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THE ASYMMETRY IN BILINGUAL LEXICAL PROCESSING:
CONCEPTUAL/LEXICAL PROCESSING ROUTE AND THE WORD TYPE EFFECT.

1. Introduction

The asymmetry in lexical processing in bilinguals (directionality effect) refers to the fact that the backward processing (from L2 to L1) is performed faster than the forward processing (from L1 to L2). Results from various experiments indicate that at least two factors contribute to the asymmetry, namely the choice of the processing route and the word type effect. Depending on the direction of processing (backward or forward) and the proficiency level of bilinguals either the conceptual or the lexical processing route applies. This, in turn, results in the asymmetry mentioned above. Moreover, the asymmetry is an outcome of the divergences in processing of different types of words (cognate/noncognate, concrete/abstract, frequent/infrequent etc.). This article presents a review of research concerning factors influencing processing asymmetry in proficient bilinguals focusing on the description of the word type effect and the importance of the choice between the conceptual and the lexical processing route.

2. Asymmetry in language processing in proficient bilinguals

The whole of the article is divided into two parts, one is devoted to the distinction between the conceptual and the lexical processing routes and the other describing the word type effect. The choice of the issues brought up in this article is by no means accidental. Both the word type effect and the application of either of the processing routes are factors directly contributing to the asymmetry in the bilingual language processing.

In the first part of the article, the interrelation between the type of a processing route and the processing direction is discussed. In general, each processing direction (the forward and the backward) has a corresponding processing route (the conceptual and the lexical, respectively). However, the attribution of a processing route to the processing direction is subject to change with the development of the second language proficiency (the developmental shift). This change as well as the explanation of how the two processing routes work is possible within the framework of the asymmetrical model of the bilingual mental lexicon. The word type effect, on the other hand, is explainable within the boundaries of the mixed memory model and the decompositional conceptual representation in bilingual memory. The account of various issues connected with the word type effect is provided in the second part of the article.

2.1. Conceptual processing route vs. lexical processing route

The currently applied model of the bilingual mental lexicon is referred to as hierarchical. The hierarchical model of bilingual mental lexicon is composed of two levels of processing: the conceptual level and the lexical level. At the conceptual level both languages of a bilingual store conceptual representations in one common conceptual store. This conceptual store has connections to the L1 lexical store (L1 conceptual connection) and the L2 lexical store (L2 conceptual connection) which hold lexical representations at the lexical level. The L1 and L2 lexical stores are also connected with each other at the lexical level by means of a lexical

connection. During lexical processing a bilingual accesses the lexical stores (lexical access) and/or the conceptual store (conceptual access) for representations.

Within the framework of the hierarchical model of the bilingual mental lexicon the conceptual and the lexical processing routes can be differentiated. If processing occurs solely at the lexical level on the lexical connection between the L1 lexical store and the L2 lexical store then it occurs on the lexical processing route. If, on the other hand, processing occurs between the lexical level and the conceptual level and comprises conceptual access then the processing route which is being used is referred to as conceptual.

The application of either of the processing routes depends, for that matter, on whether the forward processing (from L1 to L2) or the backward processing (from L2 to L1) takes place (Kroll – Sholl, 1992). Generally, researchers agree that when the forward processing takes place then the conceptual route is being used and when the backward processing takes place then the lexical route is being used (Kroll – Sholl, 1992; Kroll, 1993; Sholl et al. 1995). The interrelation between the direction of processing and the application of one of the processing routes can be explained within the framework of the asymmetrical model of the bilingual mental lexicon, to which we shall now turn.

