Chapter IV

General Discussion

In this chapter, results are discussed and linked back to the predictions of the Distributed Feature Model (de Groot, 1992a), identifying its strengths and weaknesses in light of the new empirical data. Following this discussion, the results are discussed through the theoretical framework of Tokowicz and Kroll's model of language production (2000). The discussion concludes by presenting methodological limitations and proposing future studies that could complement the present research.

Empirical findings suggest a concreteness effect with monolingual speakers (Paivio, 1971; Kieras, 1978; Schwanenflugel and Shoben, 1983). In light of this claim, concreteness effects have been researched with different bilingual populations and the early findings congruently support a concreteness effect (de Groot, 1992a; de Groot et al., 1994; de Groot and Comijs, 1995; de Groot and Keijzer, 2000; van Hell and de Groot, 1998a). Nonetheless, there is a lack of empirical evidence documenting an interaction between concreteness and ambiguity effects.

In this study, a concreteness effect was found only across items. A concreteness effect across participants was considered not quite significant. This partially replicated earlier empirical findings which were obtained using translation production tasks primarily with fluent bilinguals in both the forward and backward directions (de Groot, 1992a; de Groot et al.; Tokowicz and Kroll, in press). The concreteness advantage can be explained under the DFM which schematically represents the links between the lexical level nodes and the conceptual level nodes for unambiguous concrete and abstract words. Under the claims of the DFM, the lexical level contains language-specific information related to word form, grammatical properties and syntactic

specifications. The conceptual level, on the other hand, consists of information related to meaning specifications. It is argued that the lexical node for concrete words in one language is linked to all the nodes at the conceptual level. These in turn are linked to the corresponding translation equivalents' lexical node in the other language. The overlap at the conceptual level between the two languages is argued to account for the faster recognition and production times for concrete words. The lexical nodes for abstract words in one language, on the other hand, are linked to fewer nodes at the conceptual level. Moreover, fewer nodes are shared between abstract words across the two languages due to greater cross-linguistic meaning variance. The limited overlap at the conceptual level may account for the slower reaction times for abstract words.

Equally important, the results of this study confirmed the reliability and validity of both the stimuli and the experimental design since the typical concreteness effect surfaced when translation ambiguity was not taken into consideration across items.

Previously, Tokowicz and Kroll (2000) observed an overall ambiguity effect with bilingual speakers, where ambiguous words were translated more slowly than unambiguous words. Although the aim of the current study was to identify an interaction between concreteness and ambiguity, it was important to determine whether ambiguity effects surfaced, independently of word concreteness. Results support an ambiguity effect across items where ambiguous words were recognized slower than unambiguous words in the forward direction (Tokowicz, 2000; Tokowicz and Kroll, 2000; in press). The present results also confirm the validity and reliability of the number of translation norms.

Finally, the concreteness effects and the number of translation effects surfaced independently from one another, confirming the adequacy of the translation recognition

design for the low-intermediate population. At this point, the specific hypotheses will be discussed in light of the results.

4.1. Theoretical Implications

4.1.1. The Distributed Feature Model

The investigation sought to identify an interaction between concreteness and ambiguity effects. At the onset of the research, four specific hypotheses were formulated. The first hypothesis posited that concrete words with a single translation would be recognized as fast as concrete words with multiple translations. The second hypothesis posited that abstract words with a single translation would be recognized faster than abstract words with multiple translations. The third hypothesis posited that concrete words with a single translation would be recognized as fast as abstract words with a single translation equivalent. Finally, the fourth hypothesis posited that concrete words with multiple translations would be recognized faster than abstract words with multiple translations. Table 8 summarizes the four hypotheses. Let us now consider each hypothesis in the light of the results from the present study.

Hypotheses	Conditions	Description
Hypothesis One	CS=CM	Concrete words with a single translation would be recognized as fast as concrete words with multiple translations
Hypothesis Two	AS<AM	Abstract words with a single translation would be recognized faster than abstract words with multiple translations
Hypothesis Three	CS=AS	Concrete words with a single translation would be recognized as fast as abstract words with a single translation equivalent
Hypothesis Four	CM<AM	Concrete words with multiple translations will be recognized faster than abstract words with multiple translations

Table 8. Summary of the hypotheses.

The results show that no significant differences between the mean reaction times for concrete words with single and multiple translation equivalents exist, suggesting that the number of translation equivalents does not interact with concreteness. The results are therefore consistent with the hypothesis. Moreover, they replicate earlier findings from a translation production task (Tokowicz and Kroll, 2000; in press), in which the number of translation equivalents did not influence the translation latencies for concrete words.

