to nonwords does not necessarily improve memory based on orthography, and the addition of semantic content offers very little effect in improving memory for novel brand names (i.e., novel nonwords). This information forms the basis for the Stratified Brand Name Hypothesis, which will provide a springboard for further investigations of linguistic properties of brand names.

Acknowledgements

First and foremost, I would like to give a special thanks to Dr. Lori Buchanan. You have been both my academic and research supervisor for over 10 years, during which time you have infused me with the necessary knowledge and encouragement to continue in my academic pursuits. You have been essential in my development as a student, and I will take what I have learned from you and use it in future professional pursuits.

I would like to thank my committee members, Dr. Dennis Jackson, Dr. Keith Taylor, and Dr. Christopher Abeare, as well as my external examiner, Dr. Antonia Mantonakis, for their guidance and valued feedback during the process of completing my Ph.D. dissertation.

I would also like to take this time to thank my lab mates, Tara, Kevin, Gillian, and Lois for their valued support during all of the hardships that one experiences in completing these degree requirements.

Finally, I would like to thank my family and friends for their unwavering support and faith in me. Thank you to my wife, Karen, for her patience and support. I could not have done this without her continued love and encouragement. I love you!

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Chapter 1

Marketing and Advertising

Marketing and advertising researchers are interested in what drives consumer-purchasing behaviour. Variables of interest include those related to product exposure and placement (Pavia & Costa, 1993; Vanden Bergh, Adler, & Oliver, 1987), spokesperson appeal and credibility, visual branding (e.g., logos), the brand name, and the emotional content of the brand name. A serendipitous example of a combination of these variables converging in a potentially effective way was when Tiger Woods aligned his chip shot to remain in contention for yet another tournament win (Masters Golf Tournament, 2005). As the golf ball rolled toward the hole, it hesitated for a moment, showing the Nike 'Swoosh' symbol before slowly falling into the hole (McCarthy, 2005). This resulted in an extraordinary amount of free product exposure using a highly credible spokesperson and a universally recognized logo. If these variables are important, then one would expect a dramatic increase in sales of Nike golf gear. Scientific marketing and advertising research is aimed at determining whether or not this is the case (Plassman, Ambler, Braeutigam, & Kenning, 2007).

For a long time, posters, magazines, and television seemed to be the obvious way to advertise (Lemont, 1979). Although we still use these traditional media techniques today, other methods have become mainstream, such as advertising on the Internet (Argyriou, Kitchen, & Melewar, 2006; Lwin & Williams, 2006) and specifically, in social media such as Facebook (e.g., Rubel, 2008). Thus, companies are continually modifying their methods of advertising to stimulate consumers' interests, including shifting consumers' personal attitudes (Bottomley & Doyle, 1996) and appealing to the pleasantness of the product (Morrin & Ratneshwar, 2000).

Lei (2000) discussed the challenges and the ramifications of using the more traditional methods of advertising (e.g., television, billboards, magazine) versus using the Internet. It appears that for any media option, one must take into consideration the following points: cost efficiency, audience targeting, and effective message communication, as well as methodological considerations for tracking results (p. 470). Thus, it appears that not one method is perfectly designed to effectively advertise. However, the Internet seems to be employed more often, as advertisers are taking advantage of its widespread usage.

Geissler (1917) set out to understand the complexities of brand influence. In particular, this researcher was interested in uncovering certain characteristics, such as personal exposure, that may have an effect on purchasing behaviour. Of interest, he reported that methods of advertising alone might not be effective in persuading the consumer to purchase items specifically for "personal use". Additionally, he suggested that a person is more likely to remember a brand and its articles (e.g., soap, toothpaste) that are of 'personal necessity' rather than 'personal luxury' (e.g., candy, tobacco). Furthermore, Kohli, Harich, and Leuthesser (2005) suggested that meaningful brand names are more liked than non-meaningful brand names after repeated exposure trials. However, a person's view of a non-meaningful brand name changes after repeated exposure as well. Perhaps this change is due to other factors, such as preference towards specific brand names. Cobb and Hoyer (1986) indicated that the greatest influence on brand choice was brand loyalty (i.e., previous purchasing). However, people who were inconsistent or non-loyal purchasers responded differently than loyal purchasers, indicating that the brand name itself was less important.

Personal preference for brand names might further be influenced by spokesperson appeal and credibility. For instance, Tiger Woods had spokeperson appeal because of his role in golf and was highly credible due to his expertise in the game. Additionally, he represented very little risk for companies because he held celebrity trustworthiness and celebrity attractiveness (Amos, Holmes, & Strutton, 2008). These facts changed considerably in 2009/2010, and Mr. Woods' contracts with sponsors decreased substantially in light of his off-course behaviour. Researchers suggest that the use of the right celebrity can positively impact the behaviours of potential consumers and their product purchases. However, problems can arise if an inappropriate celebrity is used. Erdogan (1999) indicated that any negative reflection on the celebrity directly impacts the equity of the brand names, as well as brand name associations with the celebrity, especially if that celebrity is no longer viewed as an expert. The disapproval can create negative connotations for the celebrity and the brand such as in the case of Michael Jackson's molestation charges and his role as a spokesperson for Pepsi, or Tiger Woods' marital difficulties and his role as a spokesperson for Nike.

Visual branding includes logos and the characteristic scripts used for brand names. Blankenship and Taylor (1937) examined whether changing the font of a brand name would have an effect on identification of the product. Font type had little effect on identification, but people preferred the familiar font. Changes in visual branding were therefore noted to be unadvisable. Moreover, these changes could be costly if promotions called for modified color schemes (Warner & Franzen, 1947) or packaging shape (Kenyon & Pronko, 1958). Doyle and Bottomley (2004) suggested that the name of the brand is not the only characteristic that contributed to brand awareness, and other aspects

needed to be considered, such as the ‘visual equity’ of the brand, including the shape, symbol, colour, and lettering (Lightfoot & Gerstman, 1998). In this study, the researchers not only found that font type (e.g., Bodoni, Courier), when used appropriately, had a significant impact on identification, but also that font type added a multidimensional aspect to brand awareness, that could enable certain products to outsell their competition. Visual branding can extend beyond product name and packaging. Therefore, companies should pay attention to how and when to use certain font types as an advertising method for their brand names.

Another variable that should be considered is the emotional content of the brand name, which is a variable that has been implemented in marketing and advertising campaign schemes for centuries (e.g., Tudoran, Olsen, & Dopico, 2009; Veloutsou & Moutinho, 2009). For a brand name to be effective, it should provide some level of arousal in terms of triggering meaning, thus creating a stronger connection to the brand name (Mehta & Purvis, 2006; Janiszewski, 1993). Some believe that this arousal enhancement should include levels of intimacy, mystery, and sensuality of the brand name (Pawle & Cooper, 2006), which can be implemented via repeated television commercial viewing that is emotion-eliciting rather than presented in an informative format (Hitchon & Thoroson, 1995).

However, establishing an emotional aspect to a brand name appears to be more complex than it might appear. For example, Steadman (1969) showed that advertisements with sexual illustrations were less effective for brand recallability compared to those advertisements that contained non-sexual illustrations. It appeared that the research subjects were more interested in the sexual illustrations than the brand names themselves.

Other external factors that have been found to account for purchasing behaviour due to emotional content were consumers' personality and brand awareness (Heath, Brandt, & Naim, 2006). Thus, it appears that advertisers and marketers have yet to fully understand this concept. Further difficulty lies in the fact that the emotional content of a brand name is not that easy to control.

The above influences (exposure, spokesperson, visual branding, and the emotional content of the brand name) certainly play a role in consumer purchasing behaviour and are the subjects of many studies. Brand names, their selection and their manipulation, have become an important focus for marketing and advertising researchers. Using a cognitive psychology approach, these researchers promote the importance of memory and language processes in brand choice. Cognitive phenomena under examination in these studies include priming effects (Coates, Butler, & Berry, 2004), recallability (Pavia & Costa, 1993), imprinting (Baker, 2003), and frequency effects (Baker, 2003; Turner, Henry, Smith, & Brown, 2004; Estes & Maddox, 2002). In general, these researchers claim that an understanding of the cognitive processes underlying brand name recognition and recall is a necessary first step in designing an effective advertising campaign.

Chapter 2

Brand Names

Consumer purchasing behaviours can be affected by brand name. Researchers investigating brand name effects are primarily concerned with what makes brand names recognizable and memorable. Variables that have been investigated include different types of memory, as well as word properties such as word frequency, semantics, phonology, and orthography.

Researchers suggest that frequency (familiarity) of the brand name facilitates brand awareness and elicits long-term memory (Park & Lessig, 1981). Long-term memory can be demonstrated either implicitly or explicitly. Krishnan and Shapiro (1996) examined implicit memory for brand names as a function of frequency in a primed memory experiment. Higher frequency brand names show greater priming than low frequency brand names. These implicit effects have also been shown to directly impact decision-making. In another implicit memory task, researchers found that people make decisions based on previous exposure to brand names (Coates, Butler, & Berry, 2004). Zinkhan and Martin (1987) reported that we have a tendency to form beliefs about the brands independent from the actual product, and "typical" or "recognized" brand names were chosen more compared to "atypical" or "unrecognized" brand names.

If familiarity with the brand name is associated with improved recognition, could marketers capitalize on that by using words that already exist in the language as brand names? Brand names that already exist as English words are quite common and include such examples as Apple, Puma, and Gap. Gontijo and Zhang (2007) explored this possibility in a task that compared memory recall to recognition of homophonic (e.g., Puma) and non-homophonic brand names (e.g., Adidas). They showed that the non-

homophonic brand names were more easily recalled than homophonic brand names. This finding suggests that creating brand names using an existing word fails to provide a memory recall advantage for the brand name, and therefore does not provide the brand name with the frequency advantage arising from repeated exposure.

On the other hand, it appears that exposure frequency does have an effect on memory, and this might have an impact on consumer decision-making. However, the frequency of the brand name is difficult and expensive to manipulate. For instance, how does a new golf ball manufacturer match the frequency of exposure of their brand name to that of Nike? Fortunately there are other variables that might impact memory for a new brand name.

Lowrey, Shrum, and Dubitsky (2003) examined several linguistic characteristics (e.g., semantics, phonology) that might influence brand memory. They discovered that linguistic features can compensate for lack of brand name familiarity: they found an improvement in recall for unfamiliar brand names that contained initial plosives (e.g., brand names beginning with the letter K) and unusual spellings and a decrement in recall for brand names that were created by semantic blending (e.g., Aspergum).

In another study, Schloss (1981) reported that brand names that started with the letter K were better retrieved in memory, regardless of frequency. Other researchers uncovered similar evidence that those brand names that began with a plosive (e.g., letter K) were better recognized than those brand names beginning with a vowel sound (Vanden Bergh et al. 1984). Importantly, recognition may not be the same as desirability, and the sound of a brand name could elicit negative feelings about the product (Heath, Chatteerjee, & France, 1990).

Phonological characteristics can be combined with semantic characteristics to mitigate against unfamiliarity. One such example comes from alphanumeric brand names. Boyd (1985) claimed that alphanumeric naming can use both phonetic and semantics to create specific and memorable brand names (e.g., WD-40). However, alphanumeric brand names are typically only used for mechanical/technical brands, especially those that include the elements of chemicals. Another way that semantics and phonetics can be combined is to make a new brand name phonologically congruent with an existing brand name (e.g., a new line of McKid's clothing originating from the fast food chain McDonalds; Meyers-Levy, Louie, & Curren, 1994).

Linguistic characteristics appear to be important aspects of memory for brand names. Lowrey, Shrum, and Dubitsky (2003) suggest that for words to exist, they must follow some basic linguistic rules relating to phonology, orthography, semantics, or morphology. Thus, for brand names to exist as 'real words', they must follow the rules of the language and be representative of the linguistic processing requirements of a given language. From a psycholinguistic perspective, this coming into existence could be restated as the lexicalization of a new brand name. There exists a great deal of psycholinguistic data and theory related to lexical processing and lexicalization that is therefore relevant to brand name research.

Chapter 3

Psycholinguistics

Many psycholinguists believe that words exist as memory representations that are stored in mental dictionaries, otherwise known as lexicons (Schriefers, 1992; Sommers, 1996; Elman, 2004; Libben & Jarema, 2002). These include the phonological, orthographic, and semantic lexicons that contain information extracted from written or spoken communication and develop with experience (Oldfield, 1966; Treisman, 1960; Halderman & Chiarello, 2005; Andrews, 1986; Buchanan, Westbury, & Burgess, 2001).

Phonology is the auditory property of language (i.e., sounds of words) (Lowrey, Shrum, & Dubitsky, 2003). The representations of this property are assumed to take on an abstract coding system for storage in the lexicon (Foss & Blank, 1980). Orthography is the look (or spelling) of the word (Grainger, 1990) and includes characteristics such as the number of letters, length of the words, font type or capitalization, and the number of syllables (Zechmeister, 1969). Semantics is defined as the meaning of the word, and these representations hold physical, emotional and contextual components of the referent (Buchanan, McEwen, Westbury, & Libben, 2003). Although there is general agreement that these word representations are stored in their respective lexicons, there is disagreement as to the form they take and the processes by which they are accessed. Psycholinguistic research aimed at questions of lexical representations and access has direct relevance to questions of brand name representation and access, which in turn has direct relevance to questions of brand name memory.

Words can be represented as specific nodes (Forster, 1976; Treisman, 1960; Oldfield, 1966) or distributed across nodes (Seidenberg & McClelland, 1989) within their respective lexicons. A serial model assumes that the lexicons are activated in a serial

manner (e.g., Collins & Loftus, 1975; Forester, 1976), whereas a parallel model assumes simultaneous or near simultaneous lexical access (Rohde & Plaut, 2003; McClelland & Rumelhart, 1981; Novik, 1974). Word recognition in a serial model occurs when a word is retrieved through a comparison of the surface features of the word and the lexical codes stored in memory. This comparison ends when some threshold of matching has been reached (Andrews, 1989). In contrast, a parallel model assumes that extracted sensory information is processed in parallel, and a match is obtained when an above-threshold pattern of activation matches a pattern specific to a known word (Andrews, 1989). These early serial and parallel models have, for the most part, evolved into parallel models that assume feedback and feed-forward processing that can be either excitatory or inhibitory (Gleason & Ratner, 1998, p. 24; Buchanan, Brown, Cabeza, & Maitson, 1999; Buchanan, McEwen, Westbury, & Libben, 2003; Sears, Hino, & Lupker, 1999; Forester, 1976; Andrews, 1989).

Although there is some disagreement as to the support for each of the above model types, there is agreement that word properties dictate the speed and ease with which representations are activated and accessed. The most commonly accepted candidate property is word frequency. Words that occur more often in printed language are recognized with more ease than infrequently encountered words (Grainger, 1990). These effects have been pivotal in the development of models of word recognition (Forster, 1976; Morton, 1969; Becker, 1979) and arise in lexical decision (Andrews, 1989; Forester & Chambers, 1973; Scarborough, Cortese, & Scarborough, 1977; Dobbs, Friedman, & Lloyd, 1985; Westbury & Buchanan, 2002; Voyer, 2003; Sears, Siakaluk, Chow, & Buchanan, 2008) and naming studies (Forester & Chambers, 1973; Balota,

Law, & Zevin, 2000; Balota & Chumbley, 1985; Balota & Shields, 1988; Connine, Mullenix, Shernoff, & Yelens, 1990; Borowsky & Masson, 1999). This ubiquitous finding demonstrates that words frequently encountered in print are easier to read and pronounce than words that are rarely seen.

Just as more frequent words are easier to recognize than infrequent words, more frequent brand names are easier to recognize than infrequent brand names (Coates, Butler, & Berry, 2004; Park & Lessig, 1981). Thus, the psycholinguistic literature is consistent with the brand name literature with respect to an advantage on the basis of frequency of exposure. Fortunately, the psycholinguistic literature also provides an indication for a way to capitalize on this frequency advantage in the development of novel brand names. An orthographic neighbourhood is the list of words that can be created by changing only one letter of the original word. For example, the words *pike*, *pine*, *pole*, and *tile* are all orthographic neighbours of the word *pile* (Sears, Hino, & Lupker, 1995, p. 876). Words vary with respect to the size of their orthographic neighbourhood, and constituent neighbours vary in frequency.

The ease with which a word is recognized is influenced by both of these factors (i.e., orthographic neighbourhood and frequency). For example, words with more orthographic neighbours demonstrate faster recognition times than those with few orthographic neighbours (see Andrews, 1989; Sears et al. 2008), and this effect is primarily seen with words of low frequency (Andrews, 1997). This finding suggests that novel English brand names could benefit to the extent that they are created using orthographic neighbours of existing English words. For example, *DAT* could be a novel brand name that would benefit from the existence of its neighbour word *CAT*.

If the presence of orthographic neighbours can confer an advantage to novel brand names, what kind of orthographic neighbour would be most helpful? Andrews (1989) reported that words with large neighbourhood sets would generally speed up lexical access, but this output effect was mostly found for low frequency word facilitation (Andrews, 1992). Others found similar effects for large neighbourhood sets (Colombo, 1986; Luce, 1986; Grainger, O'Regan, Jacobs, & Sequi, 1989; Grainger, 1990). On the basis of the careful work by Sears, Hino, and Lupker (1995), it appears maximum advantage should fall to brand names that are orthographic neighbours of high frequency words (i.e., low frequency words with greater frequency neighbourhoods).

The above psycholinguistic findings provide a potential mechanism to assist marketers or manufacturers in the development of an effective novel brand name. Further the findings will help us understand how these items are represented and stored in the brain. However, the above findings come from work conducted using already existing English words. In order to justify the extension of these findings to brand name construction, the extent to which existing brand names can elicit lexical processes similar to other (well-studied) English words must first be established.

Chapter 4

Brand Name Representation

Much of what we know about representations and processes in the mental lexicon is found in word recognition research using common English words (Meyer & Schvaneveldt, 1971; Gleason & Ratner, 1998). Very few studies have attempted to place brand names within this literature. Two notable exceptions are Gontijo and Zhang (2007) and Gontijo, Rayman, Zhang, and Zaidel (2002). These studies attempted to answer important questions about the lexical effects of the linguistic properties of brand names (e.g., orthography, semantics).

