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The Impact of Modality Expectancy on Memory Accuracy for Brand Names

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THE IMPACT OF MODALITY EXPECTANCY ON MEMORY ACCURACY FOR BRAND NAMES

by

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This manuscript has been read and accepted for the Graduate Faculty in Business in satisfaction of the dissertation requirement for the degree of Doctor of Philosophy

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ABSTRACT

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It is proposed that an individual's expectations regarding the modality by which to-be-remembered brand names will be communicated in the future can impact memory accuracy for those brand names. Specifically, we hypothesize that the likelihood of malapropistic errors (i.e., false recognition of phonetically similar brand names) increases with greater attention to phonemic codes relative to orthographic codes. Attention to these memorial representations is driven by expectations as to whether retrieval will be written or spoken. When visually presented with brand names, those expecting text-based retrieval pay relatively greater attention to the visual forms or orthographies of brand names, as this information is necessary for successful written reproduction. Individuals expecting to orally communicate brand names discount the orthographic information at encoding in favor of internally generated phonetic representations (i.e., the way the brand names sound when spoken), as the spellings of the brand names are immaterial for successful spoken reproduction. The formats by which stimuli are presented (i.e., sequentially vs. simultaneously) are shown to interact in predictable ways with modality expectancies, such that mere exposure effects are maximized only when presentation format is optimal for a specific expected modality—sequentially when spoken recall is expected and

simultaneously when written recall is expected. These conditions generate relatively high-quality memorial representations, which result in relative metacognitive ease of retrieval on subsequent recognition tasks. Consequently, downstream variables including purchase likelihood and willingness-to-pay for products featuring those brand names can be impacted via this perceptual fluency.

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CHAPTER 1: INTRODUCTION

Individuals exchange information via an array of media including telephone, email, written letter, text-message, video, and face-to-face conversation. These methods of communication differ on a key dimension that is of interest to this research, namely that some necessitate speaking while others require writing. When individuals encounter a novel brand name, they may anticipate how they will communicate or retrieve that brand name from memory in the future. This expectation to communicate through a specific modality, be it written or spoken, may be the product of previous interactions that tend toward one medium or be the result of foreknowledge of a specific impending interaction. Marketing communications themselves may provide calls to action that can lead individuals to develop expectations regarding the modality by which brand names are to be retrieved from memory at a future point in time. For example, advertisements for pharmaceutical drugs frequently implore potential customers to "Ask your doctor about BRAND X" or similar. In this scenario, a consumer may come to expect spoken reproduction of the drug name. In expecting to speak the brand name, one need not necessarily reencounter or produce the spelling of that brand name at any point from encoding to storage to retrieval. If however, a marketing communication suggests something such as, "Like BRAND X on Facebook," it would be obligatory for a consumer to produce the visual word form or spelling of that brand name to successfully comply.

This research hypothesizes a dual-mechanism process by which anticipation of the retrieval modality can impact memory accuracy. Prior knowledge of the context under which information is to be retrieved should impact selective attention strategies, such that attention for sensory information is biased in favor of presentation-retrieval congruence. Thus, those expecting to have to produce written output will pay relatively more attention to the visual

representation of the brand name and the way it is spelled, than will those expecting spoken production, as written production necessarily requires spelling but speaking does not. Relatedly, we theorize that individuals employ distinct processing strategies depending on the modality through which future communication is expected and will recode encountered brand names into whatever representation is consistent with the anticipated retrieval modality. Specifically, when spoken output is anticipated one should be expected to recode visually presented brand names into a phonetic code to a greater extent, discounting the value of encoding the spelling of the brand name. Whether it is created directly from presentation or generated through recoding, individuals will allocate greater attentional resources to the maintenance of whichever code is consistent with that of the expected modality of output. Further, the relative reliance on these codes will determine recognition accuracy and the patterns of errors displayed in memory failures.

The real-world scenario we use as a basis for our model is that of an individual committing to memory a brand name from an advertisement or other marketing communication who then goes to purchase a product featuring that brand name in a retail environment. This is analogous to engaging in a memory recognition task in that these individuals have to select, from a number of alternatives, the one that matches the brand name stored in memory. False recognition occurs when another product is mistakenly selected over the target brand. We contend that anticipating the modality of retrieval biases attention for perceptual representations in memory in favor of those consistent with the expected retrieval modality, thus moderating the likelihood of such false recognitions. That is, the presence and utilization of these perceptual codes will have systematic effects on recognition accuracy and patterns of false recognition.

CHAPTER 2: LITERATURE REVIEW

Presentation Modality

The literature is inconclusive as to whether spoken or written presentation of verbal materials is more beneficial for memory accuracy. It has been shown that the visual presentation of verbal material results in superior memory accuracy compared to identical information that is presented auditorily (Cleary and Greene 2002; Green 1981; Loveman, Hooff, and Gale 2002). In direct opposition to these findings, other research has found that auditory presentation of information results in superior memory accuracy when compared to visually presented information (Conway and Gathercole 1987; Gathercole and Conway 1988; Maylor and Mo 1999). These seemingly contradictory findings are significant for two reasons – (1) they support the existence of a perceptual component to memorial traces (i.e., support for a conceptualization of memory involving separate processing streams) and more importantly (2) they suggest that yet unexplored external factor(s) moderate the relationship between presentation modality and memorial accuracy.

One potential explanation that has been offered to reconcile some of the findings associated with modality effects involves the systematic examination of sequential versus simultaneous stimuli presentation. Specifically, that the optimal modality of presentation appears to depend upon the particular presentation conditions or format (Taub and Kline 1976). There is a substantial body of evidence that the method of presentation (i.e., sequential versus simultaneous) interacts in predictable ways with mode of presentation (i.e., auditory versus visual). Auditory presentation of stimuli results in superior performance on memory tasks given that those materials are presented sequentially, while visually presented stimuli are better

remembered when presented simultaneously (Penney 1975; Taub 1975; Taub and Kline 1976). It has been argued that the temporal component of sequentially presented materials makes them optimal for auditory processing (Penney 1975), whereas simultaneous presentation allows for spatial cues to reach their fullest potential via review of the materials (Taub and Kline 1976). Attention can be flexibly allocated and comparisons drawn between concurrently presented visually stimuli in a manner that is strictly not possible through audition (Goolkasian, Foos, and Krusemark 2008). The present research exploits these findings to create a novel procedure for inferring whether visually presented materials have been processed auditorily or visually. Specifically, we show that despite visual presentation and visual test of stimuli in all conditions, expectations of spoken reproduction can result in superior memory performance when conditions are optimal for phonetic processing. Thus, expectations of retrieval by a specific modality appear to produce memorial outcomes similar to those we would predict given presentation of stimuli in that modality.

The current research takes a further step toward reconciling the discrepant findings regarding presentation modality effects by highlighting the possibility of advance knowledge of retrieval context influencing memorial processes. In memory research, it is generally not made clear if subjects have expectations regarding the specific conditions under which memory will be tested. The extent to which subjects know the specific conditions of memory tests in advance are not universally disclosed in academic writing nor are these expectations normally measured. Previous research expounds the benefits of specific presentation formats for information that is read versus heard. The current research progresses the knowledge of the field by demonstrating that presentation modality *per se* is not the determining factor in memorial accuracy, but rather

such accuracy is a function of processing modality and the quality of subsequent memory traces produced—both of which are affected by expectations regarding retrieval modality.

Retrieval Expectations

The distinction between retrieval modalities is not arbitrary, as differences in memory accuracy have been demonstrated between spoken and written response formats (Kellogg 2001; Murray 1966). When compared to speaking, writing puts greater demand on working memory, is slower, less practiced, requires the activation of graphemic representations in order to spell words, uses more muscular energy, and is acquired much later in life (Kellogg 2007; Sauerland and Sporer 2011).

