Mapping the Changes in the Mental Lexicon of Pre-Intermediate Learners of English:

A longitudinal study of depth of word knowledge development

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Középhaladó Nyelvtanulók Mentális Lexikonjának Feltérképezése:

Longitudinális kutatás a szókincsmélység fejlődéséről

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Abstract

This dissertation reports on a longitudinal research study intended to explore the changes in the organization of pre-intermediate EFL learners' mental lexica. The fourteen participants of the study were given a depth of word knowledge elicitation task involving 21 target words, three times over the period of sixteen months. The following aspects of lexical depth were assessed: knowledge of word meaning; spoken and written form, part of speech, other word forms and meanings, sentence formation and collocation use, as well as five associations for each target word.

Data obtained for the depth of word knowledge categories were analyzed quantitatively in an attempt to reveal how well the participants knew them at the beginning of the project and how this deep word knowledge would develop in the course of sixteen months. A further aim was to establish a developmental hierarchy between the word knowledge categories. For data analysis on the word associations a mixed methods design was used: statistical procedures on association categories (paradigmatic, syntagmatic, phonological 'clang' and analytic responses as well as meaning-based and position-based responses) were complemented with other emerging categories.

As for development in lexical depth, at the beginning of the investigation, the participants demonstrated more receptive knowledge and had better results on the component of part of speech, written form, followed by spoken form and word meaning. The overall knowledge of the 21 words improved significantly over time and significant development was also observed with regard to both receptive (i.e. written form, spoken form and word meaning) and productive (other word forms, sentence formation and collocation use) deep word knowledge components. However, although for different reasons, there was no progress in the knowledge of part of speech and other meaning senses. A hierarchical order for the word knowledge types was established with relevance to the present study.

The results of word association use illustrate important changes in the mental lexicon of these pre-intermediate learners. In Phase 1 the participants relied on their mother tongue and gave more translations for nouns and concrete words than for verbs, adjectives and abstract words. L2 nouns were found to have a significant organizing role in pre-intermediate learners' bilingual lexicon. Over time, with a steady decrease in the use of the mother tongue, the links between L2 words seemed to strengthen and the convergence in association use points to a more standardized L2 network, where nouns, verbs and adjectives all play important roles.

Key words: *vocabulary*, *mental lexicon*, *depth of word knowledge*, *word associations*

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1 Introduction

1.1 Background and rationale

Vocabulary is a widely researched area in second language research and a lot of attention has been given to the subject of vocabulary acquisition, especially to the size and development of lexicons, that is, breadth of word knowledge (Read, 2004). However, in comparison with the abundance of research on how and how many lexical items are acquired, there is still a lack of investigations on depth of word knowledge, that is, how well single words are known; and even less is known about how particular words are acquired over a longer period of time. The problem is all the more complex since it can be supposed that individuals differ in the acquisition of words; furthermore, the notion of knowing a word is also problematic. The reason for this is that words are learnt incrementally, not "in a not acquired/acquired manner" (Schmitt, 1998a, p. 283), thus there are different levels of knowing a word, and meaning is just one element of this. This incremental nature of vocabulary acquisition can only be observed over a longer period of time, which calls for a longitudinal investigation.

1.1.1 The need for longitudinal research

Interestingly, several researchers point out that there is a lack of longitudinal research

in applied linguistics (Mellow et al, 1996; Ortega & Iberri-Shea, 2005; Dörnyei, 2007, cited in Dörnyei, 2007) although the field of SLA research would greatly benefit from obtaining "meaningful characterizations of the gradual process of attaining advanced second language and literacy competencies across various contexts (Ortega & Iberri-Shea, 2005 cited in Dörnyei, 2007, p. 80). This is all the more true for psycholinguistic research on vocabulary acquisition and the mental lexicon.

One of the few exceptions to this hiatus is Bell's (2009) longitudinal case study, in which he observed the changes in the mental lexicon of one participant (a Korean student studying in the UK) over the course of sixteen months. Through the analysis of 28 discursive essays which focus on a variety of topics, Bell examined the use of single-word and multiple-word lexical items and tracked the changes in the subject's productive lexicon. Despite a number of limitations, which he lists in the concluding section, he found that there was constant interaction between the lexical and syntactic networks and the developing lexicon of the observant was in a permanent flux.

1.1.2 The need for depth of word knowledge research

It was Cheng (2009) who emphasized that while researching breadth of vocabulary is highly important, only by taking both dimensions of vocabulary knowledge into account can we gain a deeper insight into the actual processes of vocabulary acquisition. Earlier research

studies also point to the significance of examining and developing students' deep word knowledge as a possible indicator of language development. For example, studying the relationship between depth of vocabulary knowledge and academic reading, Qian (1999) showed that when breadth and depth of word knowledge were tested in combination, it resulted in better prediction of reading performance. In another study he found that the correlation between the two dimensions of word knowledge was 0.80 and hypothesized that the higher the number of words the learner knows, the greater their depth of knowledge for these words (Qian, 2002).

Two years later Qian and Schedl (2004) aimed to assess whether a vocabulary knowledge measure could possibly be incorporated into the TOEFL test, instead of the multiple choice items used up until then, in order to determine reading comprehension. They concluded that the depth of vocabulary measure was as difficult as the multiple choice and reading comprehension tests and significant correlation could be established between them.

It is important to examine what it means to know a word through individual behaviour for two reasons. On the one hand, observing the incremental nature of vocabulary acquisition could provide a deeper understanding of the processes of vocabulary learning. On the other hand, through examining depth of word knowledge we might gain an insight into how words are organized in the bilingual memory. Research into vocabulary acquisition has indicated that L1 and L2 words are stored in a common lexicon and recent studies have also

aimed at investigating the connections between words through word associations. However, as most of the research to date has either compared native and non-native associations or used advanced L2 speakers, little is known about the organization of beginner or pre-intermediate learners' mental lexica. Furthermore, there is also a lack of appropriate measures for the analysis of word associations and other depth of word knowledge categories.

To conclude, this thesis attempts to fill the void in three ways:

1) by investigating the changes in depth of word knowledge of lower level learners
2) by using a longitudinal research design and observing the participants on three different occasions over the course of 16 months
3) by examining the participants' depth of word knowledge with the help of all the word knowledge categories available.

1.2 Aims of the study

The present research project aims at exploring the depth of word knowledge through examining all the word knowledge types (spoken form, written form, grammatical and collocational behaviour, frequency, register, meaning and associations) with a special emphasis on word associations. Following the line of research started by Schmitt and Meara (1997), a further aim is to investigate the relationships between the different word knowledge components. To achieve this, the participants of this longitudinal study were given the same

target words in English on three occasions over the period of sixteen months (September, 2005; May, 2006 and January, 2007), and changes in the depth of their word knowledge and word association use were observed in order to investigate the types of connections that exist between L1 and L2 words in pre-intermediate learners' bilingual memory as their language proficiency develops.

1.3 Pedagogical implications

Since the importance and complexity of vocabulary acquisition has been acknowledged in second language research, a number of findings and recommendations have been applied in pedagogical contexts. As Thornbury (2002, 2009) stated, with the introduction of the communicative approach, the questions of what vocabulary should be taught and how, were addressed in various forms. Research on vocabulary size and the discoveries of corpus linguistics have contributed to the development of vocabulary teaching. Usefulness and frequency have also been determining factors in syllabus and coursebook design as most recently published coursebooks explicitly refer to the rationale behind the selection of their lexical content. However, the actual treatment of vocabulary when it comes to teaching still focuses mostly on form and meaning and there are certain aspects of knowing a lexical item that, important though they might be, are not emphasized enough. My pedagogical aim with the present study is to shed light on the components of lexical depth that might pose

difficulties for L2 learners and are still neglected. For example, except for training learners for specific language exam tasks (e.g., CAE or CPE), very few coursebooks recognize the need and usefulness of teaching various word forms of certain words or their possible collocations (other than presenting them in lists) even though, as my personal teaching experience shows, L2 learners often express that their knowledge is lacking in these aspects. In sum, through researching the lexical depth and the order of acquisition of its components, recommendations could be made about the proficiency level at which these aspects can be taught or emphasized the most constructively.

1.4 Overview of the dissertation

In the following I will present the theoretical framework for the proposed study, review the theoretical background as well as previous research carried out on the topic, and outline the design of the research that was undertaken. This will be followed by the results of data collection and discussion of the findings in the light of previous research. The conclusion section summarizes the results and explores some pedagogic implications, but it also pinpoints the limitations of this investigation as well as showing some further research possibilities. In the following I would like to detail how the chapters and appendices in my dissertation are organized.

Chapter 2 reviews the literature relevant to the study. The first section of Chapter 2

gives an overview of the theories and models of L1 and bilingual mental lexicons, also focusing on evidence based on empirical data. The second section of Chapter 2 is devoted especially to theories and research studies related to depth of word knowledge and word associations, while the final section raises the problematic issues of previous research studies and provides a background and basis for the present one.

Chapter 3 outlines the research methodology used in the dissertation, addressing such issues as the rationale for the longitudinal research design, the selection of participants, the process of word selection, the interview protocol and procedure, as well as measurement procedures.

Chapter 4 and 5 contain the results of the study. Chapter 5 presents the findings of statistical procedures with regard to depth of word knowledge categories, while Chapter 6 examines the changes that take place in the participants' associative behaviour, which are also placed into the context of the findings of previous research studies.

In Chapter 6, the conclusions and implications (both research and pedagogic) are considered and avenues of further research are discussed, along with the limitations of the present study. Following the references, the appendices include the placement vocabulary test, the dictionary entries of the 21 stimulus words used in the study, the interview protocol and samples from the interviews both in relation to the various depth of word knowledge categories, as well as the associations provided by the participants on the three occasions.

2 Review of literature

2.1 Introduction

The theoretical framework of the study is based on psycholinguistics and will focus on the following issues: Firstly, features of the L1 mental lexicon and lexical access are to be discussed, including justifications for its existence, information about its size, conceptual models of organization, storage, lexical access and word selection. This will be followed by a detailed analysis of the bilingual mental lexicon, covering conceptual and lexical representation (what is stored and where), lexical access in L2, lexical selection, as well as models of the organization of the L2 lexicon and the problematic aspects of these models. Then theoretical issues and empirical findings of both depth of word knowledge and word associations are to be presented. Finally, conclusions and problematic issues from previous studies will be highlighted, accentuating the aims of the present study and its research questions.

Although the significance of vocabulary acquisition in a second language is unquestionable, there is still relatively little known about the actual processes that take place during the course of activation and actual production of lexical items; and much attention as the organization of the lexicon in a second language has gained recently, there is still a lot of confusion concerning terminology as well as theory (Kormos, 2006). Swain and Carrol (1987)

characterized the nature of second language vocabulary acquisition as "incremental, potentially limitless and heavily constrained by the individual's experience" (p. 193, as cited in Santos, 2002). Therefore, in order to gain a deeper understanding of the issues in question, in the first part of the review of literature theoretical issues are to be addressed, followed by the findings of empirical research.

2.2 Definition of key terms

2.2.1 The mental lexicon

Since the crucial importance of vocabulary knowledge in the language learning process has finally been recognized, the literature has been rich with theories and studies on vocabulary acquisition. As the centre of vocabulary storage, the *mental lexicon* has also been the focus of attention in a significant number of theoretical and empirical research papers and books. However, as Jarema and Libben (2007) argue, it is difficult to obtain a clear and concise definition of the mental lexicon for several reasons. Although the commonly used metaphor of the 'dictionary', which is represented in the mind, seems straightforward, psycholinguistic research studies have mostly been centered upon lexical access, on the basis of which they have aimed to gather information on lexical representation.

In order to bridge this gap, Jarema and Libben (2007) defined the mental lexicon as "the cognitive system that constitutes the capacity for conscious and unconscious lexical

activity" (p. 2) as, in their view, this characterization of the lexicon, namely, the use of the word "system", accounts for both storage and retrieval. Furtermore, the editors also explain the rationale behind referring to the mental lexicon as "capacity". One the one hand, taking all the aspects of language into consideration, is is unquestionable that it is the component of lexis that is prone to the greatest change and development during one's life, therefore the mental lexicon is in constant flux. On the other hand, the system enables the possession, acquisition, conceptualization, use and loss of lexical knowledge, drawing our attention to all the processes that can actually be achieved with the help of the mental lexicon. Theories and research evidence about the mental lexicon will be explained in the first section of the review of literature, followed by a similar analysis of the bilingual lexicon.

2.2.2 Depth of word knowledge

From the point of view of the present study, the definition of *depth of word knowledge* is also required. Wesche and Paribacht (1996) defined it as the richness of the representation of a given word or concept, incorporating several features associated with lexical knowledge. These features, which are relevant from the point of view of the present study, include semantic, orthographic and phonological representation, frequency, morphological structure and syntactic properties, as well as pragmatic and collocational behaviour (Nation, 1990). Although today researchers are mostly in agreement about the dimensions of deep word

knowledge, the number and exact content of the aspects of knowledge have undergone substantial change, therefore specific details about its components and the evolution of the definition are explained in section 2.9. Throughout the dissertation the terms *depth of word knowledge*, *deep word knowledge*, *deep lexical knowledge* and *lexical depth* are used interchangeably.

2.3 Justifications for the existence of the mental lexicon

Aitchison (2003) claimed that there are two fundamental reasons that justify the need for the mental lexicon to be organized. On the one hand, the sheer number of words call for logical ordering because, as she reasons, psychologists have indicated that human memory is "flexible and extendable" as long as "the information is structured" (p. 5). The other reason for the organization of the mental lexicon is the impossible speed with which words can be found and recalled from tens (or maybe hundreds) of thousands of words. An average person's natural flow of six syllables per second and the fact that this flow is quite standard both underscore the necessity of some sort of logical structuring. She demonstrated this with two lines of research: speech shadowing (repeating what one has just heard) and non-word detection tasks. Both forms of research have commonly been used in psycholinguistics and the correction of mistakes provide evidence of conscious processing, but while the former one has yielded faster (250-275 ms) responses, the latter proved to be somewhat slower (450 ms)

due to the fact that more processing was needed for the participants to make a decision. In Aitchison's view, these findings clearly point to speakers' ability to search the mental lexicon for the right word in an extremely quick manner.

Aitchison (2003) also detailed the most significant types of research with the help of which information has been collected about the mental lexicon, as well as the problems associated with them, which are listed below.

2.3.1 Word searches and slips of the tongue

Word searches and slips of the tongue are phenomena that occur to everyday people. As Aitchison (2003) observed, word searches are based on the assumption that while we are looking for a certain word, there are clues that might help us to find it. These clues might be semantic or phonological and they might give an insight into the links of the mental lexicon. For instance, if we are looking for the synonym of the word 'give up' but the only information available is that it starts with 'sur', it can happen that several phonologically similar words are activated (such as 'surpass' or 'surmount') before the word 'surrender' is found. The problematic issue with word searches is that these phenomena typically occur with less frequent words, therefore the way in which they can be located cannot be applied for words which are often used.

Slips, on the other hand, occur with any kind of vocabulary item and speaker, and

presuppose that for a short instance the speaker rendered the selected word correct and has arrived at this solution by using – what Aitchison (2003) calls – "the normal retrieval process" and rules with "predictable patterns" (p. 18). Slips of the tongue might originate from similarity between meaning or sound but they can also be a combination of both. Moreover, blends, that is, two-word combinations, are selection errors as well. In the following I would like to show a case in point for each:

- *I'm definitely coming yesterday.* (instead of 'tomorrow') – meaning-based slip
- *I don't accept anyone to understand this.* (instead of 'expect') – sound-based slip
- *A lot of vocabulary is learnt accidentally.* (instead of 'incidentally') – meaning and sound-based slip
- *I don't expose it will be successful.* (instead of expect or suppose) – meaning-based blend
- *It was an interesting experimence.* (instead of experience, confused by the word experiment) – sound-based blend
- *Their cottage was exclurious.* (blending the words exclusive and luxurious) – meaning and sound-based blend

Aitchison (2003) emphasized that the major problems with researching errors of selection are that both the collection and the interpretation of data are a delicate matter as slips

can be difficult to observe and record; furthermore, it seems extremely difficult to be always fully aware of the context in which they occurred. However, as she concluded, the spontaneity of these word selection errors might give useful clues about the structure and retrieval processes of the mental lexicon.

2.3.2 Researching aphasia

Speech disorders, such as aphasia, are also a valuable source of information about the mental lexicon for two reasons. One is that aphasics may simply experience the problems a normal person might, but in an exaggerated way. Secondly, the fact that there are patients who suffer from particular symptoms, such as the inability to recall certain nouns, points to the existence of "sub-systems within the mental lexicon" (Aitchison, 2003, p. 21). The value of aphasic research has been emphasized by several researchers in applied linguistics (Ellis, 1985; Dell et al., 1997); however, it is still not known whether in the case of aphasic patients it is the mental lexicon itself that is impaired or the process of accessing it. In Aitchison's (2003) view, the other two problematic aspects of researching aphasia are that a damaged brain cannot necessarily be used to represent or be compared to a normal one and there might be several reasons for a particular word to be used or avoided, including the patient's very own survival strategies developed through the course of experimentation.

2.3.3 Psycholinguistic experiments

In Aitchison's view, psycholinguistic experiments have given a lot of valuable insight into the mental lexicon of individuals. This line of research began in 1883 with Galton's (cited in Aitchison, 2003) word association experiment, in which he provided two associations for 75 words he had selected himself some days before the observation, and is still popular with researchers. The primary advantage of this type of investigation is its simplicity and the fact that there is a tendency for people to associate in similar ways, pointing towards the structured nature of the mental lexicon (Aitchison, 2003).

More recently 'tip of the tongue' experiments have been adopted (Brown, 1991). In the first such study by Brown and McNeill (1966, cited in Brown, 1991), the two researchers listed the definition of certain rarely used words and attempted to trigger the condition of almost knowing them before revealing each lexical item. Subsequently, participants were encouraged to describe any feature or information that they could recall, by eliciting the number of syllables, initial letters or sounds or naming phonetically and semantically similar words. Their findings confirmed the existence of the 'tip of the tongue' phenomenon and inspired several other researchers, generating new approaches and avenues of research. In brief, 'tip of the tongue' investigations elicit information about the links between words in the mental lexicon, thus facilitating a more thorough understanding of its structure.

Another type of analytical tool is the lexical decision task, where participants are

asked to react to either a number of sounds or letters, frequently used and rare words, or even nonsense words. In these investigations, reaction times are measured. Aitchison (2003) emphasized that it is extremely important to differentiate between the actual time it takes to find the word and the mental activity taking place in the mind after locating it.

One type of lexical decision task is priming, which has been an area of investigation not only in relation to 'tip of the tongue' research (Rastle & Burke, 1996), but also in order to study the structure and organization of the mental lexicon. According to Hoey (2005), priming is the experimental method where a 'priming' word is used to elicit a 'target' word, based on the assumption that the relationship between the two will reveal information about the structure of the lexicon. We can distinguish between positive and negative priming, depending on how the priming word influences the speed of the target word's selection. Another difference between the stimuli can be whether they are perceptual (that is, they are based on formal aspects, such as phonology) or conceptual (that is, a semantically similar word serves as the primer). In the following each type of priming is demonstrated with an example.

In a Dutch study on perceptual priming McQueen, Cutler and Norris (2006) investigated how the ambiguous use of fricatives (s-f) in priming words influenced the visually represented target words. They found that words cannot possibly be stored as detailed acoustic traces of episodic memory due to the fact that participants were affected by the auditory training they received and reacted differently to the priming words in the testing

phase of the experiment.

On the other hand, Ferrand and New (2004) conducted a semantic priming experiment, using priming words either based on meaning ("purely semantic priming without association", (p.25), such as bread-cake) or based on associations ("purely associative priming without semantic similarity", (p.25), such as bread-butter). They found evidence, to the contrary of previous research, that both types of priming exist without the other and they can therefore be dissociated; however they also claim that there is an "associative boost" (p.38) and the priming effect is the highest if the priming and the target words are both semantically and associatively linked. There is a vast body of research (e.g. Swinney, 1979, cited in Aitchison, 2003; de Groot, 1990; Hoey, 2005, Reisberg, 2007) into the preactivation of participants' attention and although Aitchison (2003) warned they must be treated with care, the priming effect of stimulus words and the reaction times might give useful insights into the organization of the mental lexicon.

Phoneme monitoring, that is, paying attention to and finding a particular sound in a word or a sequence of words can give an insight into the underlying structure of a given word, its difficulty as well as the processes of speech recognition. However, this line of research has been criticized for being extremely task-specific and also because it is hard to decide whether the response is made prior to or following word recognition. For an overview of the merits and critical observations on phoneme monitoring, see Connine and Titone (1996).

Although the types of research listed above have served as valuable tools for enabling researchers to discover aspects and processes of lexical selection, Aitchison (2003) warned that it must not be forgotten that these experiments were all created and conducted in artificial circumstances and even if variables have been carefully controlled, there might have been factors or aspects which are overlooked. Still, it can be stated that the abundance and variety of these empirical research studies has had the greatest impact on the discovery of the mental lexicon to date.

2.3.4 Conclusion

To conclude this section, it can be observed that both naturally occuring speech data and data elicited under laboratory conditions have provided various clues about the length and strength of connections between words, thus proving the existence of the mental lexicon and the necessity of it to be organized in a systematic way. Figure 1 summarizes the findings so far.

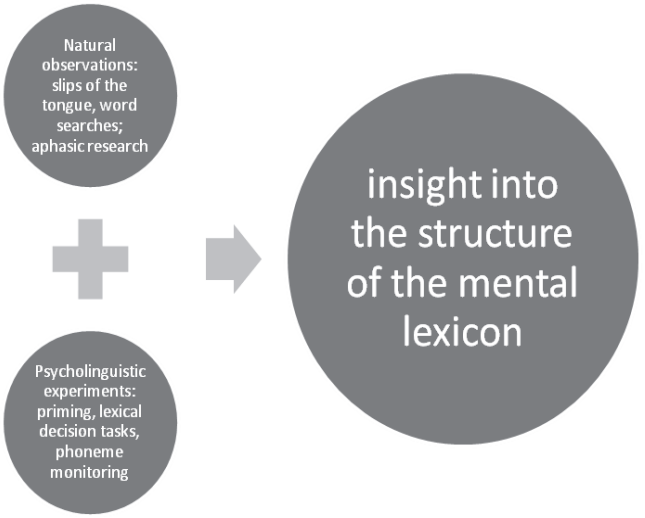

Figure 1. Justifications for the existence of the mental lexicon.

2.4 The conceptual organization of the mental lexicon

As for the organization of concepts in the lexicon, several models have been put forward. In the following section, various models of the organization of the mental lexicon are discussed, followed by the problematic issues related to them.

2.4.1 The Hierarchical Network Model

The very first theoretical model constructed by Collins and Quillian was the *Hierarchical Network Model* (1969, 1970, 1972). It claims that information is stored in categories, which are related to one another in a hierarchical fashion. According to this theory,

concepts are organized as “pyramids” (p. 197). As we can see in Figure 2, superordinate categories (e.g. animal) are at the top, more specific ones are to be found the middle (bird or fish) and subordinate ones (e.g. penguin or salmon) are at the bottom of the hierarchy.

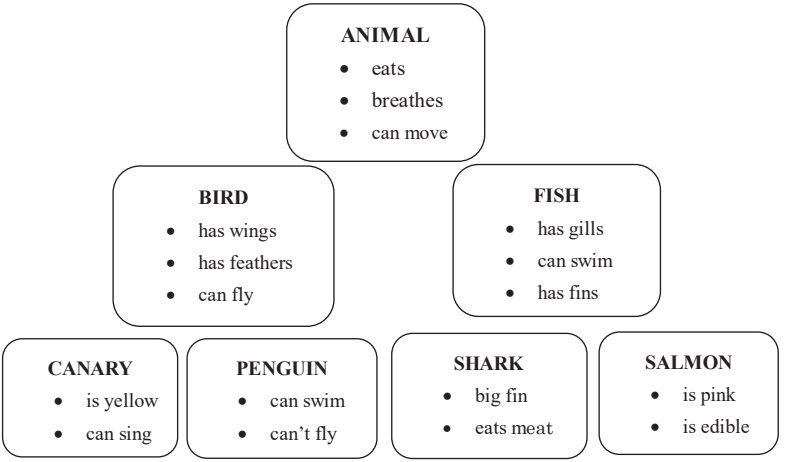

Figure 2. The Hierarchical Network Model (adapted from Collins & Quillian, 1969).