The theoretical foundation for studying brand names is relatively unformed. However, Gontijo et al. (2002) attempted to answer one specific question: "Do brand names hold a special cognitive psychological status different from that of other noun categories, such as common nouns?" They argued that if word categories are associated with word type-specific processes (e.g., common noun processes), then perhaps brand names evoke processing specific to them.

An important word class distinction in the present context appears to be one between proper nouns and common nouns. Proper nouns include items that Semenza and Zettin (1988) referred to as *tokens*, such as places, names, and dates. Common nouns include items Semenza and Zettin referred to as *types*, such as objects (e.g., table, chair, desk). Gontijo et al. (2002) described brand names as falling somewhere between these two categories. For instance, the car company "Nissan" sells certain car brands such as the "Sentra" (*token*), and this "Sentra" can be purchased based on colour, engine size, and make (*type*) (see Gontijo et al. 2002, p. 330).

Using a lateralized lexical decision task, Gontijo et al. (2002) uncovered a rather striking observation through the comparison of the processing of common nouns, brand names, and nonwords. Supporting the idea that brand names are lexicalized, they reported that brand names were recognized faster than nonwords. However, despite this reaction time advantage for brand names over nonwords, the brand names differed from common nouns in that they produced less lateralized processing (i.e., they are processed by both hemispheres) and showed sensitivity to case manipulations not found for common nouns. Given this evidence, Gontijo et al. (2002) claimed that brand names are lexical items. However, this experiment provided only a partial examination of the lexical status of brand names because it failed to include a second category of real words. More specifically, the critical proper noun condition was missing from this initial experiment, which does not provide us with a complete stimulus set.

There is compelling evidence that proper nouns are not processed in the same way as common nouns, and these differences have been seen in normal and clinical populations (Semenza & Zettin, 1988/89; Nieto et al. 1999; Chiarello et al. 2002; Sereno, 1999; Damasio & Tranel, 1993; Aggujaro et al. 2006). These differences include the reduced lateralization for proper nouns compared to common nouns (Ohnesorge & Van Lancker, 2001; Saffran et al. 1980), which is similar to the reduced lateralization reported for brand names by Gontijo et al. (2002).

The rate at which young children acquire word knowledge increases every year during a ‘naming explosion’ (Goodman, Dale, & Li, 2008). During this time, children acquire not only words, but specific word classes such as nouns and verbs. Common

nouns are said to appear earlier than proper nouns, and verbs appear much later with respect to developmental phases.

Not only are there developmental differences in the acquisition of word classes, there appear to be differences in the hemispheric specialization for word classes (see Appendix A). While the left hemisphere is usually considered dominant for language function (Caplan, Holmes, & Marshall, 1974), more recent research has found evidence that the right hemisphere has a role in linguistic processing (Searleman, 1977; Bryden, 1990; LeDoux, Wilson, & Gazzaniga, 1977). Some of the earliest studies, using a tachistoscope, confirmed language processing in the right hemisphere, especially in the identification of word class differences (Caplan, Holmes, & Marshall, 1974; Walters & Zatorre, 1978; Hines, Glista, & Byers, 1985; Young & Ellis, 1985; Howell & Bryden, 1987; Crossman & Polich, 1988; Bryden & Bulman-Fleming, 1994). These studies on word category differences have continued to advance (e.g., neuroimaging, lexical decision tasks (LDT), and naming tasks) in more recent years (Nieto et al. 1999) with the general findings that representations of verbs appear to be stored in the left inferior temporal region (Rowan et. al. 2004) or left frontal region (Miozzo, Soardi, & Cappa, 1994; Daniele et al. 1994). In another study, Sereno (1999) reported less hemispheric specialization for nouns than verbs. Hemispheric differences as a function of word class have been reported by a number of additional researchers as well (Nieto et al. 1999; Chiarello et al. 2002; Damasio & Tranel, 1993). These hemispheric differences also appear to exist within the broad class of nouns, with common nouns assumed to be stored in the middle and inferior part of the left temporal lobe (Aggujaro et al. 2006), and proper nouns assumed to be less localized (Ohnesorge & Van Lancker, 2001; Nieto et al. 1999).

Evidence to support differences in noun categorization processing also comes from neuropsychological studies. When the brain is damaged (i.e., lesion), components of language may be compromised, depending on the site of the lesion, such that not only do patients have difficulty with word retrieval, but also with spoken language, phonological processing, orthographical processing, as well as semantic processing (Kemmerer, Tranel, & Manzel, 2005; Kay & Hanley, 2002). However, sometimes damage to the brain affects certain abilities and not others. For instance, in one case of global aphasia, BMW suffered trauma to his left hemisphere and as a result, had difficulty with written naming ability for common nouns but had perfect written naming ability for proper names (Schmidt & Buchanan, 2004). This pattern of performance was also found in Gold and Kertesz's (2000) left temporal lobe patient, G.P. Moreover, patient F.A. showed even more specific word class impairment in that he had difficulty with mass nouns (e.g., water, calcium, and oatmeal) compared to count nouns (e.g., dog, window, hammer) (Semenza, Mondini, & Cappelletti, 1997, p. 670). Over the years there have been a number of studies that support the claim that word class and word class type are important linguistic distinctions that can be revealed in behaviour (McNeil, Cipolotti, & Warrington, 1994; Van Lancker & Klein, 1990; Robson et al. 2004; Kay & Hanley, 2002; Ohnesorge & Van Lancker, 2001; Cipolotti, 2000; Milders, 2000; Fukatsu et al. 1999; Hittmair-Delazer, Denes, Semenza, & Mantovan, 1994; Lucchelli & De Renzi, 1992; Semenza & Zettin, 1989, 1988; Yasudo & Yoshiharu, 1998; Neininger & Pulvermuller, 2003; Van Lancker & Canter, 1982; Rivers & Love, 1980).

Additionally, emotional content differences have been found based on word categories. The importance of the emotional content of brand names has been described

in marketing and advertising articles (e.g., Tudoran, Olsen, & Dopico, 2009; Veloutsou & Moutinho, 2009). There is speculation that brand names may be similar to proper nouns with respect to hemispheric representations and emotional content (Sato & Aoki, 2006; Smith & Fleming, 2005; Gontijo et al. 2002; Ohnesorge & Van Lancker, 2001; Van Lancker & Ohnesorge, 2002; Gerard, Green, Hoyt, & Conolley, 1973; Van Lancker, 1991).

Memory Research

Taken together, the psycholinguistic findings presented in the previous section can be used to broaden our understanding of brand name representations and potentially provide marketers and advertisers with an empirically based method of creating effective novel brand names. Before this approach can be embraced, the psycholinguistic findings must be considered in the context of related (though different) findings from memory researchers. The psycholinguistic data may suggest which novel brand names would be most word-like, but they do not necessarily provide us with the information that is crucially important to marketers: they do not tell us which novel word is most likely to be remembered. The marketing and psycholinguistic research previously described show evidence for a frequency advantage, whereby familiar brand names and familiar words are recognized faster than unfamiliar words.

Recognition in psycholinguistic research is usually measured in lexical decision tasks. In such tasks, a participant has to decide whether an item is a real word or not. In memory research, the term recognition is defined by asking the question, “Have you seen this word before?” (recognition), similar to its representation in marketing research. Another way to assess whether something is familiar is to conduct a recall task, where a

participant is instructed to verbalize or write down the words they just saw. These two tasks typically result in different effects of frequency (Andrews, 1997).

According to the recall and recognition memory literature, word retrieval is sensitive to word frequency (i.e., how often a word appears in language). Word frequency effects, as previously noted, have been manipulated across a variety of cognitive experiments to help ascertain specific underlying distinctions of verbal memory (Brebion, David, Bressan, & Pilowsky, 2005). It is generally understood that recall and recognition tasks have different processing demands, such that recall relies on a word-level retrieval mechanism, and recognition relies heavily on word-level distinctiveness (Gontijo & Zhang, 2007; Guttentag & Carroll, 1997). An advantage for low frequency words is seen in recognition tasks (Guttentag & Carroll, 1997; Brown, Lewis, & Monk, 1977; Glanzer & Bowles, 1976; Gregg, 1976), whereas an advantage for high frequency words is seen in recall tasks (Hulme, Roodenrys, Schweickert, Brown, & Martin, 1997; Gregg, 1976). This general pattern is not always found, and the exceptions result from different manipulations, including when frequent words and rare words are tested together (Watkins, LeCompte, & Kim, 2000). Some reports have indicated findings that high frequency words are generally more memorable than low frequency words (Balota & Neely, 1980), while others report an advantage for low frequency words (Van Overschelde, 2002).

High and low frequency words may have different strength connections between lexical representations of words in memory that may trigger different retrieval effects for recall and recognition tasks (e.g., semantics, Hulme, Stuart, Brown, & Morin, 2003). The bulk of studies that examine this issue include common words as a big part of their

stimulus set, and none of these studies comment on the lexical representations of proper nouns and brand names and how they are retrieved in memory. This was addressed in the following experiments. Saffran et al. (1980) and Semenza and Zettin (1988) claim that proper nouns are unique nouns that can be classified as low frequency words. More recent evidence suggests that brand names also have unique representations and can be characterized as both high frequency (i.e., brand names using a common noun) and low frequency (invented brand names) items (Gontijo & Zhang, 2007).

In light of the word frequency effect, common nouns used as brand names (e.g., *Apple*) should show an advantage in recall tasks, whereas invented brand names may show an advantage in recognition tasks. However, a reverse effect was found in the Gontijo and Zhang (2007) study. They reported that common brand names showed a difference in processing compared to common words in the recognition phase, and invented brand names were better remembered compared to common brand names and common words in the recall phase. These results are inconsistent with previous psycholinguistic research for low frequency words (Brown, Lewis, & Monk, 1977; Glanzer & Bowles, 1976) and high frequency words (Hulme et al. 1997; Gregg, 1976) in recognition and recall tasks.

Although an important first step in the study of brand names, Gontijo and Zhang's (2007) and Gontijo et al.'s (2002) experiments can be improved upon in several ways. First, publication of their stimulus set would have been very helpful to other researchers. Secondly, a full analysis of their recognition data may have revealed whether one type of brand name was more central to the effect (i.e., frequency). Lastly, although they

recognized the importance of proper nouns, they did not include this word class in their stimulus set.

Summary

For decades marketers and advertisers have been interested in what drives consumer purchasing through examining specific variables of product exposure and placement, visual branding, and the emotional content of the brand name. Advertising ploys such as billboards, magazines, television, and ever more increasingly, the Internet, seem to be effective as a means of product enhancement, but it appears that much research is still needed to identify an effective brand name. Constituents in psycholinguistic research such as word frequency, semantics, phonology, and orthography may contribute to this determination. One of the most important psycholinguistic properties that dictates the speed and ease with which word representations are activated and accessed is word frequency. Another important property is the size of the word's orthographic neighbourhood. This is especially true for words with low frequency; it may be that a novel brand name would benefit from orthographic neighbors of high frequency English words but the extent to which that is true is unknown.

To date there have been a few researchers who have speculated that brand names hold a special psycholinguistic status, but their evidence is inconclusive (e.g., Gontijo et al. 2002; Gontijo & Zhang, 2007). The bulk of this research comes from other word-class distinctions, namely proper noun and common noun classes. The current study will attempt to answer very specific questions including, "Do brand names truly hold a special psycholinguistic status?", "Is there an advantage for using novel brand names over

common word brand names?", "Do differences exist in memory performance for nonwords from high versus low orthographic neighbourhood size?", "Does exposure help in the facilitation of remembering novel brand names?", and "Does adding semantic content to these novel brand names moderate the orthographic neighbourhood effect?" These questions will be examined through a series of lexical decision and memory tasks.

Chapter 5: Methodology

Pre-Screening Measures

Demographics are important methodological considerations for researchers (Bourne, 2006). This study screened and controlled for a number of demographics (e.g., age, sex, education), as well as visual and neurological impairments (see Appendix B for questionnaire). If participants stated that they sustained a significant head injury and/or experienced visual abnormalities, then they were excluded from the following experiments. Additionally, every participant was asked to read a short story as fast as they could for one minute (see Appendix C). This task was used to rule out reading disorders or language problems with a cut-off point of 3 standard deviations above or below the mean number of words read in one minute[1].

All participants were recruited through the University of Windsor's Psychology Participant Pool and awarded course credit for their participation. The participants were neurologically sound, native English speakers with normal or corrected to normal vision and normal reading performance as evaluated by the short story task.

Stimulus Set Construction

Purpose

A stimulus set was constructed to obtain familiarity ratings for brand names and common and proper nouns. This task was designed to ensure that the familiarity of experimental items in subsequent experiments was equated.

[1] Reading speed (words per minute) was analyzed by mean and standard deviation. Average reading speeds: Familiarity Rating Test = 207.8(26.12), Experiment 1 = 203.18(32.24), Experiment 2 = 210.28(34.58), Experiment 3 = 199.23(24.57), Experiment 4 = 208.36(27.78), Experiment 5 = 201.24(13.93).

Methods

Nine male and 41 female psychology students [average age = 20.58(1.82), average education = 13.94(1.24)] from the University of Windsor Psychology Participant Pool participated in the familiarity rating task (see Appendix D for consent form).

The stimulus list consisted of 96 single word items (24 nonambiguous brand names, 24 ambiguous brand names, 24 proper nouns, and 24 common nouns) randomly presented in upper case font on the Dell OPTIPLEX 745 computer monitor using Direct RT, an experimental delivery computer program (Jarvis, 2006). An ambiguous brand name is one that is also a common noun (e.g., PUMA), whereas a nonambiguous brand name has only one referent (e.g., ADVIL). The participants were asked to fixate centrally on the computer screen and rest their dominant hand on the keyboard number pad. The participants then read the following instructions:

"You will be presented with a brand name, common noun, or proper noun on the computer screen. This is a Familiarity Rating Test. Please rate each item on a scale of 0 (not familiar), 1 (least familiar), 2 (familiar), or 3 (most familiar). You will make your decision by pressing either 0, 1, 2, or 3 on the number pad. Please go as quickly as possible, while being as accurate as possible. Please press the spacebar to begin the rating test."

Once a code was entered, the participant began the study. When a response was given, a new word appeared until all of the items were rated. The participants were then debriefed.

Results

The original stimulus list consisted of 96 single word items (24 nonambiguous brand names, 24 ambiguous brand names, 24 proper nouns, and 24 common nouns). After controlling for familiarity, this list was reduced to 52 items, 13 items per word

category (see Appendix E). This reduction was conducted on an item-by-item basis with high and low rated words removed to create a balanced word list.

To be sure that this manual matching was successful, the ratings were analyzed using the Predictive Analytics SoftWare (PASW) Version 18. A Univariate Between Item Analysis of Variance design (ANOVA) revealed no differences between familiarity ratings for word categories [$F(3, 196) = .028$, $p > .05$]. Thus, these words were matched on familiarity and comprised the stimulus set in the following two experiments. Table 1 provides the means, standard deviations, and overall average for each word category in this list (see below).

Table 1

Mean Familiarity Ratings as a Function of Word Category

Word Category	Mean	Std. Deviation
BNamb	2.79	.24
BNnonamb	2.78	.23
CN	2.80	.40
PN	2.79	.28
Avg.	2.79	.29

Note. BNamb (ambiguous brand names)
BNnonamb (nonambiguous brand names)
CN (common nouns)
PN (proper nouns)
Avg. (overall average for word category)

Experiment 1: Exploration of Brand Name Hypothesis

Purpose

The purpose of Experiment 1 one was to resolve the question of whether brand names hold a special lexical status when compared to common and proper nouns.

Methods

Twenty-two male and 61 female psychology students[2] [average age = 21.93(4.63), average education = 13.94(0.97)] from the University of Windsor Psychology Participant Pool participated in this study (see Appendix F for consent form). This lexical decision experiment consisted of a practice phase followed by an experimental phase.

The stimuli consisted of the 13 proper nouns, 13 common nouns, 13 ambiguous brand names, and 13 nonambiguous brand names in the stimulus list developed from the familiarity rating task list. An additional 52 nonwords were constructed by rearranging the letters from the words in the stimulus list to make pronounceable letter strings. A set of 6 practice items with characteristics similar to the experimental items were presented prior to the lexical decision task. These items were presented via Direct RT (Jarvis, 2006) in random order on a Dell OPTIPLEX 745 computer monitor, and participants were asked to decide whether the items were real words and to indicate that decision by pressing a key on the keyboard. Participants were asked to sit in front of the computer screen with their chin positioned on a chinrest with their right index finger on the "?" key for the real word responses, and their left index finger on the "Z" key for the nonword responses. Each participant was given a break at the midway point to minimize fatigue and eye irritation, and to help maintain attention and concentration for the stimuli.

[2] A total of 3 participants' results were eliminated as outliers due to either an apparent failure to understand the experiment or a reading rate that fell more than 3 standard deviations from the mean.

To begin the practice phase, the experimenter entered the participant's code number, and the following script was read to each participant:

"You are asked to participate in a lexical decision task. It is necessary to keep your focus in the middle of the computer screen, so please do not move your chin outside of the chinrest. In both the practice and study phases, you are asked to determine whether items presented on a computer display are real words. A letter string will appear in the middle of the computer display. You have to decode whether it is a real English word. If it is a real word, press the "?". If it is not, press the "Z" key. A new word will appear once your response is determined. We will be looking at the time it takes you to make this decision so please go as quickly as possible. However, we cannot use your data if you make many errors so please try to be as accurate as possible. A word is real if it is spelled correctly. Sometimes you may see a word that would sound like a real word (e.g., brane), but since it is not spelled correctly you should hit the "Z" key. Please hit the spacebar after you have read this to begin the experiment."

The experimenter left the testing room when the participants indicated that the instructions were understood. Each participant responded to 6 practice trials and then saw the following prompt:

"That completes the practice set. You may now proceed to the experimental trials. Press the "?" key if the letter string is a word or the "Z" key if the letters are not a word. Please try to be as fast and as accurate as possible. Please press the spacebar when you are ready to continue."

The participants then saw the experimental items, one at a time on the computer screen. A second prompt occurred halfway through the experiment, indicating that they could take a break. The prompt read:

"You may take a short break if you wish. Press the spacebar to continue with the trials."