Bettman (1979) has suggested the possibility that consumers may encode incoming information with some task in mind that will direct, "what is to be stored and the form of storage." If, due to prior experience or otherwise, individuals are aware, at some level, that these qualitative differences exist between spoken and written recall, then advance knowledge of an impending recall episode from memory may determine attention and encoding processes to differential perceptual information (i.e., phonetic vs. orthographic representations) that will subsequently impact memory performance.

The current research explores how anticipating the context under which brand names are to be retrieved from memory in the future impacts the initial encoding of those brand names. We formally predict:

H1A: Modal congruence between presentation and expected output biases attention to the code consistent with presentation. Thus, participants expecting written recall will process brand names primarily in a visual form.

H1B: Modal incongruence between presentation and expected output causes individuals to recode into and primarily attend to the code consistent with expected output. Thus, participants expecting spoken recall will recode brand names into an acoustic code and process brand names primarily in an auditory form.

Across a number of domains, consideration of future events impacts cognitive processes and behaviors, including memorial processes and accuracy. For example, research on test expectancy effects in the education psychology literature has shown that consideration of the format of future retrieval of information from memory can influence metacognitive activity, learning strategy adoption and actual test performance (Dutke, Barenberg, and Leopold 2010; Scouller 1998). Research on such test expectancy effects generally finds that individuals are capable of encoding information differently depending upon whether they expect a recall or recognition task, which subsequently leads to different levels of recall and recognition accuracy. Beyond the education psychology literature, research has shown that when people are aware that information will be accessible in the future, they exhibit diminished recall for the information itself and enhanced recall instead for the location in which the information is stored, such as where to access it on the internet (Sparrow, Liu, and Wegner 2011). Memorial advantages have also been shown when subjects have advance knowledge as to whether recall will be cued or unaided (Finley and Benjamin 2012). These advantages stem from the employment of qualitatively

different strategies that are appropriate for the expected memory task demands. Taken together, there is strong support for the claim that anticipation of the nature of future retrieval can impact encoding and memorial processes in the present.

There is, however, a void in the literature with respect to the study of potential memorial effects of anticipating spoken versus written output. This is despite research showing a benefit of knowing the modality of output in advance. When subjects are aware of the modality by which memory will be tested (spoken or written) they are more accurate in their responses than when they are not aware of the modality (Tattersall and Broadbent 1991). Murray (1966) also compared knowledge of response modality prior to stimuli presentation and post list-presentation, similarly finding that advance knowledge of the response modality leads to superior memorial performance. While this research is limited, it supports a memorial benefit of foreknowledge of output modality, though it is silent as to whether differences will manifest between expectations of spoken versus written output. Both Tattersall and Broadbent (1991) and Murray (1966) exclusively explored the main effect of pre versus post-presentation knowledge of retrieval modality. Further, in their research, memorial tests always matched the modality by which participants were told to expect. In the current work, we use surprise recognition tests that do not strictly match the modality participants are made to expect. Thus, the present research extends the previous findings by systematically exploring differences between the anticipation of written and spoken response modes. Formally stated:

H2A: Participants anticipating written recall will exhibit maximal recognition accuracy when presentation of stimuli occurs simultaneously.

H2B: Participants anticipating spoken recall will demonstrate similar recognition accuracy regardless of whether stimuli are presented simultaneously or sequentially. Though, sequential presentation will be optimal for phonological processing, acoustic representations are less useful in discriminating between seen and unseen brand names.

Recoding

Extant research has shown that information presented in one modality need not be encoded exclusively in that modality (Downes et al. 1996; Kirsner, Dunn, and Standen 1989; McClelland and Pring 1991). It is well established that visually presented verbal materials, such as brand names, can be processed in either orthographic (visual) or phonological (auditory) codes at encoding. More specifically, individuals can visually process the physical word and letter shapes (Baddeley 1986) or they can recode this visual information into a corresponding phonetic representation and rehearse that spoken word-form acoustically (De Haan et al. 2000). For example, when encoding prices, individuals can code and store representations that are visual or auditory, regardless of the initial presentation modality, and this encoding influences memory performance (Vanhuele, Laurent, and Drèze 2006). It appears that the use of recoding strategies can produce memorial representations that are consistent with those that would be expected if the original presentation of the information had physically occurred.

It has been suggested that all incoming stimuli undergo obligatory recoding into the alternative perceptual form (McKone and Dennis 2000). Tanenhaus, Flanigan, and Seidenberg (1980) adopt a similar position, suggesting that both orthographic and phonological features are briefly activated regardless of presentation modality, but that orthographic codes are generally

not selected for maintenance in working memory and thus experience rapid decay. Without such selection for processing in distinct, dedicated subsystems in short-term memory, both orthographic and phonological traces will very quickly become inaccessible (Baddeley 1986; Logie 1986). The relative accessibilities of these traces at retrieval are likely to give an indication as to the processing that occurred at encoding, as it is generally thought that presence in these short-term stores is a necessary prerequisite for storage in long-term memory. This means that the representation held in long-term memory should reflect the manner in which the information was treated in the short-term store (Vanhuele et al. 2006). Russo and Grammatopoulou (2003) support the claim that variables affecting short-term memory should similarly impact long-term memory.

Importantly, the use of phonological versus orthographic codes does not appear to be an all-or-nothing proposition, as the recoding of visual stimuli into phonemic codes appears to occur along a spectrum that has implications for memory accuracy. Murray (1965) demonstrates that immediate recall for voiced consonant lists is superior to when they are whispered, that recall for whispered lists is superior to that of mouthed lists, and finally that mouthed lists were better recalled than silently read lists. Such voicing, or overt vocalization, has been shown to result in a higher proportion of acoustic errors relative to other types of errors, such as transpositions and serial order intrusions (Murray 1966). Voicing errors refer to falsely recalling similar sounding items such as recalling the letter "C" when "D" was actually presented, as both contain the /ē/ phoneme (Conrad 1964). It is errors such as this—those that occur when the generation of an acoustic representation is known—that are by extension, generally supposed to be indicative that phonological processing has occurred, even for subvocalization or covert phonetic recoding.

We contend that anticipating the context under which brand names are to be retrieved from memory in the future will have an effect on encoding activities and subsequent memory performance. It is expected that individuals who anticipate speaking brand names will primarily attend to phonological representations of the brand names during encoding at the expense of the visual orthographic codes. Conversely, we expect individuals anticipating to produce the visual word form to attend to the orthographic representation of the brand names during encoding at the cost of the phonological code. The differential processing in the short-term memory will be reflected in the quality of memory traces they produce.

Retrieval from Memory/ Recognition

It is generally proposed that words are represented in memory as vectors of orthographic, phonological, and semantic features (Hintzman 1988; Shiffrin and Steyvers 1997). The degree of activation of a word's memory trace is a function of its similarity to the probe word (Hintzman 1988). When subjects encounter a test word, they scan their memory for a trace of the word in the specific context in which it is presented. If the probe reveals an active trace of the word then the word is identified as old. False recognition occurs when a new word partially matches an old word. Words that partially match a trace can potentially exceed the threshold for a correct match because there is random noise in the activation values of each memory trace (Anderson et al. 1998). Similarity increases the probability of false recognition errors because it increases the probability of such partial matches (Lambert, Chang, and Lin 2001). We propose that phonological similarity instead of orthographic similarity should drive any found effects as it has been shown that homophone errors are likely even for orthographically distinct stimulus pairs. For example, homophones that are completely distinct orthographically, like 5 and FIVE, are

generally more confusable than pairs like STAKE and STEAK (Davis 1967), despite the greater orthographic overlap of the latter pair. There is also very little evidence for systematic visual confusion between letters in print (Fisher, Monty, and Glucksberg 1969).