The DFM does not make claims regarding the role of ambiguity in the representation of concrete words. De Groot's (1992a) original schematic representation appears to account for the concrete words when they have a single translation equivalent. The DFM was slightly modified in order to account for concrete words with

multiple translation equivalents (see Figure 19). A lexical node was added to represent the multiple translations in the L2 such that the translation equivalents available in the L2 have, independently of one another, a complete overlap with the nodes at the conceptual level. For example, the word *reloj* in Spanish has two available translations in English, namely *watch* and *clock*. Under this model, some nodes at the conceptual level are linked to both translation equivalents and some are linked to only one. Nonetheless, both translation equivalents have multiple overlapping nodes from the conceptual level to the lexical level. This could explain in part why there are no concreteness effects for ambiguous and unambiguous concrete words. The complete overlap might eliminate strong activation of lexical competitors. Such a claim requires more empirical support.
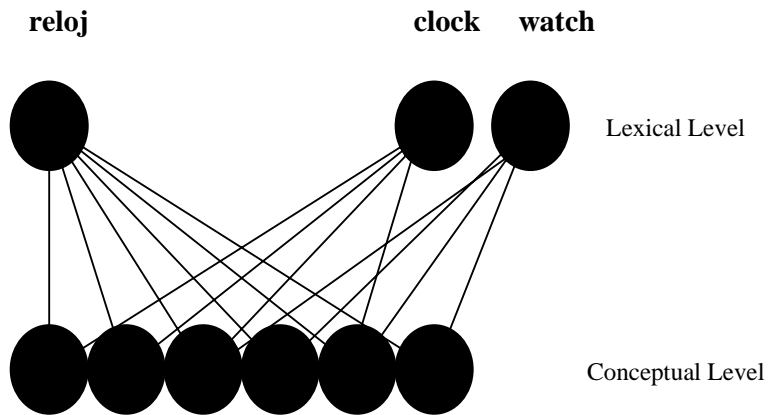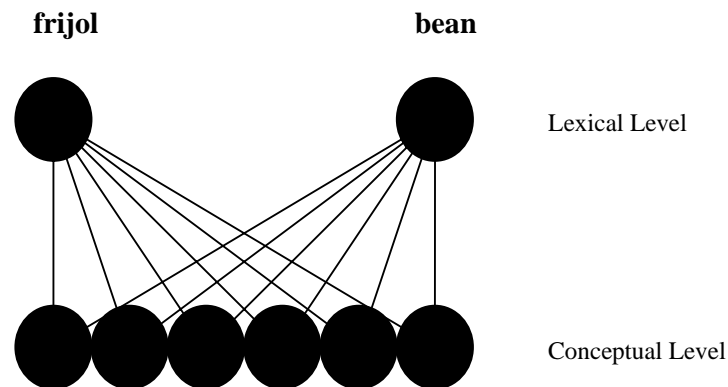
Figure 19. A modified version of the DFM illustrating the multiple translation equivalents at the lexical level (bottom representation).

Second, a concreteness effect was hypothesized to surface for ambiguous abstract words such that unambiguous abstract would be recognized faster than ambiguous abstract words. This hypothesis was motivated by the idea that translation equivalents for abstract words have fewer overlapping nodes at the conceptual level and have more meaning variation cross-linguistically, which could result in slower recognition of the translation equivalent. Although Schönpflug (1997) observed a complex interaction between concreteness and ambiguity for German and English

