A Comparison of Lexical Processing in Monolinguals and Bilinguals

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Abstract

Bilinguals have twice as many words in their mental lexicon as compared to monolinguals. There means that bilinguals are slower and less accurate in lexical processing when compared to monolinguals. This study investigates whether Turkish-English bilinguals (n= 48) differ from Turkish monolinguals (n= 53) in their perception of Turkish words. Both groups were instructed to decide if the visually presented Turkish words were either real words or nonwords in a lexical decision task Response times and the accuracy of the answers were recorded. In line with the results in the literature, it was shown that bilinguals were slower and less accurate than monolinguals in processing Turkish words. The results were discussed in the light of psycholinguistic models of lexical processing.

Keywords: Bilingualism;Lexical Processing; Psycholinguistics

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1. Introduction

   With the increasing number of people who speak more than one language in the world, bilingualism has become a norm rather than an exception. Accordingly, there has been an increase in the number of experimental studies investigating different aspects of bilingualism. Among these, one of the issues is how bilinguals manage lexical processing in their two languages and   how they differ from monolinguals. A great deal of research devoted to reveal how lexical processing proceeds in bilinguals has shown that bilinguals process the words in their mental lexicon differently from monolinguals, both in recognition and production (Duyck et al. 2008; Gollan et al. 2008; Lehtonen et al. 2012).

   It is a well-established fact that lexical processing in bilinguals proceeds with the combined participation of all words from both lexicons, thus increasing the number of candidates and the processing time. A lot of evidence from experimental studies support this view (Illes et al. 1999; Marian, Spivey and Hirsch, 2003; Brysbaert and Dijkstra, 2006; van Heuven, Dijkstra and Grainger, 1998). A comparison of monolinguals and bilinguals in lexical processing has revealed that the former perform better, and this difference has been attributed to the size of the mental lexicon, where bilinguals have almost twice as many words. van Heuven, Dijkstra and Grainger (1998) reported that Dutch-English bilinguals had longer response latencies than English monolinguals in processing English words. Similarly, Marian and Spivey (2003) argued that bilinguals fall behind monolinguals due to the parallel activation of the two lexicons during the selection process.

   Another line of research suggests the frequency of use is an important factor in lexical processing. This factor is more important in the bilingual word recognition process. Bilinguals choose between the languages and thus use each of them less frequently than the monolingual speakers of each language. Lehtonen et al. (2012) compared monolinguals and bilinguals in a lexical processing task and reported monolinguals' better success. The authors stated that bilinguals are unable to use each of their languages as frequently as the monolingual speakers of those languages. A similar result emerged from Duyck et al.'s (2008) study. They suggested that the frequency of use has more pronounced effects on bilinguals than on monolinguals. Gollan et al. (2008) argued that lexical links in the bilingual lexicon are not as strong as those in the monolingual speakers of those languages, and this accounts for the differences between monolinguals and bilinguals in lexical processing.

   In this study, we investigate whether Turkish-English bilinguals from birth process Turkish words differently from the Turkish monolinguals.

2. Method

2.1.Participants

   Two groups of participants took place in the experiment. The first group comprised of 48 Turkish-English bilinguals (15 male, 33 female). The participants were contacted via e-mail and sent a questionaire to assess their age, degree, handedness, health and the language background for the two languages they speak. Those who met the criteria were selected and given appointments for an interview. Some of the participants had acquired both languages simultaneously (n=33), others before age 5 in a natural setting. All are classified as either simultaneous or early bilinguals according to the literature. They were asked to self-report their language proficiency in both languages on a 5-point scale, 5 indicating full proficiency, and no significant differences were found between their two languges in terms of listening, speaking, reading and writing skills. Mean age of the participants in the bilingual group is 29.75 (*SD*= 9.64). They were all right-handed, as assessed by *Edinburgh Handedness Inventory* (Oldfield, 1971).

   The second group comprised of 53 monolingual speakers of Turkish (17 male, 36 female). They were given an assessment questionaire similar to that given to the first group. Those who were eligible

were given appointments for an interview. Mean age of the participants was 28.25 (*SD*=7.32). They were all right-handed as assessed by *Edinburgh Handedness Inventory* (Oldfield, 1971).

2.2. Design and Procedure

A lexical decision task was used in the experiment. It took part in a quiet, dimly-lit room. Participants were taken one at a time. Prior to the experiment, a practice trial was given. The trial structure was as follows: The participants were seated in front of a laptop computer at a distance of 40 cm. They were asked to use a chin rest to avoid any head movements, and told to fixate on the central cross on the screen. The stimuli were presented either from from the right or left of the screen in a random order, and the participants were told to press the designated keys on the keyboard to decide whether the letter strings they saw on the screen were real words or nonwords. Their response times and the accuracy of their answers were recorded via SuperLab 4.0 software and the SPSS 18.0 was performed to analyse the data.

