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The Effects of Talker Variability and Talkers' Gender on the Perception of Spoken Taboo Words

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ABSTRACT

In the current experiment, I examined the effects of inter-talker variability and talkers' gender on listeners' perception of spoken taboo words. Previous spoken word recognition research using the long-term repetition-priming paradigm, in which listeners respond to two separate blocks of spoken words, found performance costs for stimuli mismatching in talker identity. That is, when words were repeated across the two blocks and the identity of the talker remained the same (e.g., male to male) reaction times (RTs) were faster relative to when the repeated words were spoken by two different talkers (e.g., male to female). Such performance costs, or talker effects, followed a time course, occurring only when processing was relatively slow. More recent research has found that explicit and implicit attention towards the talker led to talker effects (even during relatively fast processing). The purpose of the current study was to examine how word meaning could affect the pattern of talker effects. Participants completed an easy lexical decision task and participants' mean accuracy rates and RTs were analyzed. I hypothesized that hearing taboo words would surprise the listeners and grab their attention, such that talker effects are obtained even when processing is relatively fast. The results are consistent with the attention-based hypothesis that talker effects emerge when participants hear both spoken taboo and neutral words. However, talker effects emerged regardless of the talkers' gender. In addition, taboo words were responded to

faster than neutral words, suggesting that spoken word recognition can be affected by word meaning. The results of the current study have important implications for theoretical models of spoken word recognition and how attention plays a role.

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CHAPTER I

INTRODUCTION

Talker Effects

Listeners are able to understand words quickly and accurately despite the fact that the speech signal can be highly variable. There is an ongoing debate between episodic and abstract theories regarding how listeners represent spoken words.

According to the episodic theories (e.g., see Goldinger, 1996), when people process spoken words, the mind stores nonlinguistic features (Church & Schacter, 1994). Nonlinguistic features, also known as indexical features, refer to features capturing variability in the talker's identity, emotional tone of voice, speaking rate, etc. (Abercrombie, 1967; Pisoni, 1997). Church and Schacter (1994) have examined the role of indexical variability on the processing of the listeners' spoken word recognition through the use of the long-term repetition-priming paradigm. In this paradigm, participants are presented with two separate blocks of spoken stimuli to which they must respond in some way (depending on the task). Usually a filler task (e.g., a math test) is presented between the first and second blocks, which are referred to as the prime and target blocks. When words are repeated in both the prime and target blocks, participants' responses are typically more rapid or accurate, relative to new or non-repeated control

words (i.e., words appearing only in the target block that had not been presented during the prime block), referred to as a repetition priming effect. When participants respond more slowly or with reduced accuracy because words are spoken by different talkers between the first block and the second block, this is referred to as a talker effect.

According to abstract theories (see McClelland & Elman, 1986; Pisoni, 1997), nonlinguistic features are not stored as part of listeners' lexical representations. Instead, following a speech normalization process, only the phonological features form listeners' lexical representations. Speech normalization is the process in which we must strip away the nonlinguistic features, considered noise in the signal, in order to process the phonological features of the word. Research has demonstrated that processing consequences occur when the speech signal is highly variable because the high variability places a greater demand on the normalization process (e.g., Mullennix, Pisoni, & Martin, 1989), implying that when there are multiple talkers, perception should be slower and less accurate. The research on representation has examined the long-lasting effects of variability on the representations underlying language perception. For example, Church and Schacter (1994) found that study-to-test changes in the speakers' voice, intonation, and fundamental frequency produced significant reductions in repetition priming on implicit tests of auditory identification and stem completion, but had little or no effect on explicit recall and recognition tests. This finding demonstrates that indexical features are stored in memory and can affect offline processing.

Previous research by M^{c}Lennan and Luce (2005) demonstrates that whether talker variability plays a role in listeners' online perception of spoken words is subject to how fast listeners are processing the spoken words. Specifically, when processing is relatively

slow (e.g., when the task is relatively difficult), talker effects emerge, consistent with episodic theories. When processing is relatively fast (e.g., when the task is relatively easy), priming is equivalent in the same and different talker conditions, consistent with abstract theories.

Beyond the work done by M^{c}Lennan and Luce (2005), there has been additional support for the time-course hypothesis. Mattys and Liss (2008) found evidence in support of the time-course hypothesis using naturally occurring degraded speech (dysarthria), without the use of artificial alterations to the stimuli, to simulate the less than ideal listening conditions of everyday listening. Three types of speech were used to create different levels of difficulty: a man and a woman with no known speech impairment, a man and women with mild dysarthric speech, and a man and woman with severe dysarthria. Each participant heard only one speech type. The authors predicted that talker effects would be greater for words spoken by dysarthric individuals than by healthy individuals. The data showed a voice specificity effect that increased with the level of difficulty, even when controlling for intelligibility. These results support the time-course hypothesis, given that as difficulty increased, listeners' processing slowed.

Also in support of the time-course hypothesis, a study by Vitevitch and Donoso (2011) demonstrated how change detection could be used to determine the processing of indexical and linguistic information in spoken word recognition. These researchers found that more listeners were "deaf" to a change in talkers (i.e., they failed to notice that the talkers changed half way through the experiment) when performing an easy lexical decision task (i.e., when processing was relatively fast) and more listeners noticed the

change in talkers when performing a hard lexical decision task (i.e., when processing was relatively slow).

Another recent additional study investigated whether intra-talker variation in emotional tone of voice followed the same time-course (Krestar & M^{c}Lennan, 2013). In this study, the same talker in sad and frightened emotional tones of voice were used because they were distinctive enough from one another (Sobin & Alpert, 1999). The experiment used the same design as M^{c}Lennan and Luce (2005) and found that both matched tone of voice and mismatched tones produced equivalent RTs in an easy lexical decision task, but not in a hard lexical decision task. In the hard lexical decision task, mismatched tone of voice produced longer RTs relative to matched tone of voice, consistent with the time-course hypothesis.

In conclusion, previous research has suggested that when processing is fast, talker effects are not present because of the time-course. However, there may be other factors modulating whether listeners use episodic or abstract representations. For example, González and M^{c}Lennan (2007) explored the possibility of hemispheric differences in relation to indexical specificity effects during spoken word recognition with the use of long-term repetition-priming paradigm and the lexical decision task. These authors found that when auditory stimuli were presented to the left ear (right hemisphere), prime words matched on talker identity were more effective primes than prime words mismatched on talker identity. When presented to the right ear (left hemisphere), matched and mismatched prime words were equally effective. In conclusion, these results suggest that indexical variability can affect the perception of spoken words differently in the right and left hemispheres.

There is evidence that attention may also affect whether listeners use episodic or abstract representations. Maibauer, Markis, Newell, and M^{c}Lennan (2013) recently provided evidence for greater talker effects in listeners hearing famous talkers relative to listeners hearing non-famous talkers. Two important aspects of this study serve as the motivation for the current study. First, talker effects were obtained, despite the fact that listeners were performing a speeded-shadowing task, and thus responding relatively quickly. Second, Maibauer et al. account for their results by positing that their participants were paying greater attention to the words spoken by the famous talkers. If indeed listeners are more likely to use episodic representations **when greater attention is devoted to processing the input**, even when processing relatively quickly, there should be other conditions in which **listeners devote additional attentional resources to the input** beyond listening to words spoken by famous talkers; presumably one such condition is when listening to taboo words. Another recent study also found talker effects when participants paid attention to the speakers, but not when participants paid attention to lexical characteristics (Theodore & Blumstein, 2011). That is, talker effects emerged when participants were first asked to identify the gender of the talker, **thereby drawing their attention to the talker identity**, but not when participants were simply asked to listen carefully to each word, even with equivalent processing time in both cases. In the current study, I was interested in using different types of words to draw participants' attention to the spoken words.