2.4.1.1 Features of the Hierarchical Network Model

An interesting aspect of the HNM is that each word with its typical features is only linked to the closest concept. Another typical feature of the model is cognitive economy, which means that information is only stored at one level of the hierarchy and is not repeated at another level. Furthermore, the more typical a semantic feature is, the higher the level it is stored. For example, the feature that birds can move is stored at the highest level ‘animal’.

This provides evidence for another logical feature that characterizes the model: category size effect, that is, the larger the category, the longer the time the search takes. This has been shown in various speeded verification tasks, in which researchers measured the reaction time of participants and found that if the property is less typical (e.g., 'sharks have big fins' as opposed to 'sharks eat meat'), the retrieval process takes longer because more scanning is needed in the brain to confirm the information (Collins & Quillian, 1969, 1970).

2.4.1.2 Problematic aspects of the Hierarchical Network Model

However, there are several problems with the HNM. One is 'typicality effect', meaning that not all the instances of a concept are equally good examples of it; for example, a shark or a guppy might be more typical fish than a blue ray. Another problem is 'the effect of familiarity': experiments have shown that familiar terms (e.g. 'sharks are predators') are found and processed faster than unfamiliar ones ('sharks' skeletons are made of cartilage and connective tissue'). Finally, there seems to be a violation of cognitive economy, as features have been found to be related to more or sometimes all the categories of the hierarchy and not just the closest one. For example, there might be situations when the higher category would be activated first: if we think of a penguin, we might categorize it as an 'animal' even before the category 'bird'.

2.4.2 The Semantic Feature Model

Another feature-oriented model is the *semantic feature* or *feature comparison model* (Smith, Shoben, & Rips, 1974), which assumes that our semantic memory stores concepts as sets of attributes. For instance, the following pieces of information might be known about a bird and a robin.

BIRD = [has feathers, can fly, has wings, lays eggs]

ROBIN = [has feathers, can fly, has wings, lays eggs, can be red-breasted, is small and hops]

2.4.2.1 Features of the Semantic Feature Model

As the characteristics might vary in the degree to which they are fundamental to the description of the given concept, this model distinguishes between the two different sets of attributes stored in the mental lexicon: defining features and characteristic ones. The main difference between these two categories lies in the fact that, whereas defining features are indispensable for an attribute to be included, characteristic features are typical but not necessary. As an example for this, we can see the features that are central to the definition of the concept ‘ostrich’ in Figure 3: it has long legs and neck. On the other hand, the features that ‘it is large’ and ‘walks’ or ‘runs’ can be categorized as characteristic but not salient.

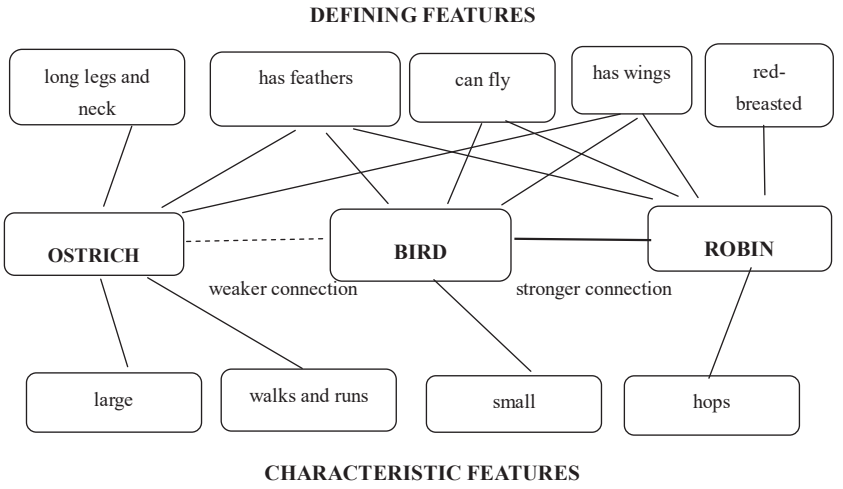

Figure 3. The Semantic Features Model (adapted from Smith, Shoben, & Rips, 1974).

There are certain aspects of the semantic feature model that enable researchers to explain what the hierarchical model cannot. First, as the concept 'robin' shares more defining features with the notion 'bird' than does the concept of 'ostrich', it can be stated that a robin is a more typical bird than the ostrich. This overcomes the problem of the typicality effect and justifies why a sentence like 'A robin is a bird' would be verified faster than 'An ostrich is a bird.' The semantic feature model also provides an explanation why false sentences, such as 'An ostrich is a fish', can be rejected relatively fast: there are very few categories that these two concepts might share.

Thirdly, the problem of category size effect is resolved. Category size effect refers to

the phenomenon that when faced with two sentences, such as ‘Robin is a bird’ and ‘Robin is an animal’, less time is needed for the verification of the sentence ‘Robin is a bird’ as it is a subcategory of the term animal. The justification for this lies in the fact that the larger the category, the more abstract it becomes, thus the number of defining features decrease. This means that as the concept is being processed, the subcategory shares more characteristics than the larger one.

Finally, the semantic feature model also accounts for ‘hedges’ like ‘Whales are sort of fish’. The rationale behind this phenomenon is that even though whales do not have the same defining features as fish, some of the characteristic features (e.g., the fact that they live in water) are indeed shared with them.

2.4.2.2 Problematic aspects of the Semantic Feature Model

Despite all the apparent positive features of the model, Housel and Acker (1977) showed that neither the hierarchical model nor the semantic feature model was accurate in the prediction of reaction times and postulated that other factors, such as the form of a word and the order in which the participants were subjected to them, played a significant role in the workings of their semantic memory. Another problematic aspect of the model is that if a category is too large (e.g., plant or animal), the reaction times are longer. Furthermore, there are some ambiguous concepts that do not even have clear defining features: an example for

this might be the concept ‘game’.

2.4.3 The Spreading Activation Model

In contrast to the previously mentioned two models, the *spreading activation model* (Collins, 1969, 1970) sees concepts as connected nodes with differing lengths of line between different concepts, based on the degree of their association (see Figure 4). However, there is also a similar feature to the hierarchical and semantic feature models: the spreading activation model also relies on concepts, rather than words, being activated. Collins and Loftus (1975) hypothesized that there are two separate networks for storing data in the mental lexicon: one for lexical information such as orthography and phonology, while the other is strictly semantic and stores information about concepts. Interestingly, the two network systems are in close relation to each other (Collins & Loftus, cited in Ferrand & New, 2004).

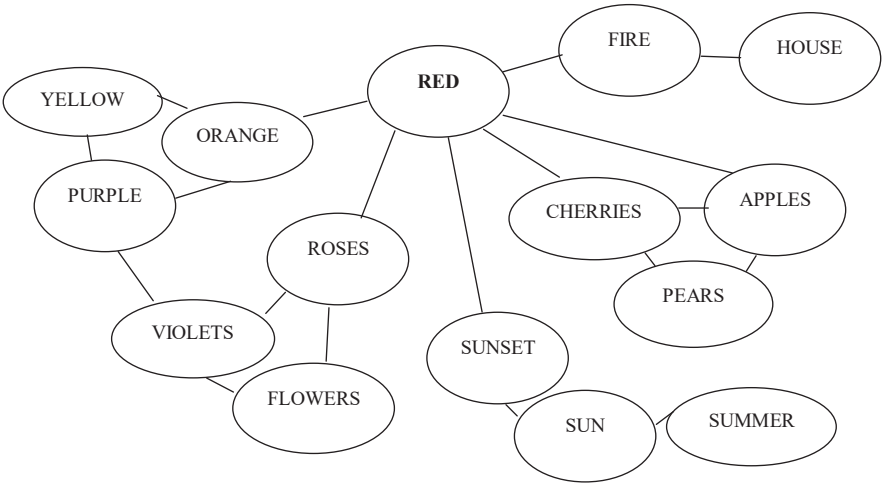

Figure 4. The spreading activation model (adapted from Collins & Loftus , 1975).

2.4.3.1 Features of the Spreading Activation Model

Out of the three theories the *spreading activation model* is the most well-founded, for two reasons. Firstly, although it is a network of associations, its structure does not imply a rigid hierarchy, but allows for words to be related to several others. Secondly, there is no need to distinguish between defining and characteristic features; the fact that some links are closer and stronger accounts for this; and the stronger the association, the closer the connection between two concepts. The model is also exemplary of how positive priming tasks work as activation spreads, if there is a link between notions (Reisberg, 2007).

2.4.3.2 Problematic aspects of the Spreading Activation Model

One of the complications with the spreading activation model is that it presupposes an entirely different mental lexicon for every individual and this might lead to difficulties in finding emerging patterns in lexical access or production. Moreover, as the model is based on concepts, it is lacking in other aspects of lexical knowledge, such as phonology, orthography or syntax (Bock & Levelt, 1994).

2.4.4 The Revised Spreading Activation Model

In order to overcome these shortcomings, Bock and Levelt (1994) put forward the *revised spreading activation model*, in which the various levels of a lexical entry are indicated. Figure 5 shows that in this model besides the conceptual layer, syntax and phonology are also accounted for.

Aitchison's *"cobweb" theory* (2003) is very similar to the revised spreading activation model: in her view, words are connected to each other in a way that one lexical item might be directly linked with several other lexical items on the basis of phonology, orthography, syntax or semantics.

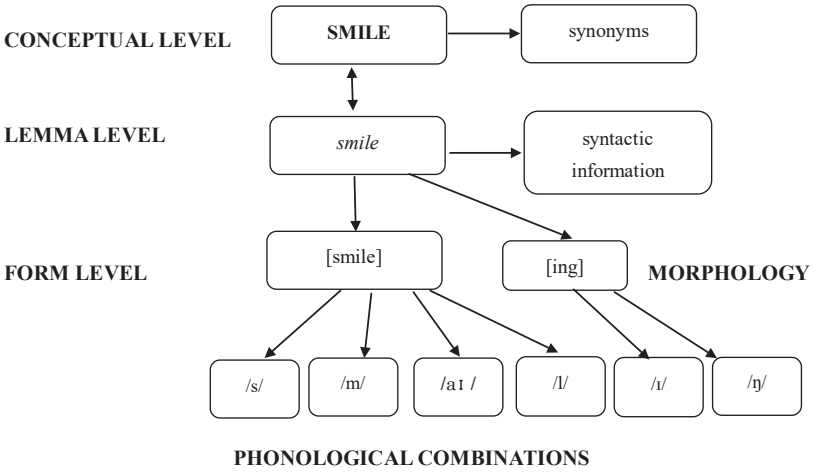

Figure 5. The revised spreading activation model (adapted from Bock & Levelt, 1994).

2.5 Storage, lexical selection and retrieval in the mental lexicon

With regard to the structure and organization of the mental lexicon, it is important to discuss what information is contained in it: concepts (the ideas to be expressed), word forms (lemmas) or word meaning (semantic knowledge) as well. On the one hand, psychological and neurological research suggests that a lemma contains only syntactic information and the word meaning is stored at the conceptual level (Levelt et al., 1999). Thus the basic tenet, as shown in Figure 6, is that lexical selection and activation occur in three sequential stages: first, based on the speaker's intention, lexical concepts are selected, which then activate the lemma linked to the concept. Finally, by extracting the relevant morphological and phonological information, the speaker can conjure the corresponding lexeme.

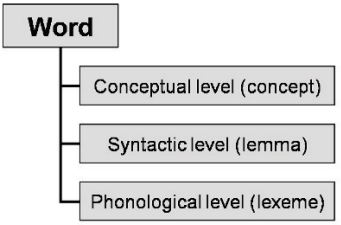

Figure 6. The process of lexical selection (adopted from Levelt et al., 1999).

Having said this, as Kormos (2006) and Jarvis (2009) reported, researchers had applied the term 'concept' inconsistently and failed to distinguish between the definitions of *conceptual knowledge* and *semantic knowledge*. In fact, the former notion refers only to the concepts and ideas stored in the lexicon, characterized by and originating from thought processes, experience, various schemas and mental images, "organized into structured categories of thought and categories of meaning" (Jarvis, 2009, p. 101). On the other hand, the latter concept represents the mental links which connect lemmas and concepts as well as lemmas to other lemmas. This distinction is especially significant with regard to the conceptualization of the bilingual lexicon, which is the topic of the next section.

2.6 Justifications for the existence of a bilingual lexicon

Several researchers have documented the ongoing debate about whether L1 and L2 lexical items are stored in two different mental lexicons or in a common one where concepts are interrelated (Pavlenko, 1999, 2009; Kormos, 2006; Singleton, 2007). The following section aims to review the evidence on both sides.

Meara's earlier studies (1982, 1984 as cited in Wolter, 2001, p. 42) indicated that connections in the L2 lexicon are less stable than those of native speakers, phonology plays a more significant role in the organization of the L2 lexicon and semantic links are systematically different from those of native speakers. This led researchers at the time to claim that the L2 mental lexicon is qualitatively different from the L1 lexicon. Singleton (2007) listed two convincing arguments in favour of a separatist perspective. The first one is founded on the premise that languages have differing morphological and phonological systems, thus L2 speakers need to find analogies relying on the structure of the new language and these searches imply separate activation. The second reason is based on aphasic research on multilingual speakers: brain damage is reported to have affected only one of their languages. Singleton added that even though code-switching from one language to another might seem to be in favour of a shared mental lexicon, models of activation have shown that the two languages are activated to differing degrees and the models allow for words to slip in.

However, Singleton (2007) also raised arguments and empirical evidence in favour of

the interaction between the L1 and L2 lexicons. Research on lexical encoding has verified that there is a shared bilingual lexicon, and the lexical items of both languages compete for word selection, as was shown in reaction time experiments with cognates. Another indication might be that in interlingual investigations, lexical items in both languages seemed to be equally activated, not to mention those studies, where similarities in morphological structure of two languages have resulted in faster translation.

Wolter's (2001) findings are more mixed: for well-known words native and non-native mental lexicons were found to be structurally different, whereas for less well-known words they were found to be similar. This is also supported by Wilks and Meara (2002), who claimed that there is a higher number of connections at the core of the lexicon than at the periphery, and postulated that the network structure of L1 and L2 lexicon might differ because L1 lexical items are more connected than L2 ones. According to Wolter (2001), it is the depth of word knowledge that might play a pivotal role in establishing to what extent individual words are integrated into the structure of the L1 and L2 lexicons and the basic technique for exploring the lexical network is through word association tasks (Read, 2004).

Both Singleton (2007) and Pavlenko (2009) agree with the assumption that there is cross-linguistic interaction between the two lexicons and there are certain domains that are shared. In her overview of the models of bilingual processing and representation, Pavlenko (2009) revealed empirical evidence (e.g., cross-linguistic semantic priming and picture

naming experiments) in support of the idea that morphological and phonological representations might be stored separately, while meaning and concepts are mostly shared. This assumption is further expanded in the next section of the review of literature.

2.7 Conceptual models of the bilingual mental lexicon

Although the models used for the organization of the L1 lexicon have also been claimed to be valid for bilinguals, they have slightly been revised for lexical storage in L2. In their theoretical overview, French and Jacquet (2004) outline the models of lexical organization for bilinguals. The broadest model is the the *hierarchical model* of Potter, So, von Eckhardt & Feldman (1984), which incorporates the idea that concepts and word meaning are indeed separated. The authors make a distinction between four types of hierarchical models: *word association*, *concept-mediation*, *mixed* and *revised hierarchical* models, which are all characterized by a separate set of lexis for each language as well as a common conceptual base. What differentiates the models from each other is "the location and weighting of the links" (French & Jacquet, 2004, p. 88) between the nodes of the first and the second language. In the following I will describe each of these in more detail.

2.7.1 The Word-association Model

The *word-association model* postulates that L2 lexical items are not directly linked to

corresponding concepts, only their L1 equivalents, which would indicate that it is not necessary to recall the concept when an L1 word is translated into L2. French and Jacquet (2004) and Kormos (2006) alike emphasize that this alternative is the most suitable for modeling lower level L2 proficiency and summarize the empirical evidence for it. In two studies in the 1980s it was shown that participants with low proficiency reacted faster to L2 translations than pictures (Kroll & Curley, 1988; Chen & Leung, 1989) and were able to translate cognates faster.

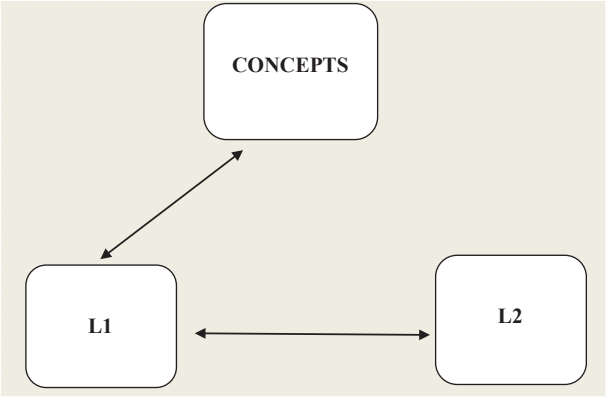

Figure 7. The word-association model (adapted from French & Jacquet, 2004).

2.7.2 The Concept-mediation Model

The concept-mediation model claims that both the L1 and L2 words are linked to the same concept. In contrast to the previous alternative, this theory proves to be useful with

higher level L2 proficiency as learners do not need the L1 equivalent to access the concept. As evidence for this, Potter et al. (1984) came to the conclusion that it took less time for proficient L2 speakers to name pictures than to give L1 translations for the words.

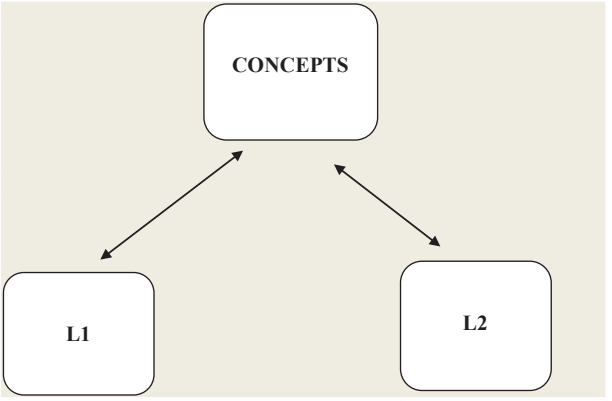

Figure 8. The concept-mediation model (adapted from French & Jacquet, 2004).

2.7.3 The Mixed Model

The mixed model, as its name suggests, combines the first two theories and is based on the premise that both L1 and L2 words are related to a common concept as well as each other. This combination is necessitated by the fact that the links between L1 and L2 words do not disappear completely as L2 learners become more proficient, especially due to the fact that different word types may evoke different strategies by language users. Studies have shown that the bilingual memory structure is dependent on several factors, such as whether a given

word is abstract or concrete or it is a cognate or a non-cognate. Kormos (2006) demonstrated this with an experiment by Tamalas, Kroll and Dufour, where it was found that advanced speakers were slower at rejecting L1 and L2 word pairs if they were semantically related but faster at accepting word pairs that had the same form.

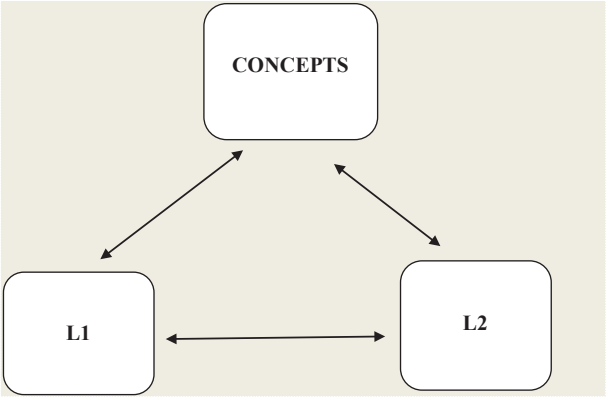

Figure 9. The mixed model (adapted from French & Jacquet, 2004).

2.7.4 The Revised Hierarchical Model

The last model to be discussed here, the *revised hierarchical model* of Kroll and Stewart (1990, 1994) is the most flexible one out of the four. Merging the most important characteristics of the previous models and still working with the assumption that there is one shared concept, it is based on the premise that there are connections between concepts and the L1 and L2 translation equivalents but the strength of these links may be weaker from L1 to L2

than from L2 to L1 and this might also change with time. As Figure 10 indicates, L1 words and concepts are linked more strongly than L2 words and the conceptual representation. It is also interesting to observe that the link is stronger between L2 words and their translations than the other way around. This has been demonstrated by a number of research studies: participants are always faster at recognizing L1 words than vice versa (for more detail, see Kormos, 2006). Altarriba and Basnight-Brown (2009) declared that one of the merits of the revised hierarchical models is that it provides an explanation for the process of second language acquisition through illustrating the progress of the links between words and concepts as well as the changes in the directions.

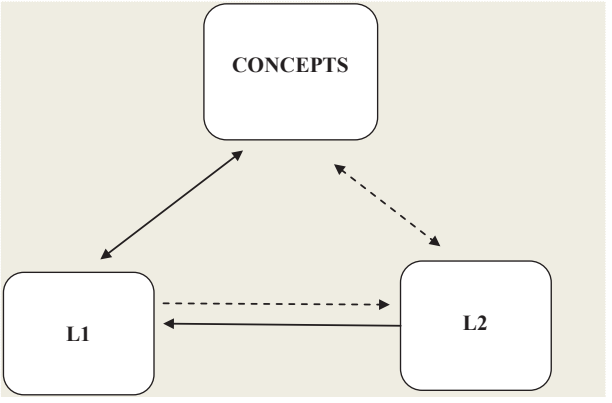

Figure 10. The revised hierarchical model (adapted from French & Jacquet, 2004).

The model is adept at demonstrating changes in the development L1-L2 connectivity, showing that beginners in a second language can only gain access to L2 words through their L1 translations, but as their level of L2 proficiency increases, the links between the concepts are formed and there is no need for the L1 equivalent of the word any more. However, the problem with this theory is partly its lack of efficiency as well as the fact that it is impossible for concepts to overlap entirely in two languages as concepts may be culture-bound and may vary from language to language (Pavlenko, 2009).

2.7.5 The Conceptual Feature Model

Contrary to the previous alternatives, de Groot's *conceptual feature model* or *distributed feature model* (1992) assumes that individual words are connected to concepts and the same word might be represented differently or similarly in L1 and L2. That is, some words (for example, concrete words such as *chair*) might have the same conceptual representation in the two languages, others may overlap partially (such as the conceptual representation of *love* in English and Hungarian), while for certain words the representations in the two languages might differ completely. The strength of this model is that it clearly accounts for cross-linguistic differences, which was demonstrated by de Groot (1992) and van Hell and de Groot (1998), who found that cognates and concrete words were translated faster by bilinguals than non-cognates and abstract words.

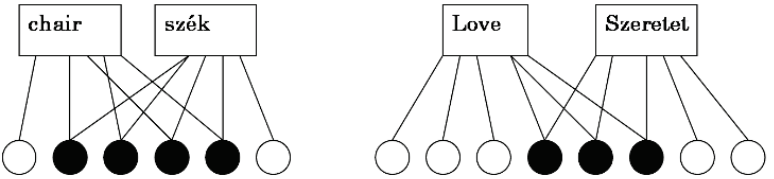

Figure 11. The conceptual feature model (adapted from de Groot, 1992).