words, in the present study the Tukey-Kramer test did not reveal significant differences between the mean reaction times for abstract words with single and multiple translation equivalents. This finding suggests that abstract words are not affected by the number of translations available in the target language. On the basis of this observation, the second hypothesis is rejected. These results further contradict the findings from the translation production study conducted by Tokowicz and Kroll (in press), where abstract words with single translations were translated more quickly than abstract words with multiple translations. A possible explanation lies in the distinct processes underlying language production and language comprehension. If we accept the idea that unambiguous abstract words have fewer links between the conceptual and the lexical level, when abstract words have multiple translations, the time needed to eliminate competing lexical candidates during production might account for the observed concreteness effect in previous studies. During recognition, the lexical competitors are not activated as strongly thus allowing for a quicker identification of the target translation. The weaker activation is represented by the grey nodes between the lexical and conceptual levels and by the dashed lines connecting the two levels (Figure 20). To support such a claim, more empirical evidence comparing the differences between these modalities for ambiguous abstract words is necessary.
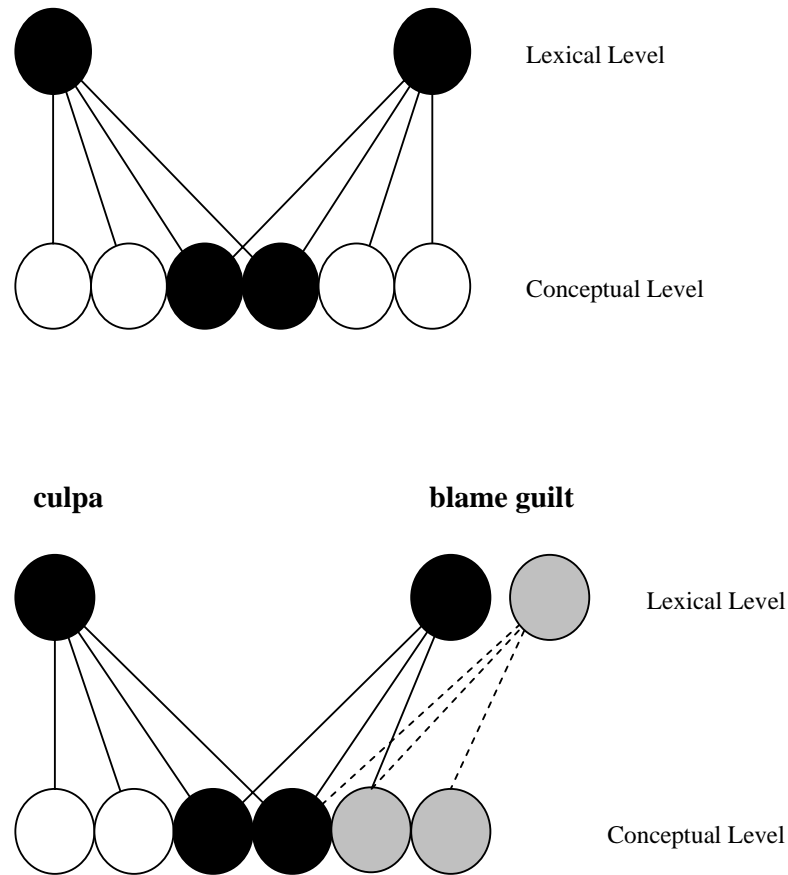
Figure 20. Representation of abstract words with single (top) and multiple (bottom) translation equivalents.

The third hypothesis predicted that concrete words would be recognized as fast as abstract words, when these had a single translation equivalent. This hypothesis was motivated by the finding that concreteness did not affect reaction times in a translation production task when a single translation equivalent was available (Tokowicz and Kroll, in press). In the present study, the Tukey-Kramer test revealed that a significant interaction between the conditions does not exist. In other words, the mean reaction time differences are not significant, consistent with the third hypothesis. The reported

results from this study and those from the Tokowicz and Kroll (in press) study, challenge the ubiquitous concreteness effect. Controlling the number of translation equivalents for concrete and abstract words may have the effect of voiding potential concreteness effects in both production and recognition tasks.

The observed interaction between concreteness and ambiguity are problematic for the DFM, which does not consider ambiguity at the lexical level. It can therefore be hypothesized that when a single lexical node is available in the target language, no other competitors are activated at the lexical level (Figure 21). The lack of lexical competitors results in a rapid lexical resolution for unambiguous concrete and abstract words and can explain in part why no concreteness effect surfaced for these. Interestingly, the lack of lexical competitors for concrete and abstract words is equally important in both productive and receptive translation tasks.

