Translation of Ambiguous Words by Translation Trainees

Dr. Filiz Mergen iD
İzmir Ekonomi Üniversitesi, Meslek Yüksekokulu
Uygulamalı İngilizce Çevirmenlik
filiz.mergen@ieu.edu.tr

Doç. Dr. Nihal Yetkin-Karakoç iD
İzmir Ekonomi Üniversitesi, Fen-Edebiyat Fakültesi
İngilizce Mütercim ve Tercümanlık
nihal.yetkin@ieu.edu.tr

Abstract

Ambiguity has attracted the attention of researchers from many disciplines. With the aim of providing a perspective from translation, this psycholinguistic study investigated ambiguity in the translation performance of late bilinguals from English (L2) into Turkish (L1). We employed an oral translation task in which the participants (N= 51) translated 30 ambiguous words, (polysemes and homonyms) in contextualized sentences. First, we investigated whether word frequency affects the participants' translation accuracy. We found no significant difference between high and low frequency words, which is attributable to the proficiency of the participants, and the facilitating role of sentential context. Secondly, we aimed to explore whether the nature of the ambiguous words made any difference to the participants' translation performance. The results showed that polysemous words were translated with greater accuracy than homonymous words, in line with the data in the literature regarding the differences in the representation and processing of polysemy and homonymy.

Keywords: Ambiguity, translation, polysemy, homonymy, psycholinguistics.

Anlam Belirsizliği Olan Sözcüklerin Mütercim ve Tercümanlık Öğrencileri Tarafından Çevirisi

Öz

Anlam belirsizliği pek çok disiplinden akademisyenin dikkatini çekmiştir. Çeviri açısından bir perspektif getirmek amacıyla yapılanbu psikodilbilimsel çalışma, geç ikidillilerin İngilizceden (İ) Türkçeye (T) çeviri performanslarında belirsizliği incelemektedir. Katılımcılara (N=51) 30 belirsiz sözcük (çokanlamlı veya eşadlı) bağlama yerleştirilerek, cümle içinde seçili sözcüklerin sözlü çevirisi istenmiştir. İlk olarak, sözcük sıklığının katılımcıların çeviride bu sözlere uygun karşılık bulmalarını etkileyip etkilemediği incelenmiştir. Buna göre, çok sık kullanımlı sözcükler ile az kullanılanlar arasında anlamlı bir farklılık saptanmamıştır. Bu sonuç, deneydeki katılımcıların dil yetkinliklerine ve sözcüklerin cümle içinde verilmesinin kolaylaştırıcı etkisine bağlanabilir. İkinci olarak, belirsiz sözcüklerin türünün öğrencilerin çeviri performansını değiştirip değiştirmediği incelenmiştir. Çokanlamlı sözcüklerin eşadlı sözcüklere göre daha uygun olarak çevrilmiş olduğunu ortaya koymakta olan sonuçlar, alanyazındaki çokanlamlı ve eşsesli sözcüklerin temsili ve işlenmesine ilişkin veriler ile uyumludur.

Anahtar Kelimeler: Anlam belirsizliği, çeviri, çokanlamlılık, eşadlılık, psikodilbilim.

INTRODUCTION

Psycholinguistic literature abounds with research on monolingual language processing. Similarly, bilingualism, which is increasingly becoming a standard norm rather than an exception, has attracted a great amount of attention, and large body of work has been devoted to how bilinguals process their two languages. The data, however, suggest that this process is more complex for bilinguals as it may be influenced by a number of factors, such as the age of acquisition, the level of proficiency and the frequency of use of both languages. An important aspect of bilingual language processing is the way words are recognized, produced and translated. Given the huge literature regarding word processing in bilinguals, generally, the specific issue of how late bilinguals deal with their less proficient language in translation process deserves more attention, as it potentially provides valuable data on the organization and the functioning of the mental lexicon. Also, despite the fact that a great deal of research has unveiled the effects of various factors on language processing, those that investigate how translation trainees handle ambiguity in sentential context are yet to be explored. This study aims to shed light on psycholinguistic processes underlying how ambiguous words are translated from English (L2) into Turkish (L1), and what role frequency plays in the translation process.

What is Lexical Ambiguity?