Research on word recognition suggests that lexical processing or the accessing of word meanings stored in memory can occur through two distinct pathways. According to indirect lexical access models, there is a necessary intermediate step in the identification of printed words. Specifically, converting the visual stimulus into a sound is required to gain access to the word meaning stored in memory (Van Orden, Johnston, and Hale 1988). There is also support for direct lexical access, a model in which the visual word form or spelling can activate lexical meaning directly without phonemic mediation (Bradshaw 1975). It is generally accepted that individuals make use of both phonemic and graphemic codes in printed word recognition (Bentin, Bargai, and Katz 1984). That recognition can occur via two discrete pathways is of concern to the present research because it highlights the importance of understanding the relative prominence of visual and phonological traces of brand names in long-term storage. We expect the likelihood of successful retrieval and the pattern of errors exhibited to depend on the nature of the stored representation in long-term memory. Stated formally:

H3: Primarily attending a code that is inconsistent (consistent) with actual retrieval will result in decreased (increased) memory accuracy. Thus, participants expecting written (vs. spoken) retrieval should demonstrate superior memory accuracy given a surprise visual recognition task.

A number of factors have been shown to influence the relative prominence of phonological and orthographic codes in mediating the printed words' access to the internal lexicon. These factors include individual differences in reading ability, characteristics of the words themselves, as well as task demands (McCusker, Hillinger, and Bias 1981). For example, rereading or "expectancy-driven" reading leads to a relaxation of the orthographic verification standards and decreases the likelihood of detecting homophone errors (Daneman and Reingold 1993). It has also been shown that the inclusion of pseudohomophones of real words (i.e., nonwords that have pronunciations that are identical to real words) in a lexical decision task mitigates the use of phonetic mediation. The rejection of such pseudohomophones requires visual discrimination and cannot be accomplished with strict reliance on the phonemic code because of acoustic similarity to real words (Martin 1982). These finding are significant because they suggest that the utilization of the phonemic code may not be optimal in recognition tasks requiring the discrimination of similar-sounding brand names. Relying on phonemic codes in a retail context may increase the likelihood of falsely recognizing and subsequently purchasing a product that was not intended, but has a brand name that is acoustically similar to a target brand. Poor readers, who have been shown depend less on phonetic coding, do not readily exhibit phonetic-based errors in recognition (Byrne and Shea 1979). Thus, the presence of phonetic information in memory is seemingly necessary for phonetic confusion in recognition to occur.

Research on spoken word recognition has shown that acoustic-phonetic similarity can cause lexical confusion (Goldinger, Luce, and Pisoni 1989). Acoustically similar words are more likely to be confused as having been presented previously than are acoustically unrelated words (Gruneberg and Sykes 1969). Though it is generally studied in the context of short-term memory, acoustic confusion has been demonstrated in long-term memory as well (Woodworth 1938). The

finding that false positive inclusion errors tend to be acoustically related to presentation materials is not limited to auditory presentation (Gruneberg and Sykes 1969), but similarly occurs when presentation is visual (Gruneberg et al. 1970). There is a great deal of evidence that these types of errors are the result of phonological processing, including the fact that congenitally deaf people do not make acoustic confusion errors (Conrad and Rush 1965). Rhyming words and cohorts have been shown to compete for lexical activation (Allopenna, Magnuson, and Tanenhaus 1998). Thus, words that are adequately similar-sounding can potentially be co-activated enough that they compete for recognition. When people expect to orally communicate a brand name at some point in the future, they will rely more heavily on phonological representations of the brand name in memory at the expense of the visual word form or spelling. Subsequently, relatively greater attention to phonemic codes will contribute to a greater likelihood of confusion in the identification of brand names.

We are able to draw inferences about covert mental processes by examining patterns of errors that occur on memory tasks (e.g., Meyer 1992; Cowan and Kail 1996). Such analysis is regularly conducted in memory research to understand whether phonological processing of visually presented materials has occurred. In the case of visually presented stimuli, it is well-established for example that phonological similarity and word-length effects only occur if phonological processing has taken place. When phonological processing is prevented, through articulatory suppression (Frick 1985) or some processing deficiency (Snowling 1980), these effects are not exhibited. Given this well-established link, it is vital to determine factors that can cause such changes in processing, as there are potential implications for consumer behaviors. Yet uncovered factors that influence the degree of phonological versus orthographic processing of

words or brand names can begin to reconcile the discrepant findings regarding presentation modality effects.

Modal Congruence and the Mere Exposure Effect

Memory has been shown to be sensitive to presentation-test modal congruency (Gibson and Bahrey 2005), and is thus to some degree reliant on perceptual processes. Tavassoli and Fitzsimons (2006) show that mismatching the modes of communicating an initial and a delayed attitude results in greater inconsistency between the two occasions. To the extent that subsequent encounters with newly learned words, and by extension, brand names match the type of memorial representation that have already been established in memory, an individual should be able to more readily retrieve the previous memory traces (Nelson, Balass, and Perfetti 2005). The metacognitive ease of this retrieval has been shown to lead to more positive consumer evaluations of products.

In the context of consumer behavior, modal congruence has been shown to result in generally positive outcomes for marketers. Fransen, Fennis, and Pruyn (2010) show that matching the communication modality of brand exposure and the modality of evaluations and choices has a positive effect on brand evaluations and choice. In these studies, the underlying mechanism for the effects of modal congruence on brand evaluations and choice was shown to be perceptual fluency, or the ease of perception (Jacoby and Dallas 1981). We propose that these effects may benefit from additional nuance, in that expectations of the retrieval context modality and subsequent differences in processing rather than presentation modality *per se* will drive them. As perceptual fluency is generally considered to be a function of the degree to which test stimuli match memorial representations (Clark and Gronlund 1996), the greater the overlap

between the stimuli and the stored representation in memory the more familiar it will seem. Familiarity is a fundamental concept in recognition memory, as greater familiarly increases the likelihood of judging a stimulus as having previously been experienced (Westerman, Lloyd, and Miller 2002). Familiarity is also the mechanism by which the mere exposure effect is generally said to operate, with familiarity being interpreted by individuals as preference for the target stimulus (Zajonc 1980).

Mere exposure to brand names has been shown to lead to more favorable attitudes toward target brands (Janiszewki 1993). The mere exposure effect, that is more positive evaluations of previously seen over novel brand names, appears to be at least partially perceptual in nature, as priming is reduced by changes in modality (Butler and Berry 2001). There is evidence that preventing subvocalization can minimize the expression of such mere exposure effects (Topolinski, Linder, and Freudenberg 2014). Subvocalization is seemingly a necessary component of recoding both graphemes into phonemes as well as the reverse, phonemes into graphemes (Locke and Fehr 1972). Thus, it would appear that it is not the act of subvocalization *per se* that cancels out the mere exposure effect, but rather forcing subjects to rely on perceptual representations that do not match the modality of output. It seems that this mismatch results in memorial representations that are relatively more difficult to access, as they have less perceptual overlap. Mere exposure effects may thus be impacted by modality expectations in that these expectations can direct stimulus recoding into alternative perceptual representations. Further, factors that lead to higher (versus lower) quality representations should result in increased (decreased) processing fluency and higher (lower) consumer evaluations.

H4: Perceptual fluency, as reflected by greater recognition accuracy, leads to more positive attitudes toward brand names, greater likelihood of purchase, and increased willingness-to-pay.

We test this hypothesis in studies 3 and 4.