This finding is important in the development of models of mental representation because concreteness effects have been reported with both monolingual and bilingual speakers. Yet these earlier reports failed to consider the number of meanings and of available translation equivalents, thereby challenging the reported concreteness effects.
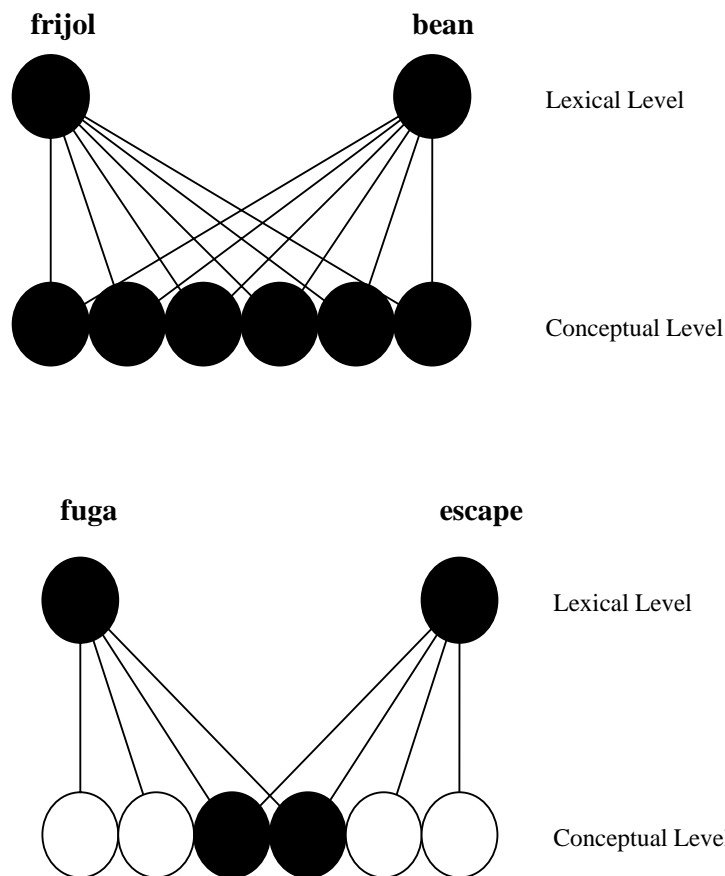
Figure 21. Representation for concrete and abstract words with a single translation equivalent.

The fourth and final hypothesis was that concrete words with multiple translation equivalents would result in faster translation reaction times than for abstract words with multiple translations. Since the Tukey-Kramer test did not reveal significant interactions the fourth and final hypothesis is rejected. These findings are not congruent with those obtained from translation production tasks (Tokowicz and Kroll, in press). To explain this, it is important to consider the different translation tasks. Producing language requires retrieval and production of a translation equivalent. When a word has

multiple translations, multiple translations may be activated meaning that more time is needed to eliminate the non-target translations before producing the target translation. In recognition, because the translation equivalent is provided, the other existing translation equivalents may not be activated as strongly. Therefore the time needed to complete the lexical selection process is faster. To illustrate the weaker activation of lexical competitors during recognition, the links between the lexical and the conceptual levels for these are represented by dashed lines (Figure 22). To support such a claim, more empirical evidence is necessary.
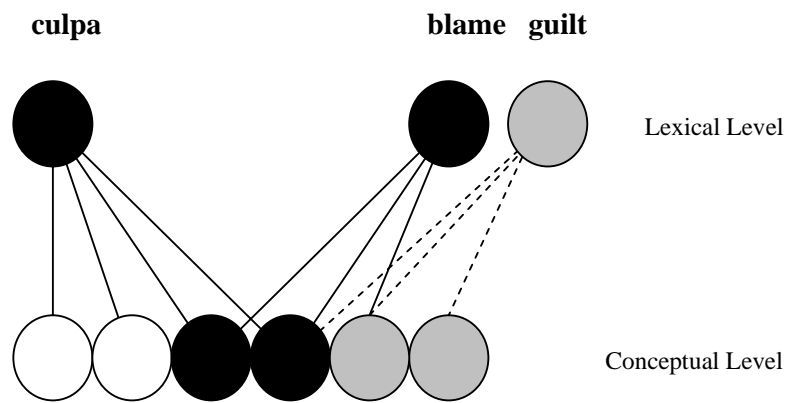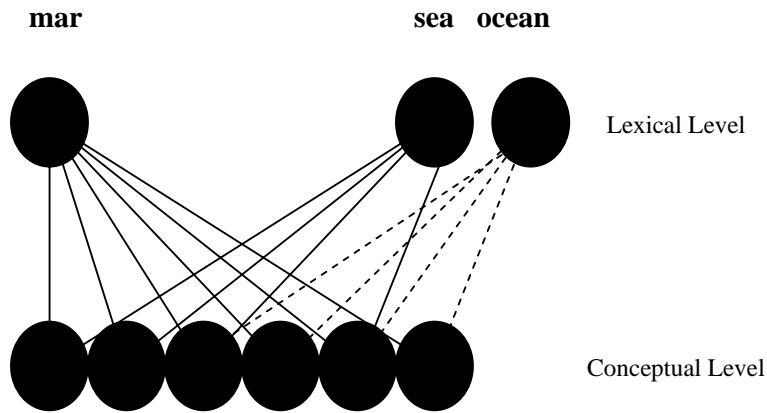
Figure 22. Representation for concrete and abstract words with a multiple translation equivalents.