2.1.1. Asymmetrical model of bilingual mental lexicon
The asymmetrical model of bilingual mental lexicon (Kroll – Sholl, 1992) (Fig.1.) belongs to the family of the hierarchical models, which means that two levels of representation can be distinguished: the conceptual level and the lexical level. Moreover, at the conceptual level the two languages of a bilingual share the conceptual store but at the lexical level the two languages have their own separate stores: the L1 lexical store and the L2 lexical store. In Figure 1. the conceptual and lexical stores are presented in the forms of a rectangle and circles respectively.
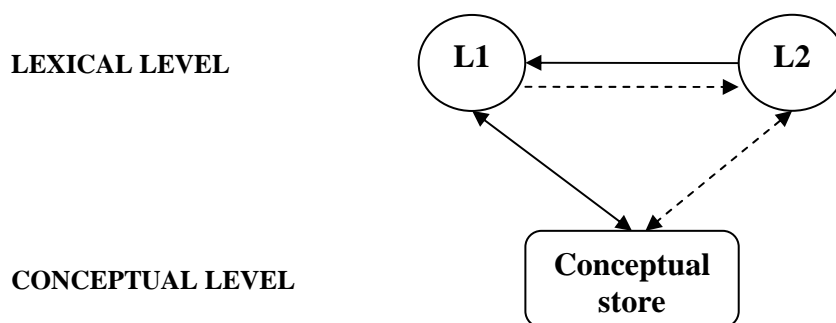

Figure 1. The asymmetrical model (from Kroll 1993: 69).

All of the three stores (the common conceptual store, the L1 lexical store and the L2 lexical store) are linked with each other by means of connections. Within the asymmetrical model of the bilingual mental lexicon the following connections can be distinguished: a) the L1 conceptual connection (between the L1 lexical store and the common conceptual store); b) the L2 conceptual connection (between the L2 lexical store and the common conceptual store); c) the lexical connection (between the L1 lexical store and the L2 lexical store).

The importance of the strength of connections is a vital issue in understanding the asymmetrical model of the bilingual mental lexicon. In Figure 1. the strength of connections is illustrated by distinguishing between the dashed line (weaker connections) and continuous line (stronger connections). Among conceptual connections the L2 conceptual connection is weaker, which is illustrated by the dashed line. As regards the lexical connection the strength differs depending on the direction of processing. Resultantly, on Figure 1. the lexical connection is depicted by two lines. The dashed line with an arrow pointing at the L2 lexical

store represents a relatively weaker connection at the lexical level and simultaneously the forward processing direction.

The difference in the strength of conceptual connections can be accounted for in the following way. The strength of connections depends on the magnitude of activation occurring on a particular connection and between particular representations, be that a conceptual or a lexical representation. For example, every time a representation at the lexical level has to connect with its conceptual representation the connection between them becomes stronger. Naturally, the rule applies also to the lexical connections, which means that every time a bilingual translates the lexical connection in the particular direction of translation becomes stronger. Secondly, the conceptual connection in L2 – in a language which is usually acquired later in life – is less developed than its equivalent in L1. Being the 'younger' connection, the L2 conceptual connection, has had less opportunity to become stronger due to frequent use than the 'older' L1 conceptual connection. While this is true at the beginning of the second language acquisition, the situation visibly changes with the development of the second language proficiency (Kroll, 1993: 72-73). With time, the L2 conceptual connection is more and more frequently used which has a positive influence on its strength. As a result, with the development of second language proficiency the difference between the strength of L1 conceptual connection and L2 conceptual connection gradually disappears (Kroll, 1993: 73). Bilinguals whose L1 and L2 conceptual connections are equally strong are referred to as *balanced* bilinguals, as opposed to *unbalanced* bilinguals whose L1 is much more developed than L2. Comparing the strength of L1 and L2 conceptual connections can, therefore, help assess the level of proficiency in bilinguals.

