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This study examined whether bilinguals activate phonological representations from their first language when reading in their second language. Specifically, the effect of interlingual homophones in Vietnamese-English bilinguals with unequal proficiencies in their respective languages was examined. Participants were completely fluent in English (could speak, read, and write it) with limited abilities in Vietnamese (could speak it, but not read or write it). Therefore, for each interlingual homophone, these unbalanced bilinguals were expected to have a phonological representation for both languages but an orthographic representation for English alone. Consequences of this relationship were examined in a lexical decision task. The critical stimuli were Vietnamese-English interlingual homophones and their matched English control words. Decision latencies and error data for the critical stimuli were recorded and analyzed. A facilitative interlingual homophone effect was predicted but only a small inhibitory effect was found in the error data. These results indicate that the lack of a second orthographic representation may reduce the inhibitory homophone effect compared to that seen in English monolinguals and that a facilitative homophone effect may only be found when there are many homophone mates. The results also indicate that weaker (Vietnamese) representations may have little influence on dominant language (English) processing.

Bilingualism is prevalent throughout the world's population and is a topic of great relevance and importance with the continuing globalization of many domains. The majority of psycholinguistic research, however, has focused on monolinguals, or individuals who speak only one language. One of the reasons for this is of a practical nature, in that bilingualism research is more difficult to conduct. Bilinguals can vary on a number of characteristics including the languages they speak, their proficiency in each language, the age of acquisition of the second language, and the contexts in which each language is used. Bilingualism research is important not only for its practical implications but also because bilinguals demonstrate different cognitive processes than monolinguals (De Groot, 2011).

Bilingualism was considered to be detrimental to cognitive functioning until Peal and Lambert's (1962) study on the relation between child bilingualism and intelligence provided evidence to the contrary (De Groot, 2011). In this study, bilingual children outperformed monolingual children on tests measuring both verbal and non-verbal intelligence. Compared to monolingual children, bilingual children performed better in concept formation and tasks requiring mental flexibility. Longitudinal studies have also demonstrated that bilingualism can improve cognitive functioning (Lambert, 1981). When tested years later, bilingual students who were provided the opportunity to receive immersion schooling in a second language outperformed matched monolingual children on tests indexing various aspects of cognitive functioning. Specifically, bilinguals tend to outperform monolinguals on tasks requiring cognitive control (De Groot, 2011).

Bialystok and colleagues used the Simon task in a series of studies to compare the cognitive control of bilinguals and monolinguals (Bialystok, 2006; Bialystok, Craik, Klein, & Viswanathan, 2004; Bialystok et al., 2005; Martin-Rhee & Bialystok, 2008). The Simon task is a perceptual motor task that assesses participants' ability to inhibit or ignore

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irrelevant spatial information. Stimuli in two different colours are presented on the right or left side of a computer screen in a randomized order. Participants are asked to press a key on the left side of the keyboard if the presented stimulus is one colour and to press a key on the right side if the presented stimulus is the other colour. In a congruent condition, the position of the stimulus on the screen matches the position of the key to be pressed. In an incongruent condition there is a mismatch between the position of the stimulus and the position of the key to be pressed (for example, a blue square presented on the right side of the screen requires pressing the left key). Incongruent trials typically lead to longer response times and more errors than congruent trials. This is known as the Simon effect. Bilinguals of various ages showed reliably smaller Simon effects and performed better overall on the Simon task than monolinguals, which suggests that bilinguals have superior inhibitory control. The use of more than two colours of stimuli to increase working memory load hampered the task performance of monolinguals more than that of bilinguals. In addition, the detrimental effects of aging on executive control were smaller for bilinguals than monolinguals. These results suggest that the effects of bilingualism on cognition go beyond the language domain to affect general executive processes (Bialystok, 2007).

Overview of Vietnamese

Presently, there is limited bilingual research involving individuals who speak Vietnamese. Studies involving Vietnamese bilinguals have examined grammaticality judgements (McDonald, 2000), sentence interpretation (Pham & Kohnert, 2008), and auditory processing (Nguyen-Hoan & Taft, 2009) but much is left to be discovered. This study seeks to investigate word reading processes in Vietnamese-English bilinguals by examining the effect of interlingual homophones, which are words that share the same sound but have different meanings across languages. Second generation Canadian Vietnamese-English bilinguals are of particular interest because they typically speak but do not read Vietnamese, and they both speak and read English. These individuals allow us to examine the impact of the phonology of a first language on reading in a second language, without the concurrent influence of knowledge of first language orthography.