Any factors that impact the nature of stored representations should also drive evaluations via processing fluency. In the current research, we explore how expectations of spoken versus written retrieval can bias processing to create a representation that is not ideally suited for a particular retrieval task. That is expectations can bias processing in favor of perceptual information consistent with the anticipated output modality (i.e., orthographic (phonetic) when written (spoken) reproduction is expected). The quality of memorial traces will impact perceptual fluency in that a lower quality representation will be less effective at retrieval. The present research identifies presentation format as a factor that interacts in predictable ways with modality expectancies to affect the quality of memory traces.

CHAPTER 3: CURRENT RESEARCH

STUDY 1: SIMULATED SHOPPING TASK

The purpose of study 1 was to demonstrate the phenomenon under investigation in a context that provides for a level of ecological validity. Specifically, that anticipating the modality by which retrieval is to occur in the future (spoken vs. written) can impact performance on a virtual shopping task. Further, it was theorized that the pattern of errors would reveal that participants expecting to vocally communicate brand names would be significantly more likely to make malapropistic errors (i.e., to falsely recognize critical lures that sound similar to target brand names).

The current study was designed to be analogous to a real-life scenario in which an individual encounters a brand name, committing it to memory while holding some concept of the context under which future retrieval will take place, and then searching for it amongst an array of products on a shelf, some of which may have names that are similar to the target product.

Participants and Procedure

Ninety-two undergraduates (65.2% female) participated in this study in exchange for course credit. The study used a 2-factor (anticipated modality: written vs. spoken) between-subjects design.

Participants were informed that they would be presented with a list of brand names of energy bars to memorize and were instructed to imagine that they would, at some point in the

future, either communicate those brand names to a friend via text-message or phone call. These channels of communication vary in that text-messaging inherently involves the production of the brand names' visual word forms or orthographies, whereas communication by means of telephone is spoken and does not explicitly involve that brand names be spelled. Participants were then visually presented with a list of nine nonsense brand names, which were displayed sequentially for 3 seconds each, with a blank screen intervening between items for 2 seconds. Next, participants completed a filler task, which included demographic questions, to clear the brand names from short-term memory. Subjects were then presented with virtual product arrays designed to mimic retail shelves with the instructions that they were to select from each array, an energy bar from the list they were asked to memorize earlier and to do so as quickly as possible. Each array featured four items equidistantly spaced on each of four shelves for a total of 16 items. To isolate the effects of brand names from visual confusion of trade dress that has been explored in previous research, each box of energy bars was displayed as simple black text on a plain white package. Each array featured one of the target energy bar brand names as well as a homophone brand name (i.e., identical pronunciation with distinct spelling). Six arrays also featured similar sounding brand names that were one phoneme different than the target brand names. The remaining shelf positions in each array were filled with distractor brand names that were phonologically and orthographically dissimilar from the target brand names.

Results and Discussion

Shopping Task. A one-way ANCOVA was conducted to assess whether the accuracy of selecting target brands from virtually simulated retail environments was affected by the modality

through which participants expected to retrieve the brand names from memory. Previous research has found gender to play a significant role in phonetic processing (Wallschlaeger and Hendricks 1997), so it is included as a covariate in this analysis, though its effects are not significant ($F(1,89) = 1.47$, NS). Results revealed a significant main effect of the anticipated modality of retrieval ($F(1,89) = 4.18$, $p < .05$, $\eta_p^2 = .05$; without the covariate: $F(1,90) = 3.94$, $p = .05$, $\eta_p^2 = .04$), such that participants expecting to communicate though text identified a greater percentage of presented brand names than those expecting to communicate by phone (M_{text} = 58.35% vs. M_{phone} = 48.42%), thus supporting H3.

Recognition Errors on Shopping Task. We conducted the same ANCOVA with the number of false hits that varied from target brand pronunciations by a single phoneme (i.e., phonetically similar brand names incorrectly selected from the shopping arrays) as the dependent variable. Consistent with our theorizing that expecting to communicate orally focuses attention away from the spelling of brand names in favor of their sounds, subsequently resulting in greater confusion between similar sounding brand names, we find a significant main effect of the anticipated modality of retrieval from memory on the number of phonetically similar false hits ($F(1,89) = 5.97$, $p = .02$, $\eta_p^2 = .06$; without the covariate: $F(1,90) = 5.77$, $p = .02$, $\eta_p^2 = .06$). Relative to participants expecting text-based output, those expecting to orally produce the brand names demonstrated a greater propensity to falsely recognize the similar sounding brand names as having been previously seen (M_{phone} = 0.79 vs. M_{text} = 0.41). Again gender was included for consistency though it did not have a significant effect on recognition errors ($F(1,89) = 0.93$, NS). As a greater number of acoustic errors occurred when spoken recall was expected, H1B is supported.

Manipulation Check. An ANCOVA of the anticipated modality of retrieval from memory on self-reported picturing of the visual form of the brand name was conducted, again controlling for gender for consistency ($F(1,89) = 0.45$, NS). As predicted, participants that were made to expect to text-message the brand names reported picturing the brand names in their heads to a greater extent than did those who were made to expect to communicate by phone ($M_{phone} = 3.78$ vs. $M_{text} = 4.64$; $F(1,89) = 4.88$, $p = .03$, $\eta_p^2 = .05$; without the covariate: $F(1,90) = 4.76$, $p = .03$, $\eta_p^2 = .05$). This is consistent with our theorizing in that people expecting to produce the spelling of the brand names seemingly processed the visual word forms in visual working memory, thus providing support for H1A.

Perceptual Fluency. We ran an additional ANCOVA with participants' self-reports of the difficulty of remembering the presented brand names as the dependent measure and gender as a marginally significant covariate ($F(1,89) = 2.78$, $p < .10$, $\eta_p^2 = .03$). We find a main effect of anticipated retrieval modality on perceptions of difficulty such that participants expecting to text-message the brand names rated the memorization task as more difficult than did those expecting to communicate the brands via phone ($M_{phone} = 2.16$ vs. $M_{text} = 2.90$; $F(1,89) = 7.59$, $p < .01$, $\eta_p^2 = .08$; without the covariate: $F(1,90) = 7.05$, $p < .01$, $\eta_p^2 = .07$). We measured the perceived difficulty with a single item measure (1= "very difficult," 7= "very easy"). This is taken as support for the perceptual fluency argument in that subjects viewed the memorization task as easier when memorial representations consistent with the expected modality matched the code of retrieval at stimuli.

We use study 1 to demonstrate the phenomena under investigation in a context that has some degree of ecological validity. This study provides support for the proposed process as well as the specific type of memory failures hypothesized.

In the remaining studies, we use different recognition tasks to better explore the underlying process and to rule out several alternative hypotheses. The reason for this change is that the nature of the recognition tasks themselves may bias retrieval processes beyond the effects of modality expectancy. The visual and phonological representations of words do not equally contribute to printed word recognition in all circumstances as task demands have been shown to influence the memorial representations used for lexical access (Meyer, Schvaneveldt, and Ruddy 1974). Relatedly, subjects have been shown to be able to control the relative weight given to phonological versus visual information to meet the demands of different types of recognition tests (Bartlett, Till, and Levy 1980). For a clear example of how recognition task demands can impact memory accuracy we can look to the criminal justice literature, where it has been shown repeatedly that memory accuracy can be impacted by whether recognition judgments are made sequentially or simultaneously (Steblay et al. 2003). In criminal lineups, false identifications of innocent foils who resemble the perpetrator are more likely when each suspect is presented to the witness in isolation (i.e., sequentially) when compared to lineups in which multiple subjects are presented to the witness at one time (i.e., simultaneously).