Differences in strength also concern the lexical connection and more specifically the directions of the lexical connection. It has previously been mentioned that the lexical connection in the forward direction is weaker than in the backward direction. If the rule that the more frequently used connections are also the stronger ones is applied to the lexical connections then the stronger backward lexical connection is the more frequently used one. One plausible explanation of this phenomenon is that at the beginning of the second language acquisition bilinguals try to learn words translating from L2 directly to L1 (Kroll, 1993: 70; de Groot, 1993: 44; Kroll – Stewart, 1994: 167). As a result, the lexical connection in the backward direction becomes stronger and associations between translation equivalents are formed. During lexical processing beginner bilinguals rely more on the relatively strong lexical connection than on the L2 conceptual connection, which is still developing. However, with the development of proficiency the role of the backward lexical connection diminishes and is taken over by the L2 conceptual connection (de Groot et al., 1994:622). Nevertheless, the backward lexical connection can still be used even by highly fluent bilinguals, despite the fact that both conceptual connections are fully developed.

The weakness of the lexical connection in the forward direction (from L1 to L2) led the researchers to stipulate that language processing from L1 to L2 cannot occur exclusively at the lexical level. It was stipulated that during lexical processing in the forward direction (from L1 to L2) the relatively strong L1 conceptual connection and the L2 conceptual connection are used instead of a weak lexical connection. The first experiment supporting this point of view was conducted by Kroll and Curley in 1988 (after de Groot 1993: 33; Kroll – Sholl 1992: 193; Kroll 1993: 67). The experiment is presented in the next section accompanied by the discussion concerning the interrelation between the direction of lexical processing and the processing route applied.

2.1.2. Processing direction and processing route

The original purpose of constructing the asymmetrical model was to rationalize the experiments showing a discrepancy between the backward and the forward lexical processing

in case of learners with different levels of proficiency. The first out of a series of experiments (Kroll – Sholl 1992; Kroll 1993; Sholl et al. 1995) was conducted by Kroll and Curley (1988, after de Groot 1993: 33; Kroll –Sholl 1992: 193; Kroll 1993: 67).

In the experiment beginner English-German bilinguals (here *beginner* refers to bilinguals with less than two years of language exposure) were asked to perform picture naming and translation in the backward direction (from L2 to L1). Kroll and Curley stipulated that in case of beginner bilinguals lexical processing in backward direction occurs via the lexical route. Translating via the lexical route would be tantamount to processing which proceeds solely at the lexical level, consists purely of lexical access and excludes any conceptual access. At the same time, the task of picture naming presupposes conceptual access. The major difference between the tasks, therefore, concerns the presence of the conceptual access. The presence of the conceptual access, for that matter, results in longer RTs (response times) due to the fact that conceptual access is more time consuming then the lexical access. The RTs for the backward translation should, therefore, prove shorter in comparison with RTs for picture naming or any other task involving conceptual access. The results from the experiment by Kroll and Curley clearly showed that the backward processing took less time than picture naming. For that reason, it was concluded that in beginner bilinguals the backward processing occurs via the lexical route.

The experiment by Kroll and Curley also included a translation task in the forward direction (from L1 to L2). The comparison of the RTs for the forward and the backward direction of lexical processing yielded the following results. The forward translation proved to be a significantly longer process than the backward translation. It has already been proven that the backward processing in beginner bilinguals requires only the lexical access. It has also been mentioned that longer RTs in picture naming are attributable to the conceptual access. Therefore, significantly longer RTs in the forward processing were also interpreted as a sign of the presence of the conceptual access. As mentioned before, in the asymmetrical model of the bilingual mental lexicon the L1 conceptual link is stronger than the forward (from L1 to L2) lexical connection. As a result, in lexical processing from L1 to L2 the conceptual processing route is chosen rather than the lexical processing route. In conclusion, processing in the backward direction proceeds via the lexical route (is a lexical task) and processing in the forward direction proceeds via the conceptual route (is a conceptual task).