At the end of the task, the participants saw the words, "Thanks you've been great". Each participant was debriefed and asked to leave the testing room.

Results

This analysis excluded reaction times that fell below 300 milliseconds (ms) and above 2500 ms. This outlier analysis and the removal of errors resulted in a loss of 5.7% of the items. Both subject (F1) and item analyses (F2) were conducted separately on both RT and accuracy data. The independent variable in this experiment was word category (common nouns, proper nouns, ambiguous brand names, and nonambiguous brand names). The dependent variables were reaction time (RTs), in milliseconds and accuracy. The RTs data were analyzed using the PASW Version 18 statistics. This analysis was a 2x4 repeated measures design.

A Multivariate Repeated Measures Analysis of Variance revealed significant main effects [$F1(7, 76) = 18.385$, $p < .0001$, Partial $\eta^2 = .629$], indicating a difference between word categories and between word categories and their corresponding nonwords. The item analysis for RTs revealed no differences [$F2(7, 97) = .130$, $p = .996$, Partial $\eta^2 = .009$].Paired Samples T-Tests revealed differences between common nouns, proper nouns, ambiguous brand names, and nonambiguous brand names, as well as differences when compared to their controlled nonwords. This analysis showed that ambiguous brand names were responded to faster than nonambiguous brand names [$t(82) = -4.532$, $p < .0001$, $d = 0.49$], responses for ambiguous brand names were faster than for proper nouns [$t(82) = -2.876$, $p < .0001$, $d = 0.32$], and responses for common nouns were faster than for nonambiguous brand names [$t(82) = 3.063$, $p < .0001$, $d = 0.34$]. Further analyses revealed that reaction times were faster for words [768.06(158.16)] compared to nonwords [944.16(274.11)] [$t(82) = -8.721$, $p < .0001$, $d = 0.95$]. Reaction times for common [$t(82) = -8.636$, $p < .0001$, $d = 0.94$] and proper nouns [$t(82) = -7.821$, $p < .0001$, $d = 0.85$] were faster than for their control nonwords. This word advantage is a

standard finding that is thought to be due to the lexicalization of words and not nonwords (Forester & Chambers, 1973; Meyer & Schvaneveldt, 1971; Ohnesorger & Van Lancker, 2001; Gontijo et al. 2002). Of interest in this experiment was whether responses to the brand names also showed a word advantage: Reaction times for ambiguous brand names were faster than for their control nonwords [$t(82) = -9.412$, $p < .0001$, $d = 1.0$], and nonambiguous brand names were also faster than their control nonwords [$t(82) = -3.634$, $p < .0001$, $d = 0.4$].

Subject (F1) and item (F2) error rates were analyzed using the IBM SPSS Statistics Version 19. A Multivariate Repeated Measures Analysis of Variance revealed a significant effect for subjects [$F1(7, 76) = 6.310$, $p < .001$, Partial $\eta^2 = .368$], but not for items [$F2(7, 97) = 2.145$, $p = .07$, Partial $\eta^2 = .171$] (see Table 2). Overall, subjects produced fewer errors for ambiguous brand names compared to nonambiguous brand names [$t(82) = -2.963$, $p < .0001$, $d = 0.31$], subjects produced fewer errors for common nouns than proper nouns [$t(82) = -2.657$, $p < .0001$, $d = 0.25$], ambiguous brand names [$t(82) = 3.297$, $p < .0001$, $d = 0.28$], and nonambiguous brand names [$t(82) = 3.764$, $p < .0001$, $d = 0.38$], and subjects produced fewer errors for proper nouns compared to nonambiguous brand names [$t(82) = 2.570$, $p < .0001$, $d = 0.26$]. Other reliable effects were found such that subjects produced fewer errors for common nouns when compared to their corresponding nonwords [$t(82) = -3.417$, $p < .0001$, $d = 0.37$], and subjects produced fewer errors for nonambiguous brand name nonwords when compared to nonambiguous brand names [$t(82) = 3.305$, $p < .0001$, $d = 0.35$]. See Table 2 for descriptives.

Table 2

Mean Lexical Decision RTs as a Function of Word Category

	RT (ms)		Percent Error	
Item Category	**Mean**	**Std. Deviation**	**Mean**	**Std. Deviation**
BNamb	746.36	162.68	.04	.07
BNnonamb	806.89	211.45	.09	.19
CN	760.11	172.94	.02	.04
PN	773.96	166.30	.04	.08
Bnnwamb	949.35	264.40	.07	.10
Bnnwnonamb	896.26	273.76	.02	.05
Common nw	956.09	300.86	.05	.09
Proper nw	975.99	302.80	.04	.07

Note. BNamb (ambiguous brand names)
BNnonamb (nonambiguous brand names)
CN (common nouns)
PN (proper nouns)
Bnnwamb (ambiguous brand name nonwords)
Bnnwnonamb (nonambiguous brand name nonwords)
Common nw (common noun nonwords)
Proper nw (proper noun nonwords)

Discussion

Experiment 1 explored whether brand names should be described in the psycholinguistic literature as having a special status that is different from common and proper nouns. The experiment revealed differences in RTs for brand names when compared to common and proper nouns. Participants responded faster to ambiguous brand names than to proper nouns, and they responded faster to common nouns than to nonambiguous brand names. Thus, it appears that brand names have a psycholinguistic status that is different from common nouns and proper nouns. This analysis also demonstrated the well-known (e.g., Semenza & Zettin, 1988, 1989) common noun versus proper noun difference in RTs (i.e., common nouns were faster than proper nouns), which was expected and which provides some assurance that the methodology followed standard practice and that the familiarity ratings were effective.

Previous researchers have reported differences between brand names and common nouns, with brand names recognized more slowly than common nouns, indicating potential processing differences for brand names versus common nouns (Gontijo et al. 2002). However, there existed nothing in the literature that examined the possible similarities or differences between other noun categories, including proper nouns. Thus, the current results are an important piece of the puzzle and indicate that the recognition of brand names might require processing patterns that are different from both common and proper nouns.

An additional finding in this experiment was that participants were better at recognizing ambiguous brand names than nonambiguous brand names. The ambiguous brand names were responded to faster than were the nonambiguous brand names. This result implies that using real English words as a basis for brand names helps enhance

recognition, possibly due to the semantic or lexical connections that already existed for those real English words. On this basis at least, *given equal familiarity*, it appears that brand name recognition may be greater for brand names that are also common nouns than for brand names that are not. Finally, the results from this experiment revealed differences for brand names when compared to their corresponding nonwords. Although this evidence supports a claim of lexical status for brand names, this argument must be tempered by the caveat that the brand names and other target words required "yes" responses while the nonwords required "no" responses. "Yes" responses are typically faster than "No" responses regardless of the task so a second experiment was deemed necessary to bolster this lexical status claim.

Experiment 2: Exploring Lexical Output of Brand Names

Purpose

The purpose of Experiment 2 was to use an additional psycholinguistic methodology (a letter detection task) to add further support to the claim regarding lexicalization of brand names. This experiment was done to clarify the brand name advantage over nonwords found in Experiment 1. On the surface, the effects found in Experiment 1 would support the claim of the lexicalization of brand names. However, because the task was a lexical decision task, and the two conditions (i.e., brand names and nonwords) required different responses (i.e. "yes" for brand names and "no" for nonwords), a direct comparison cannot be made. Experiment 2 eliminates this problem by equating the two conditions on response.

Methods

Sixteen male and sixty-five female psychology students [average age = 22.46(6.86), average education = 13.68(1.23)] from the University of Windsor Psychology Participant Pool participated in this study (see Appendix G for consent form). The experiment consisted of a practice phase followed by an experimental phase. This experiment used the same stimulus list as in Experiment 1. However, in this experiment, each participant was asked to participate in a Letter Detection Task rather than the Lexical Decision Task. After each participant was stationed in front of the computer monitor, they were asked to read the following instructions:

> A letter string will appear in the middle of the computer display. Following this, two more letters will be presented simultaneously on either side of the computer screen, and your task is to decide which of the two were in the original letter string. When responding to the correct letter, you will press either the "?" key or the "Z" key. If the correct letter appears on the left hand of the screen, you are to press the "Z" key. If the correct letter appears on the right hand of the screen, you are to press the "?" key. We will be looking at the time it takes you to make this decision, so please go as quickly as possible. However, we cannot use your data if you make too many errors, so please try to be as accurate as possible. Press the spacebar to begin the study.

Each participant was given 5 practice trials before beginning the experimental trials and at the end of the task, the participant saw the words, "Thanks you've been great". Following this, each participant was debriefed and asked to leave the testing room.

Results

This analysis excluded RTs that fell below 300 ms and above 2500 ms. Removing these items as well as the incorrect responses resulted in a loss of 6.2% of the items. Both subject (F1) and item (F2) analyses were conducted in separate analyses.

The independent variable in this experiment was word category (common nouns, proper nouns, ambiguous brand names, and nonambiguous brand names). The dependent variables were RTs and accuracy. The RTs data were analyzed using the IBM SPSS Statistics Version 19. This analysis was a 2x4 repeated measures design.

A Multivariate Repeated Measures Analysis of Variance revealed a significant main effect of word category in the subject analysis [$F1(7, 74) = 29.376$, $p < .0001$, Partial $\eta^2 = .735$], but not in the item analysis [$F2(7, 86) = .024$, $p = .877$, Partial $\eta^2 = .002$]. Paired Samples T-Tests revealed differences between common nouns, proper nouns, ambiguous brand names, and nonambiguous brand names, as well as differences when compared to their control nonwords. This analysis showed that ambiguous brand names were responded to faster than nonambiguous brand names [$t(80) = -5.743$, $p < .0001$, $d = 0.64$], responses for ambiguous brand names were faster than for common [$t(80) = -8.555$, $p < .0001$, $d = 0.95$] and proper nouns [$t(80) = -9.127$, $p < .0001$, $d = 1.01$], and responses for nonambiguous brand names were faster than for common [$t(80) = -2.676$, $p < .0001$, $d = 0.3$] and proper nouns [$t(80) = -2.151$, $p < .05$, $d = 0.24$]. Additional Paired Samples T-Tests contrasted word [792.26(179.27)] and nonword [832.36(205.22)] RTs and revealed the standard advantage for word RTs over nonword RTs [$t(80) = -4.948$, $p < .0001$, $d = 0.55$]. Reaction times for ambiguous brand names [$t(80) = -4.678$, $p < .0001$, $d = 0.52$], nonambiguous brand names [$t(80) = -3.876$, $p < .0001$, $d = 0.43$], and proper nouns [$t(80) = -3.988$, $p < .0001$, $d = 0.44$] were faster than for their control nonwords. However, this same word over nonword advantage was not found for common nouns [$t(80) = -.453$, $p > .05$, $d = 0.05$]. The fact that there was not an advantage for common nouns compared to their corresponding nonwords is a finding that

goes against previous research but was not the focus of this particular experiment (Forester & Chambers, 1973; Meyer & Schvaneveldt, 1971; Ohnesorger & Van Lancker, 2001; Gontijo et al. 2002). Overall, brand names showed a lexicalization effect, similar to that seen in Experiment 1.

Subject (F1) and item (F2) error rates were analyzed using the IBM SPSS Statistics Version 19. A Multivariate Repeated Measures Analysis of Variance revealed a significant effect for subjects [$F1(7, 74) = 14.017$, $p < .001$, Partial $\eta^2 = .570$], but not for items [$F2(7, 86) = .659$, $p = .706$, Partial $\eta^2 = .051$] (see Table 3). Overall, subjects produced fewer errors for nonambiguous brand names compared to ambiguous brand names [$t(80) = 8.070$, $p < .0001$, $d = .87$], subjects produced fewer errors for common nouns than ambiguous brand names [$t(80) = 5.632$, $p < .0001$, $d = .87$], and subjects produced fewer errors for proper nouns than ambiguous brand names [$t(80) = 6.735$, $p < .0001$, $d = .75$]. Further inspection of these differences revealed effects for words compared to their control nonword, with subjects producing fewer errors for ambiguous brand name nonwords than ambiguous brand names [$t(80) = 5.953$, $p < .0001$, $d = .62$], subjects producing fewer errors for nonambiguous brand names than nonambiguous brand name nonwords [$t(80) = -3.212$, $p < .0001$, $d = .33$], and subjects producing fewer errors for proper nouns than proper noun nonwords [$t(80) = -3.667$, $p < .0001$, $d = .36$]. See Table 3 for descriptives.

Table 3

Mean Letter Detection RTs as a Function of Word Category

	RT (ms)		Percent Error	
Item Category	**Mean**	**Std. Deviation**	**Mean**	**Std. Deviation**
BNamb	732.37	168.67	.11	.06
BNnonamb	790.82	204.38	.04	.07
CN	826.65	203.72	.06	.07
PN	815.83	184.36	.05	.08
Bnnwamb	784.22	191.66	.06	.07
Bnnwnonamb	844.66	220.45	.08	.08
Common nw	833.39	221.36	.05	.07
Proper nw	867.69	239.68	.10	.11

Note. BNamb (ambiguous brand names)
BNnonamb (nonambiguous brand names)
CN (common nouns)
PN (proper nouns)
Bnnwamb (ambiguous brand name nonwords)
Bnnwnonamb (nonambiguous brand name nonwords)
Common nw (common noun nonwords)
Proper nw (proper noun nonwords)

Discussion

Experiment 2 further investigated the claim that brand names are lexicalized items. Similar to Experiment 1, this experiment revealed an RT advantage for brand names over nonwords. Therefore, the data supported the claim that brand names are lexicalized, at least to the extent that they produce a word superiority effect when compared to carefully matched control nonwords. Also similar to Experiment 1, this experiment revealed differences between brand names and common and proper nouns, providing further support for the claim that brand names have their own special psycholinguistic status, one that is different from common and proper nouns. This analysis also demonstrated the well-known common noun versus proper noun difference (Semenza & Zettin, 1988, 1989), again increasing confidence in the overall results. Furthermore, as in Experiment 1, the responses to ambiguous brand names were faster than those to nonambiguous brand names, suggesting that, *given equal familiarity*, brand names taken from common nouns are more recognizable than those that are not.

Experiment 3: Memory for Visually Displayed Nonwords

Purpose

Novel and nonambiguous brand names are initially indistinguishable from nonwords in terms of orthographic familiarity. There is some evidence that the existence of orthographic neighbours (i.e., neighbourhood size) has a positive impact on word recognition (Sears, Hino, & Lupker, 1995); however, it is unknown whether neighbourhood size has an impact on nonwords. The purpose of Experiment 3 was to determine whether the same is true for nonwords or novel, nonambiguous brand names (i.e., potential brand names).

Methods

Eighteen male and 52 female psychology students[3] [average age = 20.95(2.07), average education = 13.95(1.36)] from the University of Windsor Psychology Participant Pool participated in this study (see Appendix H for consent form). This experiment consisted of a study phase and a memory test phase with recall and recognition conditions.

The stimulus set consisted of 60 pronounceable nonwords, 30 with many orthographic neighbours and 30 with few or no orthographic neighbours (see Appendix I). The 30 nonwords were used as foils for the recognition memory condition.

Study Phase

Participants were asked to sit in front of the Dell OPTIPLEX 745 computer screen and then fixate on the center of the screen for a study phase, in which they were presented with a list of 30 nonwords, 15 from high orthographic neighbourhoods and 15 from low orthographic neighbourhoods. They were asked to read these nonwords and attempt to remember them. After reading and studying one nonword, they pressed the computer's spacebar to initiate the presentation of the next nonword, and they were to continue until all nonwords were studied. Once this phase was completed, the participants were randomly assigned to either a recall or recognition memory test condition.

Memory Test Phase

Recall Condition

Immediately following the study phase, the participants who were selected for the recall task saw the following prompt:

[3] One participant's results met the requirements of an outlier due to failure to understand the instruction of the experiment (i.e., This participant produced too many errors to be included in the analysis).

"Write down as many nonwords as you can remember on the sheet of paper that was provided to you. Thanks you've been great."

The participants were told to take as long as they needed. All participants were debriefed and asked to leave the testing room.

Recognition Condition

Participants who were selected for the recognition task were asked to remain seated with their eyes fixed at the center of the Dell OPTIPLEX 745 computer monitor. This condition presented the participant with two types of nonword items, those on the initial studied list (30 in total) and those not on the list (i.e., 30 foils). Each participant was asked to read the following instructions that appeared on the computer screen:

"You have reached Task II. Prior to Task II, you were asked to try your best to attend to the presented items. The following task was designed to see how much you have attended. You will be presented with a list of items. You are to choose the items that you believe to be on the studied list with a YES or NO response. The ? key is for YES responses and the Z key is for NO responses. Please make your decision quickly and accurately. Please press the spacebar to continue."

The experimenter left the testing room as soon as the instructions were understood. The randomly presented 60 nonwords appeared individually on the computer screen and were replaced by the next nonword after a decision had been made. At the end of the recognition task, the participant saw the words, "Thanks you've been great". The participants were then debriefed and asked to leave the testing room.

Results

The analyses included participant responses in the recognition and recall phases. The independent variables in this experiment were task (recall and recognition) and

orthographic neighbourhood size (high and low). The dependent variables were accuracy of recognition and recall.

The data were analyzed using the PASW Version 18. This analysis was a 2x2x2 mixed factorial design. A Multivariate Repeated Analysis of Variance design revealed a main effect of task [$F1(1, 68) = 274.951$, $p < .0001$, Partial $\eta^2 = .802$] and of orthographic neighbourhood size [$F1(1, 68) = 28.11$, $p < .0001$, Partial $\eta^2 = .293$], as well as an interaction between task and orthographic neighbourhood size [$F1(1, 68) = 15.81$, $p < .0001$, Partial $\eta^2 = .189$]. The memory advantage for the recognition task over the recall task has been well documented (Touron, Hertzog, & Speagle, 2010; Gontijo & Zhang, 2007; Guttentag & Carroll, 1997; Andrews, 1997) and is neither surprising nor of particular interest. However, the performance patterns for nonwords with high and low orthographic neighbourhoods as a function of task is of interest. A Paired Samples T-test analysis indicated that, on average, recall was better [$t(34) = 6.969$, $p < .001$, $d = 1.0$] for high orthographic neighbourhood nonwords than for low orthographic neighbourhood nonwords. On the other hand, recognition of high orthographic neighbourhood nonwords did not differ from low orthographic neighbourhood nonwords [$t(34) = .888$, $p > .05$, $d = 0.14$].