Despite the positive aspects of the model, Pavlenko (2009) found that because of its reliance on conceptual features, it does not take into account the role of the context in which a word appears; furthermore, unlike the Revised Hierarchical Model, it fails to account for any developmental change in language use. Pavlenko's final claim was that the research justifying the framework was based on the assumption that cognates and concrete words definitely share all their features, which might not be the case.

2.7.6 The Shared Asymetrical Model

The Shared Asymetrical Model by Dong (cited in Pavlenko, 2009) exhibits the fluctuation of the learning process and language use in a more dynamic way. The model connects the L1 and L2 lexicons, which are both linked to a shared store of common conceptual elements (see Figure 12). According to Pavlenko, the model successfully accounts for the differences across the two languages and it also demonstrates the developmental process; however, the representation of concepts is vague.

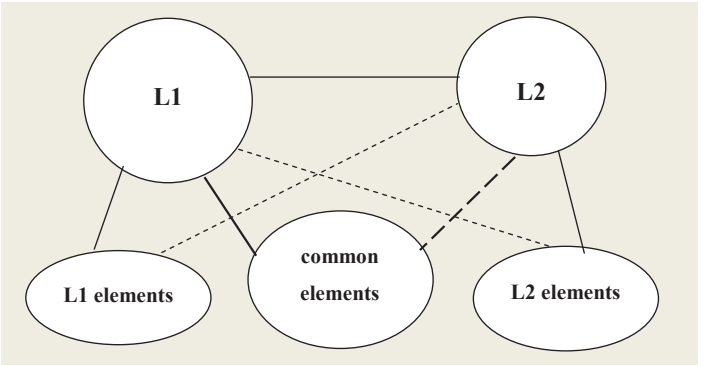

Figure 12. The shared assymetrical model (Dong et al., 2005, cited in and adopted from Pavlenko, 2009, p. 146).

2.7.7 The Modified Hierarchical Model

The most recent model put forth by Pavlenko (2009) is the Modified Hierarchical Model (Figure 13), whereby she attempted to combine the positive features of the previous models. For example, similar to the Revised Hierarchical model, Pavlenko placed emphasis on illustrating the "developmental progression from lexical to conceptual mediation" (p. 146). Secondly, cross-linguistic differences in the features of concepts are also accounted for, as in the Distributed Feature and Shared Asymetrical Models.

As regards the distinctive features of the model, it can be seen that Pavlenko distinguishes between language-specific, partially overlapping and completely shared conceptual respresentations. She illustrated language-specific concepts with the example of

'privacy' and 'frustration', which might be unknown in some cultures. She also acknowledged a problematic issue, the difficulty of formulation; due to the fact that lexical processing is assumed to begin with a search for the suitable conceptual representation, which in the case of language-specific words cannot be achieved. However, in her explanation Pavlenko quoted prior research studies whose participants in this case relied on "code-switching, lexical borrowing or loan translation" (p. 147). Pavlenko also emphasized the importance of context-dependence and task-performance in bilingual research, which, in her view, the model takes into consideration.

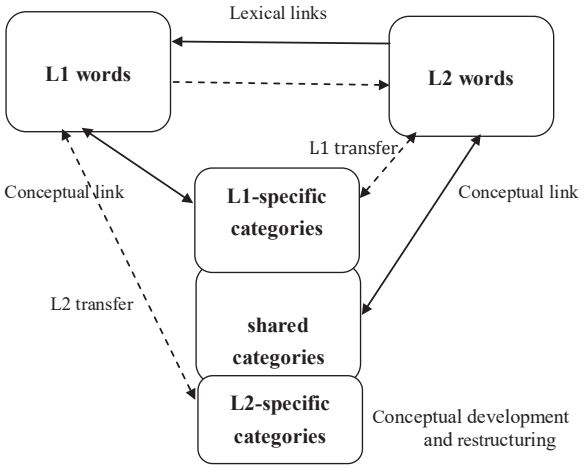

Figure 13. The modified hierarchical model (adopted from Pavlenko, 2009, p. 147).

The complexity of the modified hierarchical model is also reflected in the constant implicit conceptual restructuring of the lexicon in case an unkown L2 concept is encountered (e.g., 'privacy') as well as the feature of distinguishing between the selection of a lexical item based on the sources of transfer. For example, in the Hungarian language two concepts match the same lexical representation of 'érett', whereas in English two concepts and two conceptual representations are used: 'ripe' for fruit and 'mature' for a person. On the other hand, only one lexical representation 'nyelv' can be selected for two concepts in English: 'tongue' and 'language' in English. In this sense the distinct advantage of Pavlenko's theoretical model is that it makes it possible to define precise conceptual and lexical categorizations and clearly separate them.

2.8 Vocabulary knowledge

In order to learn a new word, it is important to clarify what kind of information needs to be acquired. However, despite a myriad of research studies in the field of vocabulary acquisition, there is still an ongoing debate about what is meant exactly by vocabulary knowledge. Ma (2009) pointed to the ambiguity and complexity of terminology since researchers and theorists seem to have emphasized different aspects of it and failed to come to a mutual agreement. For example, as she noted, in the literature *vocabulary knowledge*, *word knowledge* or *lexical knowledge* is frequently substituted by the terms 'lexical competence'

(Henriksen, 1999), 'vocabulary knowledge scale' (Wesche & Paribacht, 1996) or 'vocabulary knowledge framework' (Meara, 1996), which all accentuate different dimensions of knowing a word. What researchers do agree on is the fact that vocabulary knowledge should be regarded as a continuum (or continua) and there are several dimensions which need to be taken into consideration.

Based on the theoretical background and research findings of the time, Richards (1976, cited in Ma, 2009) highlighted eight aspects of word knowledge: frequency, register, syntax, derivation, association, semantic values and polysemy, which were adopted by the next generation of researchers. Ma (2009) poses challenge to Richards' theory for two reasons: on the one hand, it lacks some dimensions, such as pronunciation, spelling and collocational behaviour (Qian, 2002), while on the other, this framework is too teacher-oriented and cannot be followed as a suitable model for a theory-based description of vocabulary acquisition (Meara, 1996).

At the emergence of the vocabulary knowledge research paradigm, the most complete and useful description of word knowledge was given by Nation (1990), consisting of eight word categories: spoken form, written form, grammatical behaviour, collocational behaviour, frequency, stylistic register constraints, meaning, and associations of a given word. These categories include both receptive and productive skills.

As a starting point, Meara (1996) proposed that research on vocabulary acquisition

must take a more comprehensive approach and suggested three facets of this complexity, which would need to be addressed: the issue of size (breadth of vocabulary), the richness of lexical structure (the strength of the links between words in the lexicon) and the automaticity of lexical access (how words can be retrieved from the lexicon).

In an attempt to define a construct for vocabulary knowledge, Chapelle (1998, cited in Ma, 2009) outlined four complementary traits of lexical knowledge: (1) vocabulary size, (2) comprehension of word characteristics, (3) the organization of the lexicon and, finally, (4) lexical access. Chapelle's definition incorporated Richards' eight features as well as Meara's more theoretical framework.

A year later Henriksen (1999) constructed a new framework based on diverging but complementary aspects of word knowledge, which he sees as dichotomous: (1) the 'partial-precise knowledge' of words, (2) 'depth of word knowledge', and (3) receptive-productive knowledge.

Qian (2002) combined the basic constituents of earlier models and proposed four intrinsically related lexical knowledge components: (1) vocabulary size, (2) depth of word knowledge, (3) the organization of the lexicon and (4) the automaticity of receptive-productive knowledge, that is, how fast words are accessed for receptive and productive use. One obvious feature of his theory is that the dimension of depth of word knowledge includes the characteristics of Richards' (1976, cited in Ma, 2009) framework.

In conclusion of this section, it can be stated that the more practical models of vocabulary knowledge rely on first language word knowledge characteristics (e.g. Richards, 1976), while the more theory-based frameworks (Meara, 1996; Henriksen) focus on the underlying processes of vocabulary acquisition. One seemingly obvious duality of the frameworks reviewed is the comprisal of the breadth and depth dimensions as well as receptive-productive continuum. There is also a clear consensus among researchers and theorists that all these capacities need to be developed for effective communication. However, as Ma (2009) proclaimed, various aspects of vocabulary knowledge are often mixed up and used interchangeably.

2.9 Diving deeper – depth of word knowledge

So far various dimensions of vocabulary knowledge have been outlined; now the main focus will be on one component of the above-mentioned: depth of word knowledge. It must be noted that due to the various interpretations of vocabulary knowledge and depth of word knowledge, there is some overlap with the previous section; however, from the point of view of the present study, the notion of deep word knowledge is the most relevant one.

2.9.1 Criteria for depth of word knowledge

Earlier Anderson and Freebody (1981, as cited in Read, 2004, p. 211) defined depth of word knowledge as "the quality of understanding of a word", which means that a word can be considered known by a learner if all the distinctions that would be understood by an adult native speaker in normal conditions are clear to them. This definition refers only to precision of meaning and disregards the fact that several high-frequency words might have numerous meaning senses or are vague (especially when seen out of context, as it happens in many test situations). Furthermore, the term 'adult native speaker' is also problematic as it is hard to define who counts as an average native speaker (see Davis, 2003).

The second way of describing depth of word knowledge was suggested by Henriksen (1999) as *network knowledge*. In his view, the greater a learner's vocabulary size, the more there is a need for new words to be incorporated into an already existing network of words, which therefore needs to be restructured. Thus, in his view, depth of word knowledge is the ability to relate to semantically linked words.

The most comprehensive definition of depth of word knowledge was constructed by Nation (2001). His framework clearly separates the dimensions of receptive and productive knowledge and, as opposed to the prior version of the model (see section 2.8 on vocabulary knowledge), synthetizes three aspects of word knowledge for each: (1) word form (containing orthography, spelling and parts of the word (affixes), (2) word meaning (the connection

between form, meaning, concepts and associations) and (3) word use (including grammatical function, collocational behaviour and constraints on use, such as the frequency or stylistic register of the given word).

In sum, Figure 14 illustrates the criteria for lexical depth. Read (2004) emphasized that Nation's list of components of word knowledge is the most well-defined and comprehensive, especially for practical purposes, such as vocabulary teaching or testing. However, for purposes of a deeper analysis it is important to look into network knowledge, as this enables us to shed light on the sophistication of the semantic network and not just individual words. Therefore, in the present study Nation's (2001) approach is applied with some modifications (for details and reasons, see section 3.4.3) complemented with Henriksen's (1999) view of the importance of a particular word's incorporation into the mental lexicon as a basis for conceptualizing depth of word knowledge.

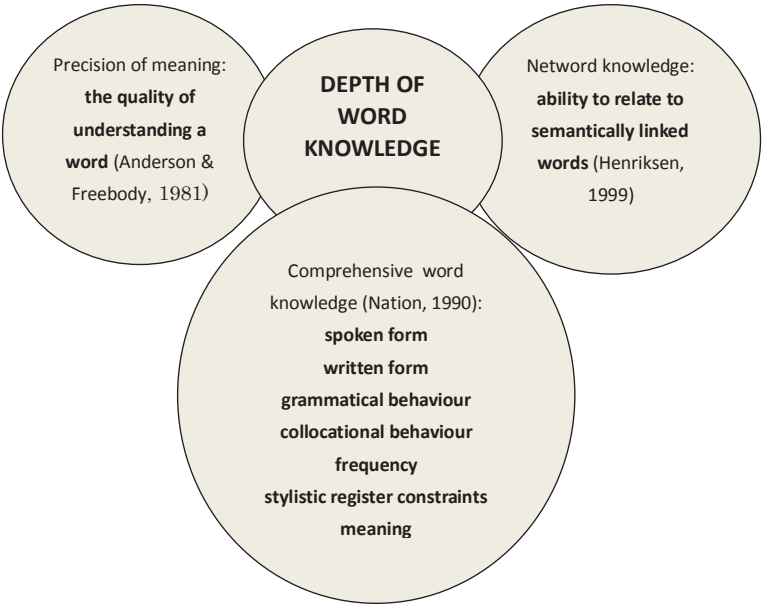

Figure 14. Critera for depth of word knowledge.

2.9.2 Research on depth of word knowledge

Schmitt (2010) described two main approaches for the investigation of lexical depth. The *developmental approach* explores the incremental nature of vocabulary acquisition, that is, how vocabulary knowledge develops along a continuum. On the other hand, the *dimensions* or *components approach* aims to specify the elements that constitute word knowledge and establich connections between them. Most researchers agree that researching depth of word knowledge is complex and time-consuming as it is extremely difficult to investigate all the components (e.g., Read, 2004; Schmitt, 2010). Furthermore, there is still a lack of appropriate measures for assessing the various kinds of word knowledge and research needs to be

longitudinal in order to show vocabulary development.

Earlier research on deep word knowledge set out to construct formal tests in an attempt to assess the quality of knowledge of individual vocabulary items along the developmental dimension. One of the most well-known of these is the vocabulary knowledge scale (VKS), developed by Paribakht and Wesche (1993, 1996; but see also Wesce & Paribakht, 1996). In this test format, test-takers are given a five-point scale on which they can rate their knowledge of a given word. Although the test was originally intended to measure vocabulary development as a result of reading, it has been widely applied in vocabulary acquisition research. One feature of the test is that it attempts to investigate both receptive and productive knowledge. Furthermore, it partly relies on self-rating; but test-takers are invited to provide evidence of their knowledge in the form of writing a synonym, a translation equivalent or a sentence (see Figure 15). In an attempt to further distinguish between receptive and productive skills, the test was improved, resulting in six scales: there are two ways of scoring for category three, depending on whether the answer provided by the test-taker is correct or not. One problematic aspect of the test is its inability to account for multiple meanings, which excludes the possibility of testing polysemous words (Santos, 2002).

I. I have never seen this word.
II. I have seen this word before, but I don't know what it means.
III. I have seen this word before, and I think it means _____ (synonym or translation)
IV. I know this word. It means _____ (synonym or translation)
V. I can use this word in a sentence: _____

Figure 15. Vocabulary Knowledge Scale (adopted from Paribakht & Wesche, 1993).

As regards the dimensions approach of lexical depth, few studies have ventured to investigate the connection between the various components of deep word knowledge. One exception is an exploratory study by Schmitt and Meara (1997), who investigated how two components of word knowledge (word associations and verbal suffixes) change in terms of receptive and productive knowledge. Their participants were secondary and post-secondary Japanese students, who were tested twice on their word association and derivational knowledge of 20 verbs. Their findings showed that even though word association knowledge and grammatical knowledge correlated with each other, there was considerable individual variation and no significant development. Nevertheless, their research is significant from the point of view of formulating the hypothesis that certain components of deep word knowledge may prove more valuable as predictors of L2 vocabulary development.

In a longitudinal study Schmitt (1998a) traced the knowledge of 11 words over a period of a year of three advanced non-native speakers of English. He measured four kinds of

word knowledge (spelling, associations, grammatical information as well as meaning) and came to four conclusions: (1) the least problematic area was spelling, (2) the participants' knowledge of the meaning senses of words improved over time, (3) some of the word knowledge types are interrelated, (4) there was no evidence for developmental hierarchy between word knowledge types. As regards the limitations of his study, he was the only rater, there were only three participants and no factors affecting the results were explained.

The findings of the studies that aimed to explore these interrelationships indicated that even though word association knowledge and grammatical knowledge correlated with each other, there was considerable individual variation and no significant development (Schmitt & Meara, 1997) and there was no evidence for developmental hierarchy (Schmitt, 1998a). For a detailed analysis of research on individual word knowledge types, see Schmitt, 2010.

As regards the exploration of the concept of network knowledge, the most appropriate and to date prevalent research technique is considered to be the word association task (Read, 2004); therefore the next part of the review is devoted to theories and empirical research on word associations.

2.10 Word associations

Perhaps due to the relative ease of measuring network knowledge through quick and easy to administer word association tasks, this component of word knowledge has gained distinguished attention in second language research and. In fact, it is no exaggeration to say that recently the word association paradigm has received distinguished attention among researchers (e.g., Cremer et. al, 2011; Schmitt et. al., 2011).

A word association task is defined as one where speakers of a language are given a set of stimulus words one by one and they are instructed to give the first word that comes to their mind (Read, 2004).

Word associations were first used by cognitive psychologists in an attempt to reveal the thought processes of human thinking, based on the assumption that associations to simple stimulus words could in fact reflect the more complex individual thought processes of humans (e.g. Cramer, 1968, cited in Zareva, 2007). The next level of associative research was based on the assumption that responses to stimulus words would provide information about "the way individuals construct their sets of meaning" (Deese, 1968, cited in Zareva, 2007, p. 124-125).

2.10.1 Categorization of word associations

By tradition, three categories of word associations have been identified: paradigmatic, syntagmatic, and phonological or 'clang' responses (Ervin, 1961; Entwisle, 1966, cited in Wolter, 2001). As it can be seen on the left side of figure 14, *paradigmatic* responses have the same grammatical function as the prompt word and can be of four types: superordinates, subordinates, coordinates, synonyms and antonyms. If we take the prompt word 'accident' as an example, the associative response 'misfortune' is a superordinate, whereas 'dog bite' belongs to the the lower category of subordinates as it is a type of accident. The response 'crash' could be considered a coordinate as well as a synonym, while the word 'miracle' is an antonym (in a specific context). *Syntagmatic* responses have a collocational or sequential relationship with the prompt word, and are not from the same word class. To illustrate this using the same prompt word 'accident', the words 'have', 'cause' 'car' and 'serious' all show a collocational relationship. *Phonological* or '*clang*' associations are semantically unrelated but similar-sounding words, such as 'access' or 'exercise' for the word 'accident'.

Some researchers have also coined and applied terminology outside the paradigmatic-syntagmatic-clang distinction. Read (1993), for example, later added a fourth category: *analytic* responses, which could be a definition of characteristics, as if explained in a dictionary. An analytic response for the word 'accident' could be that 'it is negative'. De Groot, on the other hand, differentiated between *objective* vs. *subjective* semantic relations

(1980, cited in Cremer et al., 2011). Objective associations refer to common or typical responses, whose connection to the stimulus word is understood by all users of the language, such as ‘hospital’ for the prompt word ‘accident’. As opposed to this, subjective responses are idiosyncratic and relate only to the individual user of the language; for example ‘accident’-‘childhood’.

Originally, the traditional categorization of responses into paradigmatic, syntagmatic and clang associations was based on the premise that the aim of word association research was to compare the L1 and L2 learners, hoping that as non-native speakers become more proficient, their responses will resemble those of native speakers. However, some important concerns continually raised by Meara (as cited in Fitzpatrick, 2009), namely that there is not enough sound empirical evidence for developing native-likeness, questioned the methodology of previous studies, especially the method of classification as well as the number and type of stimulus words selected. In light of these concerns, Fitzpatrick (2006) challenged the previously used and widely accepted system of response classification and recommended the use of new categories.

As it can be observed in Figure 14, there are some overlaps with the old-type classification and that of Fitzpatrick’s (2006), which she herself admitted (Fitzpatrick, 2009). However, her justification for the new coding system is two-fold. One the one hand, she argued that its transparency makes it easier to use in research, while on the other hand, the

categories themselves are more detailed and therefore allow for more precision. After establishing the type of connection between the stimulus word and its response and determining whether it is based on meaning, position or form, various subcategories (four for meaning, three for position and two for form) can be selected.

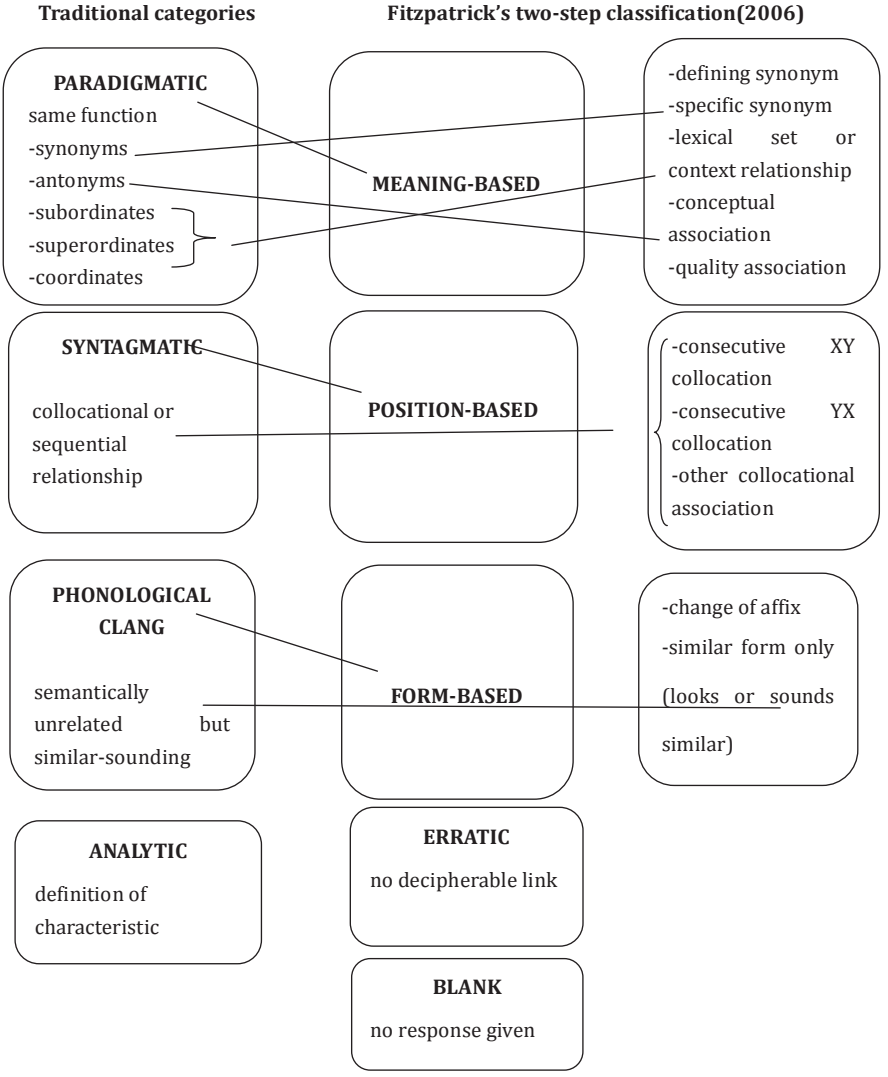

Figure 16. Categorization of word associations (based on Wolter, 2001; Fitzpatrick, 2006, 2007, 2009).

In the following the similarities and differences in the two categorization systems will be considered. First, instead of the term paradigmatic, Fitzpatrick (2006, 2007) recommended the use of meaning-based associations. In practice, this renaming does not entail significant change due to the fact most of the subcategories are analogous and account for the same concepts. If we take the previously mentioned example of the word ‘accident’, ‘crash’ is a defining synonym in Fitzpatrick’s terminology as it means the same as the stimulus word. However, she also distinguishes between defining and specific synonyms, which may mean the same in a specific context. An example for this kind of synonym could be ‘misfortune’ for the prompt word ‘accident’. As for coordinates, subordinates, superordinates and meronyms (words that are parts of a larger whole), they are referred to as belonging to the same lexical set and having a contextual relationship, such as ‘dog bite’, in our case. I believe that except for the extra details, the paradigmatic and meaning-based ways of categorization show basically the same patterns. This means that a paradigmatic association would probably not be counted as anything else but meaning-based.

The conceptualization of the second aspect, the notion of a word being position-based also seems to be covering similar aspects as the syntagmatic paradigm as it describes collocational behaviour. However, here the emphasis is placed much more on viewing the mental lexicon as a systematic entity because a position-based association already indicates the possibility of sentence production.

As far as the form-based vs. clang dichotomy is concerned, it is apparent that Fitzpatrick's categorization accounts not only for phonological but also for orthographic similarity; furthermore, words that are changed with an affix (meaning that the association is the original word +/- a suffix or prefix), Fitzpatrick advocates the greatest change compared to the traditional system. If we take the example of 'appear', 'disappear' would be regarded as a paradigmatic response (same word class); however, in this classification it is form-based. Likewise, changing the word 'accident' into 'accidental' would call for a syntagmatic categorization, whereas hereby it is referred to as form-based. This is problematic because it is extremely difficult in the case of every stimulus word to ascertain what the exact thought processes of participants were prior to selecting an association, and which category would be more suitable. Since Fitzpatrick's framework is relatively novel, we have yet to see the methodological considerations of how it can be applied in research.