Kroll and Stewart (1990, 1992 after Kroll, 1993: 70) used a translation task to find further support for the view that the forward processing is conceptual and the backward lexical. The experiment on proficient Dutch-English bilinguals aimed at investigating the presence or absence of the conceptual access during translation in both directions (that is the forward and the backward). The participants performed translation on two lists of words in both directions. In one of the lists, the words were semantically categorized, for example, animals or kitchen utensils were grouped together within the list. The other list contained randomly organized words. It was stipulated that the semantic categorization of words in one of the lists will have a stronger effect on the forward translation as the one accompanied by the conceptual access. What is more, the semantic categorization of words should exert no influence on the backward translation as it uses the lexical processing route alone. The results of the experiment confirmed the assumption showing that semantic categorization of words influences the forward processing direction but not the backward processing direction.

In general thus, processing in the forward direction proceeds along the conceptual processing route whereas processing in the backward direction proceeds along the lexical processing route, at least in the experimental tasks mentioned in this section. With the development of language proficiency bilinguals increasingly rely on the conceptual processing route even in the case of the backward processing.

2.1.3. Developmental shift
The results of the experiment by Kroll and Curley (1988 after de Groot 1993: 33; Kroll –Sholl 1992: 193; Kroll 1993: 67) described in section 2.1.2. indicate that processing in the backward direction proceeds along the lexical processing route at least for the beginner bilinguals. It has also been suggested that with the development of language proficiency bilinguals begin to use their conceptual route more than at the beginning of the language acquisition. The weaker L2 conceptual connection develops with time and the difference between the L1 and the L2 conceptual connections gradually disappears. In the case of balanced bilinguals the strength of both of the conceptual connections is approximately the same which, in turn, encourages a more frequent use of the conceptual route. Therefore, it is relevant to present results of the part of Kroll and Curley's experiment which was conducted on proficient learners.

The results from the part of the experiment conducted on the beginner bilinguals showed that the conceptual task of picture naming was performed slower than the lexical task of the backward translation. The results concerning proficient bilinguals are different, though. In the case of proficient bilinguals RTs for the picture naming and the backward translation were similar. Taking these results into consideration, it can be stipulated that in the case of proficient bilinguals both of the tasks proceeded along the conceptual route. In sum, beginner bilinguals use the lexical route for the backward translation but proficient bilinguals rely on the conceptual route performing the same task. It seems that with the development of the second language fluency a learner begins to use the conceptual processing route in place of the lexical processing route. The phenomenon of changing the processing route in the course of the second language acquisition is referred to as the *developmental shift* (Kroll, 1993: 67).

Nevertheless, La Heij et al. (1996) on the basis of their study on the nonverbal context effects in the forward and the backward word translation came to a conclusion that the conceptual processing is present in both of the processing directions (forward and backward). Moreover, their results indicate that semantic context has a more powerful effect on the processing in the backward direction than in the forward direction.

An explanation of the fact that beginner learners use the lexical processing route has already been mentioned in section 2.1.1. According to de Groot et al. (1993: 44) and Kroll (1993: 70) it is the result of a learning strategy commonly used at the beginning of the second language acquisition. Very often acquiring new vocabulary in the second language is accompanied by learning their translation equivalents. Moreover, vocabulary revisions are often based on repeating lists of translation equivalents alone, an activity which does not activate the L2 conceptual connections directly linking the lexical and the conceptual representations. Resultantly, the more frequently used connections between the lexical representations of L1 and L2 words become stronger then the less frequently used L2 conceptual connection.

Later research the phenomenon of the developmental shift indicated that the conceptual access is present even in the processing of quite beginner bilinguals (Altarriba – Mathis, 1997) and that even for highly proficient bilinguals the lexical connections stay active (Kroll, 1993: 68). However, it is generally agreed that lexical processing of beginner bilinguals is more likely to depend on their lexical connections than lexical processing of proficient bilinguals and that time is needed for the L2 conceptual connection to achieve its full development.