Vietnamese is an Austro-Asiatic language with over 85 million speakers worldwide (Nguyen, 2001). The majority of Vietnamese speakers reside in Vietnam, Cambodia, Thailand, and Laos (Nguyen, 2001). Populations of Vietnamese speakers also exist overseas in countries such as the United States, Canada, and Australia. Vietnamese consists of three major dialects: Northern (Hanoi), Central (Huê), and Southern (Ho Chi Minh City) (Nguyen, 2001). Vietnamese is a tonal language that uses six tones (level, rising, falling, dipping-rising, creaky, constricted) to differentiate meaning. Tone is indicated in the written language using diacritic marks (Nguyen, 2001). The Vietnamese writing system is unique in that Vietnamese is one of the few Asian languages to use the Latin alphabet. Vietnamese orthography is also extremely transparent in that there is a high degree of regularity in letter-sound correspondences (Pham, Kohnert, & Carney, 2008). Vietnamese is an isolating language. Instead of bound morphemes, such as *–ness* in *happiness*, Vietnamese uses separate function words and word order to express grammaticality (Pham et al., 2008). In terms of syntax, Vietnamese has a basic subject-verb-object (SVO) word order, as does English (Nguyen, 2001).

Use of Homophones to Study the Role of Phonology in Reading

When reading in English, individuals can activate word meanings using either the phonological or direct route to meaning. These two routes exist because English uses an alphabetic writing system that encodes sound information. Readers are using the phonological route to meaning when they translate a word from its written text to its phonological

representation and subsequently activate the meaning of the word using this sound information. Alternatively, readers can also activate the meaning of a word directly from its written form. This direct route is often necessary since English is somewhat opaque in that its letter-sound correspondences are not perfect (Jared, Levy, & Rayner, 1999).

Homophones are useful when studying phonology because they can differentiate whether the phonological or direct route to meaning is being used. Homophones are words that share phonology but differ in orthographic and semantic representation. In other words, homophones are words that share the same sound but have different spellings and meanings (e.g., *dye-die*) (Mihalicek & Wilson, 2011). The visual information of a homophone will only activate the meaning of the presented word (e.g. *dye*-"colouring"). The sound of the homophone will activate both meanings corresponding to the homophone pair (e.g. "colouring" and "death"). If there is evidence that both meanings of a homophone pair were activated when only a single member was shown, it can be concluded that the phonological route was involved in the activation of meaning (Jared et al., 1999). A group of cognitive psychologists specializing in psycholinguistics have explored this topic in a series of studies.

Jared and colleagues (1999) used homophones to examine the role of phonology in the activation of word meanings. They examined whether participants noticed when a homophone in a sentence was substituted for its homophone mate. The manipulated variables were the frequency of the correct and incorrect homophones and the predictability of the correct homophone. Reading skill was also examined as a possible moderator of task performance. Jared and colleagues found that phonology played a role in activating meanings of low-frequency words when correct homophones were not predictable and reading skill was not considered. When reading skill was examined, it was found that good readers tended to use the direct route to meaning whereas poor readers tended to use the phonological route to meaning. Overall, this study demonstrated that phonology is important in the activation of word meanings and that its impact depends on factors such as frequency and reading skill. What is still unclear is how printed words are translated into their phonological representations. In addition, examining words in the context of simple sentences may not be the best method for studying the role of phonology in the activation of word meanings because readers of different skill levels may monitor their comprehension of sentences in different ways (Jared et al., 1999).

Rather than examining the effect of homophones in the context of sentences, Pexman, Lupker, and Jared (2001) examined homophone effects for words in isolation using a lexical decision task (LDT). In the LDT, participants are shown letter strings and are asked to indicate whether or not the string of letters forms a word in a given language. This involves shallower processing of words than sentence reading. Consequently, any homophone effects found using a LDT would suggest that phonology plays a role early on in the word-recognition process (Pexman et al., 2001). Pexman and colleagues examined whether homophone effects could be found in a LDT and whether individuals could strategically control the use of phonology in this task. Homophones were found to have longer decision latencies than matched control words in the LDT. Observation of these homophone effects was influenced by three factors: the frequency of a homophone and its mate, the orthographic nature of the nonword foils, and the phonological nature of the foils. Homophone effects were found to be more likely for low-frequency words with high-frequency mates and when foils were orthographically and phonologically similar to English words. The authors suggested that these homophone effects are due to feedback activation from phonology to orthography. Activation of the phonological representation of a homophone feeds back to orthography, thereby activating both corresponding spellings and resulting in competition at the orthographic level. Assuming that lexical decisions are based primarily on

orthographic activation, this competition at the orthographic level will increase decision latencies in the LDT due to the extra time required to decide upon the appropriate orthographic representation (Pexman et al., 2001). Other experiments found no evidence of the strategic reliance on phonology, suggesting that phonology consistently plays a role in word recognition.