Although no hypothesis was put forth regarding possible interactions between concrete words with a single translation equivalent and abstract words with multiple translation equivalents, the Tukey-Kramer revealed significant differences between abstract words with multiple translations and concrete words with single translations such that the latter were recognized faster than the former.

These results are very interesting since they reveal a more subtle and complex interaction between ambiguity and concreteness that was originally conceived. This result supports the general predictions of the DFM (and other models such as the CAM, DCT), in terms of apparent concreteness effects. Concrete words are expected to be recognized faster than abstract words since concrete words have a greater number of overlapping feature nodes at the conceptual level. But the interaction is more complex than simply perceiving a concreteness effect as it shows a summative effect between concreteness and ambiguity. Interestingly, both the concreteness and the ambiguity effects are in the directions predicted by the DFM and the model of language production proposed by Tokowicz and Kroll (2000). A preliminary explanation for the results can be provided when taking into account competition between translation equivalents at the lexical level. Let us briefly consider the results under the prediction of the model of language production proposed by Tokowicz and Kroll (2000).

4.1.2. Summative Effects of Concreteness and Ambiguity Factors

The finding that unambiguous concrete words were recognized faster than ambiguous abstract words cannot be explained under the DFM since the latter only supports an interaction between concrete (single or multiple) and abstract (single or multiple) words. This suggests that the DFM is too simplistic. Tokowicz and Kroll's model of language production (Figure 23 and 24) assumes two representations at the lexical level and that competition between the lemma (meaning) and the lexeme (orthographic/phonological) and the conceptual level may explain the different time latencies across the different word-types. Let us consider the representation of Spanish concrete words with single translation equivalents in English and Spanish abstract words with multiple translation equivalents in English, respectively.

Figure 23 represents the mapping for unambiguous concrete words. The orthographic representation of the Spanish word at the lexeme level led to activation of its respective meaning at the lemma level. When only one meaning exists, the feature nodes at the conceptual level would be quickly activated since no competition at the lexical level exists in the L1[1]. In accord with the predictions of the DFM, the conceptual nodes for concrete words and the translation equivalents completely overlap. Because only a single translation equivalent is available, the mapping from the conceptual level to the lexeme level in the L2 is quickly resolved. In other words, lateral competition at the lexical level does not exist for unambiguous concrete words. This could account for the faster recognition times for concrete words with a single translation equivalent observed in the present study.
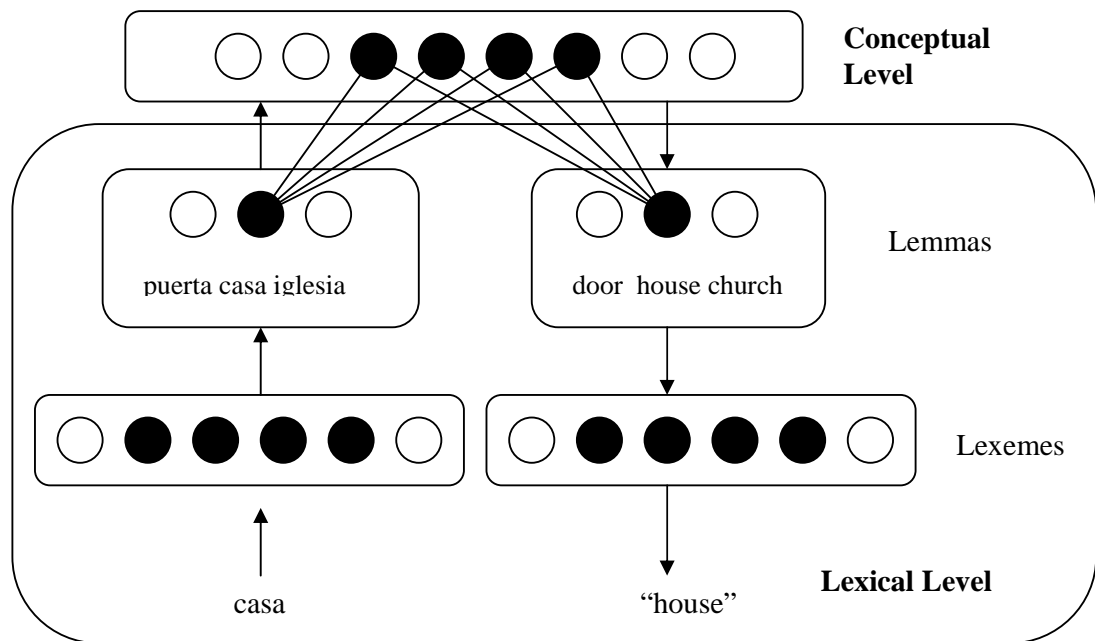

Figure 23. Tokowicz and Kroll's model of language production for unambiguous words, adapted from Tokowicz and Kroll, 2000, p.78.