The term lexical ambiguity, also known as semantic ambiguity, is the presence of two or more possible meanings within a single word. Polysemy and homonymy are two concepts within the context of lexical ambiguity. There has been much controversy about how each concept is represented in the lexicon, and how they are processed during language comprehension. Similarly, brain research suggests that the underlying mechanisms for processing polysemy and homonymy differ (Macgregor, Bouwsema, & Klepousniotou, 2015). Linguistically speaking, too, views on the characteristic features of polysemous and homonymous words are still inconclusive. Views vary as to how far speakers of a language agree on the extent of the ambiguity. For example, there is one that distinguishes polysemy and homonymy on the basis of the relatedness of the senses: polysemy involves related senses, whereas the senses associated with homonymous lexemes are not. (Murph & Koskela, 2010).

In the psycholinguistic literature, polysemy is considered to be a synonym of ambiguity (Klein & Murphy 2001). Polysemy, also known as radiation or multiplication (Quiroga-Clare, 2003), is referred to when a word is used in semantic analysis (Crystal, 1980, p. 274). It is a case in which the same word may have a set of different meanings (Palmer, 1981, p. 100). Since ambiguity occurs when something can be interpreted in more than one possible senses or ways (Quiroga-Clare, 2003), polysemy can be seen as a form of as ambiguity (Paulin & Bejoint, 2008, p. 7).

Armstrong (2005, pp. 85-86) sees polysemy in terms of paradigms which refer to the set of substitution relationships a linguistic unit has with other units in a specific context. He describes near synonymy as polysemes, referring to the role of selectional restrictions in translation. These restrictions differ across languages, leading to the difficulty in translating polysemes into the target language as words have different collocations.

Homonymy, on the other hand, is defined as words that have the same sound and spelling, but are different in meaning or origin (Longman Dictionary of Contemporary

English). In other words, homonymous words are those spelled and pronounced similarly, but differ in meaning (Beretta, Fiorentino, & Poeppel, 2005).

Despite the lack of mutual agreement in the literature, Klepousniotou (2002) highlights two prominent views regarding the representation of ambiguous words. One view is described as *Sense Enumeration Lexicons*, which assumes that there are separate stores for ambiguous words, regardless of their being polysemous and homonymous. This view suggests similar representations for both polysemes and homonyms. The other view predicts separate representations for ambiguous words. Known as *Generative Lexicon Approach*, this view maintains that the senses of homonyms are listed separately, while for polysemes, there is only one store for the core sense, and all the other senses are derived in the sentence context. This view predicts differential processing for ambiguous words.

The issue of polysemy and homonymy has been frequently addressed in experimental studies. For example, Klein and Murphy (2001) found evidence for separate store for the different senses of polysemous words. Klepousniotou (2002), in a comparative study, concluded that homonyms are stored separately, while there is a single mental representation for all the senses of polysemous words. Similarly, Ortega-Andrés and Agustín Vicente (2019) maintained that the related senses of polysemous words facilitated access to all the different senses in interpretation. Beretta, Fiorentino and Poeppel (2005) found behavioral and neural support for a single entry model of polysemy. Foraker and Murphy (2012) explored polysemy in sentence comprehension and concluded that while all different senses of polysemous words are represented in the mental lexicon, it is the dominant sense which is easier to access.

Another point to consider is the frequency with which the words are used. Psycholinguistically speaking, Thomas and van Heuven (2005, s. 208) argued that word recognition is initiated by the recognition of the physical properties of the words, which are then separately matched with the existing candidates in the mental lexicon until the best match for the printed words is found. This competition proceeds with the facilitation of the possible candidates, and the inhibition of the unlikely ones, whereby frequently used words are privileged over the less frequently used ones. The privileged status of high frequency words, as Thomas and van Heuven (2005, p. 208) argued, has been attributed to their lower activation thresholds as compared to the less frequently used ones, which, in turn, leads to faster and easier recognition. It is known that a number of lexical variables affect lexical processing (Larsen, Kimberley, Mercer, & Balota, 2006; Yap & Balota, 2009). Frequency effect, being the most important, can be defined as the faster and better recognition of high frequency compared with low frequent words. There is a huge literature regarding the processing differences between high and low frequency words, as revealed by a wide range of experimental tasks, for both monolinguals (Balota & Spieler, 1999) and bilinguals (Duyck, Vanderelst, Desmet, & Hartsuiker, 2008). In bilinguals, frequency effects were shown to be more pronounced, particularly when speakers are less proficient in one of the two languages (Kroll & Stewart, 1994). Although this bias may change depending on the frequency of use of the less proficient language (Basnight-Brown & Altarriba, 2007), it has been well-established that bilinguals have more difficulties in lexical processing than monolinguals, due to the greater overall number of words in their lexicon (Dijsktra & van Heuven, 2002; Duyck, Vanderelst, Desmet, & Hartsuiker, 2008; Gollan, Montoya, Cera, & Sandoval, 2008; Lehtonen, Hulten, Rodriguez-Fornells, Cunillera, Tuomainen, & Laine, 2012).