Subject error rates were analyzed using the IBM SPSS Statistics Version 19. A Multivariate Repeated Analysis of Variance design revealed main effects of orthographic neighbourhood size [$F1(1, 68) = 28.11$, $p < .0001$, Partial $\eta^2 = .293$], task [$F1(1, 68) = 2854.739$, $p < .0001$, Partial $\eta^2 = .977$], and an interaction between orthographic neirghbourhood size and task [$F1(1, 68) = 15.814$, $p < .0001$, Partial $\eta^2 = .189$]. Paired Samples T-Test revealed no effect for high versus low orthographic neighbourhood size

in the recognition task [$t(34) = -.888$, $p = .381$, $d = 0.15$]. However, this analysis revealed a significant effect of neighbourhood size in the recall task [$t(34) = -6.969$, $p < .001$, $d = 1.18$]: High orthographic neighbourhood nonwords resulted in fewer errors than low orthographic neighbourhood nonwords (see Table 4).

Table 4

Mean Recall and Probability of Recognition as a Function of Orthographic Neighbourhood Size

Ortho. Neigh.	**Task**	**Mean**	**Std. Deviation**
High	Recall	4.86	2.76
	Probability of Recognition	.87	.13
Low	Recall	2.86	2.92
	Probability of Recognition	.85	.12

Note. High and low orthographic neighbourhoods (Ortho. Neigh.) means were taken from an overall average from participant responses on the recall or recognition task.

Discussion

Experiment 3 investigated whether differences exist for memory for nonwords as a function of orthographic neighbourhood size. Results reveal an interaction between task and orthographic neighbourhood size. Performance differences were found for orthographic neighbourhood size for the recall condition but not for the recognition condition. Specifically, the results indicated an advantage for high orthographic neighbourhood nonwords compared to low orthographic neighbourhood nonwords in the recall phase. It appears that an advantage can be conferred to novel items via their orthographic neighbourhood size. It has been argued that larger orthographic neighbourhood sizes do elicit, rather than inhibit, processing for low frequency items (Sears, Hino, & Lupker, 1995). Nonwords taken from high orthographic neighborhoods of real English words demonstrated a greater advantage in memory due to their orthographic similarities (e.g., letter) to the real English words. Overall, it appears that these results are consistent with earlier studies in illustrating that low frequency words would be better retrieved when taken from larger orthographic neighbourhood sizes (Sears, Hino, and Lupker, 1995; Andrews, 1992). It may be that brand names benefit from this effect as well, as they too are low frequency words. Creating brand names using nonwords from high orthographic neighbourhoods may allow novel brand names to be more efficiently accessed during memory retrieval processes.

Experiment 4: Memory for Visually Displayed Nonwords Following Double Exposure

Purpose

The purpose of Experiment 4 was to determine the differences between high orthographic neigbourhood nonwords and low orthographic neighbourhood nonwords

with respect to their memorability and the extent to which repeated exposure impacts memory for these nonwords in a recall task.

Methods

Ten male and 66 female psychology students [average age = 21.91(4.24), average education = 13.86(1.23)] from the University of Windsor Psychology Participant Pool participated in this study (see Appendix J for consent form). This experiment consisted of a learning phase (with the nonword list presented once or twice) and a memory recall task.

This experiment used the same 30 nonword items as Experiment 3, with 15 nonwords from high orthographic neighbourhoods and 15 nonwords from low orthographic neighbourhoods.

Participants were randomly assigned to one of two learning phases. In the first learning phase, the participants were given an opportunity to learn the nonword list only once (Exposure Trial 1). In the second learning phase, in the same session, the participants were given the same list a second time to learn again (Exposure Trial 2). In each learning phase, each participant was given as long as they needed to learn the list. All participants saw the following prompt:

You are asked to participate in a memory task. Prior to the memory task, you are to review a list of nonwords that are individually presented on the computer screen. Once a nonword is reviewed, you are to press the spacebar for subsequent presentations until the words "Thanks you've been great" appear, which indicates the end of the study phase. The study phase is used to ensure that you have attended to the items. A test of

memory for these items will follow this task. Always press the spacebar when you have finished reviewing each nonword. Press the spacebar to begin the study phase.

The experimenter left the room when the participant made it clear that the instructions were understood. In the first exposure the 30 items were individually presented in a randomized order on the computer screen. Immediately after the first exposure the experimenter entered the testing room to prompt the participants that they were to learn the nonword list again. The participants were exposure to the same nonword items in a randomized order. Following the second exposure, all participants were provided with a recall task where they had to write down as many of the nonwords from the study phase as possible on a sheet of paper. Participants were then debriefed and asked to leave the testing room.

Results

The analyses included participant recall responses. The independent variable in this experiment was amount of exposure (i.e., 1 or 2 exposure trials) and orthographic neighborhood size (high and low). The dependent variable was accuracy of recall.

The data were analyzed using the IBM SPSS Statistics Version 19. This analysis was a 2x2 mixed factorial design. A Multivariate Repeated Analysis of Variance design revealed main effects of orthographic neighbourhood size [$F(1, 74) = 35.260$, $p < .0001$, Partial $\eta^2 = .323$] and exposure [$F(1, 74) = 5.761$, $p < .05$, Partial $\eta^2 = .072$]. However, this analysis did not reveal an interaction between exposure and orthographic neighbourhood size [$F(1, 74) = 2.750$, $p = .101$, Partial $\eta^2 = .036$]. Thus, there was no memory advantage for the repeated exposure condition based on orthography. On the other hand, Paired Samples T-Test statistics revealed better performances for high

orthographic neighbourhoods over low orthographic neighbourhoods in Exposure Trial 1 [$t(37) = 3.386$, $p < .0001$, $d = 0.55$] and better performances for high orthographic neighbourhoods over low orthographic neighbourhoods in Exposure Trial 2 [$t(37) = 4.901$, $p < .0001$, $d = 0.79$]. A separate Paired Samples T-Test revealed a better performance of Exposure Trial 2 [3.803(2.45)] over Exposure Trial 1 [2.711(2.23)] [$t(37) = 1.092$, $p < .05$, $d = 0.2$]. Thus, it appears that as in Experiment 3, nonwords taken from high orthographic neighbourhoods of real English words elicited a better performance than those taken from low orthographic neighbourhoods. This experiment also revealed effects consistent with the advantage of repeated exposure for items, leading to a facilitating effect for memory retrieval (Park & Lessig, 1981). However, exposure time did not interact with orthography - both high and low orthographic neighbourhood nonwords benefited to a similar extent.

Subject error rates were analyzed using the IBM SPSS Statistics Version 19. A Multivariate Repeated Analysis of Variance design revealed main effects for orthographic neighbourhood size [$F1(1, 74) = 28.909$, $p < .0001$, Partial $\eta^2 = .281$], exposure [$F1(1, 74) = 241.924$, $p < .0001$, Partial $\eta^2 = .766$], and an interaction effect between orthographic neighbourhood size and exposure [$F1(1, 74) = 62.520$, $p < .0001$, Partial $\eta^2 = .458$]. Paired Samples T-Test revealed fewer errors for high orthographic neighbourhoods compared to low orthographic neighbourhoods in Exposure Trial 1 [$t(37) = -3.386$, $p < .0001$, $d = 0.5$], and this effect was reversed in Exposure Trial 2 [$t(37) = 7.160$, $p < .0001$, $d = 1.1$]: high orthographic neighbourhoods elicited more errors than low orthographic neighbourhoods. See Table 5 for descriptives.

Table 5

Mean Recall as a Function of Orthographic Neighbourhood Size and Exposure

Ortho. Neigh.		**Mean Recall**	**Std. Deviation**
High	Exposure 1	3.24	2.09
	Exposure 2	4.74	2.38
Low	Exposure 1	2.18	2.17
	Exposure 2	2.87	2.37

Note. High and low orthographic neighbourhood (Ortho. Neigh.) means taken from an overall average of participant responses on a recall task. The amount of exposure (e.g., Exposure 1, 2) denotes the trial number.

Discussion

Experiment 4 further examined whether differences exist in memory retrieval for nonwords having high versus low orthographic neighborhood sizes, and additionally investigated whether there is any benefit of repeated exposure to these nonwords. The results suggested that memory is improved with high orthographic neighbourhood size and that repeated exposure also improved memory. However, an interaction between orthographic neighbourhood size and exposure was not found. Therefore, although exposure improved performance for both types of nonwords, it did not significantly improve the performance of high orthographic neighbourhod nonwords over the low orthographic neighbourhood nonwords. High orthographic neighbourhood nonwords did show better performance than low orthographic neighbourhood nonwords regardless of amount of exposure. In fact, they outperformed their low orthographic neighbourhood nonwords in both exposure trials.

Given these findings, the creation of novel brand names from nonwords taken from a high orthographic neighbourhood may be a useful practice. These results are congruent with the psycholinguistic research on the benefits of using high orthographic English real words to facilitate low frequency items (e.g., Andrews, 1997). As in Experiment 3, these results provide further support for creating novel brand names using high orthographic neighbours of real words.

Experiment 5: Novel Brand Name Semantic Memory Test

Purpose

Experiments 3 and 4 revealed an orthographic size effect for nonwords, and by extension, for novel brand names, as high orthographic neighbourhood nonwords were better recalled than low orthographic neighbourhood nonwords. The nonwords (i.e.,

novel brand names) from Experiment 3 and 4 were originally created using both high and low orthographic neighbourhoods of real English words. However, novel brand names are different from nonwords to the extent that they have some semantic content. That is, they will have real-world object or meaning associated with them. Experiment 5 was aimed at determining whether exposing participants to nonwords (novel brand names) with an attached object picture drawing, and thus eliciting some semantic processing, would impact memory for nonwords (i.e., novel brand names). Brand names refer to an object or objects (e.g., Nike and its products), and therefore, it is important to study whether meaning associated through pairing with consumer items affects memory.

Methods

Twenty male and sixty female psychology students [average age = 24.44(7.52), average education = 14.06(1.18)] from the University of Windsor Psychology Participant Pool participated in this study (see Appendix K for consent form). Participants were randomly assigned to two groups: a high semantic content condition (where a picture was presented with a nonword) and a low semantic content condition (where only the nonword was presented). They participated in the following phases: a learning phase, a matching task (for the high semantic content condition), a distractor task, a study phase, and a memory task (recall or recognition).

This experiment used the same 30 nonword study items and 30 nonword foil items as Experiment 3.

Learning Phase

In the low semantic content condition, the participants were asked to learn a list of nonwords that were described as potential brand names. The instructions read:

You are asked to participate in a memory task. Prior to the memory task, you are asked to learn a list of nonwords (i.e., potential brand names for various consumer products) that are individually presented on the computer screen. Once a nonword is reviewed, you are to press the spacebar for subsequent presentations until the words "Thanks you've been great" appear, which indicates the end of the learning phase. Please open the testing door once you have finished the learning phase. Press the spacebar to begin the learning phase.

In the high semantic content condition, the participants were given the following instructions:

You are asked to participate in a memory task. Prior to the memory task, you are asked to learn a list of nonwords paired with an object drawing (i.e., ***potential brand names linked to consumer products****) that are presented on the computer screen. Once a nonword and a picture are reviewed, you are to press the spacebar for subsequent presentations until the words "Thanks you've been great" appear, which indicates the end of the learning phase. Please open the testing door once you have finished the learning phase. Press the spacebar to begin the learning phase.*

In the high semantic content condition, the object pictures were generated from a normed set of pictures originally standardized by Snodgrass and Vanderwart (1980). Participants were given a list of nonwords matched with object pictures and were given as much time as they needed to study these items. The participants were then handed a sheet of paper with the nonwords and the object drawings, and they had to match them up until they achieved 75% success (see Appendices L). The matching task was used to ensure that the participants had learned the pairings. This condition was used to investigate whether adding object drawings moderated the orthographic effect for novel brand names. Specifically, would adding semantic content to novel brand names create a robust statistical advantage for memory, even more so than the effects of orthographic neighbourhood and memory task?

A distractor task followed both types of learning phases. This task required each participant to separate a deck of playing cards by number (e.g., 2, 4, Jack). Upon completion of this task, all participants moved on to a study phase.

In the study phase, all of the participants saw just the nonwords taken from the learning phase list. Participants were required to press the spacebar after reviewing each nonword. They were given as much time as they needed to study these items and were told that a memory test would follow. The following instructions were given:

Your task is to study the same nonwords list. Please take your time because a test of memory will follow this task. Please press the spacebar for subsequent presentations until the words "Thanks you've been great" appear. Please open the testing door once you have finished this task. Press the spacebar to begin.

After the study phase was completed, participants were randomly assigned to either the recall condition or the recognition condition, both of which were conducted in the same manner as Experiment 3.

The experimenter left the room when the participant made it clear that the instructions were understood. The 60 items were individually presented in a randomized order on the computer screen for the recognition condition, and participants had to write down as many of the nonword items they could remember for the recall condition. Participants were then debriefed and asked to leave the testing room.

Results

Participant responses were included in the analyses. The independent variables in this experiment were task (recall and recognition), presentation (high semantic condition and low semantic condition), and the orthographic neighbourhood size of the nonwords (high and low). Participants in the high semantic condition saw both the nonword and the

object drawing, whereas participants in the low semantic condition saw the nonwords without the paired drawing. The dependent variables were recall or recognition accuracy. In the high semantic condition, it took more than 1.5 matching trials on average for participants to learn the pairings with at least 75% accuracy [average = 1.68(0.53)]. The data were analyzed using the PASW Version 18. This analysis was a 2x2x2x2 mixed factorial design.

A Multivariate Repeated Measures Analysis of Variance revealed a main effect of orthographic neighbourhood size [$F(1, 76) = 8.774$, $p < .001$, Partial $\eta^2 = .104$] and a main effect of task [$F(1, 76) = 267.446$, $p < .0001$, Partial $\eta^2 = .779$], but no main effect of presentation [$F(1, 76) = 0.40$, $p = .842$, Partial $\eta^2 = .001$]. This analysis also revealed an interaction between task and orthographic neighbourhood size [$F(1, 76) = 13.004$, $p < .001$, Partial $\eta^2 = .146$]. There was no interaction between orthographic neighbourhood size and presentation [$F(1, 76) = 2.007$, $p = .161$, Partial $\eta^2 = .026$], nor was there a three-way interaction between orthographic neighbourhood size, task, and presentation [$F(1, 76) = 1.062$, $p = .306$, Partial $\eta^2 = .014$]. Paired Samples T-Tests revealed differences in performance between high and low orthographic neighbourhood items by task: on average, performance was better [$t(39) = 3.395$, $p < .05$, $d = 0.54$] for nonwords from high orthographic neighbourhoods than for nonwords from low orthographic neighbourhoods in the recall task. As in the previous experiment, there was no effect of orthographic neighbourhood size in the recognition condition [$t(39) = -1.356$, $p = .256$, $d = 0.17$]. Table 6 provides the means and standard deviations for high and low orthographic neighbourhood nonwords, both in the high and low semantic content conditions for the two memory conditions (recall and recognition).

Table 6

Mean Recall and Probability of Recognition as a Function of High/Low Semantic Pairings and Orthography

Orthography	Memory Task	Pairing	Mean	Std. Deviation
High	Recall	Low Semantic	6.85	3.59
		High Semantic	7.30	2.98
	Probability of Recognition	Low Semantic	.96	.05
		High Semantic	.98	.03
Low	Recall	Low Semantic	6.05	3.36
		High Semantic	5.55	3.36
	Probability of Recognition	Low Semantic	.97	.05
		High Semantic	.98	.02

Note. High and low orthographic neighbourhood means taken from an overall average of participant responses to the memory task(s) (i.e., recall or recognition) within high semantic content (i.e., High Semantic) or Low Semantic Content (i.e., Low Semantic) pairings. Pairing denotes if a nonword was paired with a picture (High Semantic) or not paired with a picture (Low Semantic).

Subject error rates were analyzed using the IBM SPSS Statistics Version 19. A Multivariate Repeated Analysis of Variance design revealed main effects for orthographic neighbourhood size [$F(1, 76) = 11.960$, $p < .001$, Partial $\eta^2 = .136$] and task [$F(1, 76) = 292.637$, $p < .0001$, Partial $\eta^2 = .794$], but not for presentation [$F(1, 76) = .003$, $p = .959$, Partial $\eta^2 = .00$]. This analysis also revealed an interaction between task and orthographic neighbourhood size [$F(1, 76) = 16.613$, $p < .0001$, Partial $\eta^2 = .179$], but no interactions between orthographic neighbourhood size and presentation [$F(1, 76) = 3.905$, $p = .052$, Partial $\eta^2 = .049$], task and presentation [$F(1, 76) = .265$, $p = .608$, Partial $\eta^2 = .003$], or orthographic neighbourhood size, task, and presentation [$F(1, 76) = 2.578$, $p = .113$, Partial $\eta^2 = .033$]. Paired Samples T-Tests revealed significant effects for orthography, in that high orthographic neighbourhood nonwords demonstrated fewer errors than low orthographic nonwords in the recall phase [$t(39) = -3.794$, $p < .0001$, $d = 0.59$], but no differences were found in the recognition phase [$t(39) = 1.152$, $p = .256$, $d = 0.18$] (see Table 6).

Discussion

Experiment 3 and 4 demonstrated the benefits of extracting nonwords (i.e., low frequency items) from high orthographic neighbourhoods of real English words as a way to enhance memory for nonwords. In Experiment 4, the results revealed that repeated exposure to the high and low orthographic nonwords helped in memory retrieval, although this effect was not greater for one or the other (high vs. low). Thus, it appears that the creation of novel brand names should focus on the extraction of a nonword from high orthographic neighbourhoods of real English words, as this is likely to enhance memory for these new brand names. Experiment 5 was designed to determine whether

introducing semantic content resulted in an interaction between orthographic neighbourhood size and presentation (high versus low semantic content).