Taboo Words

Taboo language, which has a unique emotional power, reflects properties that affect cognitive processes such as memory and attention. Jay, Caldwell-Harris, and King

(2008) predicted that words processed at a deep level have a higher percentage recalled than words processed at a shallow level. Experimental trials consisted of a deep (e.g. "Does the word fit in the sentence: *The*_____ *is blue*?") or shallow (e.g., "Is the word in upper case?") orienting question followed by the stimulus word. After completing a filler task, participants received a surprise recall task. Jay, Caldwell-Harris, and King (2008) found that neutral words had a higher recall percentage when processing was deep rather than shallow. However, they also found that overall taboo and emotional words had a higher recall percentage, regardless of the type of processing used.

Next, they measured skin conduction responses, used category verification questions for deep processing (e.g., for taboo words: "Is this a derogatory term?"), and participants received either a surprise free recall test or one of three cued recalled tests (e.g., participants were told to recall emotional words first). They found that skin conduction responses to taboo words were high compared to emotional and neutral words, regardless of level of processing. They also found that using category verification questions for deep level of processing enhanced recall for taboo words and that cueing participants to recall non-taboo words first inhibited recall of taboo words, which reduced their recall and total number of words recalled. As a result, these authors concluded that taboo and emotional words are inherently arousing and memorable independent of task instruction. Therefore, taboo and emotional words are exogenous (i.e., where attention is drawn automatically to the stimulus) and neutral words are endogenous (i.e., attention is voluntarily directed towards the stimulus). Thus, in the current study I predicted that even during an easy lexical decision task, indexical features would be stored for taboo words because they are exogenous and indexical features would not be stored for neutral

words because they are endogenous. In the current study, I was interested in investigating whether the same results would occur with an implicit spoken word recognition task with taboo words.

There is also support for a neurological basis for taboo words being more arousing than non-taboo words. Kensinger and Corkin (2004) examined brain structures involved in processing emotional words using fMRI and behavioral methodologies. Participants were presented with words that were neutral, negative and non-arousing, or negative and arousing. During the encoding scan, the words were presented pseudorandomly and participants rated each word as "abstract" or "concrete". Followed by a retrieval scan (after a 10 minute delay), participants indicated by pressing a button whether they vividly remembered seeing the word at encoding, sensed that the word was familiar and thought it had been presented at encoding but did not remember any details about its prior presentation, or believed that the word was new (i.e., the word was not presented during the encoding scan). Participants were aware that after each encoding scan, a recognition test would be given. After the encoding and retrieving sessions, participants were asked to rate the words for valence (i.e., how positive or negative) and arousal (i.e., how calming or exciting). The researchers found that arousing words were processed by the amygdalar-hippocampal pathway (i.e., the amygdala is known to mediate the automatic capture of emotion), while the processing of non-arousing emotional words relied on the hippocampal-prefrontal pathway (i.e., the prefrontal cortex is known to mediate controlled processes such as rehearsal).

The authors also investigated whether additional encoding resources were required for the memory enhancement for negative non-arousing words versus arousing

words. Participants encoded words that were previously used in the fMRI experiment while performing either a hard discrimination task, an easy discrimination task, or no secondary task. They found that when there was no secondary task, there was a benefit for the negative non-arousing words and the negative arousing words compared to the neutral words. During the easy and hard discrimination tasks, participants did not show any memory enhancement for the negative non-arousing words compared with the neutral words, but participants did have significantly better memory for negative arousing words. Therefore, memory enhancement for arousing words relies little on the amount of resources available to devote to intentionally attending to the words during encoding because the negative arousing words are presumably using exogenous attention, while the encoding of non-arousing emotional words are endogenous because they require conscious attention to yield memory enhancement. This result implies that memory for highly arousing words is enhanced automatically regardless of conscious intention. Therefore, in the current study I predicted hearing taboo words would lead to **greater exogenous attention to processing the input** (i.e., not requiring participants to do so intentionally). Thus, in the current study, when I refer to "attention", I am specifically referring to the idea that listeners' are unintentionally devoting additional resources to processing the spoken input than is necessary to complete the task, and compared to what would be expected when hearing all neutral words spoken by unfamiliar (non-distinct) talkers.

Additionally, through a series of experiments, MacKay, Shafto, Taylor, Marian, Abrams, and Dyer (2004) examined effects of emotion on memory and attention. They used a visual Stroop task to examine the effects of taboo words in three experiments.

They found that color-naming times for taboo words were longer than for neutral words. They also found that when participants were given a surprise memory test after the color-naming task the participants showed a superior recall of taboo words. The last effect found was that taboo words were associated with better recognition memory for colors than neutral words. This study also demonstrated that taboo words impair immediate recall of the preceding and succeeding words in rapidly presented lists but do not impair visual lexical decision times because lexical decision responses were unrelated to contextual aspects of the word, indicating that the distribution of limited-capacity attentional resources to taboo words is task specific. Even though there were no differences in RTs for taboo and neutral words in a visual lexical decision task, this study did not examine the auditory effect of taboo words on a lexical decision task.

Bertels, Kolinsky, Pietrons, and Morais (2011) created an auditory hybrid version of the emotional and taboo Stroop task, in which the words were presented in a block design and mixed presentations, to investigate the influence of the task-irrelevant emotional dimension of spoken words on the processing of an unrelated task-relevant dimension of the same stimulus (e.g., the speakers' identity). An auditory word was presented, uttered by one of four speakers, and participants were required to identify the speaker by pressing one of the four keys of the button box as quickly and accurately as possible. There were three practice blocks for participants to learn the identity of the four speakers by receiving feedback and were corrected if they made an error after each trial. Participants were presented with four experimental blocks and received feedback—a beep—when the answer was wrong. Participants were randomly assigned to blocked and mixed conditions. In a blocked condition, all words of the block had the same emotional

valence (neutral, negative, positive, or taboo). Therefore, the same words were repeated four times in each block, each time by a different speaker. In a mixed condition, all words were presented once in each block in a pseudorandom order (i.e., a word of the same emotional type or said by the same speaker was never presented more than three times in a row). They found that overall women responded more quickly than men. One limitation is that the authors did not analyze whether the speaker's gender showed a difference in RTs or if there was an interaction between the participant's gender and the speaker's gender. The block design showed that both the taboo and negative words led to significantly longer RTs. However, planned comparisons of the mixed presentations showed that taboo words led to shorter RTs compared with neutral words, and with positive words only tending to elicit longer RTs. The authors also analyzed carryover effects within the mixed blocks. They found that neutral words had a longer RT when it was preceded by a negative or taboo word. They also found that positive words had longer RTs when it was preceded by a negative word. Therefore, negative and taboo words can have a long lasting influence on certain types of words that follow. However, this study only looked at the immediate carryover effects and did not look at the effect taboo words have across multiple blocks.