Also, in translation, word frequency plays an important role. For example, de Groot and Poot (1997) highlighted the role of word frequency in accessing conceptual store in translation of words and its influence on the translation speed of unbalanced bilinguals. Similarly, Prior, MacWhinney and Kroll (2007) reported that performance of the Spanish-English bilingual participants was affected by frequency as well as other lexical variables, such as ambiguity. Ibrahim, Cowell and Varley (2017) also reported that word frequency had a significant effect on the speed of translation.

Translation of Ambiguous Words

Many bilinguals report that not all words in one language can be readily translated into the other (Pavlenko, 1999). Also, this is a challenging task for speakers of a second language, particularly when that language is learned later in life. Many second language learners find not only that many words in one language have more than a single appropriate translation in the other language, but that this difficulty increases when the nature of ambiguous words are considered. For example, Ghazala's (1995, p. 99) study indicates that language learners tend to know only the common meaning of a polysemous word, understand it as a monosemic word, and ignore or forget non-core meanings, which causes serious problems in translation. In a study exploring the effects of translation ambiguity on translation production and recognition, it was found that ambiguity slows down translation and reduces accuracy, possibly due to competition, as well as to the strength of associations between words and their meaning (Tokowicz & Degani, 2010).

Translation ambiguity, according to Tokowicz and Degani (2010) may occur due to multiple translations, word class ambiguity, polysemy, near-synonyms and conceptual distinctions in some languages. They state that there are two sources of translation ambiguity: lexical ambiguity and near-synonymy ambiguity. Translation ambiguity arising from lexical ambiguity within a language is referred to as meaning ambiguity because each meaning is captured by a separate translation, whereas translation ambiguity arising from near-synonymy is referred to as *form ambiguity*. As to the sources of translation ambiguity, it was found in a study by Degani, Prior, Eddington, de luz Fontes, and Tokowicz (2016) that it sometimes, but not always arises from within-language *semantic ambiguity*, and that meaning dominance matters in translational choices. Prior, Kroll and MacWhinney (2013) found that translation ambiguity affected bilingual translation performance, independent of variables such as frequency, context availability and cognate status. In this study, it was also found that the difficulty identified for translation ambiguous words decreased with enhanced L2 proficiency.

Research on ambiguous words has attempted to reveal the mechanisms underlying how they are in systematically represented and processed in the brain. In one such study by Tokowicz, Kroll, de Groot, and van Hell, J. G (2002), the authors asked the participants to write the translation that came to mind for each word. The results showed that number of translations available for each word influenced their decisions in the semantic similarity rating task. Another study by Prior, MacWhinney and Kroll (2007) examined the relationship between word frequency and translation ambiguity. The results showed that high frequency words had fewer translations across languages as compared to low frequency words. Klein and Murphy (2001) examined whether there are any task differences in the way polysemous and homophonous words are processed and found that similar responses to these words regardless of the type of lexical processing tasks. Prior,

MacWhinney and Kroll's (2007) study on translation norms for English and Spanish words revealed that translation ambiguity was a determinant in bilingual performance. This study emphasized word class, i.e. verbs were more ambiguous in translation than nouns. However, in a more recent study by Prior, Kroll and MacWhinney (2013), word class did not prove to be a variable in translation performance, suggesting that previous findings of difference between nouns and verbs might be attributable to the greater translation ambiguity of verbs in comparison to nouns.

Bilingual mental lexicon has been vastly investigated in the literature by means of a variety of tasks as specified in Pavlenko (2014). However, none of them explored how a translation task would provide evidence for lexical organization in the bilingual mind. Besides, despite the large amount of data on translation ambiguity in different language pairs, to the best of the authors' knowledge, no research has been conducted on the Turkish-English language pair. This study aims to explore which factors are at play in the translation of English words into Turkish by late bilinguals and fill the gap in the psycholinguistic literature by shedding light on the role frequency plays in the translation of ambiguous English words.