2.2. Word type effect
The experiments described in the previous section showed that the asymmetries in the bilingual lexical processing are the result of the application of either the conceptual or the lexical processing route. Nevertheless, it seems that the asymmetry is also dependent on the type of words which are being processed. De Groot and her colleagues (de Groot, 1993; de

Groot et al., 1994; de Groot – Comijs, 1995) distinguished between different types of words and conducted translation tasks proving that different types of words can slow down or speed up lexical processing. In scientific literature this phenomenon is called the word type effect. For the reason that the asymmetrical model of the bilingual mental lexicon could not account for some of the effects observed in experiments by de Groot and her colleagues a new mixed memory model was devised. Some of the effects were also explained within the framework of the decompositional conceptual representation in the bilingual memory.

2.2.1. Different word types

The following variables characterizing word types can be distinguished: cognateness, imageability (or concreteness)[1], definition accuracy, context availability, familiarity and frequency. Most of those variables were first introduced in the 1980's and then referred to again by de Groot and her colleagues (de Groot – Comijs 1995). De Groot and Comijs (1995) shortly present these variables completing the presentation with the names of the original proponents. Cognates are such words which are phonologically and/or orthographically similar translation equivalents. For example, English-Dutch translation equivalent pair *bed-bed* are cognates. The feature of word imageability, mentioned in Paivio (1968, after de Groot – Comijs 1995: 475), describes the ease with which a mental image of a particular word can be recalled. For example, it is relatively easy to retrieve an image of a *table* or a *ball*, but recalling an image of *freedom* or *independence* is a much more difficult task. The first two words can be categorized as concrete words (of high imageability) and words such as *freedom* and *independence* can be categorized as abstract words (of low imageability). Words characterized by high definition accuracy are easy to define and contrarily, it is difficult to think of a definition for words characterized by low definition accuracy. Another variable characterizing words is context availability referring to the ease with which one can formulate a lexical context for a particular word. The two last variables, word frequency and familiarity, are highly similar. The difference, however, lies in the objectivity of the variable. Familiarity refers to the subjective opinion of a language user as to how well-known a certain word appears to be. Word frequency, on the other hand, describes how often a particular word is used in a language, which makes it a more objective, statistical variable. Despite the divergence in objectivity between familiarity and frequency, if language learners decide that a particular word is familiar then with most probability it also is statistically frequent. Reference to word familiarity can be found in Noble (1953, after de Groot – Comijs, 1995: 475) whereas word frequency is mentioned in de Groot (1992, after de Goot – Comijs, 1995: 475).

It is noteworthy that the intention of the researchers was to distinguish two contrasting groups of words which can be characterized by the same variable. For example, one variable of concreteness can describe two contrasting groups of words, namely concrete and abstract words. Creating opposing categories was compatible with the results of an experiment showing significant differences in RTs (response times) for words belonging to opposing groups. For example, various experiments showed that cognates are processed faster than noncognates and that abstract words are processed slower than concrete words.

The influence which concreteness of words exerts on the speed of lexical processing was the scope of the experiment conducted by de Groot in 1992. (after de Groot 1993: 40, 42) In the experiment three different word-translation tasks were used, namely: *normal translation*, *cued translation* and *translation recognition*. The normal translation task and the

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[1] Some works (de Groot – Comijs 1995: 475; de Groot et al., 1994: 602) mention the distinction between word imageability and word concreteness. In such circumstances word concreteness refers to the possibility of sensual examination of the word's referent rather than the ease of creating an image of the word.

cued translation task were very similar and consisted in the forward translation. In this particular case, the translation proceeded from Dutch into English, in this particular case. The only difference between the tasks was a prompt in the form of the first letter of the target translation equivalent in the cued translation task. In the translation recognition task the participants were to decide whether words from a word pair are or are not translation equivalents. The stimuli presented in the experiments consisted of words differing in concreteness. The results contained a comparison of RTs for abstract and concrete words (normal and cued translation) and the number of errors present in the translation of abstract and concrete pairs of words (translation recognition). In the normal translation task and the cued translation task shorter RTs were observed in the case of concrete words than abstract words. Moreover, the processing of concrete translation equivalents resulted in a smaller number of errors in the translation recognition task. The shorter response times and the smaller number of errors suggest that the concrete words are easier to process across languages.