There has been some research that investigates the long-term effect of taboo words. Thomas and LaBar (2005) conducted three experiments to investigate whether emotional content increases the magnitude of the repetition priming effect. Each experiment consisted of two phases, a study phase and a test phase. During the study phase of Experiment 1, participants were presented 15 taboo and 15 neutral words one at a time, and after each word participants were instructed to categorize the word as either

"concrete" or "abstract". During the test phase, participants were shown the same 30 words from the study phase, along with 15 new taboo, 15 new neutral words, and 60 nonwords. Participants were instructed to decide whether the word presented was a "word" or "nonword" (i.e., a lexical decision task). During the study phase, participants took longer to semantically categorize taboo words than neutral words. During the test phase, participants responded faster to studied words than to novel words; however, taboo words showed a larger priming effect than neutral words. Experiment 2 investigated whether the manipulation of arousal and valence could also influence study phase RTs and priming magnitude. The methods were the same as Experiment 1, except that 30 low-arousing negative (LAN) words were used instead of 30 taboo words. During the study phase, participants took significantly longer to semantically categorize LAN words than neutral words. During the test phase, participants responded faster to studied words than to novel words regardless of whether the word was LAN or neutral. Experiment 3 incorporated all three word categories in a single, within-participants design. During the study phase, participants took longer to semantically categorize LAN words than neutral words. Participants also took longer to semantically categorize taboo words than LAN words and neutral words. During the test phase, words high in emotional arousal demonstrate the greatest benefit of previous experience. Therefore, in the current study I predicted that taboo words would show a greater magnitude of priming compared to neutral words.

In conclusion, there seems to be mixed results on whether the taboo words are special because they are attention grabbing. The majority of past research argues that arousing taboo words enhance memory. However, there is some research that argues that

taboo words are processed automatically, regardless of arousal, and taboo words are a special word category in their own (i.e., not reducible to limited cognitive resources).

Gender Differences

Gender differences in cognitive studies and personal use of taboo words are common, but not always consistent. For example, Janschewitz (2008a) found that men rated that they swore more and that swear words are more attention grabbing and imaginable compared to women. In 2006, men accounted for 55% of public swearing episodes (Jay, 2009). Men tend to use more offensive words (e.g., *fuck, shit*) whereas women use less offensive words (e.g., *bitch, piss*; Jay, 2009). On the other hand, past research has also provided support against the stereotype that women are socially conservative or traditional and formal, in that women did not seem to have a problem providing derogatory terms to describe people, particularly men (Risch, 1987; De Klerk, 1992). Stapleton (2003) found that terms referring to female body parts are almost universally considered obscene by women. She also found that women's use of obscenity is likely to be evaluated more negatively than that of their counterparts. In addition, women and men participate on equal terms within the community. Men and women both swear more frequently in same sex contexts than in mixed contexts (Jay, 2009).

Researchers have even found gender differences within cognitive processes. More specifically, McGinnies (1949) investigated word recognition thresholds and the galvanic skin response (GSR) to neutral and taboo words. Participants were required to say the word out loud when they had recognized the word. Overall, they found that taboo words took longer to perceive and that participants had higher pre-recognition GSR levels

in comparison with the levels for the neutral words. Additionally, McGinnies found that males had lower thresholds (i.e., longer RTs) for both the neutral and taboo words compared with females. Postman, Bronson, and Gropper (1953) investigated McGinnies' (1949) reported sex differences in visual thresholds. They required participants to respond by writing rather than orally. Consistent with McGinnies' (1949) findings, they found that with the written format, females had higher recognition thresholds than males when taboo words were presented. Postman et al. (1953) suggests that these gender differences are due to females not being as familiar with taboo words or that they are relatively slower to respond to taboo words. Grosser and Walsh (1966) also investigated sex differences in the recall of taboo and neutral words. In this study, after the words were presented visually, participants were asked to recall both taboo and neutral words. Results showed that females consistently recalled more neutral words than males and males recalled more taboo words than females. Thus, results from studies on both recall and recognition memory processes demonstrated sex differences in the perception of and memory for taboo words.

In conclusion, previous research demonstrates that there are various gender differences in expectations and the actual use of taboo words. These gender differences could be found for the talker's gender, the listeners' gender, or both. Therefore, I chose to examine data from female participants only as a starting point for investigating possible gender differences, leaving a parallel study with male participants for future work. For that reason, in the current study, I predicted that the gender of the talker would affect the perception of spoken taboo words.

Current Study

The purpose of the current study was to examine how word meaning could affect the pattern of talker effects. Talker effects have previously been found when processing was relatively slow but not when processing was relatively fast (Mattys & Liss, 2008; M^{c}Lennan & Luce, 2005; Vitevitch & Donoso, 2011). Two recent studies found talker effects even when processing was not slowed. In the current study, I extended this previous work by examining whether talker effects would emerge without explicitly directing participants' attention to the talker (Theodore & Blumstein, 2011) and without using words spoken by famous talkers (Maibauer et al., 2013). Taboo words were used because previous research has shown that taboo words are processed differently than other types of emotional words and listeners tend to respond more quickly to taboo words relative to words with a neutral meaning (Bertels, Kolinsky, Pietrons & Morais, 2011; Jay, Cadwell-Harris, & King, 2008; Kensinger & Corkin, 2004; Thomas & LaBar, 2005). Thus, if greater talker effects are found for taboo words than for neutral words, even though taboo words are responded to as quickly as – and perhaps even more quickly than – neutral words, such results would support an attentional account, and provide a more general demonstration that other factors besides time course of processing ability to influence whether listeners use abstract or episodic representations.

For neutral words, results are expected to mirror those of M^{c}Lennan and Luce (2005) in the easy lexical decision condition. I hypothesized that talker effects would not occur because processing would be relatively fast. In other words, RTs would show no difference when talker voice matches from prime block to target block compared to when it mismatches.

For taboo words, I hypothesized that talker effects would occur despite relatively fast processing. Specifically, when talker voice matches, RTs would be faster compared to when talker voice mismatches.

I also hypothesized that there would also be an effect of talker gender on the perception of taboo words. Specifically, when a taboo word is spoken by the female talker in the prime block and then by the male talker in the target block, the talker effect was expected to be exaggerated (relative to when a taboo word is spoken by the male talker in the prime block and then by the female talker in the target block) because it should be even more surprising and attention grabbing when a female swears than when a male swears.

CHAPTER II

EXPERIMENT: EASY LEXICAL DECISION TASK

Method

Participants. Seventy-four female participants were recruited from Psychology 101 classes at Cleveland State University and received 0.5 credits for a half hour of participation. Participants were right-handed native speakers of American English between 18 to 30 years of age with no current speech or hearing disorders.

Materials. The auditory stimuli consisted of 12 spoken taboo experimental words, 12 spoken neutral experimental words, 24 spoken nonwords, and 8 control words (four taboo and four neutral).

The taboo words were chosen from Janschewitz (2008b; See Appendix A). The neutral words (See Appendix A) were matched to the taboo words for frequency, familiarity, concrete or abstract, part of speech (i.e., noun, verb), the number of phonemes, and number of syllables. Statistically, the 12 experimental taboo words and 12 experimental neutral words did not significantly differ on syllables, phonemes, familiarity, frequency, log10 frequency, density, mean raw neighborhood frequency, and mean log neighborhood frequency (all t's < 1, all p's > .5).