In a follow-up study, Pexman, Lupker, and Reggin (2002) evaluated the feedback account by investigating the impact of feedback activation in several word recognition tasks. They compared the occurrence of homophone, regularity, and homograph effects in the LDT and phonological LDT. Homographs are words that share spelling but have different pronunciations and meanings. For example, the homograph *wind* is spelt the same but pronounced differently depending on whether the intended meaning is 'a gust of air' or 'to twist'. In a phonological LDT, participants are asked to indicate whether presented stimuli sound like a word. This task was expected to be sensitive to competing phonological representations whereas the visually presented LDT is sensitive to competing orthographic representations. As predicted, Pexman and colleagues found homophone effects but not regularity or homograph effects in the visually presented LDT and found regularity and homograph effects but not homophone effects in the phonological LDT. These results provide evidence that homophone effects are the result of feedback activation from phonology to orthography. Accordingly, phonology does appear to play a role in visual word recognition (Pexman et al., 2002).

Homophone Effects in Other Languages

Although studies conducted in English have found that homophones have longer decision latencies than matched controls, studies in other languages have found different effects. Chen, Vaid, and Wu (2009) examined homophone effects in Chinese. Chinese differs from English in that Chinese homophones are typically quite different in written form. Furthermore, Chinese homophones typically have about 10 homophonic mates whereas English homophones rarely have more than one.

Using lexical decision and naming tasks, Chen and colleagues found a facilitative homophone effect in that homophones were responded to faster than control words. The authors suggest two possible mechanisms that may be responsible for their finding. Chinese homophones do not share orthography the way homophones of alphabetic languages like English do. Therefore, Chinese homophones may not demonstrate the same kind of orthographic competition that causes the inhibitory homophone effects found in English. Alternatively, Chen and colleagues suggest the facilitative homophone effect may be due to an increase in global activation of the mental lexicon (Chen et al., 2009).

Hino, Kusunose, Lupker, and Jared (2011) sought to resolve the discrepancy in results regarding the facilitative and inhibitory nature of homophone effects across languages. Hino and colleagues examined homophone effects in Japanese Kanji words using a LDT. Japanese Kanji is ideal for resolving the discrepancy in results because it shares characteristics with both English and Chinese. Similar to Chinese, Japanese is a logographic language with homophones that can have many homophonic mates with quite different orthographic forms. Similar to English, Japanese homophones can also have few homophonic mates. This large range in the number of homophonic mates makes Japanese Kanji ideal for examining homophone density effects. Hino and colleagues found results consistent with studies of both English and Chinese homophones in that inhibitory homophone effects were found for homophones with few homophonic mates whereas facilitative homophone effects were found for homophones with many homophonic mates. These results suggest that homophone density may explain the discrepancy in results found in studies of English and Chinese homophones.

Hino and colleagues explain the facilitative effect of increased homophone

density using the global activation account. The authors suggest that when a word has many homophonic mates, the increased global activation in the lexicon facilitates one's ability to decide on the homophone's status as a word. One homophonic mate is not enough to cause this increased global activation (Hino et al., 2011).

Bilingual Studies of Phonology Using Interlingual Homophones

Although monolingual research has demonstrated the importance of phonology in word recognition, considerably less research has been done on the role of phonology in bilingual word recognition. Just as homophones are useful in studying phonology in monolinguals, interlingual homophones are useful in examining phonological processes in bilinguals. As previously mentioned, interlingual homophones are words that share sound, but not meaning or spelling, across languages.

One of the most prominent bilingual word recognition models is the Bilingual Interactive Activation (BIA+) model proposed by Dijkstra and Van Heuven (2002). The BIA+ is a localist connectionist model which posits that bilinguals have a common phonological lexicon between their two languages. Within this single phonological lexicon are separate nodes for words in each language. According to this model, there is a separate node for each member of an interlingual homophone pair.

Nas (1983) provided early evidence of the shared phonological lexicon of bilinguals. Dutch-English bilinguals participated in an English LDT which included nonwords and cross-language pseudohomophones. The cross-language pseudohomophones were created from Dutch words. The spelling of Dutch words was changed to appear orthographically English, yet when read according to English spelling-to-sound conversion rules these letter strings produced a phonological representation corresponding to the original Dutch word. In other words, the cross-language pseudohomophones were nonwords in English with Dutch phonological representations. The Dutch-English bilingual participants made more errors on the cross-language pseudohomophones than the regular nonwords and were also slower to reject them as words in the English LDT. These results indicate that phonological representations of Dutch words were activated during the English task, which suggests that bilinguals have a shared phonological lexicon (Nas, 1983).