The subject of the role of cognateness in the lexical processing was undertaken by de Groot et al. (1994). The experiment showed that processing asymmetries between the forward and the backward direction (the directionality effect) are present only in the case of noncognate words. De Groot and her colleagues (after de Groot 1993: 40, 42; de Groot et al., 1994) conducted a translation experiment measuring the relation between the directionality effect and word type. The experiment was conducted on unbalanced Dutch-English bilinguals, who were asked to translate the stimuli differing in cognateness. The comparison of the RTs (response times) calculated for the processing of cognates and noncognates in the forward and the backward direction clearly showed that the directionality effect was present only for noncognate words. Cognate words were translated with approximately the same speed in both the forward and the backward directions. What is more, the speed of the backward translation of noncognates was comparable to the speed of the translation of cognates in both of the directions. On the basis of these results de Groot et al. (after de Groot 1993: 40, 42; de Groot et al., 1994) stipulated that the processing route used in cognate translation should be the same as the processing route used in the backward direction of noncognate translation. Since lexical processing in the backward direction generally is said to proceed via the lexical processing route, it was suggested that the whole of the cognate processing, both in the forward and in the backward directions, also proceeds via the lexical processing route.

To prove the fact that cognates are processed lexically in both processing directions the influence of the variables of imageability, context availability and definition accuracy (in de Groot et al. (1994) also referred to as semantic variables) on the processing of cognates was measured (de Groot et al., 1994). Because variables require the conceptual access it was estimated that they should exert a more powerful influence on the forward processing as the processing which proceeds via the conceptual route. Additionally, the backward processing should be relatively uninfluenced by the presence of the semantic variables as it is a lexical task[2]. The results obtained for noncognates indeed showed that the semantic variables powerfully influence the forward direction and that their influence on the backward direction is marginal. As a result, it can be stated that the processing of cognates engages mainly the lexical processing route regardless of the direction of processing. Subsequent experiments by de Groot and Comijs (1995) confirmed the stipulations described above using not only the translation production task (as the one used by de Groot et al., 1994) but also the translation recognition task.

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[2] It needs to be mentioned here that de Groot et al. (1994) do not suggest that no conceptual processing is present in the backward direction and in the translation of cognates. It is clear, however, that the importance of the conceptual processing in cognate translation and in the backward translation is incomparably less significant than in the forward translation.

The last of the variables influencing the asymmetry in the bilingual lexical processing which shall be discussed in this section is frequency. In a translation production experiment, which has already been mentioned in this section, de Groot and her colleagues compared the RTs not only for concrete and abstract words but also for frequent and infrequent words. The comparison yielded the following results: the RTs were shorter in case of concrete and frequent words. Moreover, de Groot et al. found that the variables of familiarity and frequency exert a more powerful influence on the backward translation. This was attributed to the finding that the variables are likely to require lexical processing.

Cieślicka and Ekert (2004) aimed at duplicating the results but in a lexical decision task with masked priming performed on Polish-English proficient bilinguals. Similarly as in the experiment by de Groot et al. the differences for the frequent/infrequent and concrete/abstract words were estimated. The results indicated that the RTs were shorter for the frequent and concrete words regardless of the processing direction, which indeed duplicated the results from the translation production task. However, contrary to the same results, Cieślicka and Ekert (2004) found that both of the directions are equally affected by the variables of frequency and concreteness. The contradicting results found in the experiment by de Groot et al and Cieślicka – Ekert call for further examination of the word type effect and its their relation to the language proficiency, experimental task and/or typological closeness of the two languages of a bilingual.