In order to make the nonword discrimination easy, the nonwords were unwordlike (e.g., *yeeshgeesh*). The nonwords (See Appendix A) were created using sequences with low phonotactic probability, determined by both positional segment frequency (i.e., how often a particular segment occurs in a position in a word) and biphone frequency (i.e., segment to segment co-occurrence probability). The nonwords were matched to the real words for number of syllables and starting phoneme.

All auditory stimuli were recorded in a sound attenuated room using Praat software (Boersma & Weenink, 2012). A male and a female speaker of a Midwestern dialect with no known speech disorders recorded the stimuli. All words were edited into individual files and stored on computer disk for later playback. All the stimuli were normalized to 95% loudness and then equated to 68 db.

A 2 (Word Type) × 2 (Gender) ANOVA was performed on the stimulus durations of the experimental words. The main effect for Word Type was not significant, $F(1, 44) = 0.05$, $MSE = .036$, $p = .83$, $\eta_p^2 < .01$. More specifically, there was no difference between the taboo (M = 734 ms, SD = 151 ms) and neutral (M = 722 ms, SD = 215 ms) word durations. The main effect of Gender was not significant, $F(1, 44) = 0.33$, $MSE = .036$, $p = .57$, $\eta_p^2 = .01$. More specifically, the male (M = 713 ms, SD = 195 ms) talker durations were not shorter than the female (M = 744 ms, SD = 175 ms) talker durations. The two-way Word Type × Gender interaction was also not significant, $F(1, 44) = 0.00$, $MSE = .036$, $p = 1$, $\eta_p^2 < .01$.

Design. The experimental design followed the same long-term repetition-priming paradigm used in M^{c}Lennan and Luce (2005). Stimuli were presented in two blocks: prime and target. Primes were matched, mismatched, or completely different words

(control) from the targets. Talker identity of matched primes and targets were identical (e.g., *bacon*$_{male}$, *bacon*$_{male}$; *bacon*$_{female}$, *bacon*$_{female}$). Talker identity of mismatched primes and targets differed (e.g., *bacon*$_{male}$, *bacon*$_{female}$; *bacon*$_{female}$, *bacon*$_{male}$). Both the prime and target blocks consisted of 48 stimuli, 12 neutral experimental words, 12 taboo experimental words, and 24 nonwords. The prime block consisted of 24 words (eight neutral experimental words, eight taboo experimental words; eight unrelated control words, four of which were neutral words and four were taboo words) and 24 nonwords. The target block consisted of 24 words (12 neutral experimental words and 12 taboo experimental words) and 24 nonwords. In the target block, eight of the 24 experimental words matched, eight mismatched, and eight were controls. Although the preparation of the nonwords and their rotation through the various conditions paralleled the real word target stimuli (neutral and taboo words), the nonwords and the unrelated control stimuli (words and nonwords that did not appear in the target blocks) were fillers. Consequently, the focus of the experimental manipulations and later statistical analyses were limited to the experimental words.

Orthogonal combination of the three levels of prime (match, mismatch, and control) and two levels of talker identity (male and female) resulted in six conditions for both types of target words (neutral and taboo), which are shown in Table 1. Across participants, each word in each voice appeared in every possible condition for both taboo and neutral words. However, stimuli were counterbalanced across six versions of the experiment. Thus, no single participant heard more than one version of a given word within a block. For example, if a participant heard the word “book” in one of the blocks, he or she did not hear another version of that word again in the same block.

Table 1.

Experimental Conditions and Examples of Primes and Targets

	Taboo Words		Neutral Words	
Condition	Prime	Target	Prime	Target
Match				
Male prime → Male target	*bitch*$_{male}$	*bitch*$_{male}$	*book*$_{male}$	*book*$_{male}$
Female prime → Female target	*bitch*$_{female}$	*bitch*$_{female}$	*book*$_{female}$	*book*$_{female}$
Mismatch				
Male prime → Female target	*bitch*$_{male}$	*bitch*$_{female}$	*book*$_{male}$	*book*$_{female}$
Female prime → Male target	*bitch*$_{female}$	*bitch*$_{male}$	*book*$_{female}$	*book*$_{male}$
Control				
Unrelated prime → Male target	*shit*$_{male}$	*bitch*$_{male}$	*cart*$_{male}$	*book*$_{male}$
Unrelated prime → Female target	*shit*$_{female}$	*bitch*$_{female}$	*cart*$_{female}$	*book*$_{female}$

Procedure. Upon arriving to the laboratory, participants were informed that they may hear offensive words and that they could opt out of the study at any time without penalty. After providing informed consent (See Appendix B), participants completed both a demographics questionnaire (See Appendix C), a handedness inventory (Cohen, 2008; See Appendix D), which is adapted from the Edinburgh Inventory (Oldfield, 1971), an objective measure of the extent of right- or left-handedness of the individual, and a race, ethnicity, and gender questionnaire (See Appendix E).

Participants were tested individually in a quiet room and they were not told at the beginning of the experiment that there would be two blocks of trials. Participants read the instructions on the computer screen (See Appendix F) in which they were instructed to decide as quickly and accurately as possible whether each item they heard was a real English word or a nonword. Participants indicated their decisions by pressing either a green button for word on the right or a red button for nonword on the left on a response

box positioned directly in front of them. After participants completed the prime block, they were asked to complete a math test (See Appendix G) for about 3-5 minutes, which was simply included as a filler task. Participants then completed the target block.

In both the prime and target blocks, stimuli were presented binaurally over headphones. After the participant responded, the next trial was initiated. If the maximum RT (5 s) expired, the computer automatically recorded an incorrect response and presented the next trial. A Macintosh computer controlled the stimulus presentation and recorded participants' RTs and percentages correct (PCs) to make correct lexical decisions. Stimulus presentation within each block was randomized for each participant. RTs were measured from the onset of the presentation of the stimulus word or nonword to the onset of the participant's button press response.

Upon completion of the lexical decision task, participants completed a post-experiment questionnaire by typing open-ended answers to questions (unless otherwise noted) displayed on a computer screen (See Appendix H). First, the participants were asked a series of questions related to their swearing experiences[1]. Next, participants were asked what the purpose of the experiment was to determine whether or not RTs may have been affected by knowledge of the experiment's purpose. Then, the post-experiment questionnaire asked if the participant had any difficulty hearing or understanding the auditory stimuli. Finally, the questionnaire asked the participants if they had any other comments. Lastly, participants were debriefed and provided with a debriefing form (See Appendix I).

[1]No relationship was found between participants' responses on the post-experiment questionnaire open-ended questions regarding their experiences with swearing and their magnitude of specificity; thus, these data are not discussed further.

CHAPTER III

RESULTS

Three percent of the RTs met the exclusion criteria set by M^{c}Lennan and Luce (2005) of less than 500 ms or greater than 2,500 ms; thus, five RTs for the experimental stimuli and 113 RTs (6%) of the nonwords met the criteria and were excluded from analysis.