Doctor and Klein (1992) found a similar inhibitory interlingual homophone effect using a generalized LDT. English-Afrikaans bilinguals were asked to decide whether presented letter strings were words in either of their two languages. The words used in the generalized LDT consisted of interlingual homophones, interlingual homographs, and words exclusive to either English or Afrikaans. Nonwords included pseudohomophones. Participants had longer decision latencies and made more errors on interlingual homophones than interlingual homographs. Interlingual homographs share spelling but not meaning across languages. Therefore, each interlingual homograph has one orthographic representation whereas interlingual homophones have two orthographic representations, one for each language. These results are consistent with monolingual English studies which suggest that inhibitory homophone effects are due to competing orthographic representations.

Haigh and Jared (2007) found an interesting facilitatory interlingual homophone effect. Performance on an English LDT was compared for interlingual homophones and matched English control words in English-French and French-English bilinguals. Homophone effects were found for the French-English bilinguals but not for the English-French bilinguals. The homophone effects found for the French-English bilinguals were of a facilitative nature; however, the effects were quite small and found only in the error data. The authors suggest that the differing results between the two groups of participants may have to do with the language in which the LDT was conducted. The task was conducted in the French-English bilinguals' second language

whereas it was conducted in the English-French bilinguals' first language. Therefore, language proficiency may influence phonological activation in bilinguals (Haigh & Jared, 2007).

The Present Study

The present study explored whether bilinguals activate phonological representations from their first language (L1) when reading in their second language (L2). Of particular interest was the effect of interlingual homophones in individuals with an unequal proficiency in their respective languages. It is not uncommon for the children of immigrants to be able to speak their native language but not be able to read or write in that language. One reason being that these children learn their native language at home and continue to speak it with their family but never go on to receive formal education in that language because they go to school in the language of the majority. Specifically, the present study will examine the effect of interlingual homophones in Vietnamese-English bilinguals who are very fluent in English but have only limited abilities in Vietnamese, such that they can speak Vietnamese but have little Vietnamese reading and writing abilities.

This specific population is of interest because their unbalanced language proficiencies may provide a better understanding of the role of phonology in visual word recognition processes. The inhibitory effect of homophones in English has been explained by feedback activation from phonology to orthography resulting in competition at the orthographic level (Pexman et al., 2001). The bilingual participants in this study are unique in that they can read in English but not in Vietnamese. When reading interlingual homophones, such bilinguals are expected to have activation at the phonological level from both languages but activation at the orthographic level from English alone. The present study seeks to explore whether interlingual homophones will have a facilitative effect on lexical decision in these individuals. Since these individuals have only one orthographic representation for each interlingual homophone, feedback activation from phonology to orthography should not cause competition at the orthographic level.

Method

Participants

The sample consisted of 25 individuals from Ontario, Canada. Included were 13 males and 12 females ranging in age from 17 to 26 years (M = 21.64). All participants learned Vietnamese as their first language and English as their second language. Participants had unequal proficiencies in their respective languages in that they were very fluent in English with limited abilities in Vietnamese. Specifically, participants were able to speak, read, and write in English but were only able to speak in Vietnamese with limited abilities to read and write in Vietnamese. Table 1 shows participants' mean language fluency as indicated on a 10-point Likert scale ranging from 1 (*none*) to 10 (*very fluent*). Three participants were excluded because they had Vietnamese reading and writing fluencies of 8 or higher.

All participants had normal or corrected to normal vision. Participants were recruited using poster advertisements and members of the Vietnamese Students Association at Western were invited to participate. Participants were compensated $5 for their participation.