Method

Participants

There were a total of 51 (23 males, 28 females, aged between 20-25) participants in the study. They were undergraduates, having taken at least two introductory translation courses, and were given extra credit for their voluntary participation. All had learned English as a foreign language during their secondary education and achieved the required grade in the officially recognized Foreign Language Exam of Higher Education Council to qualify for university placement. Their level of English is at least B1 based on the Common European Framework of Reference for Languages. As part of the department's curriculum, they are offered a wide range of second foreign languages but the participants involved are at the beginner level of the language of their choice. Since utmost care was devoted to exclude cognate words, we do not consider the second foreign language to be a confounding factor in language processing.

Stimuli

The test included English words (L2) in a total of 30 sentences with equal length (7-8 words per sentence), 15 with high frequency words, and 15 with low frequency words appearing in sentences. The students were instructed to translate them into their mother tongue (Turkish). Relative ease of translation was taken into consideration in the choice of directionality as participating students were used to translating in that direction up to the time of the experiment. Some of the examples are given below:

e..g. The factory had produced car <u>bodies</u> (high frequency word)

e.g. They walked down a broad <u>avenue</u> (low frequency word)

The words were selected from the *ANEW* (Bradley and Lang, 1999). They were categorized as high (*M* = 200 ipm, *Std* = 45.53) and low frequency words (*M* = 51.7 ipm, *Std* = 25. 94). An Independent Samples *t*-Test revealed that there was a statistically significant difference between the two groups of words, t (28) = 10.96, $p < .001$. These words were further categorized as homonymous and polysemous words with the aid of a dictionary

(Oxford Learner's Dictionary) and then, four native speakers were consulted about the conformity of the categorization. The ambiguous words in the sentences appeared towards/at the end of the sentences.

Procedure

An oral translation task was employed in the experiment, which took place in a quiet room with one participant at a time. The participants were first familiarized with the experiment through a trial test with five sentences, the results of which were excluded from the statistical analysis.

In the experiment, the participants' task was to translate the underlined English words into Turkish, which were presented on a computer screen with 1366x768 resolution. The experiment started with a ding sound followed by a cross in the middle of the screen. Then the stimulus appeared on the screen when the participant pressed on the enter key and remained on the screen until he/she replied. The presentation of the sentences with high and low frequency words were random, and counterbalanced across participants. To explore the second research question, the same set of words were recategorized on the basis of polysemy and homonymy. The participants were allowed to read and respond to sentences at their own speed, and their voices were recorded. The recordings were assessed independently by five raters, who taught at the translation department. The number of raters was determined to be five for statistical reliability, and an inter-rater reliability analysis using 2-way mixed-effects model was run to determine consistency among five raters. The results showed an excellent reliability. ICC was .972 with 95% confident interval from .953 to .985, $F_{(29, 116)} = 176.124$, $p < .001$. The total number of accurate responses were calculated for each participant. Since there was no time constraint, response times were not taken into account, and the statistical analysis was conducted on the accuracy of answers. Participants were not informed that the sentences included ambiguous words. They were asked not to use any dictionaries.

Results

We first explored whether the word frequency had any effect on the accuracy of the participants' translations. To see if frequency made any difference in the accuracy of the participants, we used a Paired Samples t-Test, and found no statistically significant difference in the frequency analysis, $t_{(49)} = 1.908$, $p = .062$.

Figure 1. Accuracy Rates for High and Low Frequency Words
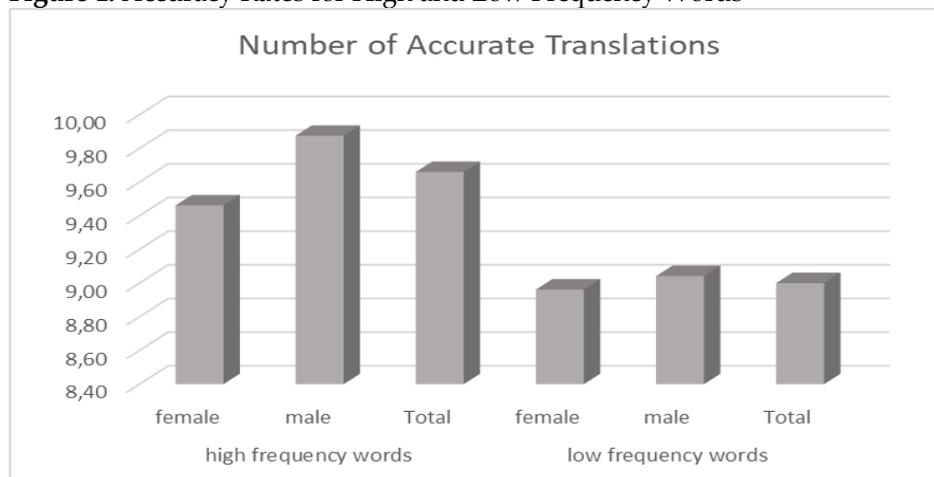
For further analysis of the translation performance of our bilingual participants, we divided the words into two groups, polysemous and homonymous. Because the number of words in each group was unequal (polysemous words: 13, homonymous words: 17), we calculated percentages for each word to normalize the data. A Paired Samples t-Test yielded significant results, t (49) = 5.661, $p < .001$, with more accurate translations for polysemous words (M=66.62, Std= 1.85) than for homonymous words (M = 56.56, Std = 2.05).