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[1] Note that this study did not control any lexical ambiguity in the native language. When a word has multiple meanings (NOM), then competition is argued to exist at the lexical level in the native language. This in turn could further affect the mapping process from the lexical to the conceptual level in the native language.

When abstract words have multiple translation equivalents, the mapping process is more complex and results in significantly slower RTs. Figure 24 represents the mapping for ambiguous abstract words. The orthographic representation of the abstract Spanish word at the lexeme level activates its respective meaning at the lemma level. When only one meaning exists, there is no competition at the lexical level which will lead to a quick activation of the corresponding conceptual nodes (at the conceptual level). According to the DFM, partial overlap of the feature nodes at the conceptual level exists for abstract words. Yet, when abstract words have only a single translation equivalent, performance does not appear to be affected due to the absence of competition at the lexical level in the target language. This could potentially result in an equally fast mapping process across the different levels of representation. But, when abstract words have multiple translation equivalents in the target language, it could be argued that there is increased competition between the possible translation equivalents at the lemma level. The process of suppressing the activated competitors slows the process of lexical selection. Only once the meaning resolution is completed can the corresponding orthographic/phonological information at the lexeme level be retrieved.
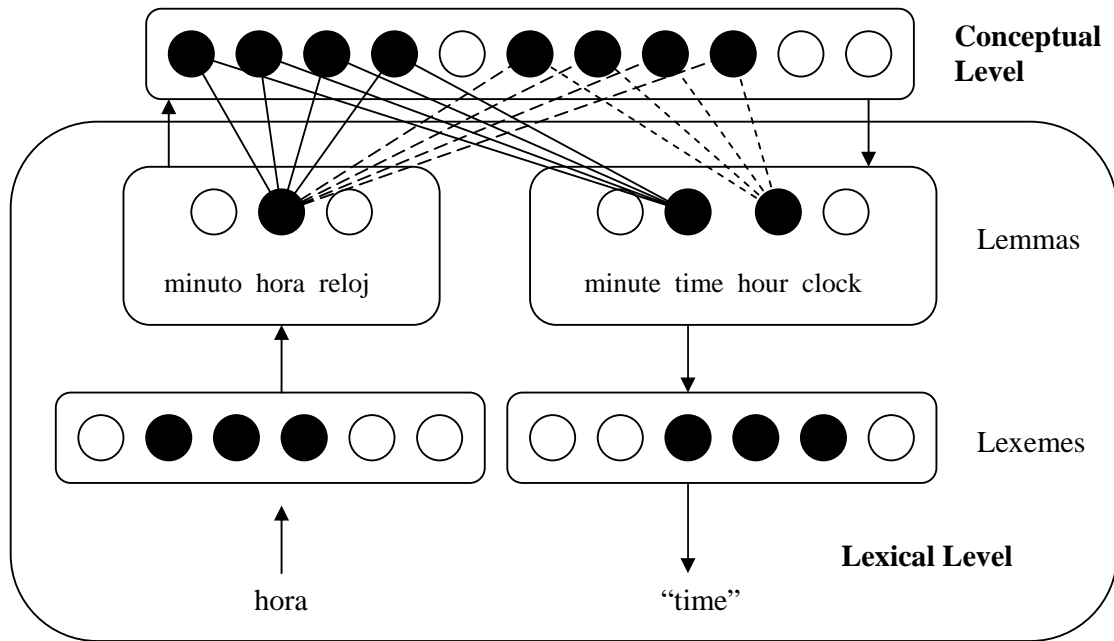
Figure 24. The Tokowicz and Kroll Model, adapted from Tokowicz and Kroll, 2000, p.78.

If we posit that there is increased activation at the lemma level when there are multiple available translation equivalents for abstract words, we should observe similar effects with ambiguous concrete words where competition at the lexical level should slow the process of lexical identification. Recall that under the DFM, strong links are in place between the L1 lexical information and the conceptual information for concrete words. Also, the conceptual representations are more similar cross-linguistically. Although there are multiple competitors at the lemma level, the results from the study support the claim that a complete overlap between the conceptual level and the lemma is available for each concrete entry and reduces the effects of competition. The selection of the appropriate translation equivalent is therefore faster than for abstract words. This is true for both productive and receptive translation tasks.