One study that has addressed this issue is by Wilks (2009), who, as part of a large-scale project, conducted an interview study with six participants in order to explore their attitude and approach to a word association task. She found a mismatch between expert categorization and participants' intention of using certain associations: all the interviewees claimed to have been driven by the meaning of the stimulus word when selecting a response. This appears to contradict some of Fitzpatrick's taxonomy and was taken into consideration in the research methodology of the present study.

2.10.2 The use of word associations in the mother tongue

By tradition, as Zareva (2007) expounds, research into word associations has been carried out adopting both quantitative and qualitative paradigms; however, the former has been dominant. Besides calculating the number of responses, quantitative measures have also been applied in order to establish the strength of the link between the stimulus word and the responses as well as to observe how common, how varied and how distinct the responses were. On the other hand, in an attempt to investigate word association domains, researchers have also tried to categorize and classify word associations, in most cases by documenting their proportions.

Based on the finding that, in spite of different learning experiences and backgrounds, respondents tended to produce identical responses, the first line of research undertaken by experimental psychologists focused on commonality and the analysis of primary responses. The former can be defined as "the frequency of occurrence of any three most commonly given associations to a stimulus word determined in terms of their absolute frequency of occurrence in a word association data set", while the latter is "a response that occurs with the greatest frequency to a given stimulus word" (Zareva, 2007, p. 125).

As far as qualitative approaches are concerned, researchers soon acknowledged the need to tap into the relationship and organization of words in language, which could be achieved by analyzing the types of associations and distinguishing between paradigmatic and

syntagmatic responses. Apart from emphasizing the supremacy of semantic relations, this distinction also acknowledges the importance of syntax: paradigmatic responses, due to the fact that they belong to the same lexical category, can in fact occupy the same position in a sentence, whereas syntagmatic responses assume different positions and therefore indicate juxtapositional relationships (Zareva, 2007).

Wolter (2001) gave an overview of early first language association research in the 1960s (Brown & Berko, 1960; Ervin, 1961; Entwisle, 1966; Palermo, 1971; cited in Wolter, 2001), in all of which associative responses of primary school children of different ages were coded according to word association types and compared to each other. Wolter reported that the ratio of paradigmatic responses increases with age. In addition, it was also found that unclassifiable and clang responses decrease as children become older.

In a subsequent study Cronin (2002) tested fifty-nine children divided into two groups based on their age (with an average of 5.4 and 6.2 respectively) at the beginning of the experiment. Their responses to stimulus words were analysed on three occasions and it was found that while the younger group tended to produce a higher proportion of syntagmatic responses as time passed, the older group provided a higher number of paradigmatic responses, which the author attributed to their development in reading. This particular phenomenon in first language acquisition, confirmed by several other research studies, has been referred to as the *syntagmatic-paradigmatic shift* or *developmental shift*, and can be

explained by the cognitive and lexical development in the L1 mental lexicon (Wolter, 2001).

2.10.3 The use of word associations in second language acquisition

Although associations were originally used to assess the cognitive development of children in their mother tongue, in the last three decades they have been adopted by second language researchers thanks to the ardent work of Meara (for an overview of his contribution to research on word associations, see Meara, 2009) with four main aims: (1) to compare native and non-native speakers, (2) to research patterns of word types and lexical retrieval in bilingualism, (3) to assess word knowledge in L2 and (4) to explore lexical organization in the mental lexicon (see Figure 17). The following sections will focus on this topic.

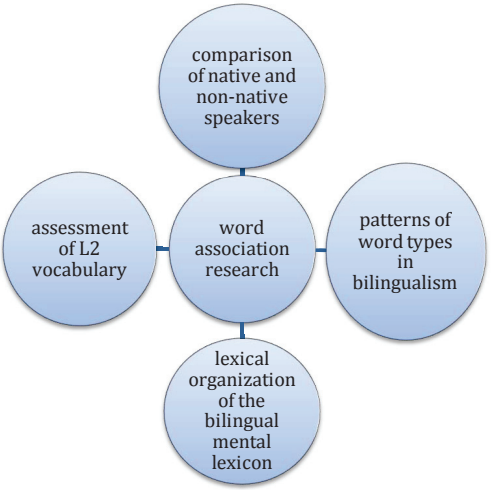

Figure 17. The use of word associations in second language acquisition.

Schmitt (1998b) claimed that there were several advantages to using word association tasks in second language research. On the one hand, it is a simple and quick procedure: after being given a stimulus word, respondents are asked to produce the first response that comes to their mind, while on the other, it yields much richer data about the respondent than any other traditional vocabulary test.

2.10.4 Comparison of native and non-native associations

By comparing the associations of native and non-native speakers, researchers have attempted to find out to what extent associations given by non-native speakers are similar to those of native's (Piper & Leicester, 1980; as cited in Wolter, 2001, Meara, 2009; Schmitt, 1998b).

Meara (1983) was among the first to hypothesize that there was a systematic difference between the way native and non-native speakers associate, claiming that their responses varied to a greater extent than those of native speakers despite their supposedly more limited vocabulary. He called for further research but at the same time raised several problems and initiated the abandonment of the most popular research tool with which associations had been measured in most prior studies: the Kent-Rosanoff list (1910, cited in Meara, 2009). He based this argument on three grounds. The first one was that the test comprised highly frequent words, which might have been the reason why it yielded similar

responses by native speakers, for whom the test was developed in the first place. The second reason also originates from the frequency of the words in the list, namely that it can only measure a very limited scope of second language learners' vocabulary and could not be used to assess advanced L2 speakers. Thirdly, he drew attention to the fact that it is unreasonable to expect second language learners to behave similarly to monolingual native speakers, simply because they are bilingual and hence different.

As far as categories of word associations are concerned, when native speakers were compared to intermediate and beginner learners of English (with Japanese as L1) in Piper and Leicester's study (1980, as cited in Wolter, 2001), it was found that for the verbs and adjectives native speakers produced the highest number of paradigmatic responses, followed by intermediate EFL learners and the lowest proportion was produced by the beginner group. However, with respect to nouns little difference was found between the groups. This also supports the assumption that non-native speakers show development in response type for nouns at an earlier stage, similar to native speaker children.

Schmitt (1998b) pointed out several pitfalls which had characterized previous research studies and aimed to overcome them by proposing a procedure for analyzing and quantifying the word associations of non-native speakers. One such drawback, according to Schmitt, is that in the norming process the differences between native speakers' responses cannot be fully taken into consideration. In addition, the fact that most research studies had relied on one

single response might distort the data gained by natives as well as by non-natives. Therefore, he recommended using multiple responses, which could then be weighted according to order and frequency. Moreover, he argued that there is a need to set a threshold from which associations can be considered native-like and went on to propose a four-point scale of native-likeness. Wolter (2001) listed other problematic features of studies comparing native and non-native speakers' word associations: either they applied a limited number of fairly common prompt words whose responses can be easily predicted or, if lower frequency words were used, then the responses became varied and at places "child-like".

Fitzpatrick (2007) also challenged the findings of previous research studies and set out to investigate whether the seemingly accepted assumption about the homogeneity of native speaker responses still held. She came to the conclusion that responses tended to differ depending on the frequency and abstractness of the word; however, individual participants demonstrated a tendency to respond in consistent ways. Fitzpatrick (2006) also concluded that even though significant differences could be traced between natives and non-natives in certain word association categories, in general, non-native speakers have not been shown to emulate native speaker behaviour as their proficiency develops.

2.10.5 Word associations in bilingualism

Following the qualitative paradigm of L1 word association research, lately first language word association research has generated considerable interest in studies on bilingualism, with a special focus on children.

In a recent study Sheng et al. (2006) asked twelve monolingual (only English) and twelve bilingual (Mandarin-English) children (whose mean age was 7) to give three associations to 36 prompt words. After coding the responses as paradigmatic and syntagmatic, the research team established a correlation between the first and second language association use of bilingual children and they also discovered a similarity between the responses of monolingual and bilingual children. However, it was also revealed that when the two groups were compared on the English measures, the bilingual children gave a slightly higher number of paradigmatic responses during the first elicitation as well as for verbs.

In the authors' view, these two findings correspond with those of previous studies (e.g. Cronin, 2002) in that the children found it more difficult to provide paradigmatic associations for verbs than for nouns or adjectives. Based on the outcomes, Sheng et al. confirmed the conclusion of earlier studies that bilinguals' first and second language semantic skills develop in converging ways; furthermore, they anticipated that bilingualism may influence the paradigmatic organization of the mental lexicon and acknowledged the need for further evidence.

Although most research has been concerned with children and early bilingualism, there are a few studies that have aimed to compare children and adults (see Cramer et. al, 2011 in section 2.10.7) or early and late bilinguals. In a study that investigated the role word class plays in lexical storage in the case of early and late bilinguals (n=90 and the dividing line was whether the participants had become bilingual before or after age 3), Navracsics (2007) found the paradigmatic link to be the stongest one, but as far as the effect of bilingualism is concerned, she found a more distinctive presence of syntagmatic associative behaviour for late bilinguals.

2.10.6 Assessing vocabulary to test proficiency through word associations

A third school of researchers have applied word associations for assessing productive vocabulary in order to test proficiency. Similar to the previously mentioned research fields, this paradigm was also started by Meara (1983), whose YES/NO test format was created with the intention of measuring learners' vocabulary size. This format is extremely simple to use and administer: test-takers are invited to mark whether they know the meaning of a target word or not. In reaction to criticism that the test only measured receptive vocabulary, a new instrument was developed: the Lex 30 task (Meara & Fitzpatrick, 2000).

The Lex30 test is a basic association task, in which respondents are given prompt 30 words and asked to associate freely. It is free and productive in the sense that the target words

are not predetermined; however, the nature of the words places certain constraints on the associations, limiting the difficulty of administering and scoring. In a test version of Lex30 Meara and Fitzpatrick (2000) awarded points for each unusual response. Although considerable correlation was shown between the association test and a receptive vocabulary test, even the authors argued that further research needed to be carried out in order to make this test more reliable.

Greidanus and Nienhuis (2001) created a more controlled format for testing vocabulary knowledge: participants were asked to select the three correct associations from six responses and the distractors varied in difficulty. It was found that the more semantically related the distractors were, the more likely that the participants would fail to find the correct answer. Furthermore, a preference was shown for paradigmatic responses.

Wolter (2002) described the following problems with previous research into using word associations for the testing of proficiency: selection of words, scoring, the fact that norming was done on native's single responses as well as the number of responses allowed. He constructed a new and simple word association test but could not establish solid foundation for the notion that word associations could be indicative of proficiency. Thus he suggested that, expanding the ideas of the first school of tradition, word associations could be applied to prove whether the native and non-native mental lexicons are structurally similar or fundamentally different (Wolter, 2001).

In a review article Read (2007) summarized his own contribution to the field of word association research, the word associates test or format (WAF/WAT) (Read, 1993), in which the central concept is the formation of connections with the help of associations. The WAF contains items that comprise a target word and six or eight associations, half of which are clearly related to the prompt word, while the other half are not. The link between the stimulus word and the others can be established based on semantic or collocational relationship, and in some cases it can also assess polysemy. The test has been widely used either in its original form (e.g. Qian, 1999; Qian, 2002, Qian & Schedl, 2004) or with some modifications (e.g. Greidanus & Nienhuis, 2001) and researchers have published promising results, especially in relation to the relationship between word association knowledge and reading performance (Qian & Schedl, 2004). Qian and Schedl went so far as to suggest using WAT items instead of multiple choice one in the TOEFL exam.

The most recent study published by Schmitt et. al (2011) challenged prior WAT research on the grounds that they appear to lack appropriate validation. In the paper, which contains two studies, they address such issues as scoring, respondent behaviour, the role of guessing and the effect of distractor types. Furthermore, they also aimed to investigate what type of lexical knowledge the test demonstrates and whether the 6-item or the 8-item format is more reliable. The first study is an interview study based on test-taking behaviour and strategy use and its influence on actual vocabulary knowledge and its reflection on scoring, while the

second investigation applied modified versions of the previous interview protocol with a special emphasis on the format and distractor types as well as methods of scoring. Finally, they concluded that despite the obvious merits of the test, in its present form, it is not reliable and accurate enough to be used in high-stakes examinations, as Qian and Schendl (2004) proposed. Schmitt et al. (2011) also warned that although the test adequately measures participants' vocabulary knowledge with low and high points, scores in the middle range require more detailed interpretation.

2.10.7 Exploring the mental lexicon through word associations

The last and most recent line of enquiry to be elaborated on is how the word association task has advanced our current view of modeling second language vocabulary knowledge as a complex network. In this sense it can be said that it is still vocabulary knowledge that is being investigated but there has been a paradigm shift towards the investigation of the knowledge of relations in order to show the interrelation and organization of words and concepts in the mind (Cremer et. al, 2011). This line of investigation also coincides with Henriksen's (1999) view of depth of word knowledge.

An example is van Hell and de Groot's study (1998), where the authors found that Dutch bilinguals, who were asked to associate once in the language of the stimulus word and once in their mother tongue, used more translations for concrete words, cognates (similar

words in L1 and L2) and nouns than for abstract words, noncognates and verbs, which might indicate that different word types might be stored in different places in the bilingual memory. This has been verified by Wolter (2001), who, through investigating how depth of word knowledge affects the connections an L2 word had with other lexical items in the mental lexicon, found that the better known a particular word was, the more central the position it occupied in the lexicon (see Figure 18). Furthermore, paradigmatic connections were formed in the centre, syntagmatic associations were typical further outside and phonological responses were found on the periphery, indicating that there is a much looser connection to other words as the speaker's knowledge of the depth of a word decreases.

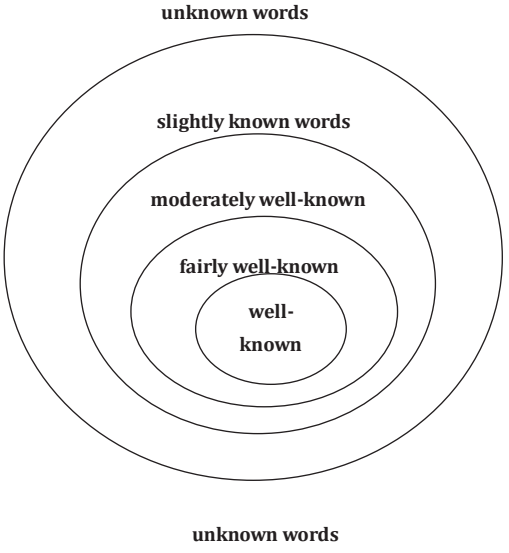

Figure 18. Wolter's (2001) depth of word knowledge model of the mental lexicon (p. 48).

Lately researchers have been intrigued by the use of computer modeling as a source of insight into the structure of the mental lexicon with a special focus on the dictinction between receptive and productive knowledge (Meara 2007, 2009). Involving the application of graph theory for modeling lexical connections, Meara and his colleagues have been exploring the possibilities of estimating the connections that exist between words in the mental lexicon. Due to the novelty of this line of research, Meara has been cautious not to form premature conclusions; however, based on the links in the network structure, there is one fascinating preliminary finding: there is a clear-cut dichotomy between active and passive vocabulary and it is not a continuum, as has been postulated for so long. Naturally, this calls for further investigation.

Another field of inquiry has been the significance of the age factor with regard to word association use. In a recent exploratory study Cremer and associates (2011) compared the differences in the responses of monolingual and bilingual children and adults. Based on the bulk of data generated by the 476 particpants, they found that associations tended to diverge more in the case of children and monolingual speakers across word association categories. Their primary finding was that age plays a determining role in association responses, which confirms the significance of conceptual development in the mental lexicon, and they also concluded that bilingualism enhances word association use.

2.10.8 Conclusion of the findings of association research

As has been demonstrated, with the revival of second language vocabulary research, there has been an abundance of investigations into lexical access and organization in the bilingual lexicon. However, to date no consensus has been reached with regard to the most challenging question of whether the L1 and L2 lexica are connected or separated. In the following I would like to present the empirical evidence for both arguments.

First, the findings in support of the similarity of L1 and L2 lexicons are as follows:

1. Both native and non-native speakers experience the syntagmatic-paradigmatic shift in their responses but it comes earlier for nouns than for adjectives and verbs.
2. Both unclassifiable and clang responses become less frequent with age (for natives) and with higher proficiency (for non-natives).
3. Both native and non-native speakers demonstrated a large diversity of responses when the prompt word was a low-frequency or abstract word.

On the other hand, there are findings which discredit the similarity of the L1 and L2 mental lexicons:

1. Connections in L2 lexicon are less stable than those of native speakers.
2. Phonology has a more important organizing role in the organization of the L2 lexicon.
3. The semantic links of natives and non-natives differ in a systematic way.

In sum, the word association task is a valuable research tool which has been of relevance in the field of second language vocabulary research, especially with regard to lexical organization.

2.11 Conclusion: limitations of previous research and rationale for the present study

One of the shortcomings of previous studies is that few investigations have been made into the actual organization of the bilingual lexicon and there is still a mismatch between theory and research methodology.

As regards researching the components of deep word knowledge, Figure 19 summarizes Schmitt's (2010) recent overview of its advantages and disadvantages. What clealy transpires from the review of the literature presented in this chapter is the lack of data (Schmitt's original depth of word knowledge investigation was undertaken in 1998) with regard to the specific components of lexical knowledge. Therefore the aim of the present study is to overcome some of the methodological issues raised by Schmitt and focus on what is amenable in order to investigate as many components of deep word knowledge as possible.

Merits of researching the components of deep word knowledge	Limitations of researching the components of deep word knowledge
• it is comprehensive in nature • it produces a rich description of vocabulary knowledge • it breaks down the complex bahaviour of vocabulary acquisition into manageable components for analysis • it allows for the establishment relationships between the various categories • it allows for a developmental order to be established • it might show the movement from receptive to productive knowledge	• the number of lexical items that can be tested is limited • research on the various components is time-consuming • it is very difficult to examine all the components within one study • some of the depth of word knowledge components are more difficult to assess than others (e.g., formality)

Figure 19. Issues of depth of word knowledge.

In conclusion of the word association paradigm, it is apparent that, especially compared to research on lexical depth, there has been a bulk of data generated. Word associations have promoted a deeper understanding of second language acquisition in four main areas: comparison of first and second language language use, bilingualism, vocabulary assessment and the structure of the mental lexicon. Although there is no doubt that research in all these fields has yielded important results, I believe that the most controversial and yet most promising avenue is the exploration of the bilingual lexicon.

To date the findings seem to confirm the existence of a bilingual lexicon, where various L1 and L2 lexical items are connected with each other to a varying degree and various word types might be stored at different places. Nevertheless, as most research has been

concerned with native speakers or advanced L2 learners (except for Piper and Leicester, 1980; Bell, 2009), it would be interesting to gain more insight into the mental lexicon of less advanced learners of the language. As regards data analysis, as recently new measures have been introduced for the analysis of responses (Fitzpatrick, 2006, 2007, 2009) and they have only been tested in a few contexts, incorporating them would prove to be useful. Wilks (2009) has also emphasized the necessity of investigating individual associative behaviour.

2.12 Research questions and hypotheses

Based on the findings and limitations of previous research studies mentioned in the review of literature, the pivotal aim of this investigation is the exploration of depth of word knowledge with a special emphasis on the lexical network of the mental lexicon. In order to achieve this, fourteen students were tested on their deep word knowledge of twenty-one words three times from September, 2005 to January, 2007. The study was guided by the following research questions:

1. What characterises the participants' depth of word knowledge of the selected 21 words at pre-intermediate level?
2. How does the participants' depth of word knowledge change over the period of 16 months?
3. Is there a developmental order for the depth of word knowledge categories?

4. How are words organized and connected in a pre-intermediate learner's mental lexicon?
5. What changes take place in the mental lexicon of pre-intermediate learners in 16 months as their language proficiency develops?
6. What does the change in the depth of word knowledge and association use imply about the organization of the bilingual lexicon?

In order to answer these research questions, the depth of word knowledge (spoken form, spelling, grammatical and collocational behaviour, word meaning and other meaning senses, word and sentence formation) of a group of pre-intermediate learners of English were explored in two different ways: (1) changes in their deep word knowledge were analyzed with the help of quantitative methods, (2) the nature of and changes in their assocatiative behaviour were observed with mixed methods techniques, relying on both qualitative and quantitative data (see Table 1 for details).

Table 1

Methods of Data Analysis for the Research Questions of the Study

Research questions	**Data sources**	**Methods of data analysis**
1. What characterises the participants' depth of word knowledge of the selected 21 words at pre-intermediate level?	Recorded interviews of a depth of word knowledge elicitation task based on 21 stimulus words on the first occasion (September, 2005)	Statistical procedures for spoken form, written form, grammatical and collocational behaviour, meaning and productive knowledge
2. How does the participants' depth of word knowledge change over the period of 16 months?	Recorded interviews of a depth of word knowledge elicitation task based on 21 stimulus words on 3 occasions (September, 2005; May, 2006; January, 2007)	Statistical procedures for spoken form, written form, grammatical and collocational behaviour, meaning and productive knowledge
3. Is there a developmental order for the depth of word knowledge categories?	Recorded interviews of a depth of word knowledge elicitation task based on 21 stimulus words on 3 occasions (September, 2005; May, 2006; January, 2007)	Statistical procedures
4. How are words organized and connected in a pre-intermediate learner's mental lexicon?	Five word associations given for the 21 stimulus words in a depth of word knowledge elicitation task on 3 occasions (September, 2005; May, 2006; January, 2007)	Word association classification (based on the review of literature) + statistical procedures
5. What changes take place in the mental lexicon of pre-intermediate learners in 16 months as their language	Five word associations given for the 21 stimulus words in a depth of word knowledge elicitation task on 3	Word association classification (based on the review of literature) + statistical procedures

proficiency develops?	occasions (September, 2005; May, 2006; January, 2007)	
6. What does the change in the depth of word knowledge and association use imply about the organization of the bilingual lexicon?	Recorded interviews of a depth of word knowledge elicitation task based on 21 stimulus words on 3 occasions with a special focus on word associations (September, 2005; May, 2006; January, 2007)	Comparison of the findings above with other models and research findings

3 Method

3.1 Introduction

The aim of the present research project was to explore the changes that take place during the course of sixteen months in fourteen participants' depth of word knowledge. Through examining all the word knowledge types (word meaning, spoken form, written form, grammatical and collocational behaviour, sentence formation, other word forms and meaning senses) with a special emphasis on word associations, I intended to develop a deeper understanding of the nature and organization of the mental lexicon of pre-intermediate learners, as well as the changes that occur in its structure. Following the line of research started by Schmitt and Meara (1997) and Schmitt (1998a), a further aim was to investigate the relationships between the different word knowledge components and perhaps set up a developmental order. To achieve this, the participants of this longitudinal study were given the same target words in English at three times over the period of sixteen months (September, 2005; May, 2006 and January, 2007), and changes in the depth of their word knowledge were observed in order to investigate the types of connections that exist between L1 and L2 words in pre-intermediate learners' bilingual lexicon as their language proficiency developed.

This chapter outlines the research methodology used in the dissertation, focusing on issues such as the rationale for the longitudinal research design, the selection of participants,

the process of word selection, the interview protocol and procedure. Subsequent to that, the various measurement procedures applied in the study are explained. The eight components of depth of word knowledge were assessed using quantitative research methods, such as descriptive and inferential statistical procedures. On the other hand, the word association task was explored with the help of mixed methods analysis, relying on both quantitative and qualitative observations.