Table 1
Mean Participant Language Fluency

	English	Vietnamese
Understanding	9.92	7.64
Speaking	9.92	6.56
Reading	9.96	3.32
Writing	9.88	2.60

Materials

The critical stimuli consisted of 31 monosyllabic interlingual homophones and their matched English controls (see Appendix A). As shown in Table 2, the English control words were matched to the interlingual homophones on frequency (Baayen, Piepenbrock, &

Gulikers, 1995), length in phonemes, length in letters, neighbourhood, and bigram frequency. Frequency, length in phonemes, length in letters, and neighbourhood statistics were retrieved from N-Watch (Davis, 2005). Bigram frequency was retrieved from the English Lexicon Project (Cognitive Psychology Lab, 2009). Furthermore, mean lexical decision latencies and accuracy for the critical stimuli were obtained from the English Lexicon Project database. This data was provided by a large number of participants in the U.S., most of whom would have been native English speakers. There was no significant difference in decision latencies between the homophones (M = 628, SE = 12.72) and controls (M = 625, SE = 12.24) for these participants, t (31) = .16, *ns*, nor was there a significant difference in accuracy data between the homophones (M = .93, SE = .02) and controls (M = .95, SE = .01), t (31) = -1.01, *ns*. This data provides further evidence that the two groups of words were well matched. Therefore, any difference found between the interlingual homophones and matched English controls would be due to the influence of Vietnamese. Although the English control words were well matched to the selected interlingual homophones, it should be noted that finding true interlingual Vietnamese-English homophones is difficult due to the tonal nature of Vietnamese.

In addition to the critical stimuli, 62 monosyllabic English distracter words and 124 pseudowords were included in the LDT. Pseudowords were created by changing letters in existing words (see Appendix A for complete list of stimuli). A demographics questionnaire was also included (see Appendix B).

Table 2
Means for Critical Stimuli

Characteristic	Interlingual Homophones	Controls
Celex Frequency (per million words)	340.07	384.53
Log Celex Frequency	1.59	1.61
Kucera-Francis Frequency	309.52	363.74
Length in Phonemes	2.61	3.03
Length in Letters	3.48	3.77
Neighbourhood	9.71	9.35
Bigram Frequency	1322.30	1282.47
Log Bigram Frequency	2.99	3.05
Reaction Time	628	625
Accuracy	0.93	0.95

Procedure

Prior to the experimental task, participants completed a demographics questionnaire. During the experimental task, participants were seated approximately 50 cm in front of a computer screen. Participants were told that letter strings would appear one at a time on the center of the screen and that they were to decide as quickly and as accurately as possible whether the letter strings formed a real English word. Participants were asked to indicate their decision by pressing either a word or nonword button. Prior to the experimental trials, participants completed 16 practice trials. Following the practice trials, participants completed 248 experimental trials. The order of presentation of the stimuli was randomized for each participant.

Each lexical decision trial began with a fixation point (+) that appeared in the center of the screen for 750 ms, followed by the presentation of a word or nonword. The stimulus remained on the computer screen until the participant made a response, with an intertrial interval of 1000 ms. All stimuli appeared in lower case letters and were printed in black 18 point Courier New font. The computer recorded the latency from the onset of the stimulus to the participant's button press and the accuracy of the response.

Results

The mean decision latencies and percent accuracy for the target stimuli are presented in Table 3. Decision latencies greater than 1500 ms

or less than 300 ms (1.89% of the data) were considered outliers and were not included in the analysis. Trials in which an error was made and those involving filler stimuli were also excluded from the RT analyses. A paired samples *t*-test was performed on decision latency and accuracy data for homophones and controls using participant (t_1) means as units of analysis. An independent samples *t*-test was performed on decision latency and accuracy data for critical stimuli using item (t_2) means as units of analysis.

No significant effect of word type on decision latencies was found, $t_1(24) = 0.94$, *ns*, $t_2(60) = 0.66$, *ns*. Participants were significantly less accurate for the interlingual homophones than the matched controls, $t_1(24) = 3.60$, $p < .001$. The error analysis by items did not show a significant effect of word type, $t_2(60) = 1.14$, *ns*.

A second set of analyses, excluding two participants with a Vietnamese reading or writing fluency of 7 or above, yielded similar results. No significant effect of word type on decision latencies was found, $t_1(22) = 0.58$, *ns*, $t_2(59) = 0.31$, *ns*. Participants were significantly less accurate for the interlingual homophones than the matched controls, $t_1(22) = 3.35$, $p < .01$. The error analysis by items did not show a significant effect of word type, $t_2(59) = 0.96$, *ns*.

Table 3
Mean Decision Latencies and Percent Accuracy for Target Stimuli (SDs in parenthesis)

	RT	Accuracy
Interlingual Homophones	563 (84)	92.8 (5.0)
Controls	556 (78)	96.4 (3.3)

Discussion

This study used interlingual homophones in a lexical decision task (LDT) to examine whether Vietnamese-English bilinguals activate phonological representations from their first language (L1) when reading in their second language (L2). Participants were fluent in English with limited abilities in Vietnamese such that they could speak Vietnamese but had little abilities to read or write it. Since participants had little knowledge of Vietnamese spellings, it was hypothesized that the interlingual homophone effect would be facilitatory because there could be no competition between English and Vietnamese spellings. On average, participants took 7 ms longer to make lexical decisions to the interlingual homophones than to control words and made 3.6% more errors on the homophones than on the controls; however, only the error analysis by subjects was significant. Although a facilitatory interlingual homophone effect was predicted, only a small inhibitory interlingual homophone effect was found.