The findings from Experiment 5 produced similar results to those found in Experiment 3 and 4, in that nonwords from high orthographic neighbourhoods were better recalled than nonwords from low orthographic neighbourhoods. However, the results failed to reveal any benefit to using an object picture as a means to improve recallability for nonwords or novel brand names. It appears that adding object pictures during the study of the nonwords did not elicit better memory retrieval in comparison to the nonwords without object pictures. Overall, this suggests that adding semantic content to a novel brand name may not improve initial memory retrieval. However, the laboratory differs from the real world, and it may simply be that the manipulation was not sufficiently similar to repeated exposure to real consumer objects and their names to produce additional benefit.

Chapter 6: General Discussion

This chapter summarizes and discusses the research questions and answers in light of the results found in the five experiments. The research questions were as follows: "Do brand names truly hold a special psycholinguistic status?", "Is there an advantage for using novel brand names over common word brand names?", "Do differences exist in memory performance for nonwords from high versus low orthographic neighbourhood size?", "Does repeated exposure help in the facilitation of remembering novel brand names?", and "Does adding semantic content to these novel brand names moderate the orthographic neighbourhood size effect?" Further, the general implications, practical utility, and directions for future research are also discussed.

The purpose of Experiments 1 and 2 was to determine if brand names truly hold a special psycholinguistic status and if so, was there an advantage for using nonambiguous brand names over ambiguous brand names. The purpose of Experiment 3 was to determine if orthographic neighbourhood size had a positive effect on the memory of nonwords. The purpose of Experiment 4 was to determine if exposure further enhanced the effects found in Experiment 3. The purpose of Experiment 5 was to determine if semantics further moderated the orthographic neighbourhood size effect found in Experiment 3.

Common Nouns, Proper Nouns, Brand Names

Research Question 1: Psycholinguistic Status for Brand Names?

Before the representations of brand names can be categorized as a special type of word, they must be shown to be lexicalized. That is, they must produce a lexical effect (i.e., words are processed faster than nonwords) and then be shown to have processing requirements that differ from other noun categories (Iacoboni & Zaidel, 1996). Semenza

and Zettin (1988, 1989) demonstrated that noun categorization is an important component to understanding how words are represented within the mental lexicon: common and proper nouns are assumed to be represented and accessed differently within the human brain (Hittmair-Delazer, Denes, Semenza, & Mantovan, 1994; Semenza & Zettin, 1988/89; Nieto et al. 1999; Chiarello et al. 2002; Sereno, 1999; Damasio & Tranel, 1993; Aggujaro et al. 2006). However, not much is known about how brand names are represented in the mental lexicon, particularly since there is a pre-existing assumption that brand names might be a subset of proper nouns (Gontijo et al. 2002). As a result, the identification of brand names as a distinct word class has yet to be explored and clearly defined. Therefore, the first research question was: Do brand names truly hold a special psycholinguistic status?

To confirm that brand names are lexicalized items, two variations of word recognition studies were employed (i.e., lexical decision task, letter detection task) in Experiments 1 and 2. These experiments uncovered several interesting findings. Both experiments revealed differences between brand names, common nouns, and proper nouns. Word category differences have been well researched, and the current study results also supported the fact that word category differences continue to exist between common and proper nouns. Overall, the results suggested a strong advantage for word over nonword categories, as anticipated (Meyer & Schvaneveldt, 1971; Gleason & Ratner, 1998). The more significant finding of this study however was that responses to brand names were faster than responses to control nonwords. Moreover, these effects were different from those associated with common and proper nouns. The aforementioned results suggest a lexical status for brand names that is different from the

other noun categories. Such findings provide a starting point for the development of a *Stratified Brand Name Hypothesis* that highlights the psycholinguistic status of brand names and the processing differences of brand names when compared to common and proper nouns. This hypothesis will be discussed in more detail in the discussion of the subsequent research questions.

Earlier researchers have provided us with some very compelling evidence regarding common and proper noun differences. According to the current study, it is apparent that brand names are represented independently from common and proper nouns. Hemispheric and linguistic research may provide an explanation for these differences.

As a consequence of brain damage, nouns can be selectively preserved or, depending on the site of damage, impaired. Some researchers have attempted to identify sites of lesion damage and the apparent effect on communication and memory for word categories (Kemmerer, Tranel, & Manzel, 2005; Kay & Hanley, 2002). Common nouns have been identified to be primarily processed in the left hemisphere (Aggujaro et al. 2006), and proper nouns are less specialized (Ohnesorge & Van Lancker, 2001; Nieto et al. 1999). More recent research reported that the representations of brand names are also less lateralized in the brain (Gontijo et al. 2002).

Additionally, common nouns and proper nouns typically have differences in their orthographic presentations (e.g., Peressotti, Cubelli, & Job, 2003). Common nouns are normally written in lower case format (e.g., cat), whereas proper nouns are almost always seen with their first letter capitalized (e.g., Darren). Brand names are sometimes printed like proper nouns and they are sometimes printed with all of their letters capitalized.

Gontijo et al. (2002) discovered that a capitalization effect exists for brand names but not common nouns (p.335).

Previous research has commonly ascribed word processing to the left hemisphere. However, more recent research has shown that proper nouns and brand names are processed by both hemispheres (Ohnesorge & Van Lancker, 2001; Gontijo et al. 2002). Furthermore, the right hemisphere has been theorized as an area specific to familiar or personally relevant material and the emotional connection to this material, specifically for proper nouns (Ohnesorge & Van Lancker, 2001; Van Lancker, 1991; Van Lancker & Klein, 1990; Sato & Aoki, 2006; Nagae & Moscovitch, 2002). If brand names and proper nouns are both processed in the right hemisphere, then perhaps brand names too carry with them some level of personal relevance and emotional connection similar to proper nouns. Little is known regarding the processing and hemispheric effects of personal relevance and emotional connection of brand names. Much of the brand name literature, especially the emotion data, comes from the marketing and advertising domains. However, an unpublished experiment (Schmidt, 2008) investigated the extent to which emotion might be extracted from brand names. This study found that nonambiguous brand names did not elicit as much emotion when compared to proper nouns, highlighting further differences in the noun categories and providing additional support for a psycholinguistic status for brand names.

Emotion Testing for Brand Names: An Independent Experiment

Relatively few studies exist that investigate the extraction of emotion from written material (Strauss & Allen, 2008). It has been assumed that both hemispheres process emotion (Sato & Aoki, 2006; Smith & Bulman-Fleming, 2005; Negae & Moscovitch,

2002; Lee, Loring, Dahl, & Meador, 1993; Van Lancker & Ohnesorge, 2001; Gerard, Green, Hoyt, & Conolley, 1973; Van Lancker, 1991; Tudoran, Olsen, & Dopico, 2009; Veloutsou & Moutinho, 2009), and that brand names may share representational features similar to common nouns (Gontijo & Zhang, 2007; Gontijo et al. 2002), but very little is known regarding the similarities between proper nouns and brand names in terms of emotional content.

However, we do know that proper nouns and brand names are represented bilaterally in the brain (Gontijo et al. 2002; Van Lancker & Ohnesorge, 2001). The current dissertation study (i.e., Experiment 1 and 2) found that brand names share linguistic features similar to both common and proper nouns. If emotional content (e.g., both positive and negative) has been shown to impact noun processing, then brand names (i.e., nonambiguous brand names) too should show the same possibility for emotional content. Schmidt (unpublished data, 2008) investigated whether 30 brand names (e.g., NIKE) would be rated as having more or less emotional valence than familiarity matched common and proper nouns (see Appendix M for stimulus list). In this study, proper nouns resulted in higher emotional ratings (on a 0-*no emotion* to 3-*very emotional* point scale) than both common nouns and brand names. The following information pertains to the emotion rating methodology and results (see Appendix N for consent form).

Methodology

Eleven male and thirty-nine female psychology students [average age = 21.70(1.31), average education = 14.30(1.3)] from the University of Windsor Psychology Participant Pool participated in the Emotion Rating task (see Appendix M for consent

form). The participants were asked to read the following instructions on the computer screen:

"You will be presented with a brand name, common noun, or proper noun on the computer screen. This is an Emotion Rating Test. Please rate each item on a scale of 0 (no emotion), 1 (little emotion), 2 (emotional), or 3 (very emotional). You will make your decision by pressing either 0, 1, 2, or 3 on the number pad. Please go as quickly as possible, while being as accurate as possible. Please press the spacebar to begin the rating test."

Emotion was defined to each participant as a word that initiates feeling, either in a positive or negative way (e.g., Happy, Sad).

Results

A Multivariate Repeated Measures Analysis of Variance was used to detect any differences that might lie between these words categories. This analysis revealed a main effect for word category [$F(2, 48) = 5.382$, $p < .001$, Partial $\eta^2 = .183$]. Thus, word category differences did exist with respect to the extraction of emotional content. Paired Samples T-Test demonstrated that, on average, emotion ratings were higher for proper nouns compared to nonambiguous brand names [$t(49) = -3.279$, $p < .05$] and for proper nouns compared to common nouns [$t(49) = -2.783$, $p < .05$]. Based on these results, it appears that there was a stronger emotion rating advantage for proper nouns in comparison to both common nouns and nonambiguous brand names. Table 7 provides the means and standard deviations for each word category in this list (see below).

Table 7

Mean Emotion Ratings as a Function of Word Category

Word Category	Mean	Std. Deviation
nonambBN	1.08	.71
CN	1.05	.73
PN	1.28	.67

Note. nonambBN (nonambiguous brand names)
CN (common nouns)
PN (proper nouns)

This study supports the claim that proper nouns are emotion-laden items, but it is inconsistent with previous studies regarding the extraction of emotion in common nouns (Negae & Moscovitch, 2002) and in brand names (e.g., Tudoran, Olsen, & Dopico, 2009; Veloutsou & Moutinho, 2009; Mehta & Purvis, 2006; Janiszewski, 1993). Many of the earlier studies employed hemispheric manipulations, and their words were often controlled for valence (e.g., positive or negative, Smith & Bulman-Fleming, 2005; Nagae & Moscovitch, 2002). The current stimulus set was developed to simply test the extent to which these three word types elicited emotion in participants regardless of whether that emotion was positive or negative.

An emotion rating test is based on a participant's judgment regarding the presented item. A person's judgment on how to rate emotion for the presented item can be affected by a number of factors, including font identification (e.g., Doyle & Bottomley, 2004), familiarity (e.g., Park & Lessig, 1981) and exposure to the item (Saegert, Swap, & Zajonc, 1973), perception (Smith & Bulman-Fleming, 2005), and personal significance (Van Lancker & Ohnesorge, 2002). In this case, it is assumed that the presentation of common nouns and nonambiguous brand names may have elicited less emotion due to their relative lack of significance to the participants when compared to proper nouns.

Researchers (e.g., psycholinguistic, marketing and advertising companies) have long explored the concept of how emotion ties into the facilitation of product identification. Variables such as personality, brand awareness, and personal attitude (Heath, Brandt, & Naim, 2006; Bottomley & Doyle, 1996) appear to play roles in consumer choices. Other researchers too have found variability when rating written

material for emotion meaning (Strauss & Allen, 2008). Strauss and Allen (2008) extend their explanation of how individual differences could affect emotional ratings, meaning, and categorization for words with respect to the variability in time tested and cultural factors, and potentially to gender and educational differences (p. 122).

The emotion rating study provides us with some insight into how specific words demonstrate variability in emotion. Based on a number of aforementioned factors (e.g., personality, awareness, culture, education), which can be very difficult to control, brand names did not appear to be rated as highly emotional items in comparison to proper nouns. However, these results may be considered as adding strength to the results of Experiment 1 in supporting the claim of a unique lexical status for brand names (little emotional content) when compared with proper nouns (more emotional content).

Research Question 2: A Novel Brand Name Advantage?

The second research question posed was: Is there an advantage for using novel brand names (i.e., nonambiguous brand names) over common brand names (ambiguous brand names)? Results demonstrated, in fact, that the opposite was true. The findings in Experiments 1 and 2 revealed a recognition advantage for ambiguous brand names over nonambiguous brand names. These results are in direct support of previous research, which suggested that ambiguous brand names were recognized more quickly in both hemispheres, and nonambiguous brand names were slower and less accurate (Gontijo & Zhang, 2007). One potential psycholinguistic explanation with regard to the difference in ambiguous brand names and nonambiguous brand names is that brand names may be represented in ways that are similar to both common nouns and proper nouns.

Word category differences have been shown between proper and common nouns (e.g., Semenza & Zettin, 1988). Proper nouns are posited to be more restricted in their representations (i.e., one entity, *Tokens*), whereas common nouns are thought to be less restricted and more connected with other nouns (i.e., many exemplars, *Types*) (Semenza & Zettin, 1988, 1989). In this regard, ambiguous brand names should be more like common nouns, as they have many "types", and nonambiguous brand names should be more like proper nouns, as they would have only one "token". Responses for ambiguous brand names were faster than for proper nouns, and responses for common nouns were faster than for nonambiguous brand names in Experiment 1. Thus, the previous hypothesis was supported, suggesting that ambiguous brand names are represented more like common nouns (responded to faster than proper nouns), and nonambiguous brand names are represented more like proper nouns (responded to slower than common nouns). Experiment 2 further showed that word category differences exist, albeit in a somewhat different pattern: responses to ambiguous brand names were quicker than for common and proper nouns, and responses for nonambiguous brand names were quicker than for common and proper nouns. Thus, it appears that responses to both ambiguous and nonambiguous brand names were faster than both common and proper nouns. The current literature offers very little explanation as to why such experimental patterns might exist; however, these differences may lie in how brand names are accessed in our lexicons.

Gontijo and Zhang (2007) offer a differing opinion regarding the use of nonambigous brand names over ambiguous brand names. They suggest that a company may be at a disadvantage if they use an ambiguous brand name to promote their

product(s). Invented brand names (nonambiguous brand names) do not share linguistic properties (i.e., orthography and phonology) with any words in the mental lexicon; this uniqueness potentially speeds up their processing. Nonambiguous brand names are unique from other nouns (e.g., common nouns), whereas ambiguous brand names share linguistic features (e.g., phonological, orthographic representations) similar to common nouns (i.e., *dual lexical status*, p. 30-32). The current study showed more of a benefit to using ambiguous brand names over nonambiguous brand names during a recognition task. However, using ambiguous brand names might also prove to be hazardous to the product and product name due to their lexical strength (i.e., connection to other words), which may have a potential counterproductive nature in facilitating brand awareness (Gontijo & Zhang, 2007, p. 30; Park & Lessig, 1981). While a person may have an easy time *recognizing* ambiguous brand names, they may have a harder time *recalling* them due to their connections with other words. It should be noted that Experiments 1 and 2 found an advantage for ambiguous brand names in a *recognition* task only. Using this logic, nonambiguous brand names (or invented brand names) may act in ways that favour their use in marketing and advertising due to their advantage of being less specialized and unique to consumers, allowing for easier retrieval in memory (see Gontijo & Zhang, 2007).

In conclusion, the results of Experiments 1 and 2 illustrate the representational uniqueness of brand names when compared to other noun categories. We can now say that brand names appear to be a word class of their own. Although there are some similarities between word categories (e.g., word status), other subtle differences in word representation (e.g., orthography), hemisphere, and emotional connectivity were

produced, such that brand names appear to be processed differently compared to other noun categories.

Creating Novel Brand Names

It has been demonstrated in the previous experiments (1 and 2) that brand names have linguistic properties that are both similar and dissimilar to those of common and proper nouns. Therefore, it may be reasonable to assume that since brand names share commonalities with other word categories, then like those words, they too also hold certain psycholinguistic features (e.g., sound, meaning, orthography, see also Lowrey, Shrum, & Dubitsky, 2003) that impact upon their encoding, storage and retrieval. Experiments 1 and 2 also showed that brand names are lexicalized; that is, they are represented as words in the mental lexicon as demonstrated through responses that differ from responses to nonwords. This is interesting considering that novel or nonambiguous brand names are initially indistinguishable from nonwords in terms of orthographic familiarity.

Creating a brand name can be quite a difficult task (Kohli, Harich, & Leuthesser, 2005), as a brand name has to elicit both meaning and durability. It is no wonder that marketing and advertising companies focus much time, effort, and resources trying to develop the perfect brand name. As demonstrated in Experiments 1 and 2, responses to ambiguous brand names were quicker than to nonambiguous brand names. The reason for this may be related to the frequency of the common nouns associated with the ambiguous brand names. The frequency of a word is directly proportional to how often it turns up in language (Sears et al. 2008). However, Experiments 1 and 2 were reaction-time tests where participants merely responded to the items and in this type of test, common words

are always responded to more quickly than other words. Therefore, it follows that responses to ambiguous brand names (based on common nouns) would be faster than responses to nonambiguous brand names. These types of tasks tap implicit recognition and not necessarily the same type of memory-based recognition of interest to marketers.

Instead, Gontijo et al. (2007) suggested that there was an improvement in memory for invented brand names (i.e., low frequency or nonambiguous brand names) when compared to common brand names (i.e., high frequency or ambiguous brand names). Therefore, using a common noun may not be the most optimal choice for a brand name when considering memory for the items (i.e., possibly due to excessive familiarity), especially if a company is attempting to develop a unique brand name. Although exposure to words has continually shown additive effects in studies, frequency may not enhance a person's memory, particularly for novel items.

Bellman (2005) reported that brands have been identified by symbol, sign, or design, or by some mixture of all of these, rather than by name (p. 216). He also commented on the fact that brand names do not necessarily evolve; it is the product associated with the brand names that does (e.g., *Coca-Cola*). Therefore, one of the best ways to ensure that a brand name will develop familiarity is through constant recognition of the product. How to increase product recognition and memory without the increased overhead appears to be an important question for marketers and advertisers.

Enhancing brand memory may be one of the best predictors of its success. Two of the most widely used memory measures in psycholinguistic research are recall and recognition tasks (Lowrey, Shrum, & Dubitsky, 2003). Word recognition is usually measured in this research by asking, "Is this item a word or not?" However, the

methodology is slightly different when it comes to exploring marketing research, where the question is, “Have you seen this item before in your experiment?” Recall is usually measured by asking participants to write down as many words as they can remember. Recall relies on a word-level retrieval mechanism (Gontijo & Zhang, 2007), and recognition relies on word-level distinctiveness (Gontijo & Zhang, 2007). Disagreement exists as to which measure of memory shows better performance for high and low frequency words (Brown, Lewis, & Monk, 1977; Glanzer & Bowles, 1976; Hulme et al. 1997; Gregg, 1976).