Overall three words and two nonwords were excluded from analysis. One neutral word (i.e., booth) and one taboo word (i.e., whore) were excluded from analysis because their mean PCs fell two standard deviations below the mean for neutral or taboo words, respectively. One neutral word (i.e., bargain) was excluded from analysis because its PC fell two standard deviations below the mean PC for all words. Two nonwords (i.e., baɪn and haɪn) were excluded from analysis because their PC fell two SDs below the mean PC for all nonwords.

Next, individual RTs that fell three SDs above or below the mean for its condition were replaced with the mean RT for that particular condition; nine RTs were replaced[2].

[2]For neutral words, four RTs meet the criteria (one RT for match-male, one RT for mismatch-male, one RT for control-male, and one RT for match-female). For taboo words, five RTs met this criterion (one RT for match-male, one RT for control-male, one RT for match-female, one RT mismatch-female, and one RT for control-female).

Additionally, missing RTs (as a result of errors in both of the trials in a given condition) were replaced with the mean RT for that particular condition; thirteen missing RTs were replaced with the mean RT in the target block[3]. Finally, any participant was excluded if their PC for nonwords and/or words fell more than three standard deviations below the mean; four participants were excluded from analysis. Of the four participants excluded, one participant met the criteria for both nonwords and words.

It is highly unlikely for RT data to be normally distributed, due to fatigue, practice effects, and other influences that are usually ignored and considered minor (Whelan, 2008). Therefore, RT data violate statistical analysis assumptions because RT data are not normal (they are positively skewed). This violation can lead to a substantial reduction in the ability to detect differences in RT using ANOVA. For that reason, in the following statistical analyses, RTs were initially transformed to speed (i.e., 1/RT), according to suggestions from Whelan (2008). However, the speed-transformed data were still positively skewed; for that reason, the raw RTs were then transformed to a natural log. The use of such transformation is commonly used and accepted in analyses for RT data (e.g., Newell & Rosenbloom, 1981). Consequently, all of the following statistical analyses that will be reported for RTs will be presented as the log-transformed data, but the means and standard errors reported will be calculated using raw RTs and will be used in the tables to facilitate interpretation of the results.

[3]For neutral words, there were 10 cells missing RTs (two cells for match-male, two cells for mismatch-male, one cell for control-male, three cells for match-female, and two cells for mismatch-female). For taboo words, there were three cells missing RTs (two cells for match-male, and one cell for control-male).

Two separate 3 (Prime: match, mismatch, control) × 2 (Talker Identity: male, female) × 2 (Word Type: neutral, taboo) within-participants ANOVAs were performed, one on mean (log transformed) RTs for correct responses and one on PCs for the experimental stimuli in the target block[4]. However, given that the task is an easy lexical decision task, PC is expected to be high in all conditions. In PCs, there was a significant main effect of word type, $F(1, 64) = 9.74$, $MSE = 154.977$, $p < .01$, $\eta_p^2 = .13$. Specifically, participants responded significantly more accurately to taboo words (M = 98%, SE = .51%) than neutral words (M = 96%, SE = .87%). All other main effects and interactions in PC data were not significant (all F's < 1). Mean PCs as a function of prime for word type are shown below in Table 2.

Although responses to nonwords are not the focus of the current study, the overall mean RT and mean PC for nonword stimuli were 1,623 ms (SE = 36 ms) and 93% (SE = .68%). The overall mean RT for nonwords was expected to be comparable to that of the

[4]Traditional item analyses are not appropriate for the current experiment. The stimuli were selected on the basis of many variables that are known to affect the dependent variables that are under investigation. As a result, performing traditional ANOVAs with items as random factors are not justified (see Raaijmakers, Schrijnemakers, & Gremmen, 1999). Additionally, the design of the current experiment used counterbalanced lists, such that each item appeared in every condition. Raaijmakers (2003; Raaijmakers et al., 1999) argued that it is inappropriate to conduct separate item analyses in analyses in which counterbalanced lists were used. Given that my design includes counterbalanced lists, such that each of the items appeared in every condition, two dummy variables representing allocation of participants to experimental lists were included in the ANOVAs. Effects involving the dummy variables are not reported because these dummy variables are included solely to reduce the estimate of random variation (see Pollatsek & Well, 1995).

words, although it was likely to be somewhat slower, as reported by M^{c}Lennan and Luce (2005). Mean PC for nonwords was expected to be high (above 90%) due to the simplicity of the easy lexical decision task.

Table 2.

Mean Percentage Correct (PC) as a Function of Prime for Word Type

Word Type	Match	Mismatch	Control
Neutral	94	96	96
Taboo	98	99	98

For RTs, as predicted, there was a significant main effect of Word Type, $F(1, 64) = 63.69$, $MSE = .019$, $p < .001$, $\eta_p^2 = .50$. Specifically, the RTs to taboo words (M = 876 ms, SE = 12 ms) were significantly faster than RTs to neutral words (M = 945 ms, SE = 10 ms).

Consistent with predictions at the outset of the study, the main effect of Talker Identity was not significant, $F(1, 64) < 1$, $MSE = .013$, $p = .98$, $\eta_p^2 = .00$. Overall, RTs to the male talker (M = 913 ms, SE = 11 ms) were equivalent to RTs to the female talker (M = 907 ms, SE = 11 ms).

As predicted, there was a significant main effect of Prime, $F(2, 128) = 35.70$, $MSE = .010$, $p < .001$, $\eta_p^2 = .36$. Mean RTs as a function of condition and magnitudes of priming (MOP) and magnitude of specificity (MOS) were calculated. MOP is the difference in RT between the match and control conditions. MOS is the difference in RT between the match and mismatch conditions. Planned comparisons revealed that the MOP of -66 ms was significant, $p < .001$. Specifically, the match condition (M = 883 ms, SE = 11 ms) was significantly faster than the control condition (M = 949 ms, SE = 12 ms). Planned comparisons also revealed that the MOS of -15 ms was significant, $p = .03$.

Specifically, the match condition (M = 883 ms, SE = 11 ms) was significantly faster than the mismatch condition (M = 898 ms, SE = 10 ms). There was also a significant difference between the mismatch and control conditions, $p < .001$.

The two-way Word Type × Talker Identity interaction was not significant, as predicted at the outset of the study, $F(1, 64) < 1$, $MSE = .012$, $p = .43$, $\eta_p^2 = .01$. See Table 3 for the mean RTs as a function of talker identity for word type.

Table 3.

Mean Reaction Time as a Function of Talker Identity for Word Type in Milliseconds (ms)

	Male		Female	
Word Type	RT	SE	RT	SE
Neutral	950	10	939	12
Taboo	877	14	875	13

Although I predicted that the two-way Word Type × Prime interaction would be significant, revealing greater talker effects for the taboo words than the neutral words, this interaction was not significant, $F(2, 128) < 1$, $MSE = .014$, $p = .82$, $\eta_p^2 < .01$. Table 4 shows the mean RTs as a function of prime for word type.

Table 4.

Mean Reaction Time as a Function of Prime for Word Type in Milliseconds (ms)

	Match		Mismatch		Control			
Word Type	RT	SE	RT	SE	RT	SE	MOS	MOP
Neutral	919	12	934	12	981	13	-15	-62
Taboo	847	13	863	13	917	16	-16	-70

Additionally, the two-way Talker Identity × Prime interaction was not significant, consistent with predictions at the outset of the study, $F(2, 128) < 1$, $MSE = .012$, $p = .65$, $\eta_p^2 = .01$. Table 5 shows the mean RTs as a function of prime for talker identity.