Stimuli were 30 words and 30 nonwords. Real words were chosen from a pool of 300 words from *Yazılı Turkce'nin Kelime Sıklıgı Sozlugu (The Dictionary of Word Frequency of Written Turkish)* by Goz (2003). A hundred native speakers of Turkish rated the frequency of use and the valence of the words on a 5-point scale (1=rare, 5=very frequent and 1=unpleasant, 5=very pleasant). Out of this pool, 10 positive, 10 negative and 10 neutral words were selected for use in the experiment. No statistical differences were found in the frequency of the words ($F_{2,27}$= 0.83, p> .05, η^2 =.058), but they differed significantly in terms of valence ($F_{2,27}$ = 98.01, p< .001, η^2 =.879). Nonwords were created by changing one letter in real words and they complied with the phonotactic rules of Turkish. Word and nonword stimuli had either two or three syllables.

3. Results

Independent Samples *t*-test revealed that monolinguals were faster (535.22, *SD*=55.46)in their response to real words than bilinguals (726.22, *SD*=170.59), and the difference between the two groups were found statistically significant, *t*(55.96)= -7.41, *p*< .001. The same result was obtained for the processing of nonwords. Bilinguals (881.73, *SD*=193.67) were slower than the monolingual group (656.26, *SD*=92.28) in processing the nonwords. The difference is statistically significant, *t*(65.80)= -7.35, *p*< .001. Response times for each group of participants can be seen in Figure 1.
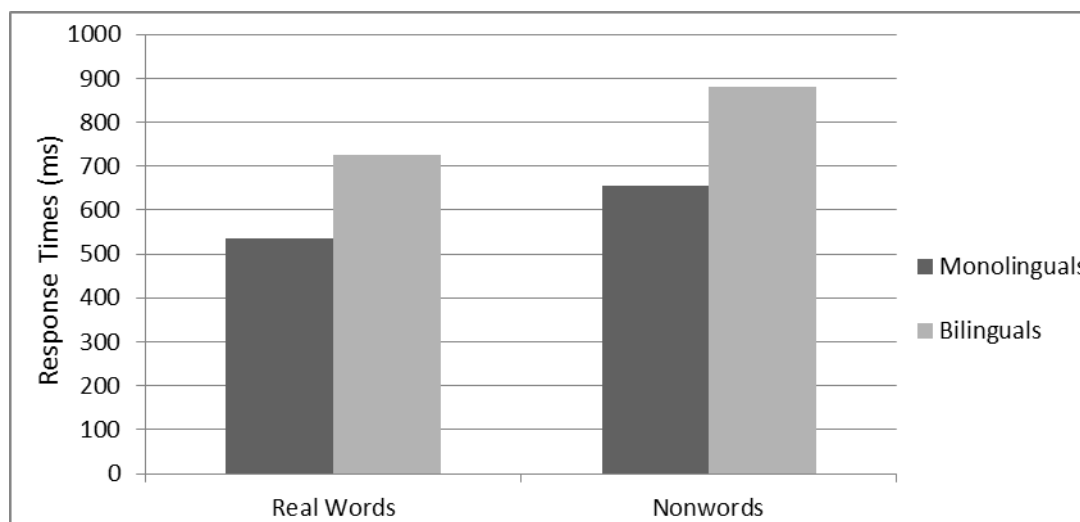

Figure 1. Response Times (in milliseconds) of the monolingual and bilingual groups