Significant memory differences for recall and recognition measures have been well defined in the psycholinguistic research for common and proper nouns, but little is known about the differences in memory measures for brand names (Gontijo & Zhang, 2007). Experiments 3, 4, and 5 used pronounceable (low frequency) nonwords, which were taken from high or low orthographic neighbourhoods of real English words, in an attempt to further explore novel brand names in memory. With regard to participants’ responses, Experiments 3, 4, and 5 found a memory advantage for recognition over recall for the nonwords, which has been well documented in previous research and served to enhance confidence in the results and their contribution to the psycholinguistic research (Gontijo & Zhang, 2007; Guttentag & Carroll, 1997; Haist, Shimamura, & Squire, 1992).

Research Question 3: A High vs. Low Orthographic Neighbourhood Size Difference?

The third research question posed was: Do differences exist in memory performance for nonwords from high versus low orthographic neighbourhood size? Experiments 3, 4, and 5 revealed a stronger advantage in memory for nonwords taken from high orthographic neighbourhoods compared to low orthographic neighbourhoods

of real English words in the recall phase. This effect is congruent with earlier psycholinguistic findings (Siakaluk, Sears, & Lupker, 2002; Andrews, 1997). These experiments demonstrated facilitation for low frequency words with large orthographic neighbourhood sizes compared to low frequency words with small orthographic neighbourhood sizes (see also Sears, Hino, & Lupker, 1999).

There exist several psycholinguistic models that pay particular attention to the effects of orthography on word and nonword facilitation (McClelland & Rumelhart, 1981- *Interactive-Activation Model*; Sears, Hino, & Lupker, 1999- *Parallel Distributed Model*). According to Sears, Hino, and Lupker (1999, p. 221, commenting on the Interactive-Activation Model), "Lexical selection is achieved when a word's lexical unit reaches a critical activation threshold. When a word is presented, activation starts to accumulate in the lexical units of both the presented word and its orthographic neighbours. These partially activated units send excitatory feedback back down to their sublexical units. In turn these units send activation back up to the lexical units, increasing lexical activation and, ultimately, helping to push the activation of one of those units over the threshold (e.g., reciprocal activation, see Andrews, 1989)". Parallel models assume that no single lexical unit exists, only interconnecting networks of units that aid in the facilitation of word-nonword activation (Sears, Hino, & Lupker, 1999). Before items are activated, they must go through some type of transition from initial registration and encoding to threshold activation. In regards to novel brand names, they must first be recognized through surface level features and then activated in parallel from their initial maker (i.e., a high orthographic neighbourhood real English word). Thus, a nonword reaches the threshold of activation more quickly due to its real word predecessor with

similar orthographic representations. Essentially, high orthographic neighbourhood nonwords reach an activation threshold more quickly than low orthographic neighbourhood nonwords, in turn, making high orthographic neighbourhood nonwords more available than low orthographic neighbourhood nonwords. The neighbours of the real word help in activating the novel brand name, making it more memorable and supporting its existence in the mental lexicon. Overall, the results of the current study support the importance of orthography and help us understand its effects on the identification of brand names and their subsequent storage and recallability in memory.

Research Question 4: Does Exposure Help?

The fourth research question posed was: Does exposure help in the facilitation of remembering novel brand names? An interaction was not found between the variables of exposure and orthographic neighbourhood size in Experiment 4, even though exposure did demonstrate some small benefit in the recall condition for high orthographic neighbourhood nonwords. However, responses to high orthographic neighbourhood nonwords did show an overall advantage in memory compared to low orthographic neighbourhood nonwords regardless of the exposure condition. Nonambiguous brand names (or novel brand names) are similar to nonwords to the extent that they are low frequency items. It appears that a maximum advantage for memory lies in creating a novel brand name using a nonword extracted from a high orthographic neighbourhood set of a real English word. This advantage seems to hold regardless of exposure (Experiment 4) or semantic association (Experiment 5).

Marketing and advertising companies continually explore certain variables that are believed to stimulate product interest and enhance product recognition. Of most

interest is the variable of exposure to the brand name and products of the brand name (Coates, Butler, & Berry, 2004; Park & Lessig, 1981). Although there is some suggestion that exposure may help, it may be that it provides more of an additive benefit than an explanation of all of the variability in memory. Additionally, manipulation of this variable can be rather costly (Gontijo & Zhang, 2007). A far less expensive way to capitalize on frequency is to develop new brand names from large orthographic neighbourhoods.

Research Question 5: Does Semantic Content Moderate Orthographic Neighbourhood Effects?

The fifth research question posed was: Does adding semantic content to these novel brand names moderate the orthographic neighbourhood size effect? Another lexical variable that is also thought to aid in a person's memory retrieval is semantics or the meaning of an item, which provides a specific representation (e.g., context) of the item (Chalmers & Burt, 2008; Buchanan et al. 2003). Grondin, Lupker, and McRae (2009) noted, "People use language every day to convey messages, and inherent in our ability to understand these messages is our ability to compute the meaning of individual words (p. 1)." One possible path for the transferring of meaning may be an item's orthographic material. Experiment 3 demonstrated that nonwords taken from high orthographic neighbourhoods of real English words were better remembered than nonwords taken from low orthographic neighbourhood nonwords. Experiment 4 supported these results but did not elicit an interaction of orthographic neighbourhood and exposure. The effects of meaning on orthographic connectivity to the words have been well researched (see comments in Hino, Pexman, & Lupker, 2006). In most models of word processing, the orthographic and semantic pathways are assumed to be interconnected such that when

orthographic representations are activated, there is a subsequent activation in the semantic system, thereby allowing us to obtain meaning from print. The speed at which these processes occur depends on the associations between a word's orthographic and semantic lexicons. Words generally vary in their amount of semantic richness, and this amount dictates the speed of word processing (Grondin, Lupker, & McRae, 2008). It has been assumed that people process ambiguous words more quickly than nonambiguous words as a result of their semantic richness (i.e., more meaning, p. 2) in word recognition studies (e.g., Hino & Lupker, 1996; Hino, Pexman, & Lupker, 2006; see also Experiments 1 and 2).

In contrast to the ambiguity effects described in word recognition literature (above), the memory literature reports an advantage for nonambiguous words over ambiguous words in recall, presumably because they have less connection with other meanings, particularly in semantic-related tasks. Thus, a person's recall of a word is more quickly established for nonambiguous words when compared to ambiguous words (Gontijo and Zhang, 2007). Ambiguous words may elicit too much competition in word facilitation by having multiple meanings.

Experiment 5 explored whether meaning benefitted memory for novel brand names based on their orthographic neighbourhood size. This experiment failed to demonstrate a three-way interaction between task (recall, recognition), orthography (high versus low), and presentation (high semantic content versus low semantic content). This study also revealed no advantage for presentation. The high semantic condition did not moderate the orthographic neighbourhood size effect for novel brand names in memory, nor did it increase memory performance compared to the low semantic condition. The

most plausible explanation for the lack of presentation effects in Experiment 5 is that the manipulation was not sufficient to engage the semantic system. These items are novel and had no association in the semantic lexicon (Ahn & La Ferle, 2008). It may be that participants just focused on the surface level features of the nonwords (e.g., letters) for later recall rather than explicitly attempting to attach meaning to them (p. 109) despite the requirements of the task

In conclusion, this research provides important findings for both the psycholinguistic and the marketing and advertising fields in regards to the memory for novel brand names. The research questions and answers presented herein will be helpful in determining which novel brand names are more likely to be remembered. The results strongly indicate that the creation of novel English brand names should begin with an extrapolation from existing high orthographic real words, which should make the brand names generally easier to remember.

Chapter 7: Brand Name Representations

The Stratified Brand Name Hypothesis is posited in the present study as an expansion on existing psycholinguistic distinctions for nouns by including consideration of ambiguous and nonambiguous brand names. This hypothesis suggests that brand names possess a distinct lexical status, as well as an intermediate status when compared to common and proper nouns. Additionally, this hypothesis supports the contention that representational differences exist between ambiguous brand names and nonambiguous brand names. Previous research has provided multiple theories on word category differences, specifically in regards to the linguistic differences between common and proper nouns (McNeil, Cipolotti, & Warrington, 1994; Van Lancker & Klein, 1990; Robson et al. 2004; Kay & Hanley, 2002; Ohnesorge & Van Lancker, 2001; Cipolotti, 2000; Milders, 2000; Fukatsu et al. 1999; Hittmair-Delazer, Denes, Semenza, & Mantovan, 1994; Lucchelli & De Renzi, 1992; Semenza & Zettin, 1989, 1988; Yasudo & Yoshiharu, 1998; Neininger & Pulvermuller, 2003; Nieto et al. 1999; Chiarello et al. 2002; Sereno, 1999; Damasio & Tranel, 1993; Aggujaro et al. 2006; Van Lancker & Canter, 1982; Rivers & Love, 1980) in the domains of frequency, orthography, and semantics, as well as hemispheric lateralization. Common nouns have been referred to as *types* and proper nouns as *tokens* by Semenza and Zettin (1988). Common nouns are usually seen in lower case and are processed in the left hemisphere, whereas proper nouns are usually seen with their first letter capitalized, and are processed in both the left and right hemispheres. It has previously been assumed that brand names are a subset of proper nouns (see Gontijo et al. 2002). However, the current findings suggest otherwise.

Although brand names are similar to both of these nouns with respect to holding word status (see also Gontijo et al. 2002), brand names may be thought of as a noun

somewhere in between common and proper nouns, collectively integrating both *type* and *token* traits. For example, the company "Tim Hortons" refers to one particular business or one entity (like a proper noun), but this company may develop more than one type of coffee or donut with many exemplars (like common nouns) (see also Gontijo et al. 2002). These exemplars would thus also be connected to the brand name. Therefore, a brand name's overall linguistic representation is more restricted than common nouns but less restricted than proper nouns.

Brand names can be seen with their first letter capitalized as well as with all letters capitalized. They can be thought of as both high frequency nouns (ambiguous brand names) and low frequency nouns (nonambiguous brand names). Brand names can be enriched with semantic information (i.e., ambiguous brand names) or almost completely lack semantic information (i.e., nonambiguous brand names). Similar to proper nouns, brand names are known to be processed by both hemispheres, but some data exists for nonambiguous brand names, which shows them to be more accurate in the left hemisphere (Gontijo & Zhang, 2007). Overall, it appears that ambiguous brand names might act more like common nouns, and nonambiguous brand names may act more like proper nouns. It is apparent that brand names should be considered as a word category of their own, and this word category should be further subdivided into ambiguous and nonambiguous categories. Although ambiguous brand names might be easier to recognize, nonambiguous brand names are more likely to be remembered just as long as they form some common association with a real English word in terms of their pronounceability and orthographic similarity.

Chapter 8: Research Contributions

Contributions to Originality

The current research has clarified the nature of brand name representation in the mental lexicon as compared to other noun categories and introduced the Stratified Brand Name Hypothesis. It also adds a repository of brand names with familiarity ratings that can be used for future research in controlled settings. This research also highlights two variations of brand names (ambiguous and nonambiguous), whose differences up to this point were relatively unknown. Finally, this research also contributes to the identification of two specific variables (i.e., frequency, orthographic neighbourhood size) in psycholinguistics, which can help in the creation of an effective brand name that can be easily stored in memory.

Further Research Implications

The previous research is quite sparse when it comes to understanding the lexical representation and construction of brand names and how they become stored in our memory. The current study supports the use of specific cognitive variables as a compensatory aid in novel brand name retrieval (e.g., frequency, orthographic neighbourhood size). Marketing and advertising companies, specifically entrepreneurial companies, can use these results to understand how to create an effective novel brand name for easy encoding, storing, and recalling. The current study also adds further support in identifying brand names as specialized and of their own lexical category, which by implication would enable them to be categorized within a psycholinguistic model.

Chapter 9: Overall Conclusions

The vast majority of the research that incorporates brand names as an important factor in analyses is contained within marketing and advertising domains, and not much has been studied in regards to brand names' representation and storage systems within the field of psycholinguistics. The current results suggest that brand names belong in a word category of their own when compared to other noun categories, as they share word properties both similar and dissimilar to common and proper nouns. Findings also showed that brand names can be further subdivided into two very distinct brand name categories (ambiguous and nonambiguous), which elicit very different lexical properties as word categories. The statistical effects found in Experiments 1 and 2 have provided information for further theory development (i.e., lexical processing) for brand names. The findings in Experiment 2 have confirmed the notion that brand names hold a special lexical status much different from other noun categories. Additionally, Experiments 1 and 2 have found new information regarding variations of brand names, which was further supported by the differences in speed at which they are processed: responses to ambiguous brand names were quicker in response time than nonambiguous brand names in reaction-timed tests.

Much of the psycholinguistic research shows that specific word properties dictate how words are accessed and activated. By examining these word properties (i.e., orthographic neighbourhoods), we can deepen our understanding of how to create novel brand names and make them more recallable. Experiments 3, 4, and 5 used pronounceable nonwords (or nonambiguous brand names) taken from high and low orthographic neighbourhoods of real words and found an advantage for high orthographic neighbourhoods over low orthographic neighbourhoods. It is apparent that extracting

pronounceable nonwords (i.e., low frequency nonwords) from high orthographic neighbourhoods of real words will aid in the creation of novel brand names, which is consistent with earlier theory (Sears et al. 2008, Andrews, 1997). Experiment 4 did not show an effect of exposure in enhancing memory based on orthographic neighbourhood size. Experiment 5 was carried out to see if by adding semantic content to a novel brand name, a person's memory for that brand name would be improved. It appears that adding additional information to these novel brand names did not enhance memorability for them. In sum, this study has demonstrated which type of novel brand names are most likely to be remembered (i.e., those taken from high orthographic neighbourhoods of real words).

Future Considerations

First and foremost, the prospective researchers who are interested in this type of experimentation will now have a repository of brand names and novel brand names to extract from for use as part of their stimulus set(s). Brand names are visual entities that surround us on a regular basis. Although these studies demonstrate that certain psycholinguistic variables (word frequency, orthography) help in understanding how brand names become memorable words, there are other constituents that will need to be examined, such as phonology. For example, it is still uncertain whether auditory properties also help in the lexical representation and storage of brand names (Lowrey, Shrum, & Dubitsky, 2003). Doyle and Bottomley (2004) and Lightfoot and Gerstman (1998) suggested that there might be other characteristics that may help in establishing brand identity, including the use of symbols. Common symbols such as the Nike Swoosh might affect the speed at which the brand names are accessed. The object pictures used in

our study were paired with a nonword, but a picture or symbol alone may ultimately produce better memory if already previously associated. Researchers might be interested in discovering how to create a memorable symbol to help improve brand identification. Additionally, in the emotion rating test, the participants were asked to rate common nouns, proper nouns, and nonambiguous brand names on a 4-point scale. Given that we have demonstrated that brand names fall into two very distinct categories, it may be that ambiguous brand names elicit more emotion than nonambiguous brand names, further contrasting their performance differences as word categories. Researchers might also want to compare and constrast phonologically similar nonwords versus non-phonologically similar nonwords and object pictures to determine if a phonological-orthographical link exists for novel brand names (McKay et al. 2008). Lastly, researchers might want to expand on Experiment 5 to determine if hemifield played a role in the results.

Summary

In sum, this study aimed to add exploratory data to the psycholinguistic literature by addressing the representation and memory development of brand names in the mental lexicon. The first two experiments, especially Experiment 2, showed word category differences for brand names, supporting the theory of a lexicalized status for brand names. In addition, responses to ambiguous brand names (based on a common noun) were quicker when compared to nonambiguous brand names (based on a nonword), but these effects may not show an advantage in memory. Experiments 3, 4, and 5 demonstrated nonwords were better remembered when they were taken from high orthographic neighbourhoods of real words, supporting the theory that low frequency

words, including brand names, benefit from high orthographic neighbourhoods of real words. Experiment 4 revealed that the variable of exposure did not show a benefit to enhancing memory for novel brand names based on orthography. Experiment 5 found that adding semantic content did not help in improving memory for novel brand names. The results of this research direct us to a potential model for brand names that could be developed via tests of the Stratified Brand Name Hypothesis under conditions that more fully tap semantic processing.

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Appendix A

Investigations on Word Categories as a Function of Hemispheric Ability

Articles	Normals	Nouns/ Verbs	Word Representation	Hemispheres	Right Hemisphere (Emotion)	Brands and Asymmetry	Brand Differences
Van Lancker & Ohnesorge, 2002	√	√	√	√	√		
Ohnesorger & Van Lancker, 2001	√	√	√	√	√		
Gontijo & Zhang, 2007	√	√	√	√		√	√
Gontijo et al. 2002	√	√	√	√		√	√
Sereno, 1999	√	√	√	√			
Smith & Fleming, 2005	√	√	√	√	√		
Nagae & Moscovitch, 2002	√	√	√	√	√		
Nieto et al. 1999	√	√	√	√			
Caplan et al. 1974	√	√	√	√			
Chiarello et al. 2002	√	√	√	√			
Lee et al. 1993			√	√	√		

Appendix B

Questionnaire

The following questionnaire will ask you about items pertaining to your demographics, medical history, general cognitive functioning, and handedness. Please complete the questionnaire honestly as this information will be integrated into your final results. This questionnaire will take approximately 10 minutes to complete.

Participant's Code:_____ Years Completed in University:_____

Sex: _____ Age: _____

Handedness: □ Right □ Left □ Inconsistent Native Language: _____

Any Secondary Languages: _____

You are now to complete a verbal reading test. Please place the reading page in front of you and read the following instructions: "Please read the short passage aloud, and as quickly and as accurately as you can for one minute".

Please complete the remainder of the questionnaire.

Please place a check mark beside any symptoms that may apply at the present time.