Notice from the discussion that the findings from the present study can not easily be explained under any of the current models. As we have just explored, the

DFM is too simplistic since it fails to consider lexical ambiguity, yet the model of language production supposes three levels of representation, even though work in psycholinguistics supports the existence of two levels of representation. More empirical investigation needs to be carried out in order to understand and propose a sophisticated model describing the interaction between concreteness and ambiguity factors during language production and language recognition tasks.

4.1.3. Pedagogical Implications

More practical motivations for this work relate to second language acquisition issues. At the onset of the investigation, the following question was proposed: is there evidence suggesting that concreteness effects correlate with the number of translation equivalents in the target language? The results demonstrate that unambiguous concrete words are recognized faster than ambiguous abstract words. This finding has some implications for teaching vocabulary practices. Many individuals begin learning a second language during adulthood in a formal educational setting, characterized by overt instruction, thereby having limited contact with the target language and with native speakers outside the classroom environment. Reduced input consequently increases the difficulties of vocabulary acquisition. A word, in the monolingual mental lexicon, is composed of a phonological/orthographic, a syntactic and a conceptual representation. The links between these are created during the early stages of vocabulary acquisition. Because concrete words make reference to concepts that can be perceived, the conceptual representations are more similar cross-linguistically. Yet, unambiguous abstract words appear to have a significant overlap of the feature nodes at the conceptual level. In light of these observations, teachers may choose to present unambiguous concrete and abstract words in the early levels of vocabulary development.

Since ambiguous abstract words are those with greater cross-linguistic variance at the conceptual level, learning these in a second language requires learning the subtle differences between the conceptual representation already in place for the native word and the target word. Learners must not only retain the novel form representation but also consider a modification of the conceptual representation to accommodate the subtle cross-linguistic differences for each possible translation equivalent. In the early stages of vocabulary development, students should not be expected to learn abstract words with multiple translation equivalents. Clearly, more advanced learners will need to learn how more abstract concepts may be spoken of in different contexts and therefore begin to construct conceptual representations that parallel the knowledge of a native speaker.

4.2. Limitations and Future Work

Reliability and validity of quantitative research is only guaranteed to the extent that the researcher controls all the possible factors that could affect the outcome of the study. In this experiment, the language proficiency level, the knowledge of the translation pairs and the concreteness ratings, were controlled by the researcher to the best of her knowledge. Yet, after a careful analysis of the results from the language questionnaire, from the pre-test and post test, some weaknesses have been identified.

Although all the participants who performed the translation recognition task were enrolled in the same English language course (offered by different teachers in different sections following the same official syllabus), each participant's personal experience with the learning of English was unique. Undoubtedly, the knowledge discrepancy had an effect on the reaction times and consequently on the general means reported. An analysis of the responses shows that a greater number of items from the

multiple translation equivalent conditions were removed from the analysis because participants either failed to provide a response or provided an erroneous response. The means from the multiple translation condition represent a smaller sample, more sensitive to individual differences. Consequently, the data might not be a representative sample of the low-intermediate population. Future research should identify participants with more homogeneous backgrounds or have more participants perform the study to mitigate possible effects related to individual experiences.

The second limitation was identified after considering the measures taken in creating the stimuli. The stimuli for the four conditions were carefully selected by relying on a series of paper-based translation recognition pre-tests. Words with a correct response rate of 70% and over were accepted. For example the Spanish word *culpa* was translated into *blame* and *guilt*. The word *blame* received a 100% answer rate whereas the word *guilt* received a 78% correct answer rate. Only the word *blame* was kept for the experiment. Unfortunately, the cut-off might have been too low. It is possible that the word with the highest rating was the only translation known to some participants and was for them an unambiguous word. Future work should only include words with a 100% answer rate to confirm the validity of the stimuli in each condition.