Pexman, Lupker, and Jared (2001) studied homophones in English monolinguals and found that individuals were typically slower to make lexical decisions to homophones than their matched controls. The authors explained this inhibitory homophone effect by feedback activation from sound to spelling. English homophones typically have one phonological representation and two orthographic representations. When reading, activation at the phonological level feeds back to the orthographic level. This feedback activation results in competition of the two orthographic representations of a homophone, which thereby slows down one's reaction time in a lexical decision (Pexman et al., 2001). The inhibitory interlingual homophone effect found in the present study was minor, only reaching significance in the error analysis by subjects. Lack of competition from the Vietnamese spelling of the homophone appears to have reduced the inhibitory effect compared to that seen in English monolinguals.

Why No Facilitatory Interlingual Homophone Effect?

Contrary to homophone effects in English monolinguals, research on homophones in Chinese monolinguals have found that individuals are typically faster to make lexical decisions to homophones than their matched controls (Chen et al., 2009). Chinese is a logographic language so every word is represented by a different character. Therefore,

Chinese homophones are orthographically distinct so there is little competition between different spellings (Chen et al., 2009). In addition, Chinese homophones typically have about 10 homophonic mates; unlike English homophones which rarely have more than one (Chen et al., 2009). This increased homophone density results in greater phonological activation which contributes to a greater global activation of one's lexicon, or mental dictionary, making it easier to decide on a Chinese homophone's status as a word (Hino et al., 2011). In the present study, any extra activation of phonology from the Vietnamese mate was not sufficient to produce a facilitatory interlingual homophone effect. A facilitatory effect may only be found when there are many homophonic mates, as in Chinese.

Another explanation for the lack of a facilitatory interlingual homophone effect may be the interlingual homophones used. The Vietnamese-English interlingual homophones may not have been a close enough phonological match, because Vietnamese is a tonal language whereas English is not. Vietnamese uses six tones: level, rising, falling, dipping-rising, creaky, and constricted (Nguyen, 2001). Since no tones are used in English, true Vietnamese-English interlingual homophones may only be words that use a level tone in Vietnamese. Furthermore, the interlingual homophones were quite high in frequency in English. High frequency English words may be less susceptible to homophone effects than low frequency words (Pexman et al., 2001).

Finally, a facilitatory interlingual homophone effect may not have been found because participants were tested in their dominant language. Participants in the present study were unique in that their second language, English, had become their dominant, more fluent language. It is not uncommon for second generation Canadians to be able to speak their native language but not be able to read or write it. This is because they learn their native language at home, and continue to speak it with their families, but go on to receive formal education in English alone. The present study included such individuals who were fluent in English with limited abilities in Vietnamese.

Haigh and Jared (2007) examined whether bilinguals activate phonological representations from both their languages when reading in one. Their study included both English-French and French-English bilinguals. In an English LDT, homophone effects were found for the French-English bilinguals but not for the English-French bilinguals. In other words, a homophone effect was found only for participants who were tested in their less dominant language. Since English has become the dominant language for participants in the present study, weaker Vietnamese representations may have had little influence on dominant language processing.

Suggestions for Future Research

Future research may seek to involve participants with the same language characteristics but test them using a task in their less dominant language. The present study cannot simply be replicated testing the participants in their less dominant language instead of their dominant language. The LDT is a reading task and the participants in this study could not read in their less dominant language, Vietnamese. Perhaps an auditory LDT could be used. Instead of stimuli being presented visually, participants could listen to sound samples of words and indicate whether or not each clip they heard was a word in Vietnamese. Another alternative could be an ERP version of the LDT used. This may be more sensitive to any interlingual homophone effects.

Much is left to be discovered regarding how one's first language influences a second language. This relationship becomes even more interesting when an individual's second language has become dominant over their first. Studying such individuals may provide interesting insights into how one's languages interact.

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References

Baayen, R. H., Piepenbrock, R., & Gulikers, L. (1995). The CELEX lexical database [CD-ROM], Philadelphia, PA: Linguistic Data Consortium, University of Pennsylvania [Distributor].

Bialystok, E. (2006). Effect of bilingualism and computer video game experience on the Simon task. *Canadian Journal of Experimental Psychology, 60*, 68-79.