Figure 2. Accuracy Rates for Polysemous and Homonymous Words
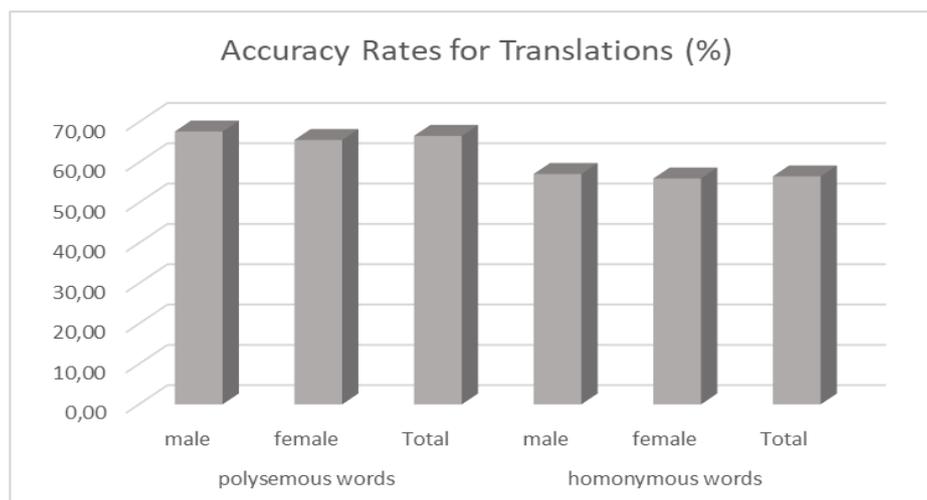
Discussion

It is well-established in the psycholinguistic literature that high frequency words are processed more easily and more accurately. With this in mind, we aimed to explore whether this difference applies to the translation of high versus low frequency words. Our results suggest that frequency is not indicative of translation accuracy in trainee translators. This result contrasts with what has generally been accepted in the literature; however, the majority of such research depends on frequency effects on processing at word level, which might be a strong predictor for word recognition. Processing ambiguous words in sentential context may facilitate comprehension by providing more data. This view was confirmed by the Foraker and Murphy study (2012) in which the participants accessed the dominant sense of polysemous words more easily when presented in sentences, suggesting the facilitative role of sentence context. The participants in our study presumably performed better due to the contextualized presentation of the ambiguous words.

Another explanation for results can partly be attributed to the language background of our participants, all advanced learners of English with two years of translation training. Their translation performance might be due to their enhanced abilities in accessing the conceptual store, as predicted by Kroll and Stewart's *Revised Hierarchical Model* (1994) which makes a distinction between a conceptual and a lexical store. According to this model, during the initial phases of second language learning, access to the mental lexicon is mediated via the lexical store, i.e. translation equivalents in the native language. In other words, learners use the native language as a clutch to extract meaning. As they grow more proficient in the second language, according to this model, this reliance on translation equivalents diminishes until they are finally able to process words via direct links to the

conceptual store. This model may account for the success of the proficient bilinguals in our study, who were equally successful in translating words, regardless of word frequency.

Our results fail to support the role of frequency in revealing the processing differences between polysemes and homonyms. This is in contrast to the idea that word frequency correlates with higher success in word recognition (de Groot & Poot, 1997; Thomas & van Heuven, 2005, p. 208; Prior, MacWhinney, & Kroll, 2007). However, these authors highlighted the role of frequency when words are used in isolation. In our study, we presented words in context, which could have facilitated their translation performance.

Another aim of the current study was to explore if the relatedness of senses would affect the processing of polysemes and homonyms in an oral translation task. Our results showed that polysemous words were translated more accurately when compared to homonymous words, confirming the relevant research. We discuss the results below.