<u>Sensory Problems (including visual, hearing, and taste)</u>
Do you have normal (or corrected to normal) vision? □ Yes □ No
□ Hearing loss
Do you wear a hearing aid? □ Yes □ No

<u>Neurological Problems</u>
Have you ever experienced trauma such as:
□ Head Injury
□ Loss of Consciousness for more than 15 minutes □ Yes □ No
From:
A motor vehicle accident □ Yes □ No
Sports Injuries □ Yes □ No
□ Contact with alcohol or illegal substances (e.g., drugs). □Yes □ No
When was the last time you consumed this? □ Today □ Yesterday □ 1 week ago
□Over 1 Month

Have you ever been diagnosed with a learning disability? □ Yes □ No. If yes, does this learning disability include difficulty with any of the following? □ Reading □ Math □ Writing
Do you have the following?
□ Diagnosis of Dyslexia

□ Difficulty with word finding
□ Difficulty with understanding others in conversation
Were you ever in some type of therapy (e.g., reading, speech) to resolve these issue? □ Yes □ No

Did you ever receive a diagnosis of Attention Hyperactivity Deficit Disorder (ADHD) or Attention Deficit Disorder (ADD)? □ Yes □ No

Lastly, please indicate your preferences in the use of hands in the following activities by *putting* + in the appropriate column. Where the preference is so strong that you would never try to use the other hand unless absolutely forced, *put* ++. If in any case you are really indifferent *put* + in both columns.

Some of the activities require both hands. In these cases the part of the task, or object, for which hand preference is wanted is indicated in brackets.

Please try to answer all the questions, and only leave a blank if you have no experience at all of the object or task[4].

		Left	**Right**
1	Writing		
2	Drawing		
3	Throwing		
4	Scissors		
5	Toothbrush		
6	Knife (without fork)		
7	Spoon		
8	Broom (upper hand)		
9	Striking match (match)		
10	Opening box (lid)		
i	Which foot do you prefer to kick with?		
ii	Which eye do you use when using only one?		

[4] The following information was taken directly from Oldfield, R.C. (1971). The assessment and analysis of handedness: The Edinburgh inventory. *Neuropsychologia, 9*, 112. The use of this method was acquired to ensure that handedness was properly assessed.

Appendix C

Reading Fluency Passage (Baum, 1900)

Dorothy lived in the midst of the great Kansas prairies, with Uncle Henry, who was a farmer, and Aunt Em, who was the farmer's wife. Their house was small, for the lumber to build it had to be carried by wagon many miles. There were four walls, a floor and a roof, which made one room; and this room contained a rusty looking cookstove, a cupboard for the dishes, a table, three or four chairs, and the beds. There was no garret at all, and no cellar--except a small hole dug in the ground, called a cyclone cellar, where the family could go in case one of those great whirlwinds arose.

Uncle Henry sat upon the doorstep and looked anxiously at the sky, which was even grayer than usual. Dorothy stood in the door with Toto in her arms, and looked at the sky too. Aunt Em was washing the dishes. Suddenly Uncle Henry stood up. "There's a cyclone coming, Em," he called to his wife.

"Quick, Dorothy!" she screamed. "Run for the cellar!" When she was halfway across the room there came a great shriek from the wind, and the house shook so hard that she lost her footing and sat down suddenly upon the floor.

It was very dark, and the wind howled horribly around her, but Dorothy found she was riding quite easily. After the first few whirls around, and one other time when the house tipped badly, she felt as if she were being rocked gently, like a baby in a cradle.

Toto did not like it. Dorothy sat quite still on the floor and waited to see what would happen. In spite of the swaying of the house and the wailing of the wind, Dorothy soon closed her eyes and fell fast asleep.

She was awakened by a shock, so sudden and severe. Dorothy sat up and noticed that the house was not moving.

While she stood looking eagerly at the strange and beautiful sights, she noticed coming toward her a group of the queerest people she had ever seen.

Three were men and one a woman, and all were oddly dressed.

An old woman walked up to Dorothy, made a low bow and said, in a sweet voice: "You are welcome, most noble Sorceress, to the land of the Munchkins. We are so grateful to you for having killed the Wicked Witch of the East, and for setting our people free from bondage."

Appendix D: Consent Form

CONSENT TO PARTICIPATE IN RESEARCH

Title of Study: Understanding Word Frequency through Word Familiarity Tests

You are asked to participate in a research study conducted by Darren Schmidt, a Ph.D. Candidate in Clinical Neuropsychology, under the supervision of Dr. Lori Buchanan at the University of Windsor. The Social Sciences and Humanities Research Council of Canada (SSHRC) sponsors this research, which is held by Dr. Lori Buchanan. Your participation will contribute to ongoing research towards Darren Schmidt's Ph.D. In addition, this research will contribute to Brittany Peretti's undergraduate studies. If you have any questions or concerns about the research, please feel free to contact Darren Schmidt at (519) 253-3000 extension 2240 or Dr. Lori Buchanan at (519) 253-3000 extension 2246**.**

PURPOSE OF THE STUDY

To explore how people process brand names, common nouns, and proper nouns when shown in print.

PROCEDURES

Phase 1

If you volunteer to participate in this study, you would be asked to do the following: You will be asked to complete a familiarity test on a computer-simulated program called Direct RT. During the familiarity test, you will be asked to rate upper case noun types (brand names, common nouns, proper nouns) on a 4-point scale of familiarity (0-*not familiar*, 1-*least familiar*, 2-*familiar*, and 3-*most familiar*). You will be asked to perform this task as quickly as you can without making any mistakes.

Phase 2
Participants will be asked to respond to a computer simulated program called Direct RT. They will be asked to rate common words on a 7-point scale of familiarity (1-*low*, 4-*moderate*, 7-*high*).

The tasks will be occurring together, and will take approximately 30 minutes to complete.

POTENTIAL RISKS AND DISCOMFORTS

This study does not involve any anticipated risks or discomforts

POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

Your participation in this study will help us learn more about how people process information about certain noun types and about the methods we can use to investigate linguistic processing in laboratory settings. In general, this information will help us learn more about language function. You will have the opportunity to see how psycholinguistic research is conducted.

PAYMENT FOR PARTICIPATION

Participants will receive .5 bonus points for 30 minutes of participation towards the psychology participant pool, if registered in the pool and enrolled in one or more eligible courses.

CONFIDENTIALITY

Any information that is obtained will remain confidential. Participants will be asked to sign their name and information on the initial screening measure, and the data will be recorded as a number in the computer system. All of the paper information (e.g., names) will be locked in a cabinet.

PARTICIPATION AND WITHDRAWAL

Your participation is entirely voluntary and you may withdraw at any time without consequences of any kind. The investigator may withdraw you from this research if circumstances arise which warrant doing so.

FEEDBACK OF THE RESULTS OF THIS STUDY TO THE SUBJECTS

The findings from this experiment will be made available to each participant via the Research Ethics Board website (http://www.uwindsor.ca/reb).

SUBSEQUENT USE OF DATA

This data will be used in subsequent studies.

RIGHTS OF RESEARCH SUBJECTS

You may withdraw your consent at any time and discontinue participation without penalty. If you have questions regarding your rights as a research subject, contact: Ethics Coordinator, Assumption University Building room 303, University of Windsor, Windsor, Ontario, N9B 3P4; Telephone: 519-253-3000 ext 3948; e-mail: ethics@uwindsor.ca

SIGNATURE OF RESEARCH SUBJECT/LEGAL REPRESENTATIVE

I understand the information provided for the study "Understanding Word Frequency through Word Familiarity Tests" as described herein. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form.

_____

Name of Subject

_____ _____

Signature of Subject Date

SIGNATURE OF INVESTIGATOR

These are the terms under which I will conduct research.

_____ _____

Signature of Investigator Date

Revised April 2009

Appendix E

Word and Nonword List for Experiments 1 & 2

PN	PNNonwords	CN	CNNonwords	BNNonAmb	BNNonwords	BNamb	BNambNonwords
MIAMI	JAYOR	NOTEBOOK	HOBITING	TYLENOL	HOAPANG	TRIDENT	CAPHERS
SYDNEY	PEAGGE	CABINET	TOCITLY	TOYOTA	VALSAN	IVORY	NIETS
VICTORIA	PLAMENCO	KEYCHAIN	PALFOATE	SMIRNOFF	DENIKIST	WHIRLPOOL	SCABBARKS
ATLANTA	MORSAMA	BOOKLET	SKRILLS	MOLSON	PADONS	THERMOS	ENDARED
BERLIN	PETACY	SALMON	HINTEL	LABATT	ENRUEL	VIRGIN	TURSOS
CLEVELAND	RUBLOINED	EAGLE	ERGUS	LIPTON	ENODEN	GUESS	LABON
TOKYO	YECAS	CABBAGE	PANTILO	VERIZON	ROVIDUE	PUMA	MOLG
REGINA	MERMUN	FOUNTAIN	TROCHIES	GILLETTE	SUAFOOMS	CANON	SACON
MOSCOW	LEDACY	ENVELOPE	CONDOLED	ADVIL	SPEME	SCOPE	BEILS
NAPLES	NATUSE	CHAIR	REKEL	LEGO	ONEV	SHARP	NORNS
DALLAS	SYNTUX	OUTLET	MALADS	TELUS	SKULF	CREST	CLACS
CHICAGO	ALOUSES	STAPLER	GRAJING	TIMEX	DOITY	SHELL	TUMED
DENVER	DELMET	CELERY	PELPIT	NIKE	VOGS	TIDE	DITE

Note. PN (proper nouns), PNNonwords (proper noun nonwords), CN (common nouns), CNNonword (common noun nonwords), BNNonamb (nonambiguous brand names), BNNonwords (nonambiguous brand name nonwords), BNamb (ambiguous brand names), BNambNonwords (ambiguous brand name nonwords)

Appendix F: Consent Form

CONSENT TO PARTICIPATE IN RESEARCH

Title of Study: Exploring Word Type Differences as a Matter of Selection in a Lexical Decision Task

You are asked to participate in a research study conducted by Darren Schmidt, a Ph.D. Candidate in Clinical Neuropsychology, under the supervision of Dr. Lori Buchanan at the University of Windsor. The Canada Research Chair Program sponsors this research. Your participation will contribute to ongoing research towards Darren Schmidt's Ph.D. If you have any questions or concerns about the research, please feel free to contact Darren Schmidt at (519) 253-3000 extension 2240 or Dr. Lori Buchanan at (519) 253-3000 extension 2246**.**

PURPOSE OF THE STUDY

To explore how people process printed brand names, common nouns, and proper nouns.

PROCEDURES

Participants will be asked to respond to a computer simulated program called Direct RT. Participants will be asked to participate in a lexical decision task (LDT). In this task, individual brand names, common nouns, proper nouns, and nonwords will be presented and the participants will be asked to decide which item is a real English word or a non-English word via computer key pressing.

POTENTIAL RISKS AND DISCOMFORTS

This study does not involve any anticipated risks or discomforts

POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

Your participation in this study will help us learn more about how people process information about certain noun types and about the methods we can use to investigate linguistic processing in laboratory settings. In general, this information will help us learn more about language function. You will also have the opportunity to see how psycholinguistic research is conducted.

PAYMENT FOR PARTICIPATION

For your participation in this study you will receive a 0.5 course credit (bonus mark) that you may apply to an eligible psychology course.

CONFIDENTIALITY

Any information that is obtained will remain confidential and will be disclosed only with your permission. All of the information will be stored within the cognitive neuroscience laboratory located in room 62 of Chrysler Hall South. With respect to digital information, this information will be stored on the hard drive of the computer. In terms of the consent forms, these will be stored within a locked cabinet in the lab. It is important to note, that only a select few (i.e., lab members) have the key to enter this lab.

PARTICIPATION AND WITHDRAWAL

Your participation is entirely voluntary and you may withdraw at any time without consequences of any kind. You may want to exercise the option of removing your data from this study. You may also refuse to answer any questions you do not want to answer and still remain in the study. The investigator may withdraw you from this research if circumstances arise which warrant doing so.

FEEDBACK OF THE RESULTS OF THIS STUDY TO THE SUBJECTS

The findings from this experiment will be made available to each participant via the Research Ethics Board website (http://athena.uwindsor.ca/reb).

SUBSEQUENT USE OF DATA

This data may be used in subsequent studies.

RIGHTS OF RESEARCH SUBJECTS

You may withdraw your consent at any time and discontinue participation without penalty. If you have questions regarding your rights as a research subject, contact: Ethics Coordinator, Assumption University Building room 303, University of Windsor, Windsor, Ontario, N9B 3P4; Telephone: 519-253-3000 ext 3948; e-mail: ethics@uwindsor.ca

SIGNATURE OF RESEARCH SUBJECT/LEGAL REPRESENTATIVE

I understand the information provided for the study "Exploring Word Type Differences as a Matter of Selection in a Lexical Decision Task" as described herein. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form.

_____
Name of Subject

_____ _____
Signature of Subject Date

SIGNATURE OF INVESTIGATOR

These are the terms under which I will conduct research.

_____ _____
Signature of Investigator Date

Revised November 2007

Appendix G: Consent Form

CONSENT TO PARTICIPATE IN RESEARCH

Title of Study: Exploring Lexical Output of Brand Names

You are asked to participate in a research study conducted by Darren Schmidt, a Ph.D. Candidate in Clinical Neuropsychology, under the supervision of Dr. Lori Buchanan at the University of Windsor. The Canada Research Chair Program sponsors this research. Your participation will contribute to ongoing research towards Darren Schmidt's Ph.D. If you have any questions or concerns about the research, please feel free to contact Darren Schmidt at (519) 253-3000 extension 2240 or Dr. Lori Buchanan at (519) 253-3000 extension 2246**.**

PURPOSE OF THE STUDY

To explore how people process printed brand names, common nouns, and proper nouns.

PROCEDURES

Participants will be asked to respond to a computer simulated program called Direct RT. Participants will be asked to participate in a Letter Detection Task. In this task, individual brand names, common nouns, and proper nouns will be presented and the participants will be asked to decide which of two concurrently presented letters were in the presented letterstring. For instance, a brand name will appear and they will be asked was an L or a P in the word?

POTENTIAL RISKS AND DISCOMFORTS

This study does not involve any anticipated risks or discomforts

POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

Your participation in this study will help us learn more about how people process information about certain noun types and about the methods we can use to investigate linguistic processing in laboratory settings. In general, this information will help us learn more about language function. You will also have the opportunity to see how psycholinguistic research is conducted.

PAYMENT FOR PARTICIPATION

For your participation in this study you will receive a 0.5 course credit (bonus mark) that you may apply to an eligible psychology course.

CONFIDENTIALITY

Any information that is obtained will remain confidential and will be disclosed only with your permission. All of the information will be stored within the cognitive neuroscience laboratory located in room 62 of Chrysler Hall South. With respect to digital information, this information will be stored on the hard drive of the computer. In terms of the consent forms, these will be stored within a locked cabinet in the lab. It is important to note, that only a select few (i.e., lab members) have the key to enter this lab.

PARTICIPATION AND WITHDRAWAL

Your participation is entirely voluntary and you may withdraw at any time without consequences of any kind. You may want to exercise the option of removing your data from this study. You may also refuse to answer any questions you do not want to answer and still remain in the study. The investigator may withdraw you from this research if circumstances arise which warrant doing so.

FEEDBACK OF THE RESULTS OF THIS STUDY TO THE SUBJECTS

The findings from this experiment will be made available to each participant via the Research Ethics Board website (http://athena.uwindsor.ca/reb).

SUBSEQUENT USE OF DATA

This data may be used in subsequent studies.

RIGHTS OF RESEARCH SUBJECTS

You may withdraw your consent at any time and discontinue participation without penalty. If you have questions regarding your rights as a research subject, contact: Ethics Coordinator, Assumption University Building room 303, University of Windsor, Windsor, Ontario, N9B 3P4; Telephone: 519-253-3000 ext 3948; e-mail: ethics@uwindsor.ca

SIGNATURE OF RESEARCH SUBJECT/LEGAL REPRESENTATIVE

I understand the information provided for the study "Exploring Lexical Output of Brand Names" as described herein. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form.

_____
Name of Subject

_____ _____
Signature of Subject Date

SIGNATURE OF INVESTIGATOR

These are the terms under which I will conduct research.

_____ _____
Signature of Investigator Date

Revised November 2007

Appendix H: Consent Form

CONSENT TO PARTICIPATE IN RESEARCH

Title of Study: Memory for Visually Displayed Nonwords

You are asked to participate in a research study conducted by Darren Schmidt, a Ph.D. Candidate in Clinical Neuropsychology, under the supervision of Dr. Lori Buchanan at the University of Windsor. The research is being funded by Dr. Lori Buchanan's research grant. Your participation will contribute to ongoing research towards Darren Schmidt's Ph.D. If you have any questions or concerns about the research, please feel free to contact Darren Schmidt at (519) 253-3000 extension 2240 or Dr. Lori Buchanan at (519) 253-3000 extension 2246**.**

PURPOSE OF THE STUDY

To explore how people process printed nonwords.

PROCEDURES

Participants will be asked to participate in a memory task with two phases. In the first phase a list of nonwords will be presented one at a time on a computer screen and participants will indicate by pressing the spacebar that they have reviewed each nonword. They will be told that a study of memory will follow. After completing the initial phase, participants will be asked to either write down as many nonwords as they can on a sheet of paper or participate in a recognition study by deciding whether nonwords that appear on the computer screen were on the list or not.

POTENTIAL RISKS AND DISCOMFORTS

This study does not involve any anticipated risks or discomforts

POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

Your participation in this study will help us learn more about how people process information about certain nonwords and about the methods we can use to investigate linguistic processing in laboratory settings. In general, this information will help us learn more about language function. You will have the opportunity to see how psycholinguistic research is conducted.

PAYMENT FOR PARTICIPATION

Participants will receive .5 bonus points for 30 minutes of participation towards the psychology participant pool, if registered in the pool and enrolled in one or more eligible courses.

CONFIDENTIALITY

Any information that is obtained will remain confidential. Participants will be asked to sign their name and information on the initial screening measure, and the data will be recorded as a number in the computer system. All of the paper information (e.g., names) will be locked in a cabinet.

PARTICIPATION AND WITHDRAWAL

Your participation is entirely voluntary and you may withdraw at any time without consequences of any kind. The investigator may withdraw you from this research if circumstances arise which warrant doing so.

FEEDBACK OF THE RESULTS OF THIS STUDY TO THE SUBJECTS

The findings from this experiment will be made available to each participant via the Research Ethics Board website (http://www.uwindsor.ca/reb).