3.2 Rationale for a longitudinal study

Data for the present longitudinal study was collected on three occasions: September, 2005; May, 2006 and January, 2007. The rationale behind arranging the data collection this way was to ensure that the same amount of time passes between the interviews. According to Menard (cited in Dörnyei, 2007), longitudinal research is defined by the data and the design used in the investigation, which is characterized by the following: first, data collection takes places two times or more; secondly, the same or comparable participants are used and, thirdly, the purpose of the analysis is to compare the data between the different time periods. Dörnyei states that there are two principal aims of longitudinal investigations: “to describe patterns of change, and to explain causal relationships” (p. 79). He emphasizes that even though there is a strong interrelation between these two purposes, they may not necessarily correspond as it is possible to “obtain precise information about the temporal order of events without detecting

any causal connection between these events" (p.79). This statement is particularly significant in the present longitudinal study on account of the fact that it would have been impossible to follow the development of each participant as their depth of vocabulary changed over two years. The reason for this is that apart from instructed learning, incidental vocabulary acquisition also takes place and even if a detailed description of the teacher's instruction is provided, it would not be feasible to observe every single influential factor that would contribute to the participants' vocabulary acquisition.

However, despite this shortcoming, it can be stated that the research design suited all the requirements of a longitudinal investigation, with the clear purpose of tracing the changes that take place in the depth of vocabulary knowledge over the course of sixteen months, given the exact same participants and variables.

3.3 Participants

The participants of the present research were a group of first year students (aged fifteen) in the non-bilingual section of a dual language secondary school in Budapest, therefore they can be considered representative of the Hungarian secondary school population. At the beginning of their studies the class was divided into two groups: a more and a less advanced one. At the beginning of the research the participants were "more advanced" at pre-intermediate level and they were to have five English lessons a week with the same teacher.

Therefore, it could be supposed that there would be great improvement in their command of the English language by the end of the academic year, as well as later on. One reason for selecting this particular group of students was the researcher's close contact with the teacher in question, which made the arrangement and operalization of the interviews easier. Another reason for experimenting with this particular group of learners was that because longitudinal studies are prone to participant attrition, it was in these circumstances (familiar teacher, secondary school environment) that the development of students could best be traced with minimal attrition.

The group consisted of seventeen students, but two of them having completed the zero year of the dual language section of the same school and studied English twenty lessons a week for the previous academic year, could not take part in the experiment due to the fact that their knowledge and level of English was higher than the others' even though they failed the end-of-year exam. It is also important to point out that one of the students changed groups with another student from the same class not long after the first phase of the experiment was conducted, and as it was not possible to arrange a suitable time for the second and third interviews, she had to be excluded. This way data was collected from fourteen participants.

Among the participants there were four boys and ten girls. Four students attended primary school in Kispest, five in Pestszentlőrinc, three in other districts close to the secondary school, one in the first district and in France, and one student in the countryside

(Martfű). The average number of years spent studying English prior to the study was 7, with the number of lessons increasing: the average number was three in the lower grades (1-4), and 4.5 in the higher ones (5-8). None of the students had ever spent considerable time in an English-speaking environment.

3.4 Instrument

3.4.1 Selection of the frequency list

Twenty-one target words were carefully selected from the second thousand words of the Brown frequency list (Francis and Kucera, 1982, cited in Nation and Waring, 1997, p. 12), which is available online (http://www.edict.biz/lexiconindex/frequencylists/words2000.htm). According to Nation and Waring (1997), there are four considerable word lists. The first one is the Teacher's Word Book of 30,000 words (Thorndike and Lorge, 1944), a list of 30,000 lemmas, which are based on a comprehensive list (18 million items) of written words. The General Service List (GSL), developed by West (1953), evolved from a 5 million word written corpus and provides percentage figures for the different meanings and parts of speech of the headword. Thirdly, the American Heritage Word Frequency Book (Carroll, Davies and Richman, 1971, cited in in Nation and Waring, 1997) is based on 5 million words used in American school texts and range figures were provided for different school grade levels and subject areas. Finally, the Brown, Lancater Oslo Bergen (LOB) and related corpora (Francis

and Kucera, 1982, cited in Nation and Waring, 1997) consists of several 1 million-word written corpora, where every dialect of English is represented and lemmatized word lists are used.

The rationale behind opting for the Brown list was three-fold: on the one hand, it was the most recent one and West's list had been criticized for using frequency studies from the first half of the twentieth century. On the other hand, in Engels' view (as cited in Nation and Waring, 1997), the GSL covers only the first one thousand words properly and lower frequency words need to be reconsidered according to topic and genre divisions. Furthermore, the Brown list takes all the different dialects of the English language into consideration.

3.4.2 Word selection

In order to prepare for the research design and select the appropriate vocabulary items to be tested in September, 2005, it was indispensable to establish the expected level of the students earlier than that, even if the final list could only be drawn up not long before the experiment. A difficulty that arose was that the students in question, just starting their secondary education, would only first enter the secondary school in September. Therefore, I tried to estimate the English knowledge of a Hungarian primary school leaver by administering a vocabulary levels test to two groups of fourteen-year-old pupils (altogether 29), in two different settings in Budapest: a six-grade secondary school in the centre of

Budapest (13 students), and a regular primary school (16 students) in the outskirts. The test was an adopted pen-and-paper version assessing the knowledge of the first thousand words (see Appendix A) developed by Nation and Laufer (1999) (adapted for www by Cobb, available at http://www.lextutor.ca/tests/levels/recognition/1k/test_1.html). The test is validated and measures controlled productive ability, and the task is for learners to decide if a sentence is true or not, through which they demonstrate their knowledge of a key word. The reason for deciding on testing the students on paper was that it would have been impossible to provide a computer and internet access for everyone. The scoring of the test is relatively simple: the number of correct responses divided by the total number give a percentage figure, which, in order to demonstrate productive knowledge of the first thousand words, should be over 0.83. The analysis of the vocabulary levels test yielded the following results: the mean score was 0.85 for group 1, and 0.78 for group 2.

On the basis of the above-mentioned, it could be concluded that the experiment would be most successful if words were selected from the second thousand words because even though the second group scored lower than the ideally required 83%, the difference was not substantial (only 5%) and the students' knowledge of the first thousand words could be verified. Therefore, the rational decision was to use the next thousand words because this way the words were likely to be receptively known by the participants at the beginning of the year but there was hoped to be a lot of room for improvement towards productive knowledge

during the year. However, applying less frequent words would have meant very limited or no initial knowledge by the participants.

Having limited the range of vocabulary to experiment with, the next step was to decide on the number of words to be assessed. Schmitt's research included eleven and my aim was to test more words, especially because learners in this case would be of lower level and the interview would probably take less time. Therefore, the number was raised to approximately twenty, as this would also allow for some words to be excluded if necessary, and still enough data would remain. More than that would be too taxing for the students in one interview. It was also of great importance that words should be representative of nouns, verbs and adjectives. Previous research studies preferred verbs and nouns because they tend to attract freer associations, so their higher ratio was kept; however, as more words are included in the present study, it was decided that some adjectives should be included as well.

It was also important to take into account the number of lessons the participants had a week as well as the books they use so that they would definitely be exposed to the words during the year. Therefore, an informal interview was conducted with the teacher and information was gathered about the curriculum he planned and the books to be used during the year (*Opportunities Pre-intermediate*, followed by *Language in Use Upper-intermediate*). This way it could be verified that the words of the experiment appear in the coursebooks and would be taught. However, the teacher in question had no idea about the words selected so his

teaching would in no way be influenced by them. Finally, the most important criterion for selection was that words had to have have depth in order to fulfill as many requirements of the categories as possible. Finally, twenty-one words were selected (for a detailed definition of the depth of word knowledge for each target word, including its word class, derivational forms, other meaning senses and examples of its most frequent collocations, see Appendix B). The words are listed below in Table 2.

Table 2

Words selected for the study

NOUNS (7)	VERBS (10)	ADJECTIVES (4)
• accident	• allow	• able
• advantage	• appear	• foreign
• advice	• concentrate	• successful
• experience	• develop	• worth
• interest	• decide	
• nature	• grow	
• reason	• laugh	
	• mean	
	• move	
	• relax	

As can be seen, the nouns selected fulfill several depth of word knowledge categories. First of all, all the words have more forms and are polysemous although it must be acknowledged that some of the the secondary meaning senses require an advanced level of

proficiency. Naturally, participants were not expected to exhibit the knowledge of other meaning senses of words such as *decide* (e.g., cause to reach a decision, as in the sentence *I was going to take a walk but the weather decided me against going.*) or *concentrate* (e.g., make or become denser, as in the expression *tomato concentrate*). However, *develop*, *move*, *experience*, *nature*, *grow* and *mean* all have meaning senses that the participants could be aware of sooner or later.

The grammatical behaviour of the lexical items selected is not so simple either. For some of the nouns the problem of being countable vs. uncountable arise, such as with *experience* or *advice*. The use of the article with *nature* is also a problematic issue, especially for Hungarians as there is a tendency to use it with a definite article (e.g., *I love being in the nature). In some other cases the preposition that can follow the word is of interest (e.g., *advantage*, *concentrate*, *successful* or *reason*); furthermore, they all have various collocational relationships. As far as the verbs are concerned, vebs with various verb patterns (e.g., in the case of *allow*, *mean* or *concentrate*) were selected in order to ensure variety.

The selection of the adjectives was a bit different in that two of them, *able* and *worth*, appear to be more difficult to translate from Hungarian or to explain their grammatical behaviour; however, it was with these words that the depth of word knowledge development could be more spectacular, which is why they were also included. Moreover, except for *successful*, their antonyms are not so obvious either, so the associations could also yield

interesting results.

3.4.3 The interview protocol

As Santos (2002) reported, interview protocols have been considered to be a useful methodological technique for investigating deep word knowledge due to the fact that "the one-on-one format facilitates extensive probing of a learner's network of meanings related to a particular word" (p. 21), which justified the use of it in the present study, despite its tiresome and lengthy nature. In the following, both the questions and the rationale behind ordering them in the way they appear are to be explained.

The following questions were asked about each word on all the three occasions in a strictly structured format:

1. Do you know how to say the word *baleset* in English? (accident) – *to elicit the spoken form + word meaning*
2. Can you spell it? – *to elicit the written form*
3. What words come to your mind when you hear this word? (either in English or in Hungarian) – *to elicit associations*
4. Do you know what part of speech this word is? – *to elicit grammatical behaviour*
5. Do you know any other forms of this word? – *to elicit other forms of the same word*
6. Can you think of any other meanings of this word? – *to elicit other meaning senses*

7. Could you say a sentence with this word? – *to elicit productive knowledge*

8. Can you think of any collocations of this word? – *to elicit collocational behaviour*

Figure 20. Depth of word knowledge information elicited about the word 'experience'.

Schmitt's (1998a) interview protocol was the starting point in the present study; however, due to the fact that he aimed to analyze only four aspects of word knowledge – spelling, associations, grammatical behaviour and meaning senses – the other categories had to be incorporated as well. In addition, as the aim here was to elicit the spoken form, it was decided that the interview should begin with the Hungarian equivalent of the word. This also made it possible to elicit a meaning sense at the same time, and for Hungarian learners of

English it is quite traditional to have to learn meaning senses in Hungarian. A disadvantage of involving the Hungarian word might be that students could easily remember the Hungarian word and relate to that instead of the English one when asked about associations and grammatical information; still, this did not seem to be the case because the second and third questions focused on the spoken and written forms of the word, and the Hungarian word was not mentioned any more.

In order not to confuse students later on, associations were invited right after the spoken form and the written form were consolidated. For eliciting word associations, both English and Hungarian responses were allowed. The rationale behind this was partly the participants' low level of English, but partly the fact that the relationship and ratio of words in English and Hungarian were meant to be observed to gain an insight into learners' bilingual lexicons. After these questions, grammatical information and other word forms were collected, followed by the different meaning senses (if there were any other). Productive knowledge and collocations, being the two most difficult categories, were the last to be asked so that participants would not despair even if they could not answer anything to them.

It must be noted here that some modifications were introduced to Nation's (2001) original list of components of word knowledge due to the participans' lower level of proficiency, which did not enable the use of infrequent or very formal words. Therefore, frequency and register could not be measured or examined in the present study.

3.5 Procedure

To accomplish Phase 1 of the longitudinal study, the fourteen participants were interviewed about their knowledge of the twenty-one target words in September, 2005. A strictly structured interview protocol (see Appendices C and D) was used and four interlocutors conducted the interviews on two school days at the same time so that students would not share the words with each other. Each interview took approximately fifty minutes and was recorded. The questions were asked in Hungarian to make students feel at ease (and also because their level of English is not high enough yet). The training of the interlocutors took approximately an hour and the following points were discussed:

1. The atmosphere of the interview – it was emphasized that it was not a problem if students did not know one or several aspects of a word and that they were to be encouraged and praised by the interviewer while the interview lasted, especially because, as was explained by the teacher, students considered this an important occasion (almost like a test) and took it seriously. However, it was also necessary that no help was given with the words and the wording and the order of the words and the questions should be the same.
2. Practical questions – as the first questions aimed to elicit the meaning of the word as well as its spoken form, it was important to highlight the fact that if students did not know them, then the interviewer was instructed to tell the word to the participant. The

rationale behind this conscious decision is the following: Schmitt (1998a) explained that even if the participant was unable to produce the spoken form correctly, they could still exhibit receptive knowledge and remember it when hearing the word in question. Likewise, after the second question, which aimed at eliciting the written form, if it was incorrectly spelt, then the correct version was to be provided for the student, which they were allowed to look at until the next word, when the paper had to be folded, based on Schmitt's (1998a) interview protocol.

3. Technical questions – as the cassettes, tape-recorders and microphones were handed out to the interviewers, they were asked to make note of the names of the students and immediately mark them on the cassettes as well for easy recognition later. All the rooms were arranged similarly before the interviews started, both the interviewer and the interviewee sat opposite each other at a student desk to avoid a threatening teacher-student position behind the teacher's desk.

The same protocol was used on in May, 2006 and January, 2007, respectively, but the number of interlocutors was reduced to two. The reason for this was that the participants, especially by the third time, were well-aware of the procedure of the interview and they seemed more concerned with answering all the questions to their best knowledge than sharing any information about them with the others. It can definitely be stated that the interviews on all occasions were extremely taxing for the interlocutors and subjects alike and towards the

end of the list of twenty-one words, sometimes the participants had to be pushed a bit to remember any collocations. Hopefully, this did not influence the results in a negative way.

3.6 Analysis of depth of word knowledge

In order to verify whether word selection had been successful, descriptive statistical analyses had to be carried out to observe the difficulty and distribution of the words. Out of 21 words, 18 were normally distributed, 2 positively and 1 negatively skewed. This information is detailed in depth at the beginning of chapter 4 (see section 4.2).

3.6.1 Scoring procedures

With regard to measurement procedures, Schmitt's (1998a) original calculation system was altered significantly so as to adapt to the present circumstances. Table 3 presents an overview of the rating system used in the present study. On the one hand, at Phase 1 the participants were at a considerably lower level than Schmitt's advanced learners. On the other hand, whereas his main aim was to compare the four aspects of vocabulary development over a year, here data on eight types of lexical knowledge had to be compared. Consequently, while Schmitt (1998a) used sensitive scales to differentiate between the three occasions (e.g. a 4-point rating system for spelling, where 0 indicated no knowledge, 1 was given if the student could give the initial letters of a word, 2 demonstrated that the word was almost correct,

written with similar-sounding letters and 3 indicated absolutely correct spelling), here only a 2-point rating system was used for providing the meaning, spoken form, written form and part of speech in order to decide whether the participant knew the correct answer or not.

There was one controversial decision to be made. Even though the question 'Do you know how to say the word *baleset* in English?' elicited only one answer, it was possible to distinguish between the correctness of both the translation and the spoken form of the target word because it frequently happened that although the participants could not recall the word, when the interlocutor provided the correct solution, they clearly demonstrated the knowledge of the spoken form or vice versa, the meaning was correct but the pronunciation of the word could not be accepted (e.g., nature).

As for other forms of the word, other meaning senses and collocations, the more the student could list, the more points were assigned (the maximum number of points the participants were able to gather was no more than 2 in all the cases). After entering the data for each student, each word and knowledge type into *SPSS*, all the data was re-coded so that all the receptive and productive categories would be comparable to each other.

Table 3

Scoring of the word knowledge types

Word knowledge type	**Productive/Receptive**	**Scoring**
Meaning	receptive	0/1
Spoken form	receptive	0/1
Written form	receptive	0/1
Part of speech	receptive	0/1
Other forms of the word	productive	0/1/2…
Other meanings of the word	productive	0/1/2…
Sentence	productive	0/1/2
Collocations	productive	0/1/2…

As illustrated in Table 3, a 3-point scale was introduced for assessing the correctness of the sentence, which demonstrates productive knowledge, because it seemed necessary to distinguish between not being able to produce a sentence or giving a meaningless one, a simple but correct sentence, and a more complex sentence. Moreover, the participants' level was not higher than pre-intermediate in September; therefore, tense and agreement mistakes were not taken into consideration. The rationale behind this is that these did not hinder the correct productive use of the word, which was the primary aim here (see Wesche & Paribacht, 1996). Therefore, it was possible for a sentence to receive the maximum score of 2 points even if there were other grammatical mistakes in it. However, anything that had to do with the

word itself (prepositions, word formation, the right place of the word in the sentence) was judged and marked according to whether it was a less serious (1 point) or a serious mistake (0 point). Failing to produce a sentence was also scored as 0 point. Table 4 contains examples for each score.

Sentence formation being the only aspect of deep word knowledge that could not be scored objectively, inter-rater reliability was obtained with the assistance of a trained external rater, using 10% of the total sentences. Out of the possible 882 (14 participants x 21 words x 3 interviews), the participants produced a total number of 839 sentences on the three occasions. The senteces missed were distributed in the following way: 32 on the first, 7 on the second and 4 on the last occasion. Therefore, after analyzing the results of both raters, inter-rater reliability was calculated at 89%, which means that 75 sentences received the same score from both raters and in the case of 10 sentences there was one point difference. Marking was followed by a discussion session where problematic issues were raised and resolved.

Table 4

Examples for scoring the sentences

Sentence	Scoring	Rationale
I'm not very successful in learning.	2	correct use of preposition
I wasn't allowed to play at home.	2	correct use of object+ infinitive
There were an accident on Váci street last night.	2	despite the agreement mistake, the overall meaning is clear
I am successful.	1	simple, correct sentence
My mother allow for me to go with her.	1	meaning clear, incorrect presposition
It is worth to buy that pen.	1	meaning clear, incorrect use of to-infinitive
The old peoples are an experience.	0	meaning unclear
I allowed the water.	0	incorrect use of the word 'enged'
Mark worths to have a cake.	0	wrong use of 'worth' as verb, and wrong meaning sense 'deserve'

3.6.2 Statistical analyses

Data deriving from the three sessions were analysed using the software SPSS 17.0 for Windows. First, with the help of the software, descriptive statistics (mean, standard deviation,

skewness and sums) were calculated to shed light on characteristics of deep word knowledge. Since sample size was small in the case of adjectives, non-parametric tests, such as the Friedman test and Wilcoxon Signed-ranks tests for post-hoc analyses were used to determine significance in the differences between the depth of word knowledge of nouns, verbs and adjectives, which would be of paramount importance in order to draw comparisons between depth of word knowledge and association use. Thirdly, as a result of the fact that deep word knowledge for the 21 words did not always comply with the requirements of parametric statistical analysis, Friedman's ANOVA analyses were applied for comparing the results of the three occasions with regard to the depth of word knowledge categories (word meaning, spoken form, written form, part of speech, other word forms, other meaning senses, sentence production and collocation use). However, the analyses regarding word class (i.e. the knowledge of nouns, verbs and adjectives) and receptive and productive vocabulary knowledge were carried out with Repeated Measures ANOVA. Following these, paired sampled T-tests were used to make post-hoc comparisons between conditions, applying Bonferroni corrections. Finally, in order to detect any developmental hierarchy between variables, the mean differences were calculated between the various components of lexical depth.

3.7 Analysis of word associations

As shown in the review of literature section, most research carried out with associations applied a purely quantitative approach, relying on either statistical comparisons between native and non-native speakers or grouping responses into already existing categories (*paradigmatic*, *syntagmatic*, *phonological 'clang'*, and *analytic*), and quantifying them. Thus, the present study aimed to complement the word counts (which language students opt for, how many associations they provide), using Fitzpatrick's (2006, 2007, 2009) classification of responses to stimulus words besides the existing word association categories. The use of two languages at the same time especially lent itself to a more qualitative and reflexive analysis.

3.7.1 Categorization of word associations

According to Johnson and Onwuegbuzie (2004, p. 17), mixed methods research is the class of research where "quantitative and qualitative research techniques, methods, approaches, concepts or language" are combined into a single study. In Creswell's view (1994) there are five main reasons for mixing methodologies within one study: to ensure triangulation, to allow different facets of a phenomenon to emerge, to strengthen one method by using the two sequentially, to allow new perspectives to come up, to expand one's study by giving scope and breadth to it.

Thus, besides using descriptive and inferential statistical procedures, the associations

were analyzed using the constant comparative method (Maykut & Morehouse, 1994). Categories, along with the existing ones, were established in each cycle of analysis (Creswell, 1998). Units of responses were counted for each student and for each word. Consequently, all the existing categories were applied and analyzed in an attempt to gain an insight into the mental lexicon of the learners:

1. paradigmatic, syntagmatic, phonological (clang) and analytic responses (based on the traditional classification reported by Wolter, 2001; Read, 2004);
2. meaning-based, position-based, form-based and erratic associations (based on Fitzpatrick, 2006, 2007, 2009);
3. language use – participants' choice of English and Hungarian for the associations;
4. language switching within responses – how the choice of the two languages changed for the associations of the same word;
5. unclassifiable and unusual (in other words, personal or original) responses – this category attempts to describe these two kinds of associations and make a distinction between them.

Although there is considerable overlap between the word association categorizations (for an overview on the dimensions of classification, see 2.9.1), the two systems were discussed in separate sections. First, the traditional paradigmatic-syntagmatic-phonological categorization was applied, complemented with unclassifiable and unusual responses for all

the three phases and followed by statistical data analyses. Secondly, the main tenets of Fitzpatrick's classification were tried on the data gathered in the second and third phases of the study, focusing on form-based and meaning-based associations. In the following I would like to attempt to explain the rationale for such a complication.

The primary reason for separating the two systems derives from the mix of the two languages, especially in the first phase. Due to the nature of the study in an attempt to explore the mental lexicon at such a low level of proficiency, the participants were encouraged to produce a word or lexical item in either of the two languages, which possibility they exploited to the full: 38% of their associations were provided in Hungarian in Phase 1. From the point of view of the traditional classification, this was not felt to be a problematic aspect since every word could be allotted into one of the paradigmatic-syntagmatic categories regardless of language use. Hence the results would still be comparable to later stages of the study, when the participants opted for English, almost exclusively. Naturally, comparisons could also be invited with regard to the ratio of response types and language choice but owing to the exploratory approach of the investigation, it was hoped to be achieved with the help of qualitative methods. Therefore, when the statistical database was created, only the paradigmatic and syntagmatic associations were separated but not language. On the one hand, perhaps it might be considered a limitation that the two languages were not separated; however, I was more interested in the organization of word types regardless of language at the

early stages of their proficiency.