Table 5.

Mean Reaction Time as a Function of Prime for Talker Identity in Milliseconds (ms)

	Match		Mismatch		Control	
Talker Identity	RT	SE	RT	SE	RT	SE
Male	891	14	900	11	949	15
Female	875	12	896	12	950	14

Although I predicted that the three-way Word Type × Talker Identity × Prime interaction would be significant, revealing greater talker effects for the taboo words spoken by the male talker, this interaction did not reach significance, $F(2, 128) = 1.19$, $MSE = .014$, $p = .31$, $\eta_p^2 = .02$. Specifically, greater talker effects for the taboo words spoken by the male talker than the neutral words spoken by the male talker failed to emerge, as shown in Table 6. However, there is a trend of greater talker effects for the female talker for both neutral and taboo words, as shown in Table 7.

Table 6.

Mean Reaction Time as a Function of Prime and Male Talker for Word Type in Milliseconds (ms)

Prime-Target	M-M		F-M		C-M			
Word Type	RT	SE	RT	SE	RT	SE	MOS	MOP
Neutral	934	17	944	16	974	17	-10	-40
Taboo	849	17	857	15	924	20	-8	-75

Table 7.

Mean Reaction Time as a Function of Prime and Female Talker for Word Type in Milliseconds (ms)

Prime-Target	F-F		M-F		C-F			
Word Type	RT	SE	RT	SE	RT	SE	MOS	MOP
Neutral	905	13	924	15	989	18	-19	-84
Taboo	845	14	869	15	911	15	-24	-66

CHAPTER IV

DISCUSSION

Taboo words significantly facilitated responses to targets, as responses were faster and more accurate than neutral words. This result suggests that taboo words are arousing and attention grabbing. Both matched and mismatched conditions significantly facilitated lexical decision responses relative to the control condition. Regardless of word type (neutral or taboo), matched primes facilitated responses to targets to a greater degree than mismatched primes in the easy lexical decision task. The fact that equivalent talker effects emerged for neutral and taboo words suggests that the inclusion of taboo words in a spoken word recognition task increases the overall level of attention, presumably because participants never knew when a taboo word was coming due to the random/mixed presentation. This finding is not consistent with a strict time-course based account of talker effects (i.e., occurring only when processing is slow and effortful). However, this finding is consistent with an attention-based hypothesis because talker effects were found even though processing was relatively fast.

An alternative possibility is that, despite my attempt to use nonwords that did not resemble real words in order to make the task easy and participants' processing fast, perhaps the participants were relatively slow (e.g., the nonwords were more word-like

than I intended). However, the mean RTs for taboo words were responded to relatively fast when compared to previous research (See Table 8). Specifically, the differences between the taboo and neutral words' mean durations and participants' mean RTs was smaller than the corresponding differences in M^{c}Lennan and Luce's (2005) easy and hard lexical decision tasks. In conclusion, as seen in Table 8, the current study's difference is the smallest that has found talker effects compared to previous research studies. Additionally, the mean percentage correct (PC) for taboo words and famous talkers were responded to relatively accurate when compared to previous research (See Table 9). Specifically, the accuracy for the control condition for both taboo words and famous talkers was higher than the corresponding differences in the M^{c}Lennan and Luce's (2005) easy and hard lexical decision tasks. In conclusion, as seen in Table 9, accuracy in the control condition (i.e., for words that participants had not heard during the prime block) in the current study and in the study with famous talkers were the highest that have found talker effects compared to previous research. Therefore, I conclude that the current study's task was easy and processing was relatively fast and accurate.

Even though talker effects (driven by the female talker) were no greater for the taboo words than for the neutral words, it is possible that processing was just too fast in the taboo word condition. That is, since participants were responding particularly quickly to the taboo words, there may not have been sufficient time for any differential effect of specificity between the neutral and taboo words to emerge.

The results of the current study have important implications for the current theories of the representational aspects of spoken word recognition. The results suggest that talker effects do not necessarily always follow the same precise time course, and that

other factors, including the type of word presented, can modulate whether listeners use abstract or episodic representations.

Table 8.

Mean Reaction Times and Stimulus Durations for Current Study and Previous Research in Milliseconds (ms)

Experiment	Match	Mismatch	Control	Overall	Stimulus Duration	Difference
Neutral Words: Easy Task	919	934	981	945	722	223
Taboo Words: Easy Task	847	863	917	876	734	142
M^{c}Lennan & Luce, 2005: Easy Task (2A)	755	763	800	773	373	360
M^{c}Lennan & Luce, 2005: Hard Task (2B)	773	808	837	806	373	433
Krestar & M^{c}Lennan, 2013: Easy Task	945	939	1020	968	844	124
Krestar & M^{c}Lennan, 2013: Hard Task	1031	1071	1127	1076	844	232
Famous Talkers Speeded Shadowing Task	879	903	908	897	524	373
Nonfamous Talkers Speeded Shadowing Task	922	933	966	940	422	518

Difference = Overall – Stimulus Duration

Table 9.

Number of Participants and Mean Percentage Correct (PC) for the Current Study and Previous Research

Experiment	N	Match	Mismatch	Control	Overall
Neutral Words: Easy Task	74	94	96	96	96
Taboo Words: Easy Task	74	98	98	99	98
M^{c}Lennan & Luce, 2005: Easy Task (2A)	72	94	96	93	94
M^{c}Lennan & Luce, 2005: Hard Task (2B)	72	96	96	89	94
Krestar & M^{c}Lennan, 2013: Easy Task	75	94	96	92	94
Krestar & M^{c}Lennan, 2013: Hard Task	75	96	92	90	93
Famous Talkers Speeded Shadowing Task	42	99	100	99	99
Nonfamous Talkers Speeded Shadowing Task	39	95	96	94	95

In the current study, I examined the perception of taboo words for females and did not examine the perception of taboo words for males. Therefore, I was unable to examine if there were gender differences between listeners' perception of spoken taboo words. Future research should investigate the perception of taboo words for males and then conduct a combined analysis of males and females.

Next, future research should look at how the perception of spoken words is affected when the word type manipulation is presented using a blocked design, unlike the current study, in which I used a mixed design. Using a blocked design in an easy lexical decision task, I predict that for neutral words there will be no talker effects, consistent with the time-course hypothesis because attention would not be increased for the block of neutral words. I also predict that talker effects will be found for taboo words, consistent with an attention-based hypothesis because exogenous attention would be increased for the block of taboo words. In addition, I predict that responses to taboo words will be faster than neutral words.

Additionally, future research should investigate the effect of word type has on talker effects on the process of spoken word recognition in a hard lexical decision task. I predict that there will be greater talker effects for the taboo words than neutral words when processing is slow and effortful. It is also predicted that the talker effects will be driven by a female talker.

One of the limitations of the current study is that the post-experiment questionnaire was open-ended. Thus, the answers were difficult to use effectively to analyze differences in MOS. Therefore, future research should develop a quantitative survey that accesses the beliefs and frequencies of the use and occurrences of swearing in a participant's life.

Recall that emotion can affect decision-making processes. Consequently, future work should examine specificity effects with taboo words in other tasks without an explicit decision component, such as shadowing. Doing so will help to ensure that our results are not task dependent and limited to the lexical decision task.