To start with, the selected ambiguous words were given in sentential context. However, this didn't necessarily help the participants to come up with the appropriate sense of the words. This finding is in compliance with previous literature (Binder, 2003; Elston-Güttler & Williams 2008), which demonstrate that translation ambiguity affects bilinguals, even when words are presented in a potentially disambiguating context.

When we analyze the ambiguous words grouped as homonymys and polysemes, our results confirm the view that ambiguity is differentially processed in the mental lexicon. Klepousniotou (2002) recorded response times in a lexical decision task, and reported shorter response times for polysemous words than for homonymous words, suggesting that the single store for polysemy facilitated retrieval, which, in turn, led to faster recognition. In our study, since there was no time constraint on the participants, we did not analyze the response time data. However, participants' better performance in translating polysemous words as compared to homonyms may be indicative of the relative ease of the retrieval of words with related meanings, i.e. polysemes.

Our results can also be explained by what is known as the "ambiguity effect" in the literature. According to this view, the multiple meanings of ambiguous words work in cooperation to facilitate word retrieval by inhibiting the competing lexical items (Piercey & Joordens, 2000). This view has found support particularly for the processing of polysemous words. For example, Frazier and Rayner (1990) reported that the relatedness of the multiple meanings of polysemous words provided a facilitative effect, while the unrelated meanings of homonymous words were associated with more time-consuming processing. In the psycholinguistic literature, this advantage is called "sense-relatedness advantage", and has been connected with the activation of the different senses in the semantic space, i.e. the multiple senses of the polysemous words do not correspond to separate regions in semantic space, thereby making them easier to process, while the reverse is true for homonymous words (Rodd, Gaskell & Marslen-Wilson, 2004). An experimental support for the sense-relatedness advantage was reported by Klepousniotou and Baum (2007), who investigated ambiguous and unambiguous words in separate experiments involving auditory and visual tasks. Both experiments yielded faster reaction times and more accurate responses for polysemous words as compared to homonymous words and unambiguous words. These results were replicated in our study.

Another possible explanation for our results concerns the learners' approach to translating words with multiple meanings. It is known that language learners are more likely to use the most common meanings of words and ignore other meanings, which may result in serious mistakes in translation (Ghazala, 1995, p. 99). These mistakes may not be as noticeable in polysemy as in homonymy, in which senses are unrelated. This may account for the poorer translation performance for homonyms in our study. Our participants might have selected the most common meaning of the words, irrespective of their the relatedness of the different senses, thus failing to select the correct option.

CONCLUSION

It has been established in the literature that ambiguity poses difficulties in lexical processing in monolingual language production and comprehension. This difficulty becomes much more evident in the case of bilingualism in which language proficiency plays an important role. More specifically, late bilinguals have greater disadvantages in language processing due to relatively lower proficiency in one language. Despite the abundance of studies on the ambiguity effects in language processing, psycholinguistic research is limited on its specific effects on the translation process. In this study, we focused on how translation trainees deal with ambiguous words in an oral translation task. Our study is the first to date that specifically focuses on the differences between polysemy and homonymy in an oral translation task performed from English into Turkish.

In this study, we used ambiguous words classified according to their frequency of use and being polysemous and homonymous. The participants' task was to translate these words taking into account their contextualized meaning.

Our first research question was to investigate whether frequency would affect the participants' translation accuracy. It turned out that word frequency had no effect on their performance. We attributed this result to the proficiency of the participants and the facilitating role of sentential context. Secondly, we investigated whether the nature of the ambiguous words (i.e. their being polysemous and homonymous) had an effect on the participants' translation performance. We found that polysemous words were translated with greater accuracy, which lends support to the findings in literature regarding the differences in the representation and processing of polysemy and homonymy. Future studies may explore the possible effects of translation direction, and whether frequency and the nature of ambiguous words influence the translation speed.

BIBLIOGRAPHY

Armstrong, N. (2005). *Translation, Linguistics, Culture: A French-English Handbook*. Clevedon: Multilingual Matters Ltd.

Balota, D. A., & Spieler, D. H. (1999). Word frequency, repetition, and lexicality effects in word recognition tasks: Beyond measures of central tendency. *Journal of Experimental Psychology: General*, 128(1), 32-55.

Basnight-Brown, D., & Altarriba, J. (2007). Differences in semantic and translation priming across languages: The role of language direction and language dominance. *Memory & Cognition*, 35, 953–965.