STUDY 2: MODERATING ROLE OF PRESENTATION FORMAT

The purpose of study 2 is to gain a better understanding of the process underlying the effects found in the first study. In order to do this, study 2 explores the interaction between the

modality by which people expect to communicate brand names and the format in which they are presented. Given the well-established modality effects when presentation formats are varied, if we see a similar moderation of modality expectations on memorial outcomes, it would provide strong evidence of the nature of the coding and recoding that is taking place and that these representations can behave similarly to as if actual perception had occurred via the alternative perceptual modality. Specifically, we should envisage participants expecting written reproduction to show superior memory accuracy compared to those expecting spoken reproduction, but more so when the presentation of brand names is simultaneous. Study 2 also provides for a control condition, in which participants were not provided any information about the modality by which recall would be tested, to better understand how people spontaneously encode brand names in the absence of external influences directing them to expect a specific retrieval modality.

Participants and Design

One hundred and forty-three undergraduates (51% female) participated in this study in exchange for course credit. This study employed a 3 (expected modality: no information vs. written vs. spoken) x 2 (presentation format: simultaneous vs. sequential) between-subjects design.

Upon being seated at individual computer stations in the lab, participants were informed that they would be presented with a list of brand names of energy drinks to memorize. As in study 1, subjects were next instructed to imagine communicating those brand names to a friend in the future either by phone call or text-message on a between-subjects basis. An additional

control group was not provided any information regarding the modality of an impending recall episode. Participants were then visually presented with a list of six nonsense brand names, which were either displayed simultaneously for 60 seconds or sequentially for 10 seconds each. It was expected that the anticipated presentation modality would interact in predictable ways with presentation format. Specifically, the benefit of visual presentation should be maximized only when presentation of stimuli is simultaneous. This is because simultaneous presentation affords the optimal conditions for visual presentation, with sequential presentation being better suited for auditory materials (Taub and Kline 1976).

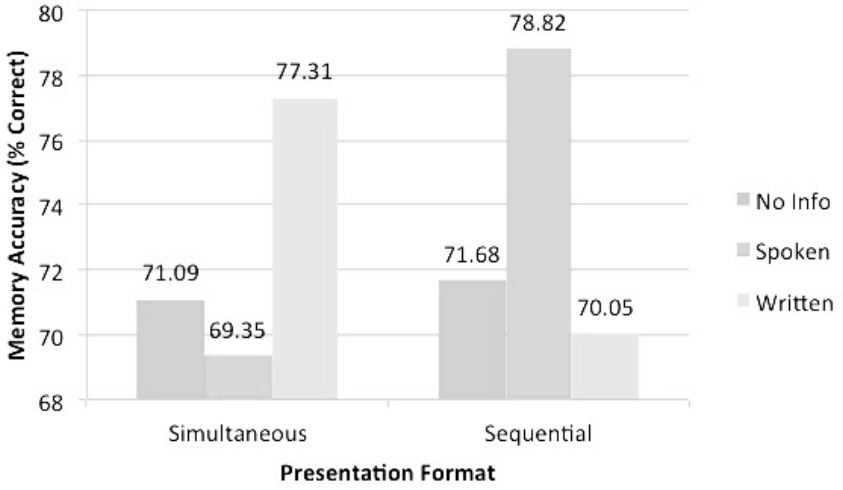
As in study 1, subjects then completed a filler task designed to clear the brand names from working memory. Subjects were finally given a yes-no recognition measure featuring the six-presented brand names, six homophone brand names, and eighteen distractor brand names. The distractor brand names were phonologically and orthographically dissimilar from the target brand names.

Results and Discussion

Old-New Recognition. A 3 x 2 ANCOVA with a combined measure of the percentage of correctly recognized presented brand names and correctly rejected homophone brand names (i.e., brand names with identical pronunciations but different spellings) as the dependent variable was conducted. This measure was provides the most adequate measure of memory performance given the lack of independence between brand names and homophone brand names in the recognition task having been presented random order. The analysis of expected retrieval modality (no information, spoken, written) and presentation format (simultaneous, sequential) as between-

subjects factors revealed no main effects of expected retrieval modality ($F(2,136) = .49$, NS) nor of presentation format ($F(1,136) = .15$, NS) on memorial accuracy. As predicted, results indicated a significant interaction between expected modality and presentation format ($F(2,136) = 3.97$, $p = .02$, $\eta_p^2 = .06$; without the covariate: $F(2,137) = 4.02$, $p = .02$, $\eta_p^2 = .06$). Participants expecting to communicate though text identified a marginally significant greater percentage of presented brand names than those expecting to communicate by phone when presentation of energy drink brand names were simultaneous ($M_{text} = 77.31\%$ vs. $M_{phone} = 69.35\%$; $t(136) = 1.89$, $p = .06$). However, when participants were presented with brand names sequentially, those who expected to communicate via telephone outperformed participants expecting to text-message ($M_{text} = 70.05\%$ vs. $M_{phone} = 78.82\%$; $t(136) = 2.09$, $p = .04$). In the no-information condition, memorial accuracy did not vary as a function of presentation format ($M_{simultaneous} = 71.09\%$ vs. $M_{sequential} = 71.68\%$; $F(1,136) = .02$, NS). This is likely the result of an averaging of a variety of nonconscious processing strategies that are employed in the absence of prompts that would create expectations as to the modality by which future communication is to occur. Further, we find that performance in the expect spoken-simultaneous and expect written-sequential conditions is on par with control subjects ($M_{text\text{-}sequential} = 70.14\%$ vs. $M_{phone\text{-}simultaneous} = 69.32\%$ vs. $M_{no\text{-}info} = 71.26\%$). As the optimality of sequential presentation for auditory stimuli and simultaneous presentation for visual stimuli is well established, this relatively weaker performance is strong evidence that processing is influenced by expectations of the modality of future retrieval from memory. To remain consistent with study 1, gender was included as a covariate though its effects are not significant ($F(1,136) = 1.49$, NS). Taken together there results support H2A, but not H2B or H3.

FIGURE 1: MODERATING ROLE OF PRESENTATION FORMAT ON EFFECTS OF MODALITY EXPECTATIONS



Consumer judgments, such as preferences, are at least partially based on perceptual fluency (Sanyal 1992). These judgments that are reliant on perceptual fluency are analogous to priming on implicit memory tasks (Butler and Berry 2001), a context in which modality effects are most frequently studied and in which they are robust (Curran, Schacter, and Galluccio 1999; McKone and Dennis 2000). Studies in this area generally support that cross-modal priming is weaker, compared to when study and test modalities match. Based on extant research, we should have expected to see higher preferences when brand name presentation and test modalities match, however, this is not precisely the case. Instead, we find that this pattern holds only when presentation is formatted in such a way as to optimize the memorial benefits of a particular mode of presentation (i.e., sequential when auditory and simultaneous when visual). These conditions are those in which a strong representation in memory is most achievable, whether phonological or orthographic in nature. Thus, we extend previous research by suggesting that the perceptual

facilitation of modal congruence may partially depend on modality expectancy, in that it biases information processing at encoding.

In all conditions in which participants were led to expect spoken reproduction we had predicted a level of memory accuracy on par with the control condition, as it was hypothesized that orthographic processing was necessary to correctly reject homophone brand names on a recognition task. Though not initially hypothesized, we find that expectations of spoken reproduction of brand names lead to memorial benefits when presentation is sequential. This is analogous to the predicted and supported claim that expectations of written reproduction operate only when presentation is simultaneous. This unexpected finding is perhaps the most significant in the present research, in that it suggests that characteristics of an advertisement (i.e., sequential versus simultaneous presentation of information) may potentially interact with calls to action and affords the possibility that they may negate the positive benefits normally experienced as a result of mere exposure effects. As mere exposure effects are generally thought to be the result of perceptual fluency, factors that lead to lower quality memorial representations of brand names in memory may cause relative metacognitive difficulty at recognition and subsequently drive diminished evaluations of products featuring that brand name. This is the claim that is tested in the remaining studies.