It is widely known that older adults tend to be positively biased (i.e., remembering more positive than negative information; see also Carstensen, Isaacowitz, & Charles, 1999). Consequently, future research should also look at the effects of word meaning on spoken word recognition in older adults. Additional future research should also consider examining the effects of different types of emotional and warning words and various voice styles on the perception of spoken word recognition. Potential applications of this research include improving the attention-getting capability of an alerting system by using arousing words, which could lead to increased warning compliance, potentially resulting in fewer incidents and accidents within critical high stress level situations (see also Arrabito, 2009).

In conclusion, the current study demonstrates that when attention and processing time are pitted against one another during spoken word recognition, the role of attention can dominate over what would be expected from processing time alone. Nevertheless, this interpretation of the current results in no way implies that the previous studies supporting the time-course hypothesis should be discarded. I believe there is sufficient evidence to indicate that the time-course hypothesis still applies to situations when attention is not increased when listeners are processing input. Indeed, I believe that there are a number of factors that have the potential to affect listeners' processing of abstract and specific details during spoken word recognition. To date, attention and processing time have been identified as two such factors. Although I do not believe these are the only factors, other factors that might be involved have yet to be identified. Future research should help to clarify the role that other such factors might play, including the

extent to which they influence the role that abstract and specific representations play in listeners' perception of spoken words.

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APPENDICES

APPENDIX A

(Stimuli List)

Taboo Words

Experimental Words	Control Words	Practice Words
anus	hooker	breasts
bastard	nipples	damn
bitch	piss	
boner	shit	
climax		
masturbate		
orgasm		
penis		
pussy		
semen		
vagina		
whore		

Neutral Words

Experimental Words	Control Words	Practice Words
acorn	hammer	boots
bagel	noodles	dose
bargain	peach	
booth	shin	
compact		
hoop		
manicure		
opener		
petal		
putty		
stencil		
violin		

Easy Nonwords

Experimental Words	Control Words	Practice Words
baɪn	hɑɪssɑɪb	bɜˠs
baɪndʒaɪp	hessep	bil
baɪsfɑɪk	nɜˠθnɜˠz	dik
bɜˠsʃɜˠdʒ	ninjitʃ	dis
bis	pɜˠb	
bʌlðʌg	pim	
empebs	ʃaɪp	
eswes	ʃɜˠtʃ	
haɪn		
henʃeg		
kikɹig		
kistʃins		
mebkebmep		
mepsebɹem		
ohinzitʃ		
oigθinkit		
peb		
pɜˠdʃɜˠtʃ		
pimfis		
pʌmwʌdʒ		
saɪbhaɪs		
sɜˠzfɜˠt		
vaɪtdʒaɪnfaɪk		
veʒnenðif		

APPENDIX B

(Participant Informed Consent)

PARTICIPANT CONSENT FORM: WORD RECOGNITION
SAMANTHA E. TUFT, GRADUATE STUDENT, S.TUFT@CSUOHIO.EDU
LANGUAGE RESEARCH LABORATORY
CLEVELAND STATE UNIVERSITY: DEPARTMENT OF PSYCHOLOGY
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(216) 687-3834
E-MAIL: LANGUAGERESEARCH@MAC.COM

This research project is being conducted as part of Samantha Tuft's Master's Thesis under the supervision of Dr. M^{c}Lennan (c.mclennan@csuohio.edu) (216) 687-3750.

If you have any questions about your rights as a research participant, you may contact the Cleveland State University Institutional Review Board at (216) 687-3630.

There are two copies of this letter. After signing them, please keep one copy for your records and return the other one. Thank you in advance for your cooperation and support.

"I agree to participate in a perceptual experiment in which I will hear spoken words and nonwords over headphones which may be offensive. I agree to respond to these words/nonwords by pressing a response button. I understand that I will be asked to fill out several surveys. I agree to respond to these questionnaires by writing and/or typing my responses. I understand that confidentiality of my identity will be maintained at all times (i.e., a participant ID code will be assigned to all of my data). I understand that my name will not be attached to any sensitive information and that any sensitive information will be filed in a separate filing cabinet in a locked storage room. I understand that my consent form and other paperwork will be kept on file for three years after the completion of the project.

I understand that the procedures to be followed in this experiment have been fully explained to me and that I may ask questions regarding the experiment at the end of the experimental session. I understand the approximate time commitment involved will be no longer than an hour and that I will receive .5 credit for every half hour of my participation. I am also aware that I may refuse to continue the experiment at any time and that I will be excused without loss of credit.

I understand that participation in this experiment involves minimal risks. I understand that the physical risk is no more than I would encounter hearing words, pressing a button or typing on a keyboard. However, I understand that I may have some negative feelings hearing some of these words. I understand that if I would like to discuss any of these feelings, I can contact the Counseling Center on campus at Cleveland State University, located in Rhodes Tower 1235 (phone: 216-687-2277).

I understand that the purpose of this research is to add knowledge to the field of spoken word recognition. I understand that although there may be several indirect benefits of this study, its direct benefit is adding to the current body of knowledge on human perception.

I, the undersigned, am 18 years or older and have read and understood this consent form and hereby agree to give my consent to voluntarily participate in this experiment."

_____ _____
Signature of Participant *Date*

_____
Name of Participant (PLEASE PRINT)

_____ _____
Signature of Researcher *Date*

APPENDIX C
(Demographics)

PARTICIPANT INFORMATION FORM
PAGE 1
SAMANTHA E. TUFT, GRADUATE STUDENT: S.TUFT@CSUOHIO.EDU
DR. M[C]LENNAN, FACULTY ADVISOR: C.MCLENNAN@CSUOHIO.EDU
(216) 687-3750
LANGUAGE RESEARCH LABORATORY - CHESTER BUILDING 249
LANGUAGERESEARCH@MAC.COM (216) 687-3834
CLEVELAND STATE UNIVERSITY: DEPARTMENT OF PSYCHOLOGY

FOR LRL USE:
Room #_____
Participant #_____
_____ (credits) OR $_____
Experiment _____
Date _____
Experimenter _____

Please fill in the following information:

Name: _____

*Address: _____

_____

E-mail address(es): _____

_____

Telephone Number: _____ Cell Phone Number: _____

Date of Birth: _____ Place of birth (City):_____

Gender: _____ Major: _____

Place of Longest Residence (City): _____

First language spoken: _____

Are you (circle one): right-handed left-handed ambidextrous

What languages do you speak fluently? _____

Would you like to be added to (or remain on) our "Paid Participants Database" so that we can notify you in the future of paid experiments for which you are eligible to participate? _____

*
Note: If you would prefer not to provide your full address and phone number(s), you may simply provide your zip code. Thank you.

PARTICIPANT INFORMATION FORM
PAGE 2
SAMANTHA E. TUFT, GRADUATE STUDENT: S.TUFT@CSUOHIO.EDU
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CLEVELAND STATE UNIVERSITY: DEPARTMENT OF PSYCHOLOGY

FOR LRL USE:
Room #_____
Participant #_____
_____ (credits) OR $_____
Experiment _____
Date _____
Experimenter _____

Please note that your responses to the following questions will *not* be directly linked to your name. As with any part of your experience as a research participant in our study, please feel free to ask the experimenter if you have any questions. Thank you.