Web address: _____http://www.uwindsor.ca/reb_____
Date when results are available: _____September 10, 2010_____

SUBSEQUENT USE OF DATA

This data will be used in subsequent studies.

RIGHTS OF RESEARCH SUBJECTS

You may withdraw your consent at any time and discontinue participation without penalty. If you have questions regarding your rights as a research subject, contact: Research Ethics Coordinator, University of Windsor, Windsor, Ontario, N9B 3P4; Telephone: 519-253-3000, ext. 3948; e-mail: ethics@uwindsor.ca

SIGNATURE OF RESEARCH SUBJECT/LEGAL REPRESENTATIVE

I understand the information provided for the study Memory for Visually Displayed Nonwords as described herein. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form.

_____
Name of Subject

_____ _____
Signature of Subject Date

SIGNATURE OF INVESTIGATOR

These are the terms under which I will conduct research.

_____ _____
Signature of Investigator Date

Revised April 2009

Appendix I

High and Low Orthographic (O.) Nonword Lists for Experiments 3, 4, & 5

High O.	High O. Foils	Low O.	Low O. Foils
LANDY	SLACE	SNOBL	REINK
SONDER	PETCH	STUALL	NEISE
HANGLE	STOPE	PAROCY	LUNUR
ROBBLE	ZATCH	OCHET	JALSH
NITTY	PASSY	JAFFO	FAMAD
BUSKY	PENCH	AFFED	JIKAD
GAVER	SCART	AVULT	RUSEW
NUSTY	STOOT	EITBER	DEVET
WAVEN	AIDER	POLOT	SANGU
TOMING	JOUSE	GONGAD	FALCH
SHIRD	SWURT	JETSAL	VIGEL
ZANGER	DATER	JOWPAT	OUTCOX
GUMBLE	GATCH	OLPHA	LIMME
CINGER	SLOCK	SOMAC	JOKAY
PANTER	CAMER	LATUNT	BURDE

Note. High O. (high orthographic neighbourhood nonwords), High O. Foils (high orthographic neighbourhood nonword foils), Low O. (low orthographic neighbourhood nonwords), Low O. Foils (low orthographic neighbourhood nonword foils)

Appendix J: Consent Form

CONSENT TO PARTICIPATE IN RESEARCH

Title of Study: Memory for Visually Displayed Nonwords Following Double Exposure

You are asked to participate in a research study conducted by Darren Schmidt, a Ph.D. Candidate in Clinical Neuropsychology, under the supervision of Dr. Lori Buchanan at the University of Windsor. The research is being funded by Dr. Lori Buchanan's research grant. Your participation will contribute to ongoing research towards Darren Schmidt's Ph.D. If you have any questions or concerns about the research, please feel free to contact Darren Schmidt at (519) 253-3000 extension 2240 or Dr. Lori Buchanan at (519) 253-3000 extension 2246**.**

PURPOSE OF THE STUDY

To explore how people process printed nonwords.

PROCEDURES

Participants will be assigned to one of two learning trials. In the first task, the participants will be asked to learn a list of nonwords individually presented on a computer screen. In the second trial, the participants will be asked to learn the same list of nonwords twice. Participants will be required to press the spacebar after reviewing each item until the list is studied. They will be given as much time as they need to study these items. They will be told that a memory task will follow. Following the study trials, each participant will be asked to participate in an experimental test where it will involve them to participate in a recall test. This test will require them to write down as many nonwords as they can remember from the studied trial(s) on a sheet of paper.

POTENTIAL RISKS AND DISCOMFORTS

This study does not involve any anticipated risks or discomforts

POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

Your participation in this study will help us learn more about how people process information about certain nonwords and about the methods we can use to investigate linguistic processing in laboratory settings. In general, this information will help us learn more about language function. You will have the opportunity to see how psycholinguistic research is conducted.

PAYMENT FOR PARTICIPATION

Participants will receive .5 bonus points for 30 minutes of participation towards the psychology participant pool, if registered in the pool and enrolled in one or more eligible courses.

CONFIDENTIALITY

Any information that is obtained will remain confidential. Participants will be asked to sign their name and information on the initial screening measure, and the data will be recorded as a number in the computer system. All of the paper information (e.g., names) will be locked in a cabinet.

PARTICIPATION AND WITHDRAWAL

Your participation is entirely voluntary and you may withdraw at any time without consequences of any kind. The investigator may withdraw you from this research if circumstances arise which warrant doing so.

FEEDBACK OF THE RESULTS OF THIS STUDY TO THE SUBJECTS

The findings from this experiment will be made available to each participant via the Research Ethics Board website (http://www.uwindsor.ca/reb).

Web address: _____http://www.uwindsor.ca/reb_____
Date when results are available: _____September 15, 2011_____

SUBSEQUENT USE OF DATA

This data will be used in subsequent studies.

RIGHTS OF RESEARCH SUBJECTS

You may withdraw your consent at any time and discontinue participation without penalty. If you have questions regarding your rights as a research subject, contact: Research Ethics Coordinator, University of Windsor, Windsor, Ontario, N9B 3P4; Telephone: 519-253-3000, ext. 3948; e-mail: ethics@uwindsor.ca

SIGNATURE OF RESEARCH SUBJECT/LEGAL REPRESENTATIVE

I understand the information provided for the study Memory for Visually Displayed Nonwords Following Double Exposure as described herein. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form.

_____
Name of Subject

_____ _____
Signature of Subject Date

SIGNATURE OF INVESTIGATOR

These are the terms under which I will conduct research.

_____ _____
Signature of Investigator Date

Revised April 2009

Appendix K: Consent Form

CONSENT TO PARTICIPATE IN RESEARCH

Title of Study: Novel Brand Name Memory Test

You are asked to participate in a research study conducted by Darren Schmidt, a Ph.D. Candidate in Clinical Neuropsychology, under the supervision of Dr. Lori Buchanan in the University of Windsor's Psychology Department. The research is being funded by Dr. Lori Buchanan's research grant. Your participation will contribute to ongoing research towards Darren Schmidt's Ph.D. If you have any questions or concerns about the research, please feel free to contact Darren Schmidt at (519) 253-3000 extension 2240 or Dr. Lori Buchanan at (519) 253-3000 extension 2246**.**

PURPOSE OF THE STUDY

To explore how people process printed nonwords and semantic (i.e., picture) information.

PROCEDURES
Participants will be asked to participate in two study phases, one distractor task, and one experimental task. Participants will be assigned to one of two learning tasks.

In first task, the participants will be asked to learn a list of nonwords individually presented on a computer screen. In the other task, they will be given the same nonwords with line drawing attached to them. Participants will be required to press the spacebar after reviewing each item or pairing until the list is studied. A matching task will be used to see if each participant has learned the pairings. A distractor task will follow the first study.

In the second study, participants will be asked to study the same list of the nonwords. Participants will be required to press the spacebar after reviewing each nonword. They will be given as much time as they need to study these items. They will be told that a memory task will follow.

Participants will then be asked to participate in one of two experimental memory tests. One of these requires participants to write down as many nonwords as they can remember from the studied list on a sheet of paper or decide if the nonwords that appear on the computer screen were on the studied list or not with a "Yes" or "No" response via computer key pressing.

POTENTIAL RISKS AND DISCOMFORTS

This study does not involve any anticipated risks or discomforts

POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

Your participation in this study will provide information about how people process information about certain nonwords and about the methods used to investigate linguistic processing in laboratory settings. In general, this information will help learn more about language function. You will have the opportunity to see how psycholinguistic research is conducted.

PAYMENT FOR PARTICIPATION

Participants will receive 1 bonus point for 60 minutes of participation towards the psychology participant pool, if registered in the pool and enrolled in one or more eligible courses.

CONFIDENTIALITY

Any information that is obtained will remain confidential. Participants will be asked to sign their name on a consent form, and fill out initial screening measure with the identifier as a code, and this code will be recorded in the computer system. All of the paper information (e.g., names) will be locked in a cabinet. All of the information (consent form, questionnaire, data) will be confidential. Only the experimenter will know each participant's information. See section 20 for cross-referencing technique.

PARTICIPATION AND WITHDRAWAL

Your participation is entirely voluntary and you may withdraw at any time without consequences of any kind. The investigator may withdraw you from this research if circumstances arise which warrant doing so.

Participants can withdrawal their information at any point in time. They are asked to make special arrangements with the experimenter if they wish to withdrawal their data. If they choose to do this, then there data will be deleted, and their consent form and questionnaire will be shredded.

FEEDBACK OF THE RESULTS OF THIS STUDY TO THE SUBJECTS

The findings from this experiment will be made available to each participant via the Research Ethics Board website (http://www.uwindsor.ca/reb).

Web address: _____http://www.uwindsor.ca/reb_____
Date when results are available: _____September 10, 2010_____

SUBSEQUENT USE OF DATA

This data will be used in subsequent studies.

RIGHTS OF RESEARCH SUBJECTS

You may withdraw your consent at any time and discontinue participation without penalty. If you have questions regarding your rights as a research subject, contact: Research Ethics Coordinator, University of Windsor, Windsor, Ontario, N9B 3P4; Telephone: 519-253-3000, ext. 3948; e-mail: ethics@uwindsor.ca

SIGNATURE OF RESEARCH SUBJECT/LEGAL REPRESENTATIVE

I understand the information provided for the study Novel Brand Name Memory Test as described herein. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form.

_____
Name of Subject

_____ _____
Signature of Subject Date

SIGNATURE OF INVESTIGATOR

These are the terms under which I will conduct research.

_____ _____
Signature of Investigator Date

Revised April 2009

Appendix L

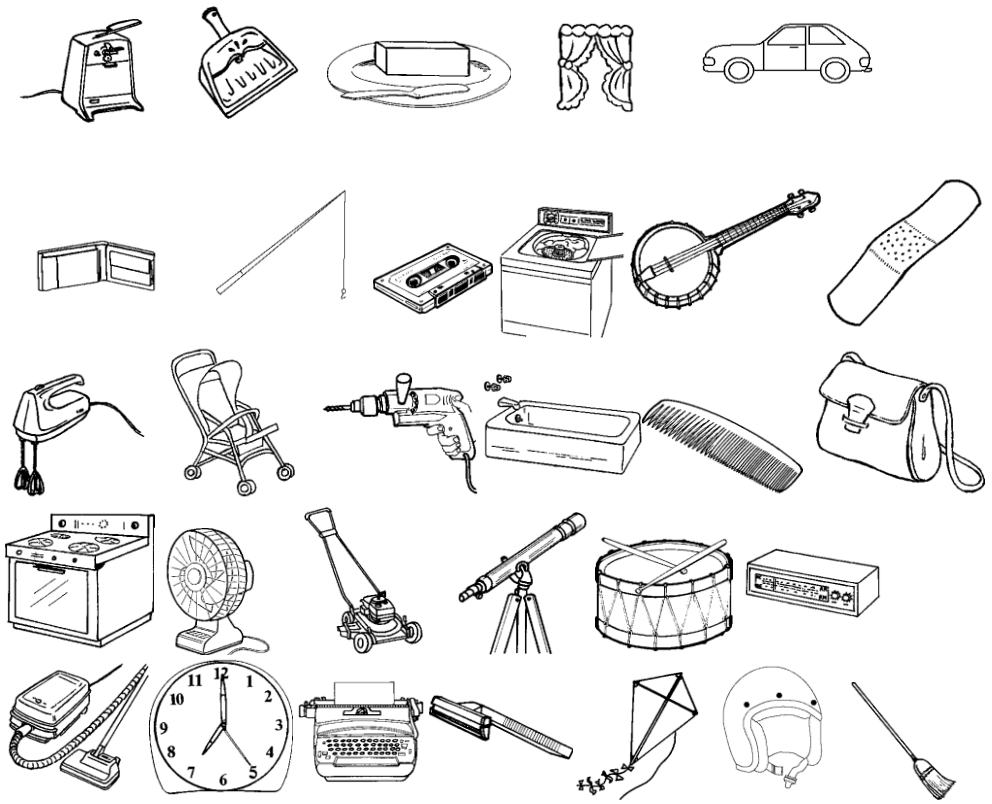
Matching Task

Directions: This is a matching task. You must match the correct nonword with its object drawing as reviewed through the learning phase. Just place a number 1-30 below the object that you believe to be the correct matching.

Nonwords

1.LANDY	6.BUSKY	11.SHIRD	16.SNOBL	21.AFFED	26.JETSAL
2.SONDER	7.GAVER	12.ZANGER	17.STUALL	22. AVULT	27.JOWPAT
3.HANGLE	8.NUSTY	13.GUMBLE	18.PAROCY	23.EITBER	28.OLPHA
4.ROBBLE	9.WAVEN	14.CINGER	19.OCHET	24.POLOT	29.SOMAC
5.NITTY	10.TOMING	15.PANTER	20.JAFFO	25.GONGAD	30.LATUNT

Objects



Appendix M: Stimuli for Emotion Study

CN	BN	PN
DESK	NIKE	TORONTO
BASKET	TOYOTA	WINDSOR
CAMERA	LEGO	LONDON
PENCIL	HITACHI	OTTAWA
OUTLET	NOKIA	BARRIE
MOOSE	KEDS	REGINA
TIGER	ADVIL	CALGARY
CAMEL	SEIKO	BANFF
WATCH	PARKAY	HALIFAX
CABINET	TELUS	VICTORIA
KEYCHAIN	EPSON	DETROIT
DRESSER	MICHELIN	CHICAGO
BOOK	BRAUN	CLEVELAND
DISK	LYSOL	DALLAS
MOUSE	BIC	ATLANTA
STAPLER	TETLEY	MIAMI
ENVELOPE	TIMEX	BOSTON
SHOE	HANES	TULSA
RADIO	XEROX	PHOENIX
DOG	LEVIS	DENVER
KEYBOARD	MOLSON	MOSCOW
PAPER	SMIRNOFF	SYDNEY
HORSE	LABATT	MADRID
TABLE	VERIZON	TOKYO
CHAIR	PREGO	OLSO
PLATE	TYLENOL	PARIS
KNIFE	LIPTON	BERLIN
WATERMELON	GILLETTE	STOCKHOLM
NOTEBOOK	MAYTAG	NAPLES
MAGNET	DELL	DUBLIN

Note. CN (common nouns), BN (brand names), PN (proper nouns)

Appendix N: Consent Form

CONSENT TO PARTICIPATE IN RESEARCH

Title of Study: Establishment of Word Type Database for Psycholinguistic Research-Phase 2

You are asked to participate in a research study conducted by Darren Schmidt, a Ph.D. Candidate in Clinical Neuropsychology, under the supervision of Dr. Lori Buchanan at the University of Windsor. The Social Sciences and Humanities Research Council of Canada (SSHRC) sponsors this research, which is held by Dr. Lori Buchanan. Your participation will contribute to ongoing research towards Darren Schmidt's Ph.D. If you have any questions or concerns about the research, please feel free to contact Darren Schmidt at (519) 253-3000 extension 2240 or Dr. Lori Buchanan at (519) 253-3000 extension 2246**.**

PURPOSE OF THE STUDY

To explore how people process brand names, common nouns, and proper nouns when shown in print.

PROCEDURES

If you volunteer to participate in this study, you would be asked to do the following: You will be asked to complete a emotion rating test on a computer-simulated program called Direct RT. During the emotion rating test, you will be asked to rate upper case noun types (brand names, common nouns, proper nouns) on a 4-point scale of emotionality (0-*no emotion*, 1-*little emotion*, 2-*emotional*, and 3-*very emotional*). You will be asked to perform this task as quickly as you can without making any mistakes. The tasks should take you approximately 30 minutes to complete.

POTENTIAL RISKS AND DISCOMFORTS

This study does not involve any anticipated risks or discomforts

POTENTIAL BENEFITS TO SUBJECTS AND/OR TO SOCIETY

Your participation in this study will help us learn more about how people process information about certain noun types and about the methods we can use to investigate linguistic processing in laboratory settings. In general, this information will help us learn more about language function. You will have the opportunity to see how psycholinguistic research is conducted.

PAYMENT FOR PARTICIPATION

For your participation in this study you may be eligible for .5 course credit (bonus mark).

CONFIDENTIALITY

Any information that is obtained will remain confidential and will be disclosed only with your permission. In order to ensure confidentiality no personal information will be in any way connected with the data you provide.

PARTICIPATION AND WITHDRAWAL

Your participation is entirely voluntary and you may withdraw at any time without consequences of any kind. You may want to exercise the option of removing your data from this study. You may also refuse to answer any questions you do not want to answer and still remain in the study. The investigator may withdraw you from this research if circumstances arise which warrant doing so.

FEEDBACK OF THE RESULTS OF THIS STUDY TO THE SUBJECTS

The findings from this experiment will be made available to each participant via the Research Ethics Board website (http://athena.uwindsor.ca/reb).

SUBSEQUENT USE OF DATA

This data will / will not be used in subsequent studies.

Do you give consent for the subsequent use of the data from this study?

RIGHTS OF RESEARCH SUBJECTS

You may withdraw your consent at any time and discontinue participation without penalty. If you have questions regarding your rights as a research subject, contact: Ethics Coordinator, Assumption University Building room 303, University of Windsor, Windsor, Ontario, N9B 3P4; Telephone: 519-253-3000 ext 3948; e-mail: ethics@uwindsor.ca

SIGNATURE OF RESEARCH SUBJECT/LEGAL REPRESENTATIVE

I understand the information provided for the study "Establishment of Word Type Database for Psycholinguistic Research-Phase 2" as described herein. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form.

_____

Name of Subject

_____ _____

Signature of Subject Date

SIGNATURE OF INVESTIGATOR

These are the terms under which I will conduct research.

Signature of Investigator Date

Vita Auctoris

Name:	Darren N. Schmidt
Place of Birth:	Belleville, New Jersey
Year of Birth:	1976
Education:	Laurentian University 1997-2000
	University of Windsor, Windsor, Ontario 2000-2001 B.A. (Honours Psychology)
	University of Windsor, Windsor, Ontario 2003-2005 M.A. Clinical Neuropsychology
	University of Windsor, Windsor, Ontario 2005-2011 Ph.D. Clinical Neuropsychology