Beretta, A., Fiorentino, R. & Poeppel, D. (2005). The effects of homonymy and polysemy on lexical access: an MEG study. *Cognitive Brain Research*, 24(1), 57-65.

Binder, K.S. (2003). Sentential and discourse topic effects on lexical ambiguity processing: An eye movements examination. *Memory and Cognition*, 31, 690-702.

Bradley, M.M. & Lang, P. J. (1999). *Affective Norms for English Words (ANEW): Instruction Manual and Affective Ratings (*Technical Report 1). The Center of Research in Psychophysiology: University of Florida.

Crystal, D. (1980). A First Dictionary of Linguistics and Phonetics. Oxford: Basil Blackwell Ltd. Retrieved from https://www.uvm.edu/pdodds/teaching/courses/2009-08UVM 300/docs /others/everything/ bradl ey1999a.pdf

De Groot, A.M.B & Poot, R. (1997). Word translation at three levels of proficiency in a second language: The ubiquitous involvement of conceptual memory. *Language Learning*, 47(2), 215-264.

Degani, T, Prior A., Eddington C. M., de luz Fontes, A. A. & Tokowicz, N. (2016). Determinants of translation ambiguity: a within and across language comparison. *Linguistic Approaches to Bilingualism*, 6(3), 290-307.

Dijkstra, T. & van Heuven, W. T. B. (2002). The architecture of the bilingual word recognition system: from identification to decision. *Bilingualism: Brain and Cognition*, 5(3), 175 - 197.

Duyck, W., Vanderelst, D., Desmet, T. & Hartsuiker, R. J. (2008). The frequency effect in second-language visual word recognition. *Psychonomic Bulletin and Review*, 15(4), 850-855.

Elston-Güttler, K.E. & Williams, W. J. (2008). First language polysemy affects send language meaning interpretation: Evidence for activation of first language concepts during second language reading. *Second Language Research*, 24:167-187.

Foraker, S. & Murphy, G. L. (2012). Polysemy in sentence comprehension. Effects of meaning dominance. *Journal of Memory and Language*, 67, 407-425.

Frazier, L. & Rayner, K. (1990). Taking on semantic commitments: Processing multiple meanings vs. multiple senses. *Journal of Memory and Language*, 29, 181–200.

Ghazala, H. (1995). *Translation as Problems and Solutions*. Valeta (Malta): Elga Publication.

Gollan, T. H., Montoya, R. I, Cera, C. & Sandoval, T. C. (2008). More use almost always means a smaller frequency effect: Aging, bilingualism and the weaker links hypothesis, Journal of Memory and Language, 58(3), 787-814.

Ibrahim, A., Cowell, P.E., & Varley, R.A. (2017). Word frequency predicts translation asymmetry. *Journal of Memory and Language*, 95: 49-67.

Klein D. E. & Murphy, G.L. (2001). The representation of polysemous words. *Journal of Memory and Language*, 45, 259-282.

Klepousniotou, E. (2002). The processing of lexical ambiguity: Homonymy and polysemy in the mental lexicon. *Brain and Language*, 81, 205-223.

Klepousniotoua, E. & Baum, S. R. (2007). Disambiguating the ambiguity advantage effect in word recognition: An advantage for polysemous but not homonymous words. *Journal of Neurolinguistics*, 20, 1–24.

Kroll, J., F. & Stewart, E. (1994). Category interference in translation and picture naming for asymmetric connections between bilingual memory representations. *Journal of Memory and Language*, 33, 149-174.

Larsen, R. J., Kimberley, A., Mercer, K. A. & Balota, D. A. (2006). Lexical characteristics of words used in emotional stroop experiments. *Emotion*, 6(1), 62-72.

Lehtonen, M., Hulten, A., Rodriguez-Fornells, A, Cunillera,T., Tuomainen, J. & Laine, M. (2012). Differences in word recognition between early bilinguals and monolinguals: behavioral and ERP evidence. *Neuropsychologia*, 50(7), 1362-1371.

Macgregor, L.J, Bouwsema, J. & Klepousniotou, E. (2015). Sustained meaning activation for polysemous but not homonymous words: Evidence from EEG. *Neuropsychologia*, 68, 126-138.

Murph, M. L. & Koskela, A. (2010). *Key Terms in Semantics*. New York: Continuum.