The stipulation whether the variable of frequency has a greater influence on the forward direction is beyond the explanatory possibilities of the asymmetrical model of the bilingual mental lexicon. Likewise, the suggestion that the forward processing of cognates proceeds along the lexical and not the conceptual route is difficult to interpret by means of the asymmetrical model. The main reason why the asymmetrical model of the bilingual mental lexicon falls short of accounting for the word effect is that it does not focus on how the processing of particular word types proceeds but on the processing in general. To account for the above mentioned phenomena a new mixed memory model was constructed.

2.2.2. Mixed memory model

The mixed memory model (de Groot – Nas, 1991; de Groot, 1992 after de Groot, 1993) is in line with the hierarchical tradition, which means that the conceptual level is common for both languages of a bilingual, and the lexical level is characterized by two separate stores. In Figure 2., L1 and L2 conceptual links are assigned C1 and C2 abbreviations, respectively. The marking which is assigned to the lexical link is LL.
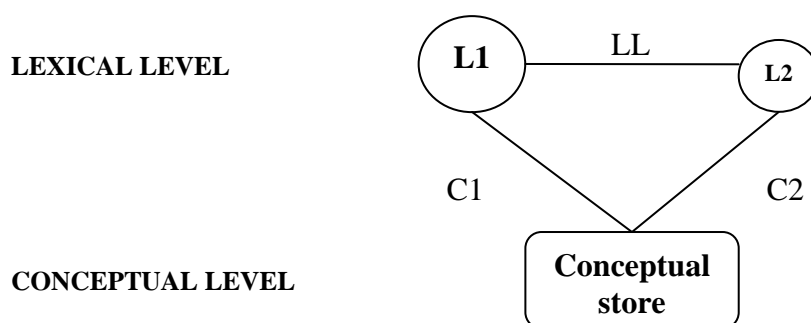

Figure 2. Mixed memory structure (adapted from de Groot et al., 1994: 601).

There are certain features which differentiate the mixed memory model from the asymmetrical model of the bilingual mental lexicon. Firstly, the size of the L1 and L2 lexical stores visibly differs. The difference in size between the circles depicting the L1 lexical store and the L2 lexical store is a graphic representation of the fact that the L1 lexical store is larger

than the L2 lexical store, at least for unbalanced bilinguals (see section 2.1.1.) Another visible difference between the models is the lack of graphic representation of the various strength of connections. This fact by no means suggests that according to the mixed memory model all of the connections demonstrate the same strength. Quite to the contrary, all of the connections differ in strength depending on the representations which they connect. For example, a lexical connection for frequent translation equivalents is supposed to be strong while a lexical connection for infrequent translation equivalents is supposed to be weak. Similarly, a conceptual connection between representations of frequent words would be stronger than a similar connection between representations of infrequent words. The strength of connection is therefore not dependent on the direction of processing but rather on the type of words being processed.

2.2.3. Decompositional conceptual representation in bilingual memory

To account for the phenomenon that concrete words are easier to process across languages the theory of the decompositional conceptual representation in the bilingual memory was used. Figure 3. below presents the notion of the decomposition of conceptual representations on the example of Dutch-English translation pairs differing in abstractness: *vader-father* (Eng. father-father) and *idee-idea* (Eng. idea-idea).
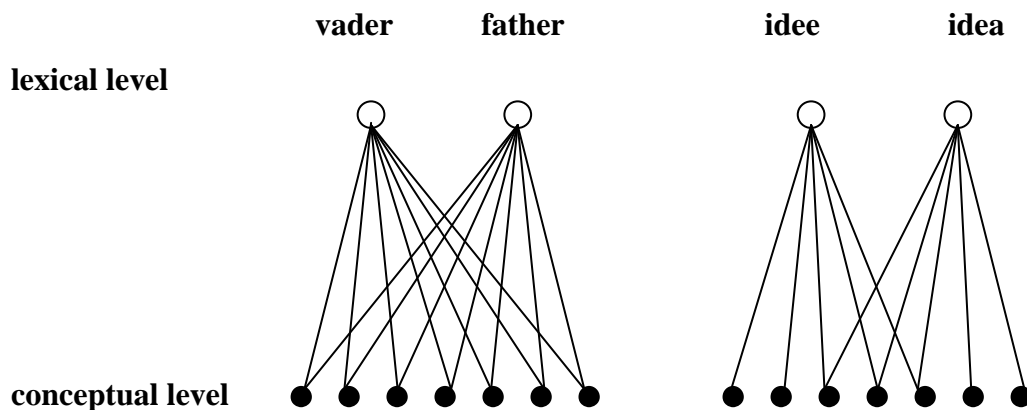