Bialystok, E. (2007). Cognitive effects of bilingualism: How linguistic experience leads to cognitive change. *The International Journal of Bilingual Education and Bilingualism, 10*, 210-223.

Bialystok, E., Craik, F., Klein, R., & Viswanathan, M. (2004). Bilingualism, aging, and cognitive control: Evidence from the Simon task. *Psychology and Aging, 19*, 290-303.

Bialystok, E., Martin, M., & Viswanathan, M. (2005). Bilingualism across the lifespan: The rise and fall of inhibitory control. *International Journal of Bilingualism, 9*, 103-119.

Chen, H., Vaid, J., & Wu, J. (2009). Homophone density and phonological frequency in Chinese word recognition. *Language and Cognitive Processes, 24*, 967-982. doi: 10.1037/0278-7393.28.3.572

Cognitive Psychology Lab, Washington University. (2009, November 10). English lexicon project web site. Retrieved from http://elexicon.wustl.edu/

Davis, C. J. (2005). N-Watch: A program for deriving neighborhood size and other psycholinguistic statistics. *Behavior Research Methods, 3*, 65-70. doi: 10.3758/BF03206399

De Groot, A. (2011). *Language and cognition in bilinguals and multilinguals: An introduction*. New York: Psychology Press.

Dijkstra, T., & Van Heuven, W. J. B. (2002). The architecture of the bilingual word recognition system: From identification to decision. *Bilingualism: Language and Cognition, 5*, 175–197.

Doctor, E., & Klein, D. (1992). Phonological processing in bilingual word recognition. In R. J. Harris (Ed.), *Cognitive processing in bilinguals* (pp. 237-252). Amsterdam: Elsevier Science Publishers.

Haigh, C. A., Jared, D. (2007). The activation of phonological representations by bilinguals while reading silently: Evidence from interlingual homophones. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 33*, 623-644. doi: 10.1037/0278-7393.33.4.623

Hino, Y., Kusunose, Y., Lupker, S. J., & Jared, D. (2011). The processing advantage and disadvantage for homophones in lexical decision tasks. Manuscript submitted for publication.

Jared, D., Levy, B. A, & Rayner, K. (1999). The role of phonology in the activation of word meanings during reading: Evidence from proofreading and eye movements. *Journal of Experimental Psychology: General, 128*, 219-264. doi: 10.1037/0096-3445.128.3.219

Lambert, W. (1981). Bilingualism and language acquisition. In H. Winitz (Ed.), *Native language and foreign language acquisition* (pp.9-22). New York: The New York Academy of Sciences.

Martin-Rhee, M., & Bialystok, E. (2008). The development of two types of inhibitory control in monolingual and bilingual children. *Bilingualism: Language and Cognition, 11*, 81-93.

McDonald, J. L. (2000). Grammaticality judgements in a second language: Influences of age of acquisition and native language. *Applied Psycholinguistics, 21*, 395-423.

Mihalicek, V., & Wilson, C. (Eds.). (2011). *Language files: Materials for an introduction to language and linguistics* (11th ed.). Ohio: Ohio State University Press.

Nas, G. (1983). Visual word recognition in bilinguals: Evidence for a cooperation between visual and sound based codes during access to a common lexical store. *Journal of Verbal Learning and Verbal Behavior, 22*, 526-534.

Peal, E., & Lambert, W. (1962). The relation of bilingualism to intelligence. *Psychological Monographs, 76*, 1-23.

Pexman, P. M., Lupker, S. J., & Jared, D. (2001). Homophone effects in lexical decision. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 27,* 139-156. doi: 10.1037/0278-7393.27.1.139

Pexman, P. M., Lupker, S. J., & Reggin, L. D. (2002). Phonological effects in visual word recognition: Investigating the impact of feedback activation. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 28,* 572-584. doi: 10.1037/0278-7393.28.3.572

Pham, G., & Kohnert, K. (2008). Sentence interpretation by typically developing Vietnamese-English bilingual children. *Applied Psycholinguistics, 31*, 507-529. doi: 10.1017/S0142716410000093

Pham, G., Kohnert, K., & Carney, E. (2008). Corpora of Vietnamese texts: Lexical effects of intended audience and publication place. *Behaviour Research Methods, 40,* 154-163. doi: 0.3758/BRM.40.1.154

Nguyen, D. H. (2001). Vietnamese. In J. Garry & C. Rubino (Eds.), Facts about the world's languages: An encyclopedia of the world's major languages, past and present (pp. 794-796). New York: Wilson.