Correct responses were taken into account and Mann-Whitney U test was used. According to the results, the accuracy of the answers support the monolinguals (Real words: 83 %, *SD*=.10; Nonwords: 61 %, *SD*=.19) better performance in processing both words and real words compared to the bilingual group (Real words: 80 %, *SD*=.13; Nonwords: 56 %, *SD*=.09). The differences in success rates haven't reached significance, though (Real words: *U*= 1120.50, *Z*= -1.03, *p*> .05;*r*= .10, Nonwords: *U*= 1032, *Z*= -1.63, *p*> .05, *r*= .16). Accuracy rates for each group can be seen in Figure 2.
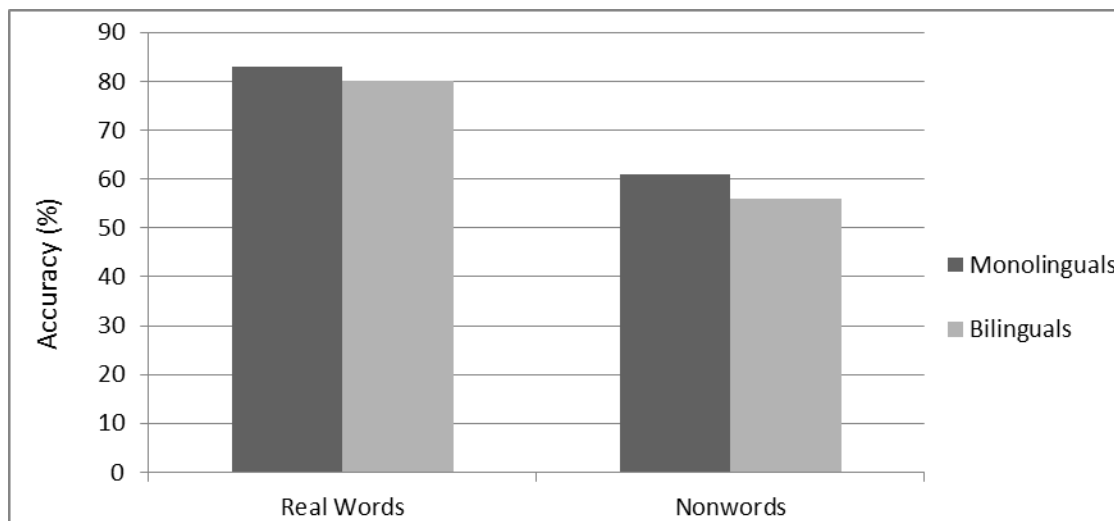

Figure 2. Accuracy Rates (%) of the monolingual and bilingual groups

4. Discussion

The results of our study replicates the view that monolinguals perform better in lexical processing when compared with bilinguals. Response times and the accuracy of the answers in processing both real words and nonwords support this view. Research on production (Gollan et al. 2008) and in perception (Lehtonen et al. 2012; van Heuven and Dijkstra, 1998) has reported monolinguals' better success in lexical retrieval in speech production and perception.

According to the principles of word recognition models in the psycholinguistic literature, correlation between the size of the mental lexicon and the speed of lexical retrieval accounts for the difference between monolinguals and bilingual lexical processing. For example, *Activation Model* (McClelland and Rumelhart, 1981) predicts that all items in the mental lexicon compete for selection in the retrieval process. Bilingual Word Recognition Models, i.e. *BIA* and *BIA+* (Dijkstra and van Heuven, 2002), suggest that the parallel activation of languages in bilinguals is a disadvantage, as bilinguals deal with almost twice as many words as the monolinguals. This leads to an increase in the number of candidates, which in turn impedes the retrieval process, and makes bilinguals more prone to errors. This view has found great deal of support from experimental studies (van Heuven, Dijkstra and Grainger, 1998; Thomas and van Heuven, 2005). Marian and Spivey (2003) reported that Russian-English bilinguals had longer response times and were less accurate than monolinguals in lexical processing and suggested that the parallel activation of two languages accounts for bilinguals' increased response times. The results of our study replicated this finding. The bilingual participants required more time to process Turkish words because the need to suppress the activation of English words led to a delay in their lexical processing.

Another reason for bilinguals' delayed lexical processing is an imbalance in the frequency with

which they use the words in the two languages. As suggested by psycholinguistic models of word recognition, word frequency is an important determiner in word recognition. According to these models, frequency of a word strenghtens lexical links and facilitates word recognition (Balota, Yap and Cortese, 2006). Bilinguals switch between languages, reducing the frequency with which they use words in each language relative to monolinguals. In fact, it has been argued that word frequency has more pronounced effects on bilingual word recognition than on monolingual word recognition (Duyck et al. 2008; Lehtonen et al. 2012).

No significant differences were found in the accuracy rates of either groups, showing that bilingual participants were comparable in proficiency of Turkish to monolinguals. Bilingual participants' slower response times compared to monolingual participants cannot be attributed to their proficiency level. In other words, it can be said that simultaneous bilinguals in our study were equally competent in processing Turkish words as monolingual speakers of Turkish.

5. Conclusion

We investigated whether monolinguals and bilinguals differ in processing Turkish words. A lexical decision task was used where both groups were instructed to determine if the word stimuli on the computer screen were real words or nonwords. The results showed that the monolingual participants were both faster and more accurate in their decisions than bilinguals. This finding is in line with the widely accepted view that monolinguals outperform bilinguals in lexical processing. Some possible explanations of this result are the size of the mental lexicon and the frequency of use of each language of bilinguals. Compared to monolinguals, the bilinguals have almost twice as many words as monolinguals, which means more time is needed to select from the candidates in the mental lexicon in lexical processing. Also, it is almost impossible for bilinguals to use the words in both languages as frequently as the monolingual speakers of each language.

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