Figure 3. Decompositional conceptual representation in bilingual memory

(from de Groot 1993: 36).

According to this theory, the meaning of a word is a set of different semantic features forming the semantic representation of this word in the conceptual store. The semantic representations of words from a translation pair can to a lesser (*idee-idea*) or greater (*vader-father*) degree overlap in semantic features. The degree of overlap depends on the word type of the translation pair. For example, concrete words (*vader-father*) would share more semantic features across languages than abstract words (*idee-idea*) (de Groot, 1993). Thus, concrete words are easier to process across languages for the reason that they share more semantic features in the bilingual mental lexicon. The situation when abstract words share only some semantic features is said to be typical for proficient bilinguals (de Groot 1993) who know all shades of meaning of a particular word in L2 and are able to determine to what extent the meanings of translation equivalents overlap.

The decompositional conceptual representation in the bilingual memory also accounts for the fact that cognate words are processed faster than noncognates (van Hell – Groot, 1998). It is argued that cognates might be the only words which share conceptual and/or

lexical representation across languages (de Groot – Nas 1991; Sanchez-Casas, Davis – Garcia-Albea 1992, after Kroll – Stewart 1994: 165). It should therefore be possible to process cognates using exclusively the faster, lexical route and to avoid the more time-consuming, conceptual access. This idea has been contradicted by Kroll and Stewart (1994). Their research showed that even though cognates did require shorter processing time than noncognates they also relied on concept mediation. One possible explanation is that cognates are similar only in the respect of orthographic features and very often differ in pronunciation. The differences in pronunciation might contribute to the fact that in tasks requiring access to phonology (e.g. naming) cognates are seen as words sharing few lexical features across languages.

3. Conclusion

The review of the research concerning the asymmetry in the lexical processing presented in this article clearly delineates two crucial issues influencing the phenomenon, namely the application of either the conceptual or the lexical processing route and the word type effect. Choosing one of the processing routes is inseparably connected with the presence of either the conceptual or the lexical accesses. Moreover, there seem to be a relation between the application of a processing route and the direction of processing, such that the forward direction is characterized by the conceptual processing and the backward direction is characterized by the lexical processing. What is more, a relation seem to exist also between the choice of the processing route and the level of bilingual proficiency. The proficient bilinguals rely more on the conceptual processing whereas the beginner bilinguals more often process via the lexical processing route. The model which is based on the differences between the conceptual and the lexical processing routes is the asymmetrical model of the bilingual mental lexicon.

The occurrence of the word type effect is due to the fact that words are processed differently depending on their features, for example, the feature of word frequency, concreteness or cognateness. Generally, the greater the magnitude of concreteness and frequency in a word, the faster the lexical processing. To recapitulate, words characterized by abstractness and low frequency are processed slower than their opposites. The word type effect is accounted for in the mixed memory model, which emphasizes the divergence in the strength of connections in case of different types of words. However, the phenomena that concrete words are processed faster than abstract words in both of the processing directions is also explained within the framework of the decompositional conceptual representation in the bilingual memory. The decompositional conceptual representation assumes that the concrete words share more semantic features in the bilingual mental lexicon and, therefore, are easier to process.

The issue of the asymmetry in the bilingual lexical processing is by no means completely resolved. For example, further research concerning the magnitude of the conceptual processing in the backward direction and the status of cognateness is still required.

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