The secondary cause of distinguishing between the two systems is a fundamental difference that only emerged when data-coding began is that while paradigmatic and meaning-based responses largely overlap, they characterize different aspects of the words selected. While the former ones focus on the class of word selected, the latter ones highlight the primary source of selection and are based on a semantic approach. Similarly, although syntagmatic responses can reveal collocational behaviour, it is the type of word again that is emphasized. Other complications also arose when actual coding began and a few examples are given which illustrate why the decision to separate the two category systems was taken. For example, according to the traditional classification, the response '*car*' for the stimulus word '*accident*' is considered a paradigmatic response (as both words belong to the same word class), whereas in Fitzpatrick's framework, this might be regarded as a position-based response since '*car accident*' is a frequently used collocation. As opposed to this, just because a participant gave the response '*hitchhiking*' for the prompt word *foreign*, a syntagmatic response, on the ground that they do not belong to the same word class does not make it a true collocational link (there is no such expression in English as foreign hitchhiking). Therefore, according to Fitzpatrick, it would be a meaning-based conceptual association. Categorizing the words as form-based was distinctly more indicative of the participants' mental processes in terms of sentence formation as they implied collocation use. This way '*answer*' for the

word *reason* was coded as meaning-based, whereas '*good*', '*logical*' and '*different*', '*explain*' were regarded as form-based. It must also be stressed that only the two major components of Fitzpatrick's framework were used (meaning-based and position-based responses) owing to the low number of participants and words. A deeper analysis, for example, in order to decide if a meaning-based response is a defining or a specific synonym, would have required a higher number of participants to yield relevant data. Furthermore, it was felt that by comparing the two taxonomies, enough data could be gathered for the present study.

Data was checked with the help of two collocations dictionaries (LTP Dictionary of Selected Collocations, 1997 & Oxford Collocations Dictionary for Students of English, 2002) as well as an online version of the first one (available at: http://5yiso.appspot.com/). The last consideration at this point was the problematic aspects of the two languages, therefore, only the words of Phases 2 and 3, where the use of English already dominated word selection, were taken into consideration and selected. The reason for this is that in Phase 1 the number of form-based associations in English was negligible.

In sum, while coding the data, it clearly transpired that the two taxonomies of classification were complementary in nature, the former one revealing information about the types of words in the lexicon, while the latter focusing on the semantic and morphological aspect of links in the lexical storage system. Therefore, in order to explore the mental lexicon and lexical organization of these fourteen participants in as much depth as possible, both of

the categorizations were felt to be necessary.

3.7.2 Statistical analyses for word associations

Data on word associations were processed with the help of the software SPSS 17.0 for Windows. In order to distinguish between the two systems of classification, two databases were created: one for differentiating between paradigmatic and syntagmatic responses in all the phases, while the other for exploring meaning-based and position-based association use in Phases 2 and 3. Descriptive statistics were calculated first (mean, standard deviation, skewness and sums). Following this, since the associations to the words were not normally distributed, Friedman's ANOVA was applied in order to highlight the differences between the use of paradigmatic and syntagmatic associations for nouns, verbs and adjectives on each of the occasions. Following these, Wilcoxon Signed Rank tests were used to make post-hoc comparisons between conditions, applying Bonferroni corrections. Additionally, the same statistical procedures were used for establishing significance between meaning-based and form-based associations for nouns, verbs and adjectives in the three phases.

4 Results and discussion 1 – Quantitative analysis of depth of word knowledge

4.1 Introduction

This section of the dissertation presents the results of the study which concern the participants' depth of word knowledge at the three stages of the longitudinal investigation in order to provide answers to the first three research questions. (Examples of the participants' deep word knowledge are given in Appendix F.)

1. What characterises the participants' depth of word knowledge of the selected 21 words at pre-intermediate level?
2. How does the participants' depth of word knowledge change over the period of 16 months?
3. Is there a developmental order for the depth of word knowledge categories?

First, in an attempt to shed light on the validity of the words and measuring instruments selected, descriptive statistics for each of the words are provided, followed by the analysis of depth of word knowledge and word knowledge types in Phase 1. Then the development in the lexical knowledge of each word according to word type is analyzed. Since sample size for small in the case of adjectives, non-parametric tests, such as the Friedman test and Wilcoxon Signed-ranks tests for post-hoc analyses were used to determine significance in

the differences between word types. In the cases where distribution and data size allow, this is followed by repeated measures ANOVA analyses and correlational analyses in order to establish the links and differences between the various deep word knowledge components and their development in each of the three phases. The next part aims to provide a detailed analysis of the characteristics of depth of word knowledge with a special focus on their overall development in an attempt to determine whether there might be a developmental order in the depth of word knowledge components, also relying on inferential statistical procedures. Finally, the presentation of the results is completed by a detailed discussion of the findings in the light of previous research.

4.2 Depth of word knowledge analysis for Phase 1

In order to track the changes in the development of lexical depth of the 21 words selected for the study, it was necessary to establish the participants' depth of word knowledge after Phase 1 of the data collection, which was addressed in the first research question. As the words could not be tested on the population before the study began, it was also essential to address such issues as (1) to what extent the selected words were known by the students, (2) which word knowledge categories were found to be difficult by the students at this level and (3) whether any of the word knowledge types were interrelated.

4.2.1 Difficulty of words

As word selection could only be finalized once the group members and the materials were decided by the school and the teacher, only the interview protocol could be tried out. Therefore, after the first phase it was important to measure whether the twenty-one prompt words were suitable because for the purpose of the longitudinal study, they should not be too easy or difficult for the students and there should be possibility for depth of word knowledge improvement in the long run.

As it is illustrated in Tables 5.1, 5.2 and 5.3, the average mean of the words is approximately 4, which indicated that these words were ideal for the purposes of the study. Altogether it was possible for the participants to gain 9 or more points, which were collected in the following way. Every receptive category (i.e. word meaning, spoken form, spelling and part of speech) was awarded one point. On the other hand, in the productive aspect of depth of word knowledge the participants could receive as many points as many examples they were able to list (i.e. other word froms, other word meanings and collocations). Finally, sentence production was worth 0, 1 or 2 points, depending on the correctness of the sentence. In light of this, five words (*grow, move, nature, mean* and *reason*) had a mean higher than 5, signifying that they proved somewhat easier for the participants than the other words. Three words seemed much more difficult for the students: *advantage, allow* and *worth*, with a mean lower than 2.5, but these words were selected on purpose because progress was expected to be

more marked in these cases. With regard to distribution, out of the total of 21 words, the knowledge of 18 was normally distributed. The exceptions included an easy word, *nature* with skewness of -1.3 (*SE* = 0.60) as well as two difficult ones, *allow* and *worth*, with skewness of 1.41 (*SE* = 0.61) and 1.91 (*SE* = 0.60), respectively. As the number show, these three words violate the assumption that for normal distribution skewness divided by its standard error should be between +/- 2. See Appendix E for histograms of word difficulty for further examples.

Table 5.1

Descriptive Statistics for Word Difficulty: Nouns

NOUNS	Mean	Mode	SD	Skewness
accident	4.71	5.00	1.38	-0.42
advantage	1.84	2.00	0.89	1.15
advice	3.50	3.00	0.94	0.00
experience	3.14	3.00	1.29	0.69
interest	3.64	5.00	1.49	-0.24
nature	5.14	5.00	1.29	-1.30
reason	5.28	5.00	1.13	-0.29
total	3.93	3.86	0.60	-0.48

Table 5.2

Descriptive Statistics for Word Difficulty: Verbs

VERBS	Mean	Mode	SD	Skewness
allow	2.46	2.00	1.39	1.41
appear	4.14	5.00	1.46	-0.45
concentrate	4.07	2.00	1.59	-0.26
decide	4.42	5.00	1.34	-0.04
develop	2.57	2.00	1.08	0.62
grow	5.50	5.00	1.09	0.41
laugh	4.35	4.00	1.44	-0.02
mean	5.35	6.00	1.08	-0.84
move	5.42	6.00	1.08	-0.20
relax	4.42	5.00	1.34	-0.71
total	4.27	4.4	0.68	-0.59

Table 5.3

Descriptive Statistics for Word Difficulty: Adjectives

ADJECTIVES	Mean	Mode	SD	Skewness
able	3.35	5.00	1.86	-0.44
foreign	3.15	3.00	1.21	-0.1
successful	4.07	6.00	1.65	-0.13
worth	0.92	1.00	1.07	1.91
total	2.92	2.75	1.06	-0.06

In total, students demonstrated a deeper knowledge of verbs (M = 4.45), followed by nouns (M = 3.87) and adjectives (M = 2.93). In order to establish whether there was any significance in lexical knowledge with regard to word class, Friedman's ANOVA was used due to the fact that sample size was small. The mean ranks of paradigmatic responses were 2 for nouns, 2.82 for verbs and 1.18 for adjectives. Significant differences could be found between the three conditions (χ^2 = 14.72, df = 2, p = 0.001). Wilcoxon Signed-rank tests with Bonferroni corrections were applied and the results showed that the participants demonstrated significantly greater depth of word knowledge for verbs than adjectives (Z = -2.94, p = 0.003), but no significant difference was found in the depth of word knowledge between nouns and adjectives (Z = -2.59, p = 0.10) or between nouns and verbs (Z = -1.41, p = 0.16).

4.2.2 Difficulty of word knowledge types

The difficulty of word knowledge types could be calculated from the frequencies of correct responses (see Table 6). The participants' scores for all the knowledge types were normally distributed, except for part of speech, which had skewness of -2.44 (SE = 0.64). On the basis of this, the easiest category was found to be part of speech, but this is not unexpected in Hungary, where from an the start of primary school a great emphasis is laid on teaching explicit grammar both in Hungarian as well as in English. The fact that 11 participants out of 14 produced at least 18 correct answers for the 21 words supports this presumption. The

second easiest category appeared to be spelling: 11 students were able to write down at least 16 of the 21 words correctly. The other two components of receptive knowledge followed next: spoken form and word meaning. From the productive components, the participants obtained higher scores for sentence formation than other forms, collocations and other meaning senses, which proved to be demanding for the students at this stage. The fact that the receptive components were found to be easier than the productive ones appears to be in line with the logical assumption raised by Schmitt (2010) in that receptive knowledge is likely to develop earlier than productive use, and words are either known only receptively or receptively and productively.

Table 6

Knowledge of the Components of Lexical Depth in Phase 1

	word meaning	**spoken form**	**written form**	**part of speech**	**other forms**	**other meanings**	**sentence**	**collocations**
Mean	0.47	0.52	0.8	0.87	0.3	0.1	0.46	0.22
Mode	0.29	0.43	0.76	0.90	0.19	0.05	0.4	0.19
Std. Deviation	0.17	0.16	0.1	0.07	0.15	0.07	0.10	0.10
Variance	0.3	0.03	0.01	0.005	.022	.005	0.01	0.01
Skewness	0.5	0.11	0.16	-2.44	-0.25	0.93	0.02	-0.03
Std. Error of Skewness	0.62	0.62	0.62	0.64	0.62	0.64	0.62	0.62

4.2.3 Relationship between word knowledge types

In order to demonstrate whether there was any connection between the different word knowledge types, the mean correlations of every word knowledge type for each of the 21 words as well as the total were calculated. Due to the low number of participants, Spearman's Rho was used.

Generally, there seemed to be a very moderate correlation between word categories when individual words were taken into consideration, and interestingly, correlation coefficients significantly varied and depended on individual words. However, the results in total showed that there appeared to be a considerably strong relationship between word meaning and spoken form ($r = 0.70$, $p = 0.008$); however, it must not be forgotten that these two responses were elicited one after the other which might have influenced this finding. Similarly, spoken form and written form ($r = 0.70$, $p = 0.008$) also appeared to be related, which might be attributed to the fact that these two word categories are often taught together and are considered the most important by primary school teachers. This might also explain why no relationship could be established between the other categories at the first stage.

4.2.4 Conclusion of word difficulty

In order to gain a better understanding of what words and word knowledge categories cause difficulties for pre-intermediate students as well as how word knowledge categories were related, the data of Phase 1 were analyzed in an attempt to reveal what characterizes the

participants' depth of word knowledge at pre-intermediate level (RQ 1). In sum, word selection could be considered successful as there was room for considerable improvement in the long run for 20 words out of 21. The findings show that the participants demonstrated deeper word knowledge of verbs than adjectives. Regarding word knowledge types, they felt the most confident about part of speech and written form, followed by spoken form and word meaning. The participants also demonstrated the ability to produce simple but meaningful sentences for most of the words. As expected, other word forms, collocations and other meanings proved to be taxing for the students at this level. As regards the interrelationships between the word knowledge types, correlation was found between knowing the meaning of a word and its spoken form as well as between knowing the spoken and written form.

4.3 Development of depth of word knowledge

In order to provide an answer to the second research question (How does the participants' depth of word knowledge change over the period of 16 months?), the next section presents a detailed analysis of the depth of word knowledge development of the words used in the study for the two eight-month periods. Due to the vast amount of data gathered, the words were grouped according to word types, therefore nouns, verbs and adjectives and will be discussed separately, followed by the analysis of types of deep word knowledge with a special focus on the development of receptive and productive knowledge.

4.3.1 Depth of word knowledge development of nouns

As Table 7.1 demonstrates, the depth of word knowledge of all the nouns selected for the study improved steadily. The average mean development for nouns was 1.37 between Phases 1 and 2, whereas it was 0.94 between Phases 2 and 3. In the case of words such as *accident*, *nature*, *advantage*, *interest* and *experience*, the greatest development can be observed between Phases 1 and 2. However, there were two nouns, *reason* and *advice*, where lexical depth developed more between Phases 2 and 3. Compared to the others, both of these nouns appeared to be easier for the participants at the beginning of the study, which might explain the relatively low mean development in depth of word knowledge between the first and the second interview as it might have taken longer for the participants to become familiar with novel aspects of these words.

Table 7.1

Depth of Word Knowledge Development of Nouns

NOUNS	N	Minimum	Maximum	Sum	Mean	Std. Deviation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
accident total elements stage1	14	2.00	7.00	66.00	4.71	1.38	-0.42	0.6
accident total elements stage2	14	5.00	8.00	83.00	5.93	0.92	0.86	0.6
accident total elements stage3	14	5.00	8.00	89.00	6.36	0.93	0.49	0.6

	14	2.00	7.00	72.00	5.14	1.29	-1.3	0.6
nature total elements stage1								
nature total elements stage2	14	5.00	8.00	84.00	6.00	0.78	1.16	0.6
nature total elements stage3	14	6.00	7.00	86.00	6.14	0.36	2.30	0.6
advantage total elements stage1	13	1.00	4.00	24.00	1.85	0.90	1.16	0.6
advantage total elements stage2	14	1.00	6.00	57.00	4.07	1.59	-0.40	0.6
advantage total elements stage3	14	4.00	7.00	79.00	5.64	0.84	-0.07	0.6
interest total elements stage1	14	1.00	6.00	51.00	3.64	1.50	-0.24	0.6
interest total elements stage2	14	2.00	7.00	73.00	5.21	1.53	-0.57	0.6
interest total elements stage3	14	5.00	7.00	93.00	6.64	0.63	-1.69	0.6
reason total elements stage1	14	3.00	7.00	74.00	5.29	1.14	-0.29	0.6
reason total elements stage2	14	4.00	7.00	79.00	5.64	0.93	-0.49	0.6
reason total elements stage3	14	5.00	7.00	91.00	6.50	0.65	-0.98	0.6
advice total elements stage1	14	2.00	5.00	49.00	3.50	0.94	.000	0.6
advice total elements stage2	14	2.00	7.00	59.00	4.21	1.48	0.41	0.6
advice total elements stage3	14	5.00	7.00	81.00	5.79	0.70	0.32	0.6
experience total elements stage1	14	1.00	6.00	44.00	3.14	1.29	0.70	0.6
experience total elements stage2	14	3.00	7.00	81.00	5.79	1.42	-1.24	0.6
experience total elements stage3	14	4.00	8.00	89.00	6.36	1.00	-0.86	0.6

Taking overall lexical development into consideration, an interesting case is that of the second easiest noun in the first part of the study, *nature*, which showed the least overall mean development, 1.00, followed by *reason* with a total mean development of 1.21. As opposed to this, the participants demonstrated the greatest overall development of the nouns which were found to be the most difficult in the first phase. For example, the word *interest* had a total mean development of 3.00, followed by *experience* (3.22) and *advantage* (3.79).

Another salient observation emerging from the database was how the mean sum of the total depth of word knowledge categories appears to have levelled off at the third phase. Whereas in the first phase the difference in mean between the least and the most known nouns was 3.44, this difference is somewhat lower in the second phase (1.93) and the difference seems to have disappeared by Phase 3 (1.00). This means that the participants demonstrated a more balanced lexical knowledge of the nouns of the study at the end of the 16 months than at the beginning. This finding might be attributed to their similar exposure in learning the language, with the same teacher, using the same coursebook and even though the teacher was not aware of the words of the study, the participants may have been exposed to them implicitly or explicitly.

In order to establish whether there was any significance in the depth of word knowledge development of nouns, Repeated Measures ANOVA was used. A non-significant value for Mauchly's Test of Sphericity indicated that the assumption of sphericity had not

been violated. The results determined that the participants' depth of word knowledge differed statistically between the three occasions (Wilks' Lambda = 0.92, F (2, 11) = 54.37, $p < 0.001$). Post hoc tests using the Bonferroni correction revealed that participants' deep word knowledge of nouns developed significantly between all the phases of the study. Paired samples T-tests indicated a significant increase between Phases 1 and 2 (M = 1.44, SD = 0.72, $p < 0.001$), between Phases 2 and 3 (M = 0.94, SD = 0.63, p <0.001), as well as between Phases 1 and 3 M = 2.31, SD = 0.76, $p < 0.001$).

4.3.2 Depth of word knowledge development of verbs

Based on Table 7.2, which illustrates the depth of word knowledge of all the verbs in the study, perceptible improvement can be observed between the first and the second phases of the study, as well as between the second and third phases. The average mean development for verbs was 1.13 between Phases 1 and 2, whereas it was 0.82 between Phases 2 and 3. For nine out of the ten verbs, the greatest development can be observed between Phases 1 and 2. The only exception to this is the verb *allow*, a difficult word for the participants at the beginning of the study, whose development in depth of word knowledge was nearly the same in both phases, with a mean difference of 1.68 between the first and the second phase and a mean difference of 1.79 between Phases 2 and 3.

Table 7.2

Depth of Word Knowledge Development of Verbs

VERBS	N	Minimum	Maximum	Sum	Mean	Std. Deviation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
develop total elements stage1	14	1.00	5.00	36.00	2.57	1.09	0.62	0.6
develop total elements stage2	14	2.00	7.00	54.00	3.86	1.70	0.48	0.6
develop total elements stage3	14	3.00	6.00	67.00	4.79	1.05	0.03	0.6
decide total elements stage1	14	2.00	7.00	62.00	4.43	1.34	-0.05	0.6
decide total elements stage2	14	4.00	7.00	77.00	5.50	0.76	0.00	0.6
decide total elements stage3	14	5.00	7.00	89.00	6.36	0.84	-0.83	0.6
grow total elements stage1	14	4.00	7.00	77.00	5.50	1.09	0.41	0.6
grow total elements stage2	14	4.00	8.00	86.00	6.14	1.17	0.02	0.6
grow total elements stage3	14	5.00	7.00	89.00	6.36	0.63	-0.43	0.6
move total elements stage1	14	4.00	7.00	76.00	5.43	1.09	-0.20	0.6
move total elements stage2	14	4.00	8.00	91.00	6.50	1.22	-0.29	0.6
move total elements stage3	14	6.00	8.00	101.00	7.21	0.80	-0.44	0.6
relax total elements stage1	14	2.00	6.00	62.00	4.43	1.34	-0.71	0.6
relax total elements stage2	14	3.00	6.00	75.00	5.36	0.93	-1.53	0.6
relax total elements stage3	14	4.00	7.00	83.00	5.93	0.73	-1.27	0.6

appear total elements stage1	14	2.00	6.00	58.00	4.14	1.46	-0.46	0.6
appear total elements stage2	14	2.00	7.00	73.00	5.21	1.53	-1.48	0.6
appear total elements stage3	14	5.00	7.00	82.00	5.86	0.66	0.15	0.6
concentrate total elements stage1	14	2.00	6.00	57.00	4.07	1.59	-0.27	0.6
concentrate total elements stage2	14	3.00	7.00	79.00	5.64	0.93	-1.83	0.6
concentrate total elements stage3	14	6.00	7.00	94.00	6.71	0.47	-1.07	0.6
laugh total elements stage1	14	2.00	7.00	61.00	4.36	1.45	-0.02	0.6
laugh total elements stage2	14	3.00	8.00	74.00	5.29	1.33	0.31	0.6
laugh total elements stage3	14	4.00	7.00	83.00	5.93	0.92	-0.54	0.6
mean total elements stage1	14	3.00	7.00	75.00	5.36	1.08	-0.85	0.6
mean total elements stage2	14	5.00	8.00	90.00	6.43	1.02	-0.03	0.6
mean total elements stage3	14	6.00	8.00	100.00	7.14	0.86	-0.31	0.6
allow total elements stage1	13	1.00	6.00	32.00	2.46	1.39	1.41	0.62
allow total elements stage2	14	2.00	6.00	58.00	4.14	1.35	-0.30	0.6
allow total elements stage3	14	5.00	7.00	83.00	5.93	0.47	-0.31	0.6

As for the overall lexical development of the verbs, the results indicate a similar tendency in increase to the nouns of the study: the easiest verb in the first part of the study, *grow*, developed the least (total development in mean is 0.86). By contrast, the participants demonstrated a steady improvement in the knowledge of the verbs which appeared to be the

most difficult in the first phase. For instance, the word *allow* had a total mean development of 3.47, followed by *concentrate* (2.64) and *develop* (2.22). A further similarity to nouns is the decrease in the difference between the overall lexical knowledge as the participants' proficiency increased: the difference between the least and the most known verb was 3.04 in the first phase, 2.64 in the second, and 2.42 in the third, respectively. This, again, might have been caused by the fact that the participants are taught by the same teacher.

In order to reveal whether any significance could be observed in the depth of word knowledge development of verbs over time, Repeated Measures ANOVA was used. A non-significant value for Mauchly's Test of Sphericity indicated that the assumption of sphericity had not been violated. The results determined that the participants' depth of word knowledge differed statistically between the three occasions (Wilks' Lambda = 0.82, F (2, 11) = 61.76, $p < 0.001$). Post hoc tests using the Bonferroni correction indicated that the participants' deep word knowledge of verbs developed significantly between all the phases of the study. Paired samples T-tests showed a significant increase between Phases 1 and 2 (M = 1.1, SD = 0.50, $p < 0.001$), as well as between Phases 1 and 3 M = 1.97, SD = 0.72, $p < 0.001$), but not between Phases 2 and 3 (M = 0.81, SD = 0.80, $p = 0.02$). Therefore, most of the development in the depth of word knowledge of verbs occurred between the first and second phases of the study.

4.3.3 Depth of word knowledge development of adjectives

Table 7.3 presents the lexical development of adjectives, which were lower in number than the nouns and the verbs in the study. However, despite the low number, similar tendencies were observed. Firstly, the deep word knowledge of most diffiicult adjective of the first phase, *worth*, showed the highest increase in knowledge, with an overall mean development of 3.36 and the easiest one, *successful*, developed the least, with a total mean development of 1.78. Secondly, the mean difference between the total lexical knowledge of adjectives was higher at the beginning of the study (3.15) and decreased by the third phase (1.92).