Also words are seldom perceived as either concrete or abstract. This is evident from the distribution of concreteness rating obtained for the stimuli used in this study (see Figure 25). In order to determine whether a more significant interaction could be identified between concreteness and ambiguity, a post-hoc analysis was performed on the stimuli using only words that were considered very abstract or very concrete (ratings between 1-2 and 6-7). Interestingly, no significant interactions were identified across the four conditions. These findings appear to contradict the results from the present study. To explain this, it is important to consider that the stimulus was reduced from 88

items to 28 items (7 words per condition). The small sample of words might have

nullified any possible effects. Future research should include a greater number of very
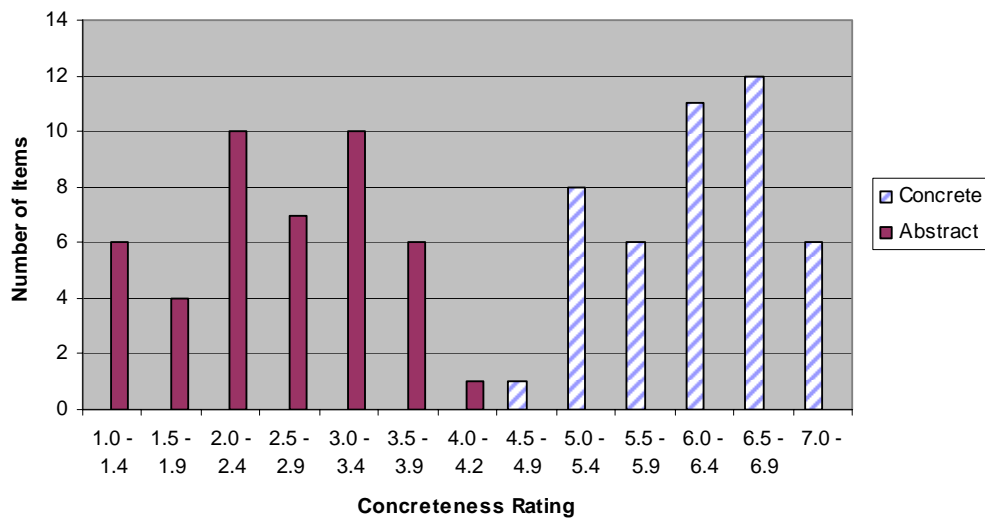
concrete and very abstract words.

Figure 25. Concreteness rating distribution for abstract and concrete words.

Klepousniotou (2001) argued that psycholinguist research with monolingual

subjects has often overlooked the different types of lexical ambiguity. In the present

bilingual study, the different types of ambiguity at the lexical level were not

discriminated against. Consider the English translation for the Spanish lexical item

enfermedad; *illness* and *sickness.*   The translations are near-synonyms. Also consider

the English translation for the Spanish lexical item *cuadro*; *square* and *painting*. These

are homonymous since they are translations with unrelated meanings. The DFM does

not consider any type of lexical ambiguity. Since ambiguity has been identified as a

variable that partially explains the organization of words in the bilingual mental lexicon,

it would be interesting to further consider the representation of homonyms and

synonyms. Further work investigating concreteness and ambiguity should attempt to discriminate between homonymous and synonymous words.

Conflicting evidence supporting translation directionality effects has been attested by studies in the field of psycholinguistics. Some theorists argue that forward translation requires conceptual mediation which leads to slower recognition and production times than backward translation because the latter relies more heavily on lexical links[2]. In this experiment participants performed a translation recognition task in the forward direction only. It would be interesting to conduct a similar study in the backward direction in order to identify whether an asymmetry exists and further, if this asymmetry correlates with the concreteness and the ambiguity of words.

Finally, the results from previous language production experiments and those from this language recognition experiment are incongruent. To identify whether the difference is due to the different modalities or the participant's proficiency levels, it would be important to conduct a translation recognition task with fluent bilinguals.

4.3. Conclusion

The ubiquitousness of the concreteness effect has been challenged by the present results. The number of potential translation equivalents plays an important role in the representation of words in the bilingual mental lexicon. Abstract words with multiple translations are recognized slower than concrete words with single translations. These findings have important theoretical implications. The predictions of the DFM are thus too simplistic and a revised version of the model is required in order to account for the ambiguity effects that surface in the different translation tasks. The language

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[2] Empirical findings suggest that asymmetry interacts with proficiency. For a complete discussion, refer to section 1.2.3 The Revised Hierarchal Model.

production model proposed by Tokowicz and Kroll (2000) assumes that competition between the different levels of representation exists and can explain in part the observed findings. Future work should carefully consider the interaction of number of meanings and also the number of translations. For the time being, the results satisfactorily demonstrate that strong links in the mental lexicon can be created for both concrete and abstract words and that the apparent difficulty underlying L2 vocabulary acquisition for intermediate level bilinguals is the range of available meanings and translations.