Nguyen-Hoan, M., & Taft, M. (2009). The impact of a subordinate L1 on L2 auditory processing in adult bilinguals. *Bilingualism: Language and Cognition, 13*, 217-230. doi: 10.1017/S0142716410000093

Tan, L. H., & Perfetti, C. A. (1998). Phonological codes as early sources of constraint in reading Chinese: A review of current discoveries and theoretical accounts. *Reading and Writing: An Interdisciplinary Journal, 10,* 165-220.

Appendix A

Interlingual Homophones

them	high	guy	sigh	bye	ham
new	am	cup	bang	bough	
some	sat	gin	lamb	gong	
now	die	gap	thaw	beak	
man	theme	jaw	hack	yam	
come	sin	dumb	hop	eye	

Control Words

than	head	goal	sore	bib	hen
how	air	coat	boom	bright	
such	six	gel	lump	gown	
not	dog	gum	thorn	boot	
much	throat	jar	hike	yarn	
case	seed	debt	hip	ear	

Filler Words

add	dance	fog	milk	said	warm
bag	did	free	mine	sale	wave
bath	dose	held	near	salt	wax
bliss	duck	hill	oil	scarf	web
born	fact	ink	own	spoil	wine
box	fair	job	page	stop	wolf
camp	fate	kit	pain	tail	youth
card	fig	lag	rag	test	
chop	firm	lots	ramp	top	
cool	fit	low	rare	vote	
coy	fix	mice	ruin	vow	

Nonwords

agian	dath	gonig	nech	relt	tarsh
alos	daw	grap	nen	rog	thrid
alsa	deda	greal	nige	roim	thrim
aog	dela	hame	niva	sair	tif
apto	dran	harf	noce	scaw	turs
bame	drap	heda	noge	scol	voird
bast	drore	herad	nrued	scuth	wab
blic	ehre	hime	nup	sheelt	waya
bral	elt	iar	nud	shob	wheer

brem	ent	kafe	nuilt	shouse	whoil
bude	erle	kele	olny	skad	woob
cag	fen	leme	ols	smat	wourt
carst	fent	lesp	oson	smed	wra
cim	fere	masp	peant	sneed	wrick
clage	fid	mena	pefe	snete	wrilt
clead	flive	mipe	pleft	sono	yair
cled	flul	mish	plize	stelt	yan
clek	fof	moard	pon	stes	yar
conse	frew	moce	point	swa	yees
crose	frim	moob	prog	swal	
daip	frist	mour	reays	swog	

Appendix B

Language Experience Questionnaire

Participant # : _____

Age:_____ Gender: M F Father's Native Language: _____

Native Country: _____ Father's Second Languages: _____

Native Language: _____ Mother's Native Language: _____

Second Language: _____ Mother's Second Languages: _____

Region of Vietnamese family background (circle): North Central South

List the languages you know in the order:

a) in which you learned them: _____

b) from the one you know best to the one you know least: _____

Language spoken most frequently at home with your family: _____

What percentage of time are you *currently* exposed to each of the following languages in your daily activities?

Vietnamese _____

English _____

French _____

Other _____

Experience with Vietnamese

For each of the following Vietnamese language skills, please indicate the age at which you first started to acquire the skill, the place in which you learned the skill (e.g. home, school), and rate the fluency with which you can currently perform the skill. (circle one number per skill).

	starting age	place	fluency none									very fluent
Understanding			1	2	3	4	5	6	7	8	9	10
Speaking			1	2	3	4	5	6	7	8	9	10
Reading			1	2	3	4	5	6	7	8	9	10
Writing			1	2	3	4	5	6	7	8	9	10

INTERLINGUAL HOMOPHONE EFFECTS

Experience with English

For each of the following English language skills, please indicate the age at which you first started to acquire the skill, the place in which you learned the skill (e.g. home, school), and rate the fluency with which you can currently perform the skill. (circle one number per skill).

	starting age	place	fluency none									very fluent
Understanding			1	2	3	4	5	6	7	8	9	10
Speaking			1	2	3	4	5	6	7	8	9	10
Reading			1	2	3	4	5	6	7	8	9	10
Writing			1	2	3	4	5	6	7	8	9	10

School Experience

Indicate the type of schooling that you received at each grade level by placing an x in the appropriate box.

	K	1	2	3	4	5	6	7	8	9	10	11	12	U1	U2	U3	U4
English school in Canada																	
French Immersion																	
Vietnamese school (no English course)																	
Vietnamese school (an English course)																	
Vietnamese class in Canada outside school hours																	