Table 7.3

Depth of Word Knowledge Development of Adjectives

ADJECTIVES	N	Minimum	Maximum	Sum	Mean	Std. Deviation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
foreign total elements stage1	13	1.00	5.00	41.00	3.15	1.21	-0.01	0.62
foreign total elements stage2	14	1.00	7.00	66.00	4.71	1.68	-0.83	0.6
foreign total elements stage3	14	4.00	8.00	87.00	6.21	0.98	-0.49	0.6
able total elements stage1	14	0.00	6.00	47.00	3.36	1.86	-0.44	0.6
able total elements stage2	14	1.00	6.00	64.00	4.57	1.45	-1.22	0.6
able total elements stage3	14	4.00	7.00	86.00	6.14	0.95	-0.95	0.6

successful total elements stage1	13	2.00	6.00	53.00	4.08	1.66	-0.01	0.62
successful total elements stage2	14	2.00	7.00	70.00	5.00	1.41	-0.57	0.6
successful total elements stage3	14	3.00	7.00	82.00	5.86	1.17	-1.04	0.6
worth total elements stage1	14	0.00	4.00	13.00	0.93	1.07	1.91	0.6
worth total elements stage2	14	0.00	4.00	23.00	1.64	1.28	0.79	0.6
worth total elements stage3	14	2.00	7.00	60.00	4.29	1.49	0.08	0.6

Repeated Measures ANOVA was applied to establish any significance in the overall lexical development of adjectives. A non-significant value for Mauchly's Test of Sphericity indicated that the assumption of sphericity had not been violated. The results determined that the participants' depth of word knowledge differed statistically between the three occasions (Wilks' Lambda = 0.07, F (2, 10) = 61.42, $p < 0.001$). Post hoc tests using the Bonferroni correction indicated that participants' deep word knowledge of adjectives developed significantly between all the phases of the study. Paired samples T-tests showed a significant increase between Phases 1 and 2 (M = 1.38, SD = 0.91, $p < 0.001$), between Phases 2 and 3 (M = 1.64, SD = 0.91, $p < 0.001$), as well as between Phases 1 and 3 M = 2.80, SD = 0.87, $p < 0.001$).

4.3.4 Conclusion of depth of word knowledge of word types

As indicated in section 4.2.1, on the first occasion the participants had deeper knowledge of verbs than of nouns, and there was a significant difference between verbs and adjectives. In order to establish whether there was any significant difference in lexical knowledge with regard to word class in the second phase, Friedman's ANOVA was used. Significant differences could be found between the three conditions (χ^2 = 21.14, df = 2, p < 0.001). Wilcoxon Signed-rank tests with Bonferroni corrections were applied and the results showed that similar to the first phase, the participants demonstrated significantly greater depth of word knowledge for verbs than adjectives (Z = -3.30, p = 0.001). However, in the second phase a significant difference was also found in the depth of word knowledge between nouns and adjectives (Z = -3.30, p = 0.001) but not between between nouns and verbs (Z = -0.79, p = 0.43). As for the differences in the third phase, the patterns are similar to those of the second one. Significance could be established between the three conditions (χ^2 = 12.11, df = 2, p = 0.002) and the participants showed better knowledge of verbs than adjectives (Z = -2.82, p = 0.005) and nouns than adjectives (Z = -2.49, p = 0.01), but the knowledge of verbs and nouns was similar (Z = -0.35, p = 0.73).

To conclude this section on the development of word types, it can be stated that depth of word knowledge of all the nouns, verbs and adjectives developed significantly in the three phases of the study and this increase in knowledge was more significant in the case of verbs

and nouns. A possible explanation for this could be the low number of adjectives and the fact that one of the most difficult words was an adjective, *worth*, which might have distorted the data.

4.4 Development of word knowledge types

A second aspect of research question 2 (How does the participants' depth of word knowledge change over the period of 16 months?) is the development of word knowledge types in the sixteen months of the study, which is to be addressed in the next section. Firstly, each component of depth of word knowledge will be examined in detail, which will be followed by a comparison in their development. Due to the scarcity of research into individual word knowledge components, analogies can only be drawn with Schmitt's (1998a) results. However, there are a number of differences that need to be taken into consideration. Schmitt used three advanced speakers and 11 words and the scope of the study only focused on different meanings of the word, written form and grammatical information (including part of speech and other word forms), which implies that these aspects lend themselves to a detailed comparison with Schmitt's findings.

4.4.1 Development of word meaning

As shown in Table 8.1, considerable increase in the knowledge of word meaning can be observed between the three occasions. In order to establish whether there was any significance in lexical knowledge with regard to this component, Friedman's ANOVA was used due to the fact that distribution was not normal in Phase 3. Significant differences could be found between the three occasions ($\chi^2 = 26.00$, $df = 2$, $p < 0.001$). Wilcoxon Signed-rank tests with Bonferroni corrections were applied and the results showed that the participants demonstrated significantly greater knowledge of word meanings in L2 between Phases 1 and 2 ($Z = -3.19$, $p = 0.001$), between Phases 2 and 3 ($Z = -3.30$, $p = 0.001$), as well as between Phases 1 and 3 ($Z = -3.19$, $p = 0.001$).

Table 8.1

Knowledge of the Lexical Component Word Meaning in Phases 1, 2 and 3

	Word meaning 1	**Word meaning 2**	**Word meaning 3**
Mean	0.47	0.73	0.91
Mode	0.29	0.81	0.95
Std. Deviation	0.17	0.13	0.09
Variance	0.03	0.02	0.00
Skewness	0.50	-0.08	-1.92
Std. Error of Skewness	0.62	0.60	0.60
Sum	6.05	10.29	12.76

4.4.2 Development of spoken form

Table 8.2 presents the participants' development in using spoken form of the words on the three occasions. Friedman's ANOVA was used to reveal any significant change in the knowledge of the spoken form of the words. Significant differences could be found between the three occasions (χ^2 = 25.12, df = 2, p < 0.001). Wilcoxon Signed-rank tests with Bonferroni corrections were applied and the results showed that the participants demonstrated significantly greater knowledge of the spoken form of words between Phases 1 and 2 (Z = -2.96, p = 0.003), between Phases 2 and 3 (Z = -3.31, p = 0.001), as well as between Phases 1 and 3 (Z = -3.19, p = 0.001). As it can be seen, there was more considerable improvement of the spoken form of the words between the second and the third phase.

Table 8.2

Knowledge of the Lexical Component Spoken Form in Phases 1, 2 and 3

	Spoken forms 1	**Spoken forms 2**	**Spoken forms 3**
Mean	0.52	0.69	0.90
Mode	0.43	0.52	0.95
Std. Deviation	0.16	0.13	0.10
Variance	0.03	0.02	0.00
Skewness	0.11	-0.24	-1.19
Std. Error of Skewness	0.62	0.60	0.60
Sum	6.76	9.67	12.52

4.4.3 Development of written form

As shown in Table 8.3, considerable increase in the knowledge of written form can be observed between the three occasions. In order to establish whether there was any significance in lexical knowledge with regard to orthography, Friedman's ANOVA was used. Significant differences could be found between the three occasions (χ^2 = 17.32, df = 2, p < 0.001). Wilcoxon Signed-rank tests with Bonferroni corrections were applied and the results showed that the participants demonstrated significantly greater knowledge of the written form of the words between Phases 1 and 2 (Z = -2.85, p = 0.004), between phases 2 and 3 (Z = -2.39, p = 0.017), as well as between Phases 1 and 3 (Z = -3.09, p = 0.002). In sum, the most substantial development emerged between the first and the second phases.

Table 8.3

Knowledge of the Lexical Component Orthography in Phases 1, 2 and 3

	Written forms 1	**Written forms 2**	**Written forms 3**
Mean	0.80	0.90	0.95
Mode	0.76	0.95	0.95
Std. Deviation	0.10	0.09	0.05
Variance	0.01	0.00	0.00
Skewness	0.16	-0.93	-0.60
Std. Error of Skewness	0.62	0.60	0.60
Sum	10.38	12.62	13.33

It is informative to compare the findings with those of Schmitt's (1998a). Similar to the present study, in most cases the participants were able to provide the correct spelling of the word and they were always able to recall it on the next session. Thus, it can be concluded that regardless of proficiency, once a word's meaning, together with its spelling, is acquired, a learner is likely to be able to retain it later on. However, Schmitt found some exceptions, words with difficult orthography, which caused recurring problems to the participants, which phenomenon rarely presented itself in this study due to the types of words selected. (Two exceptions might be *average* (avarage) and *develop* (develope), which were problematic for some of the participants.)

4.4.4 Development of part of speech

Table 8.4 demonstrates the increase in the knowledge of part of speech between the three phases. An interesting finding is that compared to Phase 2, unlike in the case of any other depth of word knowledge components, some of the participants reached lower scores in the component of part of speech on the third occasion compared to the second. It is my personal belief that the rationale behind the decrease, however moderate it may be, is that the participants were more aware of other word forms and meanings of several of the words and they became confused when they were asked to name what part of speech the given word was. For instance, although in the case of the words *interest* and *experience* the noun form was

being asked, some of the participants had the verb forms in mind. Therefore, despite the incorrect answer, they demonstrated more depth of word knowledge in other aspects.

In order to establish whether there was any significant difference in lexical knowledge with regard to this component between any of the occasions, Friedman's ANOVA was used as distribution was not normal in Phases 1 and 2. Significant differences could not be found between the three occasions ($\chi^2 = 1.49$, $df = 2$, $p = 0.49$), which might be attributed to the fact that the participants already possessed an outstanding knowledge of part of speech. A plausible explanation for this phenomenon might be the emphasis of grammar in both primary and secondary schools. Furthermore, Schmitt (1998a) also acknowledged his participants' advanced knowledge of grammatical forms but he hypothesized that it was due their level of English and the fact that they regularly studied dictionaries and concentrated on grammatical knowledge.

Table 8.4

Knowledge of the Lexical Component Part of Speech in Phases 1, 2 and 3

	Part of speech 1	**Part of speech 2**	**Part of speech 3**
Mean	0.88	0.88	0.91
Mode	0.90	0.90	0.86
Std. Deviation	0.07	0.09	0.05
Variance	0.00	0.00	0.00
Skewness	-2.44	-2.34	-0.32
Std. Error of Skewness	0.64	0.60	0.64
Sum	10.48	12.38	10.90

4.4.5 Development of other word forms

Table 8.5 shows the increase in the participants' ability to list other word forms on the three occasions. In an attempt to reveal whether there was any significant development in lexical knowledge with regard to this category, Friedman's ANOVA was used. Significant differences were found between the three occasions ($\chi^2 = 12.30$, $df = 2$, $p = 0.002$). Wilcoxon Signed-rank tests with Bonferroni corrections were applied and the results showed that the participants demonstrated significantly greater knowledge of word forms between Phases 1 and 2 ($Z = -2.77$, $p = 0.006$), between Phases 1 and 3 ($Z = -2.94$, $p = 0.003$), but not between Phases 2 and 3 ($Z = -2.04$, $p = 0.04$). In conclusion, it can be seen that although there is definite improvement in all the phases, most of the development in word formation occurred between the first and the second phase of the study.

Table 8.5

Knowledge of the Lexical Component Other Word Forms in Phases 1, 2 and 3

	Other word forms 1	**Other word forms 2**	**Other word forms 3**
Mean	0.30	0.56	0.81
Mode	0.19	0.71	0.48
Std. Deviation	0.15	0.31	0.23
Variance	0.02	0.10	0.06
Skewness	-0.25	0.42	0.32
Std. Error of Skewness	0.62	0.60	0.62
Sum	3.86	7.86	10.57

The marked development of the knowledge of other word forms seems to contradict the results of Schmitt (1998a). He found that providing other derivative forms caused difficulties for the participants, despite their higher level of proficiency and his prompts. Naturally, compared to this study, the words he used were considerably less frequent, which may have led to these difficulties. However, the findings of the present study also differ from those of Schmitt and Meara (1997), who tested their pe-intermediate participants' knowledge twice, using similarly frequent words as in the present study (altogether 20 verbs; in fact, there was an identical verb: *develop*). Contrary to the steady progress witnessed in my study, their Japanese leaners did not demonstrate significant improvement regarding morphology.

My hypothesis is that the development with this particular group of learners may be attributed to their teacher, who in an informal interview about his teaching methods,

emphasized the importance he attached to focusing on word formation. In this sense, the development of the knowledge of lexical morphology might be strongly influenced by the emphasis teachers put on this aspect of vocabulary knowledge.

4.4.6 Development of other word meanings

Interestingly, the category of other word meanings was felt to be the most difficult one as this depth of word knowledge component developed by far the least over time (Table 8.6). In order to establish whether there was any statistical significance in lexical knowledge with regard to this component between any of the occasions, Friedman's ANOVA was used as there was non-normal distribution in the third phase. No significant differences were found between the three occasions ($\chi^2 = 3.85$, $df = 2$, $p = 0.15$); in fact, following some slight development between the first and the second phase, no further development was traceable later on.

Table 8.6

Knowledge of the Lexical Component Other Word Meanings in Phases 1, 2 and 3

	Other word meanings 1	**Other word meanings 2**	**Other word meanings 3**
Mean	0.10	0.14	0.14
Mode	0.05	0.05	0.14
Std. Deviation	0.07	0.09	0.08
Variance	0.00	0.00	0.00
Skewness	0.93	0.67	1.65
Std. Error of Skewness	0.64	0.60	0.60
Sum	1.14	1.95	1.95

The lack of development of other word meanings is especially worth examining in comparison with Schmitt's (1998a) study, where the two of the three participants demonstrated progress in the knowledge of different word meanings. There seem to be two distinct reasons for this. Firstly, it must be noted that Schmitt's participants were far more proficient in English than those of the present study. Secondly, Schmitt provided help and prompted the target words as well as explained them during the session, which might have been useful in a later session. Interestingly, despite the level of proficiency and all these sources of aid, there are some common tendencies with the present study, namely that knowledge development was not significant and fell short of productive use. This might indicate that at lower levels of proficiency students mainly learn the most frequent meaning of a word and do not yet acquire multiple meanings of words.

4.4.7 Development of sentence formation

As shown in Table 8.7, there was a considerable increase in the participants' ability to form sentences between the three occasions. In order to establish whether there was any significance in lexical knowledge with regard to forming sentences, Friedman's ANOVA was used due to the fact that there was non-normal distribution in phase 3. Significant differences could be found between the three occasions ($\chi^2 = 22.00$, $df = 2$, $p < 0.001$). Wilcoxon Signed-rank tests with Bonferroni corrections were applied and the results showed that the participants demonstrated significantly greater knowledge of sentence formation between

Phases 1 and 2 (Z = -3.19, p = 0.001), between Phases 2 and 3 (Z = -2.94, p = 0.003), as well as between Phases 1 and 3 (Z = -2.94, p = 0.003).

Table 8.7

Knowledge of the Lexical Component Sentence Formation in Phases 1, 2 and 3

	Sentences 1	**Sentences 2**	**Sentences 3**
Mean	0.46	0.77	0.94
Mode	0.40	0.81	0.95
Std. Deviation	0.10	0.10	0.05
Variance	0.01	0.01	0.00
Skewness	0.18	-0.95	-1.71
Std. Error of Skewness	0.62	0.60	0.64
Sum	6.00	10.88	11.31

4.4.8 Development of collocation use

As shown in Table 8.8, considerable increase in collocation use can be observed between the three occasions. In order to reveal whether there was any significant development in lexical knowledge with regard to this category, Friedman's ANOVA was used. Significant differences were found between the three occasions (χ^2 = 17.22, df = 2, p < 0.001). Wilcoxon Signed-rank tests with Bonferroni corrections were applied and the results showed that the participants demonstrated significantly greater knowledge of collocations between Phases 1 and 2 (Z = -2.87, p = 0.004), between Phases 1 and 3 (Z = -3.18, p = 0.001), but not between

Phases 2 and 3 (Z = -2.27, p = 0.02). In conclusion, it can be seen that most of the development in collocation use occurred between the first and the second phases of the study.

Table 8.8

Knowledge of the Lexical Component Collocation Use in Phases 1, 2 and 3

	Collocations 1	**Collocations 2**	**Collocations 3**
Mean	0.22	0.51	0.72
Mode	0.19	0.48	0.67
Std. Deviation	0.10	0.25	0.16
Variance	0.01	0.06	0.02
Skewness	-0.03	0.30	-0.75
Std. Error of Skewness	0.62	0.60	0.60
Sum	2.86	7.14	10.14

The results in the development of sentence formation and collocation use cannot be compared to any findings of previous studies. However, it is hypothethised that the teacher, who is known to regularly use a great number authentic resources, emphasized the importance of formulaic language use, focusing on effective and fluent communication, may have had an influential role in the participants' development in sentence formation as well as collocation use. It must also be noted here that the scoring system was relatively simple and needs further refinement since in the present investigation only a two-point scale was used for marking the sentences and simple sentences and collocations were accepted as well.

4.4.9 Development of receptive and productive knowledge

In an attempt to investigate the development of receptive and productive word knowledge, the total results of the word knowledge types in all the phases were grouped into either one of the categories. Accordingly, the components *word meaning*, *spoken form* and *written form*, as well as *part of speech* were regarded as aspects of receptive knowledge, while *other word forms* and *other word meanings*, *sentence formation* and *collocation use* were considered to be aspects of productive knowledge. Table 9 presents the descriptive statistical analyses of receptive and productive word knowledge, which progressed visibly in all the three phases of the study.

Table 9

Descriptive statistics for receptive and productive word knowledge

	Receptive knowledge 1	**Receptive knowledge 2**	**Receptive knowledge 3**	**Productive knowledge 1**	**Productive knowledge 2**	**Productive knowledge 3**
Mean	2.73	3.34	3.79	1.44	2.63	3.43
Std. Deviation	0.38	0.35	0.21	0.31	0.63	0.33
Variance	0.15	0.12	0.04	0.09	0.40	0.11
Skewness	0.12	-0.43	-1.56	-0.54	0.33	-0.15
Std. Error of Skewness	0.60	0.60	0.60	0.62	0.60	0.64
Kurtosis	-1.64	-1.37	1.87	-0.94	-0.16	-0.49
Std. Error of Kurtosis	1.15	1.15	1.15	1.19	1.15	1.23

As the data can be considered to be normally distributed, Repeated Measures ANOVA was applied in order to detect any significance between the three conditions. A non-significant value for Mauchly's Test of Sphericity indicated that the assumption of sphericity had not been violated. The results determined that the participants' receptive knowledge differed statistically between the three occasions (Wilks' Lambda = 0.11, F (2, 12) = 51.40, $p < 0.001$). Post hoc tests using the Bonferroni correction indicated that receptive knowledge improved significantly between all the phases of the study. Paired samples T-tests showed a significant increase between Phases 1 and 2 (M = -0.61, SD = 0.21, $p < 0.001$), between Phases 2 and 3 (M = -0.44, SD = 0.31, $p < 0.001$), as well as between Phases 1 and 3 M = 1.05, SD = 0.39, $p < 0.001$).

In another similar test it transpired the participants' productive knowledge also differed statistically between the three occasions (Wilks' Lambda = 0.03, F (2, 9) = 175.32, $p < 0.001$). Post hoc tests using the Bonferroni correction indicated that receptive knowledge improved significantly between all the phases of the study. Paired samples T-tests showed a significant increase between Phases 1 and 2 (M = -1.16, SD = 0.46, $p < 0.001$), between Phases 2 and 3 (M = -0.68, SD = 0.63, $p = 0.003$), as well as between Phases 1 and 3 M = -1.94, SD = 0.37, $p < 0.001$).

The present finding that both receptive and productive knowledge developed throughout all the phases of the study seems to contradict the tenet of the "treshold effect"

that there might be a clear boundary between knowing a word receptively and using it productively, as argued by Meara (in Schmitt, 2010, p. 225). Instead, the results seem to indicate receptive and productive knowledge should rather be placed on a continuum and words are indeed learnt incrementally. In this sense the findings of the present study harmonize with the hypothesis of Schmitt (2010) that individual words are known receptively and productively to differing degrees and might develop parallel to each other.

4.5 Developmental hierarchy

In an attempt to answer the Research Question 3, whether there might be a developmental order for the depth of word knowledge categories, the difference in the mean development of each word knowledge category was calculated (see Table 10). As it was expounded in section 4.2.2, the most notable progress was measured for the components of *part of speech* and *written form*, followed by the categories of *spoken form* and *word meaning*, and the participants had difficulties with *sentence* and *word formation*, as well as providing *collocations* and *other meaning senses*.

Between the first and the second phase of the study, the most substantial development occurred in the component of *collocation use* and *sentence formation*, followed by providing the *word meaning* and *other word forms* of the given word. It is informative that three out of these four aspects are parts of productive vocabulary use. Being able to provide the *written*

and *spoken forms* appeared to have developed to a lesser degree, perhaps due to the fact that these aspects were relatively well-known at the beginning of the study. Table 10 shows that the easiest and the most difficult categories of the first phase, namely *part of speech* and listing *other word meanings*, developed the least between the two phases.

As for the development between Phases 2 and 3, the mean differences are lower in general; however, the most outstanding improvement can be observed with regard to *word formation*, *pronunciation* and *collocation use*. The knowledge of *word meaning* and *sentence production* developed in similar degrees, while almost no progress could be traced in the categories of *written form*, *part of speech* and *other word meanings*.

Table 10

Mean Differences in the Depth of Word Knowledge Categories

	Phase 1-2	**Phase 2-3**	**Phase 1-3**
Word meaning	0.26	0.18	0.44
Spoken form	0.17	0.21	0.38
Written form	0.10	0.05	0.15
Part of speech	0.01	0.03	0.04
Other word forms	0.26	0.25	0.51
Other word meanings	0.04	0.00	0.04
Sentence formation	0.31	0.17	0.48
Collocation use	0.32	0.21	0.53

In sum, in this particular study the overall developmental order of word knowledge components has been perceived as follows and will be divided into five sections (see Figure 21 for an illustration). The reason for this is that some of the components seem to have developed at a similar rate and the present study does not provide enough evidence for establishing one accurate hierarchical order.

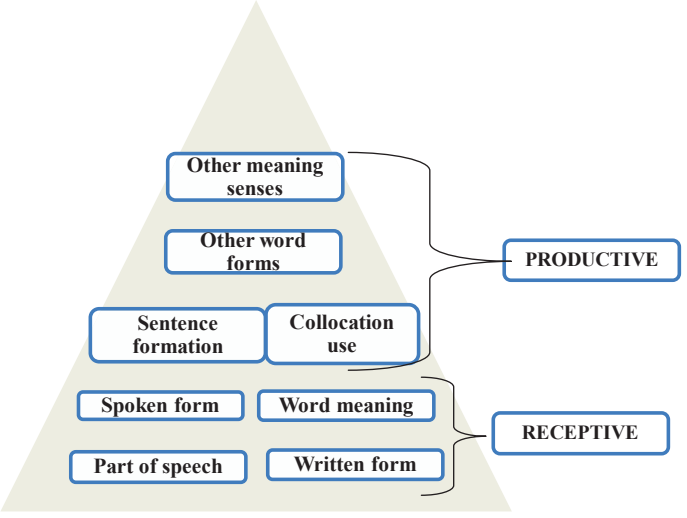

Figure 21. Hierarchical order of development of word knowledge types.

1. In the first stages of vocabulary development, part of speech is likely to be acquired among the first deep word knowledge components; however, this might more salient in the Hungarian context than elsewhere due to the fact that Hungarian students study

grammar in their mother tongue, too. Another category is the knowledge of written form. The participants demonstrated a solid knowledge of written forms, thus this category had less room for overall improvement.

2. Secondly, it was observed that the components of spoken form and word meaning improved by similar degrees and improved significantly over the given amount of time.
3. The next stages of progress concerned collocation use and sentence formation. Nevertheless, in the case of the former it must be noted that as the words were not too difficult, providing a simple collocation using the words in a correct sentence developed visibly, especially between the first and the second phase.
4. The knowledge of the two above-mentioned productive aspects was followed by the knowledge of providing other word forms. This category developed continually; however, the most outstanding improvement occurred between the second and the third phases.
5. The knowledge of other word meanings was the only category with no trace of development in the present study. Although there is no straightforward explanation for this phenomenon, one reason might be the format of the test: the participants were so absorbed in the process of deliberating every aspect of the given word and its meaning that it might have been demanding for them to conjure up another meaning sense. However, this finding might also suggest that at this stage of proficiency, only the

most frequent meaning senses of a word are acquired by the learner. However, the justification for this may also be that other meaning senses, once they are learnt, will be connected to other conceptual representations, as hypothethised by Pavlenko (2009) in her Modified Hierarchical Model. To sum up, further research is needed to trace the development in the knowledge of multiple meaning senses.