STUDY 3

The purpose of study 3 was to further probe the interaction found in the previous study and to test whether these effects were the result of conscious strategizing. This study was intended to provide additional evidence that varying nothing more than the modality by which

participants expect to be tested can impact memory accuracy. Study 3 also explores how variable memorial processing impacts the expression of mere exposure effects to brand names, specifically as it relates to downstream variables such as attitude and purchase likelihood.

Participants and Design

One hundred and twelve undergraduates (50% female) participated in this study in exchange for course credit. The study used a 2 (anticipated modality: written vs. spoken) x 2 (cognitive load: low vs. high) between-subjects design.

First, the availability of cognitive resources was manipulated by instructing participants to memorize a 7-digit number (vs. a 2-digit number) for the course of the study. Memorizing the 7-digit string of numbers is cognitively demanding and prevents the allocation of attention to concurrent tasks, whereas the 2-digit string is relatively easy to memorize and does not cause interference (Shiv and Fedorikhin 1999). This manipulation was included to enable us to determine whether any found effects were resultant from conscious strategizing. Following this manipulation, participants were informed that they would be presented with a list of brand names and were instructed to imagine that they would either communicate those brand names to a friend via text-message or via phone call. As in the previous studies, these channels of communication vary in that text-messaging inherently involves the production of the brand names orthographies in a visual manner whereas communication by means of telephone is verbal in nature and does not explicitly involve that words are spelled. Participants were then visually presented with a list of six nonsense brand names, which were simultaneously displayed for 60 seconds. Next, a filler task was included to clear the brand names from working memory. During

this time participants completed demographic information and a measure of need for cognition (Cacioppo, Petty, and Kao 1984). Subjects were then given a yes-no recognition measure featuring the six-presented brand names, six homophone brand names, and six distractor brand names. The distractor brand names were phonologically and orthographically dissimilar from the target brand names. Several items were included in the survey to assess self-reported allocation of attention between phonological and orthographic information. Lastly, measures were included for downstream variables including liking of each brand name and likelihood of purchasing a product featuring each.

Results and Discussion

Old-New Recognition. As in study 2, a composite score was calculated for performance on the old-new recognition task by summing the number of correctly identified seen brand names and correctly rejected homophones. The recognition task was composed of six previously seen nonsense two-syllable brand names and six homophone brand names presented in random order. Six two-syllable distractor brand names were included in the task but were orthographically and phonologically distinct from the target brands. As no differences were expected between groups on these distractor brand names, they were excluded from analysis. This measure was used because it takes into account false hits (incorrectly identifying a homophone as seen) and misses (incorrectly identifying a seen brand name as new).

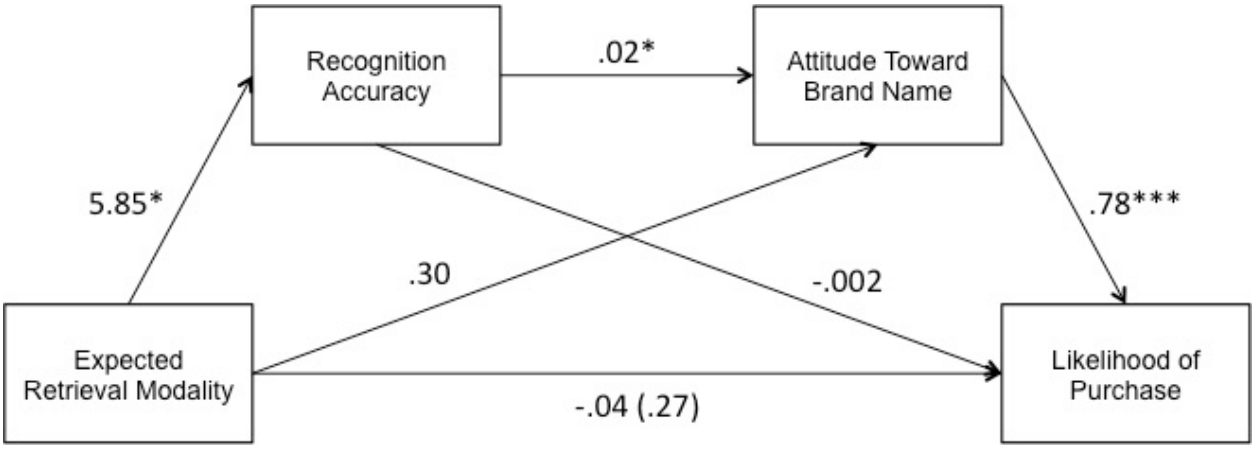
An ANCOVA for correct responses on the old-new recognition task yielded a significant main effect of anticipated mode of recall ($F(1,106)= 5.07$, $p < .05$, $\eta_p^2= .05$; without the covariates: $F(1,108)= 4.11$, $p < .05$, $\eta_p^2= .04$). Participants expecting to communicate the

remembered brand names via text messaging (M_{text} = 83.64% correct) outperformed those expecting to verbally communicate the brand names via phone (M_{phone} = 76.86% correct), supporting both H2A and H3. There was no main effect of cognitive load ($F(1,106)=1.89$, NS). There was no interaction between cognitive load and anticipated mode of recall ($F(1,106)=.01$, NS). The lack of an interaction suggests that the main effect of the anticipated mode of recall is not driven by a strategic allocation of cognitive resources to information matching the intended mode of retrieval (i.e., auditory in the phone condition and orthographic information in the text condition). Had this effect only persisted in the low-load condition, it would have provided evidence for a conscious strategic allocation of resources. Alternatively, the lack of an interaction between expected test modality and cognitive load could reflect a relative ease of phonological recoding, as extant research suggests this is a relatively automatic process (McCutchen and Perfetti 1982). Further study is necessary to rule out this alternate explanation for the found pattern of results. Gender and need for cognition (NFC) had significant effects on response latencies for the recognition task and were thus included as covariates for consistency, though neither significantly affect performance on the yes-no recognition task (gender: $F(1,106)=1.87$, NS; NFC: $F(1,106)=.51$, NS).

Serial Multiple Mediation Analysis. When testing serial multiple mediation (PROCESS Model 6, Hayes 2013), the indirect effect of advance knowledge of retrieval modality on purchase likelihood through both recognition accuracy and liking of brand names was significant (effect = .083, CI [.0026 to .2436]). Superior recognition accuracy for those expecting text-based retrieval (compared to verbal retrieval) increased liking of presented brand names, which in turn led to increased likelihood of purchase, thus supporting H4.

Recognition accuracy, as measured, takes into explicit account participants ability to not only recognize brand names as presented, but also to correctly reject homophone brand names that were not seen previously. This measure, thus serves as an indicator of the quality of memorial traces in long-term storage and of their usefulness as cues at retrieval. Higher quality memorial traces are easier to access and this metacognitive ease translates to the expression of mere exposure effects—more favorable attitudes, increased likelihood of purchase and increased willingness-to-pay.

FIGURE 2: SERIAL MULTIPLE MEDIATION ANALYSIS



Study 3 replicates the basic effect under study, that anticipating the modality through which brand names will be retrieved from memory influences recognition accuracy. We find that participants expecting to communicate to-be-learned brand names via text demonstrate superior performance on a recognition task. Previous research has shown that the memory advantage for visually presented of information over that which is presented through an auditory medium is the result of a greater flexibility of ordering visual information in working memory as it is presented visually (Goolkasian et al. 2008). In the following study, we eliminate the proposed source of

advantage for visual presentation by sequentially presenting brand names, thus removing the ability to flexibly allocate attention.