Have you ever had a hearing or speech disorder?

(circle one) YES NO

If yes, please explain: _____

Have you ever had a visual or reading disorder (other than glasses/contacts)?

(circle one) YES NO

If yes, please explain: _____

Have you ever been diagnosed with Attention Deficit Disorder (ADD) or Attention Deficit Hyperactivity Disorder (ADHD)?

(circle one) YES NO

If yes, please explain: _____

APPENDIX D

(Edinburgh Handedness Inventory [modified and completed on computer])

You can further help us by providing answers to the following questions. There are no right or wrong answers. Please indicate your preferences in the use of hands in the following activities by answering L for Left hand OR R for Right hand, OR X for No preference. After answering L, R, or X, please answer whether or not you ever use the other hand for each activity by typing Y for Yes OR N for No. Please answer all of the questions. If you have any questions, please ask the experimenter. Please type in your assigned ID number.

Which hand do you write with?
L) Left R) Right X) No Preference

Writing
Do you ever use the other hand?
Y for Yes OR N for No

Which hand do you draw with?
L) Left R) Right X) No Preference

Drawing
Do you ever use the other hand?
Y for Yes OR N for No

Which hand do you throw with?
L) Left R) Right X) No Preference

Throwing
Do you ever use the other hand?
Y for Yes OR N for No

Which hand do you use when using scissors?
L) Left R) Right X) No Preference

Scissors
Do you ever use the other hand?
Y for Yes OR N for No

Which hand do you put your toothbrush in?
L) Left R) Right X) No Preference

Toothbrush
Do you ever use the other hand?
Y for Yes OR N for No

Which hand do you use when using a knife without a fork?
L) Left R) Right X) No Preference

Knife
Do you ever use the other hand?
Y for Yes OR N for No

Which hand do you use when using a spoon?
L) Left R) Right X) No Preference

Spoon
Do you ever use the other hand?
Y for Yes OR N for No

Which hand is your upper hand when using a broom?
L) Left R) Right X) No Preference

Broom
Do you ever use the other hand?
Y for Yes OR N for No

Which hand do you use when striking a match?
L) Left R) Right X) No Preference

Striking a match
Do you ever use the other hand?
Y for Yes OR N for No

Which hand do you use when opening a lid to a box?
L) Left R) Right X) No Preference

Opening a lid to a box
Do you ever use the other hand?
Y for Yes OR N for No

Thank you! Please inform the researcher that you have completed this questionnaire.

APPENDIX E

(Race, Ethnicity, and Gender Questionnaire [completed on computer])

Your gender is:

a.) Male
b.) Female
x.) Skip

Your ethnic background is:

a.) Hispanic or Latino
b.) Not Hispanic or Latino
x.) Skip

Your racial background is:

a.) American Indian/Alaska Native
b.) Native Hawaiian or Other Pacific Islander
c.) White
d.) Unknown
e.) Asian
f.) Black or African American
g.) More than One Race
x.) Skip

Thank you! Please inform the researcher that you have completed the questionnaire.

APPENDIX F

(Lexical Decision Task Instructions)

Language Research Laboratory: Chester Building 249

ST Thesis Experiment:

Welcome to the Language Research Laboratory. We appreciate you helping us today.

In the experiment that you will be participating in today, you will hear spoken items over headphones. Some of the words will be real English words; some will be nonsense words. We want you to decide as quickly but as accurately as possible if each item is a real word in English OR a nonword by pressing one of the two appropriately labeled buttons on the response box in front of you.

A typical trial will proceed as follows: A spoken item will be presented over your headphones.

As quickly as you can, press the GREEN button on the right if you think the item is a real word or the RED button on the left if you think the item is not a real word in English. Try to be as fast but as accurate as possible. As soon as you have responded, a new trial will begin.

Please HOLD the response box in your hands with your right thumb above the GREEN (word) button and your left thumb above the RED (nonword) button.

We will begin with a brief practice phase to familiarize you with the experiment.
If you have any questions, please ask the experimenter now.

Let the experimenter know when you are ready to begin the experiment. Thank you.

APPENDIX G
(Math Test)

Language Research Laboratory
Mathematical Evaluation Test (MET)

Welcome to our research laboratory. We are attempting to determine the level of difficulty of certain math problems for another experiment in our laboratory. You can help us by completing the following problems as quickly but as accurately as possible. This is not a test of your intelligence or your math abilities. In fact, we will never associate your name with your answers. We are simply interested in determining which of the following problems are easy and which are difficult.

When the experimenter tells you to begin, turn the page and begin working on the problems. The experimenter will tell you when to stop working.

Thank you for helping us.

MET PART 1

1. $5387 \div 52 =$ _____

2. $585{,}975 \div 32 =$ _____

3. $7845.55 \times 77.99 =$ _____

4. $\left(\frac{77}{32}\right) \div \left(\frac{895}{84}\right) =$ _____ (express answer as fraction)

MET PART 2

1. $4276 \div 41 =$ _____

2. $485{,}875 \div 22 =$ _____

3. $6835 \times 66 =$ _____

4. $\left(\frac{32}{77}\right) + \left(\frac{84}{895}\right) =$ _____ (express answer as fraction)

APPENDIX H

(Post-Experiment Questionnaire [completed on computer])

You can further help us by providing answers to the following questions. There are no right or wrong answers. We are simply interested in your experience in the experiment that you have just participated in and your experience with swear words. If you have any questions, please ask the experimenter. Please type in your assigned number.

What do you think was the purpose of this experiment?

Have you ever used swear words?

Approximately how many times do you swear per week?

Approximately how frequently do you hear swear words in everyday conversation and in what contexts?

How frequently do you have conversations with the opposite gender that involves swearing?

How frequently do you have conversations with the same gender that involves swearing?

Who do you think swears more: men or women and why?

Did you have any problem hearing or understanding the words and nonwords you were presented?

Do you have any general comments or observations about the experiment?

Thank you!
Please inform the researcher that you have completed this questionnaire.

APPENDIX I
(Debriefing Form)

DEBRIEFING FORM
SAMANTHA E. TUFT, GRADUATE STUDENT: S.TUFT@CSUOHIO.EDU
DR. M^{C}LENNAN, FACULTY ADVISOR: C.MCLENNAN@CSUOHIO.EDU
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CLEVELAND STATE UNIVERSITY: DEPARTMENT OF PSYCHOLOGY

Thank you for your participation! The study you have just participated in is based on work by Dr. M^{c}Lennan demonstrating perceptual benefits during spoken word recognition when information contained in the speech signal (e.g., talker voice, speaking rate) matches from one time to another. Specifically, the current experiment investigated how variation in talker identity and meaning of word might affect spoken word recognition.

If you have friends participating in experiments in this laboratory, please keep the purpose of this experiment confidential in case we ask them to participate in the future.

Any data you have provided will be kept confidential. Any information you provided relating to perceptual impairments will not be tied directly to your name.

Some participants may experience negative feelings about their performance in the experiment. If you would like to discuss any of these feelings, please feel free to contact the Counseling Center on campus at Cleveland State University, located in Rhodes Tower 1235 (phone: 216-687-2277). If you have any questions about your rights as a research subject, you can contact the Cleveland State University Institutional Review Board at (216) 687-3630.