Ortega-Andrés, M. & Vicente A. (2019). Polysemy and co-predication. *Glossa: A Journal of General Linguistics*, 4(1), 1–23.

Palmer. F. R. (1981). *Semantics*. Second Edition. Cambridge: Cambridge University Press.

Paulin, C. & Bejoint, H. (2008). Introduction polysemy: contributions to the grammatical, lexicogenic and lexicographic study of the phenomenon. *Lexis Journal*. Issue 1. Retrieved from http://screcherche.univ-lyon3.fr/lexis/spip.php?article72

Pavlenko, A. (1999). New approaches to concepts in bilingual memory. *Bilingualism: Language and Cognition*, 2(3): 209-230.

Pavlenko, A. (2014). *The Bilingual Mind*. New York: Cambridge University Press.

Piercey, C. D. & Joordens, S. (2000). Turning an advantage into a disadvantage: Ambiguity effects in lexical decision versus reading tasks. *Memory & Cognition*, 28, 657–666.

Prior A., Kroll J. F. & MacWhinney, B. (2013). Translation ambiguity but not word class predicts translation performance. *Bilingualism: Language and Cognition*, 16, 458–474.

Prior, A., MacWhinney, B. & Kroll, J. F. (2007). Translations norms for English and Spanish: The role of lexical variables, word class, and L2 proficiency in negotiating translation ambiguity. *Behavior Research Methods*, 39, 1029–1038.

Quiroga-Clare, C. (2003). Language ambiguity: a curse and a blessing. *Translation Journal*, 7(1). Retrieved from: http://accurapid.com/journal/23ambiguity.htm

Rodd, J. M., Gaskell, M. G., & Marslen-Wilson, W. D. (2004). Modelling the effects of semantic ambiguity in word recognition. *Cognitive Science*, 28, 89–104.

Thomas, M. S. C. & van Heuven, W. J. B. (2005). *Computational models of bilingual comprehension.* In Kroll, J. F. & De Groot, A. M. B. (Eds). *Handbook of bilingualism: psycholinguistic approaches* (pp. 202-225). U.S.A.: Oxford University Press. Retrieved from http:// site.ebrary. com/lib/ ekonomi /Doc?id =10233717ppg=448

Tokowicz, N. & Degani, T. (2010). Translation ambiguity: Consequences for learning and processing. In B. Van Patten & J. Jegerski (Eds.), *Research in second language and parsing* (pp. 281-297). John Benjamins Publishing Company: Amsterdam /Philadelphia.

Tokowicz, N., Kroll, J. F., de Groot, A. M. B. & van Hell, J. G. (2002). Number-of-translation norms for Dutch-English translation pairs: A new tool for examining language production. *Behavior Research Methods, Instruments, & Computers*, 34 (3): 435–451.

Yap, M. J. & Balota, D. A. (2009). Visual word recognition of multi-syllabic words. *Journal of Memory and Language*, 60 (4): 502-529.

Appendix. Sentences used as stimuli

High Frequency Words

1. He still felt <u>alone</u> and helpless.

2. The factory had produced car <u>bodies</u>.

3. You pay for your <u>board</u> and lodging.

4. Pollution had become a <u>dead</u> issue.

5. We saw professionals in various <u>fields</u>.

6. You are now <u>free</u> to leave.

7. He poured out his <u>heart</u> to me.

8. He has had a <u>hard</u> life.

9. I typed the alphabet <u>letters</u>.

10. There is a <u>market</u> for stolen goods.

11. The <u>parties</u> signed a ceasefire agreement.

12. She had a love of open <u>spaces</u>.

13. We need harmony between body and <u>spirit</u>.

14. Everyone at the <u>table</u> got up.

15. We hired a room with two <u>beds</u>.

Low Frequency Words

1. I left my car in a <u>secure</u> place.

2. We have ten <u>items</u> on the list.

3.He shared <u>intimate</u> details about his life.

4.He is very <u>gentle</u> with his kids.

5.<u>Execution</u> is still a penalty for murder.

6.We have recently <u>engaged</u> a cleaner.

7.They painted the kitchen in <u>bold</u> colors.

8.They walked down a broad <u>avenue</u>.

9.Her friend <u>saved</u> her from drowning.

10.She has an excellent <u>memory</u> for names.

11. The village <u>lies</u> in ruins today.

12.You really should take more <u>exercise</u>.

13.He designs <u>dresses</u> for many celebrities.

14.They are currently <u>arming</u> for war.

15. I want a <u>glass</u> of wine.