It is our assertion that the allocation of resources at encoding to the phonological and visual components, respectively, of brand name representations, need not be intentional. There is evidence to suggest that directed remembering and forgetting can be implemented unintentionally (Mitchell et al. 2002). Situational cues that are present when information is encountered can serve to signal the relative importance of the information. Bargh (1997) suggests that such cues allow individuals to allocate their limited attentional resources by guiding covert rehearsal processes to important information, even when the perception of the cues is outside of conscious awareness. In the case of the present research, these cues come in the form of advance knowledge of the modality by which brand names are to be retrieved from memory at a future point in time.

STUDY 4

The purpose of study 4 is to attempt to replicate the unexpected results of study 2. Specifically, we had predicted relatively low levels of memorial accuracy among participants expecting spoken reproduction of brand names, as brand name orthographies should be required to correctly reject homophone brand names on a visual recognition test featuring homophone brand names. Counter to this prediction, we found that memorial accuracy among those expecting spoken production exceeded expectations when brand names were presented sequentially—a format that is optimal for auditory presentation. Additionally, this study is designed to show that positive outcomes for downstream marketing variables are not an artifact

of expecting written reproduction and extends effects of processing fluency to an additional marketing outcome—willingness-to-pay for items featuring the presented brand names.

Participants and Design

One hundred and sixteen undergraduates (56.9% female) participated in this study in exchange for course credit. The study used a 2 (anticipated modality: written vs. spoken) x 2 (cognitive load: low vs. high) between-subjects design.

The procedure of study 4 was nearly identical to that of study 3 with the exception of the manner in which brand names were presented. Instead of being presented simultaneously, three nonsense brand names were sequentially presented in a visual form on a canned beverage for eight seconds each. The brand names were presented in this way so as to provide some context for participants to base their responses to a willingness to pay measure. The recognition task consisted of the three target brand names, three homophone brand names, and eighteen distractor brand names.

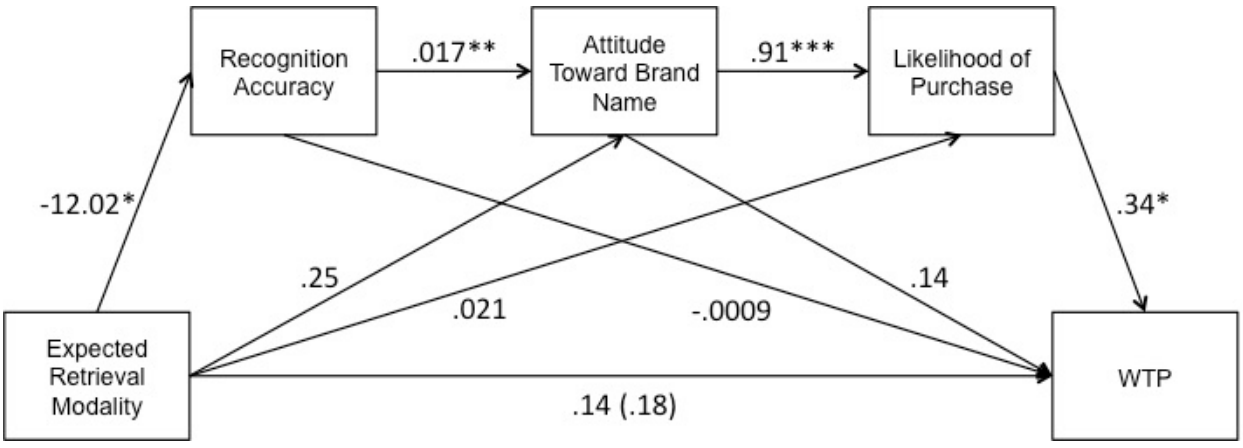
Results and Discussion

Old-New Recognition. An ANCOVA for percentage of correct responses on the old-new recognition task yielded no main effect of cognitive load ($F(1,110) = .26$, $p = .32$) nor an interaction between expected retrieval modality and cognitive load ($F(1,110) = .64$, $p = .43$). We find a significant main effect of the anticipated mode of retrieval ($F(1,110) = 11.54$, $p < .001$, $\eta_p^2 = .10$; without the covariates: $F(1,112) = 11.76$, $p < .001$, $\eta_p^2 = .10$). Participants expecting

spoken recall exhibited superior performance on the recognition task than did those expecting to text-message the brand names (M_{phone} = 61.45% correct vs. M_{text} = 49.45%). As in study 2, these results again fail to support either H2B or H3. Gender and NFC were included as covariates for consistency, though neither significantly affects performance on the recognition task ($F(1,110)$ = .26, NS; $F(1,110)$ = 1.44, NS). The insignificance of the cognitive load manipulation is further evidence that the found effects are the results of nonconscious strategizing.

Serial Multiple Mediation Analysis. Serial multiple mediation analysis (PROCESS Model 6, Hayes 2013) revealed an indirect effect of advance knowledge of retrieval modality on willingness to pay that is carried through recognition accuracy, liking of brand names, and purchase likelihood (effect = -.064, CI [-.2168 to -.0079]). Those expecting verbal retrieval (compared to orthographic retrieval) demonstrated superior recognition accuracy, which increased liking of presented brand names, which in turn led to increased likelihood of purchase and an elevated willingness-to-pay, thus supporting H4.

FIGURE 3: SERIAL MULTIPLE MEDIATION ANALYSIS



CHAPTER 4: GENERAL DISCUSSION

In this research we demonstrate that expectations of future recall episodes can influence encoding processes in the present. Specifically, we show that people expecting written recall tend to process presented brand names in a predominantly visual manner, whereas those anticipating spoken retrieval in a manner that is predominantly acoustic. In all studies, the actual modality of presentation was visual, yet differences persisted in terms of memorial accuracy. Taken as a whole, this research suggests that commonly used components of advertisements (i.e., calls to action that direct people to expect spoken or written production), as well as presentation format, can potentially impact memorial accuracy and downstream variables informed by perceptual fluency.

In attempting to exploit the well-documented finding that visual processing is optimized when stimuli are presented simultaneously and auditory processing when presentation is sequential, we unexpectedly discovered that people expecting spoken reproduction can actually exceed performance on a recognition task given that stimuli are presented simultaneously. This result calls into question the generally accepted finding that presentation-test modality offers benefits for memorial accuracy, as presentation and test were visual in all cases. These differences suggest that research on presentation modality may require additional nuance and perhaps a keener interest in processing modality instead. As identically presented information can be processed in either a visual or auditory code, it is the nature of this processing that primarily determines modality effects and not the presentation modality itself directly.

Across four studies, we investigate the impact of prior knowledge of retrieval modality on the encoding and subsequent recognition of brand names. In study 1, we demonstrate the

basic effect under study in a context that maintains a degree of ecological validity. In study 2, we show that modality expectations interact with presentation format and thus provide strong evidence for the underlying process. In study 3, we find additional evidence that the modality by which people expect to retrieve brand names from memory in the future influences recognition accuracy and subsequently the likelihood of purchasing products featuring those brand names. We follow this with study 4, which validates the unexpected result of study 2 and supports the finding that mere exposure effects operate chiefly when presentation format is ideally suited for processing by a specific modality. Study 4 also shows that the expected modality of retrieval can impact peoples' willingness-to-pay for products. Taken together this series of studies demonstrate that the phenomenon under investigation is most likely due to a tendency to process incoming information via the subsystem in memory consistent with expected retrieval – visuo-spatial scratchpad when written reproduction is expected and the phonological loop when spoken reproduction is expected.

At first glance, the results of study 1 may seem to contradict the findings of subsequent studies; however, research in the domain of criminal law has repeatedly demonstrated that the outcomes of simultaneous and sequential recognition tasks are not comparable outright (Steblay et al. 2003), in that the procedure by which recognition task stimuli are presented directly influences subject performance. While study 1 provides support for the initial hypothesis that phonological confusion is likely to occur when processing is predominantly visual in nature (i.e., when retrieval from memory is expected to be written), subsequent studies call this finding into question. In studies 2 and 4 as we find that under certain circumstances stimuli that are processed phonetically can exceed recognition rates of visual processed stimuli, interestingly when presentation and surprise recognition tests occur in visual domains. Thus, our initial hypothesis

that memorial errors would be consistent with processing modalities triggered by modality expectations is only partially supported and may only persist when shopping among product arrays in which several options are simultaneously presented.

The results of study 1, that sequentially presented to-be-learned brand names allowed for superior accuracy on the shopping task when visual retrieval was expected, likely serve as a conservative demonstration of our proposed effects. This claim is based on the persistence of the effects under conditions in which studies 2, 3, and 4 suggest are not optimal for visual processing. The magnitude of the effects should only be expected to increase with the simultaneous presentation of brand names as simultaneous presentation allows individuals the flexibility to allocate their attention and has been shown to improve the recall of printed words (Goolkasian et al. 2008). The existence of a benefit of expecting written retrieval in spite of sequential presentation of brand names in study 1, at the very least, warrants deeper probing. At present there are several feasible explanations for this finding. First, it is possible that a simultaneous recognition task encourages a visual processing strategy. Second, it is possible that partial traces are elaborated upon at the time of retrieval. Extant research has shown that people are in fact able to adjust the weight given to verbal versus nonverbal information depending on the nature of particular recognition task demands (Bartlett et al. 1980).

Factors that influence brand name processing should be of great concern to marketing managers as they can impact brand name recognition (Hennessey, Bell, and Kwortnik 2005). From a consumer protection standpoint, the present research is especially significant. Up to 25 percent of the 1.5 million injuries and 100,000 deaths reported annually are caused by similarity between drug names (Haiken 2010). This statistic is particularly troubling when we consider that the number of prescriptions filled annually is trending upward with a record 4.3 billion

prescriptions being filled in 2014 alone (Tribune Wire Reports 2015). Studying factors that impact memory for brand names is particularly important considering the prominence of brand names as a factor in consumer judgments and choice. The privileged consideration of brand names is evidenced by mere exposure effects that occur even across product categories (Topolinski et al. 2014) and the presence of brand confusion among phonetically similar brand names even when packaging is visually distinct (Howard et al. 2000). That is, people appear to ignore other available cues in favor of brand names.

Accidental purchases (i.e., purchases in which individuals intend to purchase a specific product and mistakenly purchase another in its place) account for $2.1 billion dollars of grocery sales annually (Rafferty and Little 2009). Such purchases appear to be widespread, as evidenced by estimates that 20 to 70 percent of people have demonstrated confused behavior in a retail context (Rafferty and Little 2009; Rafiq and Collins 1996). While research on copycat brands tends to focus on visual similarity to a target brand's trade dress or overall appearance (i.e., shapes, sizes, colors, and labeling; (Finch 1996; Horen and Pieters 2012), there is evidence that acoustic similarity between brand names can analogously cause confusion even in the absence of visual similarity (Howard, Kerin, and Gengler 2000). One purpose of this research is to expose an antecedent to potential brand confusion. Specifically, we investigate whether prior knowledge of the modality by which items will be recalled from memory influences the process of encoding visually presented brand names.

In this research, we assume that initial exposure to a brand name is indistinguishable from exposure to a new word, in that a previously meaningless visual string of letters or combination of sounds is encoded with some context, thus linking some representation of the word and meaning to create a lexical representation that is stored in memory. Individuals

necessarily encounter a new word or brand name either visually or auditorily, subsequently, "an episodic trace of such an encounter is likely to include context-specific information such as visual or acoustic input features in addition to more context-independent orthography or phonology (Nelson et al. 2005)." A unique episodic trace is formed with each exposure to a new word or brand name, each replete with distinct information dependent upon the specific context of the encoding situation. As a consequence of these repeated exposures, a lexical entry should become more independent from the individual episodic traces. A lexical entry rich with semantic, phonological, and orthographic representations is more connected and will thus be easier to access by way of a variety of retrieval cues. By design, our experiments allow for only a single episodic trace to be formed, so that we are able to assess whether lexical access is mediated primarily by phonological or orthographic information.

Davis (1967) suggests that homophones sharing meaning are more confusable than those that are semantically distinct, as the semantic associations are used to discriminate between homophones. We propose that newly encountered brand names are likely to have very little, if any, existing semantic content. Thus, semantic representations should not contribute to discrimination between nonword homophones such as those employed as brand names in our visual recognition tasks. We do not claim that semantic traces are irrelevant, but rather by design we limit the possibility of semantic encoding by using pseudoword brand names that should not be expected to have prior semantic associations. Thus, we are able to isolate the contribution of phonological and orthographic traces in memory accuracy.

Further research is needed to partial out the relative contributions of orthographic and phonological processing on memory accuracy. Based on the relatively small percentage of malapropistic errors, it seems that both competing codes remain available in long-term memory.

However, it remains unclear whether internally generated codes are more activated than those created by perception alone or whether there is directed forgetting or discounting of memorial representations not selected for rehearsal in working memory. Additional research is also needed to explore whether the current findings extend to brand names that are presented auditorily, as the current series of studies use visual presentation exclusively.

A number of individual differences may contribute to the manner in which consumers process perceptual stimuli and thus require additional research. Consumers have been shown to have different abilities and preferences for visual versus verbal information processing (Childers, Houston, and Heckler 1985). Reading ability has also been shown to affect reliance on auditory versus visual coding, with skilled readers preferring to access the lexical meanings of visually presented stimuli though phonological recoding (Barron 1978). Dyslexics make less use of phonological codes in memory (Shankweiler et al. 1979). Instead of recoding into a phonological form, dyslexics demonstrate reading using a primarily visual or orthographic strategy (Snowling 1980). Further, research has shown that previous experience with writing and speaking can impact memory performance (Davis and Herr 2014).

In the future, this paradigm should be tested in other contexts, considering that task demands have been shown to influence information processing. In certain situations people are apparently able to adjust their usage of phonological and orthographic information. For example, previous research has found that phonetically similar words and homophones do not always demonstrate the same memorial effects (Verstaen et al. 1995). As the complexity of written material increases and with less frequent words there is a tendency for increased usage of phonological codes (Hardyck and Petrinovich 1970). The number of exposures to a stimulus can also impact the route of lexical access. Additionally, there is a shift from phonological recoding

to direct visual access as a function of the number of previous exposure episodes (Zecker and DuMont 1984).

Future research could also explore whether people spontaneously anticipate the context under which they will have to retrieve information from memory. At present, it appears that in the absence of information that might lead to the formation of expectations of retrieval by a specific modality, people use a variety of processing strategies seemingly at random. This is consistent with extant research, which has found people to employ a variety of strategies on memory tasks when no explicit processing instructions are provided, even within a single research session (Logie et al. 1996). Event-based prospective memory involves an individual establishing a plan to initiate a future action when some external cue is experienced (Einstein and McDaniel 1990). For example, "When I see person X, I will give them a message." The prospective memory literature demonstrates that individuals envision the future environment in order to establish retrieval cues for successful plan implementation. Given this fact, it seems logical to assume that individuals may at times spontaneously consider the future context under which some piece of information will later be required for retrieval.

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