4.6 Conclusion of word knowledge development

To summarize, in Phase 1 the participants demonstrated more receptive knowledge of the 21 words selected for the study and had higher scores on the components of part of speech and written form, followed by spoken form and word meaning. There was a significant development of the 21 words over time and both receptive (i.e. written form, spoken form and word meaning) and productive (other word forms, sentence formation and collocation use) deep word knowledge components were found to improve parallel to each other. However, in the present study little progress was measured in the knowledge of part of speech and other meaning senses. A hierarchical order for the word knowledge types was established with relevance to the present study, hypothesizing that part of speech and the written form are acquired first, followed by the spoken form and word meaning. Productive aspects, such as sentence formation and collocation use were found to develop next, after which the knowledge of other word forms progressed.

5 Results and discussion 2 – Mixed methods analysis of word associations

5.1 Introduction

In an attempt to provide answers to the fourth, fifth and sixth research questions, the present chapter focuses on word associations, using the mixed methods research analyses outlined earlier. (Examples of the participants' associations are given in Appendix G.) In order to follow a systematic arrangement and pursue as comprehensive an investigation as possible, the chapter begins with a detailed review of the participants' associative behaviour in all the three phases of the study, relying mostly on qualitative data analysis, that is, the traditional paradigmatic-syntagmatic-phonological system of classification supported by a few statistical procedures. Subsequent to this, as a counterpoint to the traditional categorization, Fitzpatrick's (2006, 2007, 2009) new taxonomy is applied as a complement to the previous findings of Phases 2 and 3. (For a comparison of the two models and the justification for using Fitzpatrick's classification only in the latter stages of the study, see 3.7.1). Finally, relying on the qualitative findings as well as the resuls of inferential statistics, the overall development of the participants' associative behaviour is synthesized and discussed with a special focus on the changes in their mental lexica.

5.2 Analysis of word associations in Phase 1

In order to address the fourth research question of the study (How are words organized and connected in pre-intermediate learners' lexicon?), the word associations of the participants were examined. The elicitation process in Phase 1 of the study resulted in 1017 responses altogether, out of which 619 (61%) were in Hungarian and 398 (39%) were in English. The lowest number of responses elicited from a student for the 21 words was 35, while the highest was 146, almost four times as high, which might be due to the differences in the students' lexical knowledge. It must be noted that although the instructions originally asked for 5 associations, in the qualitative data coding all the words provided by the participants were considered for analysis, whereas in the statistical coding this number was maximized at 5 to ensure comparability. Table 11 provides a detailed summary of each lexical item according to word type and response type.

Table 11.1

Word Associations According to Word types and Word Association Categories in Phase 1: Nouns

prompt word	total	responses based on language		paradigmatic responses		syntagmatic responses		clang responses		analytic responses*	unclassifiable responses*
		E	H	E	H	E	H	E	H		
accident	62	30	32	29	30	1	0	0	1	0	1

nature	59	27	32	21	27	1	4	2	1	0	3
advantage	48	20	28	14	20	4	6	4	0	0	0
interest	44	22	22	17	12	3	6	2	0	3	1
reason	34	7	27	3	19	1	6	1	1	1	2
advice	49	20	29	11	16	3	11	4	2	0	2
experience	47	13	34	4	19	5	13	3	1	0	2
sum	343	139	204	99	143	18	46	16	6	4	11

* There were so few instances of analytic and unclassifiable responses that there seemed no point in separating the two languages

Table 11.2

Word Associations According to Word Types and Word Association Categories in Phase 1: Verbs

prompt word	total	responses based on language		paradigmatic responses		syntagmatic responses		clang responses		analytic responses *	unclassifiable responses *
		E	H	E	H	E	H	E	H		
develop	43	21	22	6	8	14	14	1	0	0	0
decide	47	15	32	3	13	7	18	3	0	1	2
grow	57	26	31	9	8	12	23	5	0	0	0
move	56	23	33	2	7	18	24	3	2	0	0
relax	48	17	31	5	4	15	23	0	0	0	1
appear	44	17	27	5	15	8	12	4	0	0	0
concentrate	48	15	33	6	18	6	15	3	0	0	0
laugh	59	21	38	2	9	17	29	2	0	0	0
mean	38	10	28	1	6	6	21	3	0	0	1
allow	48	17	31	4	8	10	18	3	0	1	4
total	488	182	306	43	96	113	197	27	2	2	8

** The Hungarian word given at the beginning was ‘eldönt’

*** The reason why students associated with *develop* for the word *grow* might be that *develop* was the first word in the interview. Perhaps it was not the best choice to include these two words from the point of view of

associations but their other word knowledge categories (e.g. word form, other meaning, collocations) justify this choice.

Table 11.3

Word Associations According to Word Types and Word Association Categories in Phase 1: Adjectives

prompt word	total	responses based on language		paradigmatic responses		syntagmatic responses		clang responses		analytic responses*	unclassifiable responses*
		E	H	E	H	E	H	E	H		
foreign	54	27	27	2	4	24	22	1	1	0	0
able	41	11	30	0	7	10	19	1	2	1	1
successful	46	23	23	2	10	15	15	3	0	0	1
worth	45	16	29	3	9	6	15	4	0	1	7
total	186	77	109	7	30	55	71	9	3	2	9

5.2.1 Typicality of responses

Table 12 presents the most typical responses for the target words in Phase 1. Concerning typicality in the responses, three groups of words could be established. Firstly, those words which better known by the participants at this stage had a higher number of identical associations in English. For example, for the word *accident* six students associated with *hospital*, for the word *foreign* six students responded with the word *country*, while for *relax* four produced *sleep/sleeping*.

Table 12

The Most Typical Words in Phase 1

Prompt word	**accident**	**nature**	**advantage**	**interest**	**reason**	**advice**	**experience**
Most typical response Phase 1	hospital (6)	növény(ek) (5) flower (4)	verseny (5)	érdekes (3)	okozat (3)	barát (3) friend (2)	tapasztalt (2)

Prompt word	**develop**	**decide**	**grow**	**move**	**relax**
Most typical response	grow (5)	elhatároz (4) question (3)	develop (5)	house (4) ház (2)	sleep (4)

Prompt word	**appear**	**concentrate**	**laugh**	**mean**	**allow**
Most typical response	eltűnik (3) disappear (3)	figyel (6)	happy (3) boldogság (4)	szó (4) word (2)	szabad (3) parent (2)

Prompt word	**foreign**	**able**	**successful**	**worth**
Most typical response	country (6)	tud (4) can (2)	siker (2) actor (2)	expensive (2)

Secondly, in the case of lesser known words, students tended to associate similarly, but in Hungarian (e.g., *concentrate* → *figyel [pay attention]* six instances, *able* → *tud [know]* four instances, *advantage* → *verseny [competition]* four instances), while in the case of words which had a low mean in total lexical depth, the number of similar associations was low in English as well as in Hungarian (e.g., *experience* → *tapasztalt [experienced]* and *worth* → *expensive*, two instances). Research comparing the associations of non-native speakers with those of native speakers (for more see Wolter, 2002) has also shown that the reason for this might be that associations tend to converge if a word is well-known by the students, whereas with lesser-known words, there is a divergence of associations.

5.2.2 Language use

Concerning the two languages, the ratio of the responses in English and the total number of responses do not seem to differ with regard to nouns, verbs and adjectives (the mean is 0.35 for nouns and verbs, and 0.38 for adjectives). Interestingly, more differences could be highlighted in the use of English and Hungarian as regards paradigmatic and syntagmatic responses for the three word types (see 5.2.2.1 and 5.2.2.2 and Table 11 for a detailed word-by-word analysis).

With regard to language use, the participants can be divided into two distinct groups: nine students provided most of their associations in Hungarian (504 responses out of 619), ranging from 64% to 100%, the average being 95%, while the other five participants gave

most responses (over 78%) in English. From their placement test, which aimed to decide whether students should join the beginner or the pre-intermediate group at the beginning of the year and consisted of a multiple choice grammar test and a short piece of writing marked by two teachers of the school, it could be concluded that the higher scores the students had on this test, the more associations they could provide in English. These findings corroborate the conclusions of Wolter (2001) as well as Wilks and Meara (2002), who have also found that the better known a certain word is, the more central position it occupies in the mental lexicon and the more connections it has with other words. Furthermore, as they found, the connections between L2 items become stronger as the words become better known by the learner.

Language transfer, that is, giving a response in one language then turning to the other and continuing giving responses in that language, was often triggered by translations. 43 instances were found (concerning 86 words, 8% of the total number of words) where it was the translation that lead to a switch in language use. The change was bi-directional: sometimes it went from English to Hungarian or the other way round. This is in line with the finding of Navracsics (2007), who called these responses “lexical equivalents” or “cross-linguistic synonyms” (p. 32) and stated that learners activate the lexical store of both languages when associating.

Moreover, out of the 43 cases, 22 were translations of nouns, 14 of verbs and 7 of adjectives. The words translated were concrete words on 38 occasions (88% of the cases). For

example:

advantage → *üzlet, business, project, businessman, travelling*;

accident → *hospital, kórház, mentőkocsi [ambulance], seb [wound], orvos [doctor], sebészet [surgery]*;

foreign → *tourist, museum, trip, túra, látványosság [sight]*;

worth → *olcsó, drága, cheap, expensive*.

These word pairs produced by the participants are consistent with the findings of van Hell and de Groot (1998), who, after showing that more translations were given for concrete words in an association task, suggested that concrete words might be stored together in the bilingual memory due to a shared conceptual representation. Despite the fact that the participants of the present study were of lower level than those in van Hell and de Groot's, there was some indication that some high-frequency and/or concrete words might indeed be organized together in the bilingual mental lexicon.

5.2.3 Word association categories

As can be seen in Table 13, the mean number of words given in the two languages together for nouns, verbs and adjectives was nearly the same (total mean for all responses=50.5, which means approximately 50 responses per prompt word) and the ratio of words associated in English (responses in English) and in the two languages (all responses)

did not show any substantial differences either (total mean for responses in English is 19.2, which means 19 associations per prompt word).

Table 13

Mean Number of Responses According to Word Types and Word Association Categories

Word class	**All responses**	**Responses in English**	**All paradigmatic responses**	**Paradigmatic responses in English**	**All syntagmatic responses**	**Syntagmatic responses in English**
Noun	49.00	19.86	35.43	14.14	9.14	2.57
Verb	48.80	18.20	12.90	4.30	31.00	11.30
Adjective	46.50	21.00	9.25	1.75	31.50	13.75
Total	48.40	18.95	19.90	7.09	23.80	8.86

5.2.3.1 Paradigmatic responses

Table 13 also shows that the mean number of total paradigmatic responses (associations having the same grammatical function as the prompt word) for nouns is 35.43, whereas for verbs it is 12.9 and for adjectives it is 9.25. This indicates that paradigmatic responses were given by the participants more frequently for nouns than for verbs and adjectives. As for the use of English, significant differences could also be established with regard to the three word types, thus participants used fewer paradigmatic responses for verbs and adjectives than they did for nouns. The mean ranks of paradigmatic responses were 2.93

for nouns, 1.79 for verbs and 1.29 for adjectives. Since sample size was small, and data were not equally distributed, Friedman's ANOVA was used and significant differences could be found between the three conditions ($\chi^2 = 21.39$, $df = 2$, $p < 0.001$). Wilcoxon Signed-rank tests with a Bonferroni correction were applied and the results showed that there was a significant difference in paradigmatic associations between nouns and verbs ($Z = -3.18$, $p = 0.001$) as well as nouns and adjectives ($Z = -3.18$, $p = 0.001$), but not between verbs and adjectives ($Z = -2.34$, $p = 0.19$).

The findings also indicated that paradigmatic responses in English were used more often by the participants for nouns than for adjectives and verbs. This is in line with previous research, showing that the paradigmatic shift occurs with native and non-native speakers as well, and it comes earlier for nouns than for other word classes (Piper & Leicester, as cited in Wolter, 2001, p. 44). The rationale behind this might be that L2 learners acquire more nouns at the beginning of the language learning process, which might lead to a more stable organization of nouns at the earlier stages of proficiency.

As for the types of paradigmatic responses, for words which had higher overall depth of word knowledge, the participants tended to produce coordinates in English (e.g., *accident* → *doctor, nurse, headache, toothache*), while for lesser-known words several synonyms were provided in Hungarian (e.g., *laugh* → *kacag, kuncog, röhög*). This could indicate that coordinates are organized earlier in the L2 memory than synonyms but further research needs

to be carried out to verify this.

The ratio of paradigmatic responses in English compared to the total number of paradigmatic responses was lower for adjectives ($M = 0.19$) and verbs ($M = 0.31$) than it was for nouns ($M = 0.41$), which indicated that when it comes to lexical selection, the participants' mental lexicon is more lacking in verbs, but especially adjectives. This is demonstrated by the fact that the participants avoided paradigmatic associations for verbs and adjectives in English.

5.2.3.2 Syntagmatic responses

The mean number of syntagmatic responses for nouns was 9.14, whereas for verbs and adjectives it was considerably higher: 31 and 32.5 respectively (see Table 13). The mean ranks of syntagmatic responses were 1.14 for nouns, 2.57 for verbs and 2.29 for adjectives. Since sample size was small, and data were not equally distributed, Friedman's ANOVA was used and significant differences could be found between the three conditions ($\chi^2 = 17.23$, $df = 2$, $p < 0.001$). Wilcoxon Signed-rank tests with a Bonferroni correction were applied and the results showed that there was a significant difference in the syntagmatic associations between nouns and verbs ($Z = -3.18$, $p = 0.001$) as well as nouns and adjectives ($Z = -3.04$, $p = 0.002$), but not between verbs and adjectives ($Z = 0.000$, $p = 1$).

Regarding the use of English, the ratio of syntagmatic responses in English and the total number of syntagmatic responses was higher for adjectives (mean=0.44) than for verbs

(mean=0.36), and it is the lowest for nouns (mean=0.28). It emerged from this set of data that learners tended to associate with nouns for verbs and adjectives as well and again, as was shown in the previous section, they did not have enough verbs or adjectives to rely on for lexical selection.

In sum, the above-mentioned findings only partly support those of Wolter's (2001), which showed a preference for syntagmatic responses in the case of non-native speakers. Wolter argued for a "syntagmatically dominated" (p. 61) L2 mental lexicon and called for a re-evaluation of the syntagmatic-paradigmatic shift in the case of non-native speakers. The results of the first stage of the research study confirm the importance of nouns in the mental lexicon of pre-intermediate L2 learners, which means that independent of word class, the participants demonstrated a tendency to associate with nouns. Therefore, this indicates that the mental lexicon is syntagmatically dominant for verbs and adjectives but not for nouns.

Furthermore, although the syntagmatic associations given by the participants belonged to a different word class (hence their classification as syntagmatic), in most cases the links did not necessarily rest on collocational connections. The reason for the discrepancy between the findings of this study and those of Wolter's might be the difference between the proficiency levels of the participants in the current study. In Wolter's study the participants all scored higher than 500 on the TOEFL test and had a higher level of L2 competence than the participants in my research. This might suggest that a higher level of L2 competence is

needed for learners to be able to produce collocational or sequential relationships.

5.2.3.3 Phonological 'clang' responses

Interestingly, there were very few clang responses provided by the students, 64 altogether, but due to the fact that 58 of these were provided by one student (her performance would be an interesting case study), this number can be considered insignificant. This finding seems to contradict some previous research studies (Meara, 1982, 1984 as cited in Wolter, 2001, p. 42), which emphasized the importance phonology plays in the organization of the L2 lexicon. Nevertheless, the few instances found in the present study are consistent with the findings of Wolter (2001), according to which non-native speakers did not produce more phonological responses than natives. In his model of the mental lexicon he claimed that phonological links are located on the periphery of the lexicon, indicating that a word is not known well enough to have paradigmatic or syntagmatic connections with other words.

Likewise, in the present study the few cases when clang responses were given, the word was always hardly known by the student. However, the fact that in the present study students were also able to produce words in Hungarian might indicate that they could use this as an avoidance strategy once they could no longer think of a word in English, and rather than give a clang response, they preferred a word closer to the meaning in Hungarian. Thus, the lack of phonological responses is by no means proof that pre-intermediate students would not use them more frequently if the use of L1 had not been encouraged.

5.2.3.4 Analytic responses

There were only eight instances of analytic responses, but except for one, all were in Hungarian, which might be attributed to students' low level of English. An interesting finding was that analytic responses were never one word, but rather an explanatory phrase, which was regarded as one unit for practical reasons. For example, for the verb *move*, one analytic unit of response was '*it needs a lot of time*' or for *interest*, '*valami fontos dolog*' *[something important]* and '*nem hétköznapi*' *[not ordinary]* were given. The recordings indicated that analytic responses usually appeared when the students found it difficult to come up with a new association either in English or in Hungarian, and they solved this problem by explaining the word in their own words.

5.2.3.5 Unclassifiable responses vs. unusual responses

The most problematic category seems to have been the group of unclassifiable associations because in previous research studies no mention was made about the distinction between unclassifiable, erratic and unusual responses. Although the participants of the present study did provide a few untypical responses, if the connection with the prompt word could be established, the response was accepted and grouped into one of the categories (e.g., *appear→ varázsló [magician], laugh → száj [mouth], fogak [teeth]*). Unclassifiable responses were the ones where the connection could not be understood by an outsider because the response was vague;

whereas unusual associations were the ones where a personal link could be established (e.g., *foreign → London, relax → medve [bear]*). An association was considered erratic if the respondent misunderstood the meaning of the original word and associated to a different one (*worth → megéri az öregkort [reach old age], idős [old]; mean → jelent a hetes [*something like*: report to the teacher]*). Altogether there were 28 (2.75% of the total) instances of unclassifiable and erratic responses but this low number might again be attributed to the fact that Hungarian associations were also allowed.

5.2.4 Conclusions of Phase 1

The aim of the first phase of the study was to gain a better understanding of how a beginner L2 learner's mental lexicon might be organized. It emerged from the data collected that students gave more paradigmatic associations in English for nouns than for verbs and adjectives, and they gave more translations for nouns and concrete words than for verbs, adjectives and abstract words. Although students did not provide many clang and unclassifiable responses, this is likely to have occurred because of the possibility of using Hungarian words in addition to English. However, allowing the students to provide associations in both languages also made it possible to note some important distinctions between analytic, unclassifiable and unusual responses so far disregarded in the literature. Concerning the organization of the mental lexicon, the following conclusions could be drawn

from this set of data, confirming the findings of previous research studies. First, the participants heavily relied on their mother tongue. Furtermore, they gave more translations of concrete words and nouns, on the basis of which it might be assumed that these word pairs are the first to be stored together in the mental lexicon. Second, better-known words (e.g., *accident* or *move*) seemed to have more established links with other L2 words, and some commonality in associations also appeared. Third, the significantly higher ratio of paradigmatic associations for nouns than for verbs and adjectives indicated that nouns might have a pivotal role in the organization of a less advanced learner's mental lexicon.

5.3 Analysis of word associations in Phase 2

Due to the fact that Research question 5 (What changes take place in the mental lexicon of pre-intermediate learners in 16 months as their language proficiency develops?) is a complex question based on a vast amount of data, it is to be addressed in two parts. Therefore, in the following, only the word associations provided by the participants in the second phase will be analyzed and the results of the third phase will be discussed in section 5.4.

The elicitation process resulted in a total 1267 responses altogether, an increase of 25% in the number of words, out of which 1216 (96%) were in English and 51 (4%) were in Hungarian. Compared to the first phase, when only 39% of the associations were in English, a fundamental change could be observed in the participants' mental lexicon, which is best

illustrated by the Concept Mediation Model (Potter, So, von Eckhardt & Feldman,1984) in the sense that as language proficiency develops, learners do not need to rely on L1 words in order to access a concept. Secondly, the number of responses elicited from each student seems to have evened out, with an average of 90 words per person. Only one person deviated from the average: she gave a total of 54 associations but she was the least responsive in Phase 1 with 35 words so this seems to be an individual trait. Table 14 illustrates the associative behaviour of the participants in Phase 2.

Table 14.1

Word Associations According to Word Types and Word Association Categories in Phase 2: nouns

prompt word	total	responses based on language		paradigmatic responses		syntagmatic responses		clang responses		analytic responses*	unclassifiable responses*
		E	H	E	H	E	H	E	H		
accident	65	64	1	61	1	3	0	0	0	0	0
nature	70	69	1	65	1	4	0	0	0	0	0
advantage	63	57	6	29	4	27	2	0	0	0	1
interest	62	60	2	44	2	16	0	0	0	0	0
reason	51	49	2	22	2	27	0	0	0	0	0
advice	61	60	1	36	0	23	1	1	0	0	0
experience	60	60	0	29	0	30	0	0	0	0	1
total	432	419	13	286	10	130	3	1	0	0	2

*There were so few instances of analytic and unclassifiable responses that there seemed no point in separating the two languages

Table 14.2

Word Associations According to Word Types and Word Association Categories in Phase 2: Verbs

prompt word	total	responses based on language		paradigmatic responses		syntagmatic responses		clang responses		analytic responses*	unclassifiable responses*
		E	H	E	H	E	H	E	H		
develop	54	50	4	12	0	38	4	0	0	0	0
decide	51	44	7	14	0	30	7	0	0	0	0
grow	64	61	3	6	0	54	3	0	0	0	1
move	66	63	3	5	1	57	2	0	0	1	0
relax	65	62	3	22	2	40	1	0	0	0	0
appear	57	53	4	13	0	39	4	0	0	1	0
concentrate	60	58	2	17	1	41	1	0	0	0	0
laugh	65	63	2	9	0	54	2	0	0	0	0
mean	55	53	2	8	0	43	1	0	0	2	1
allow	57	54	3	19	0	35	3	0	0	0	0
total	594	561	33	125	4	431	28	0	0	4	2

Table 14.3

Word Associations According to Word Types and Word Association Categories in Phase 2: Adjectives

prompt word	total	responses based on language		paradigmatic responses		syntagmatic responses		clang responses		analytic responses*	unclassifiable responses*
		E	H	E	H	E	H	E	H		
foreign	60	59	1	0	0	59	1	0	0	0	0
able	56	54	2	8	2	46	0	0	0	0	0
successful	64	64	0	11	0	53	0	0	0	0	0
worth	61	59	2	15	0	44	2	0	0	0	0
total	241	236	5	34	2	202	3	0	0	0	0

5.3.1 Typicality of responses

Concerning typicality in the responses, the analysis yielded very interesting results. It emerged that, compared to Phase 1, there was a higher number of identical associations. When deciding about commonality, the conceptual level of lexical access was taken into consideration, therefore responses such as '*child*'/'*children*' or '*race*'/'*racing*' were regarded as identical. In the first phase the ratio of common responses was 108/1017 (10.6%), out of which 55 were in English and 53 in Hungarian. Due to the low number of such cases, if two participants shared a concept, it was accounted for in the total value. In sharp contrast with the first phase, in the second phase this ratio was 274/1267 (21.6 %), out of which 263 identical responses were in English, that is, this finding concerned 20.75% of the total associations provided in Phase 2. Table 15 shows the comparison of typical responses in Phases 1 and 2.

Table 15

Comparison of the Most Common Reponses in Phases 1&2

Prompt word	**accident**	**nature**	**advantage**	**interest**	**reason**	**advice**	**experience**
Most typical response Phase 1	hospital (6)	növény/ növények (5) flower (4)	verseny (5)	érdekes (3)	okozat (3)	barát (3) friend (2)	tapasztalt (2)
Most typical response Phase 2	car (10) blood (7) people/ person/ man (8)	animal(s) (9) tree(s) 9	race/ racing (5) competition (4) disadvantage (3)	hobby/ hobbies (6) interesting (5)	decide (4) decision (1)	good (5) question (3)	old (7)

street/ road (6)	verseny (2)	

Prompt word	**develop**	**decide**	**grow**	**move**	**relax**
Most typical response Phase 1	grow (5)	elhatároz (4) question (3)	develop (5)	house (4) ház (2)	sleep (4)
Most typical response Phase 2	grow (10)	forms of dönteni (7) in H decide (2)	child/children (10)	house (13) room (5)	sleep(ing) (10) bed (9)

Prompt word	**appear**	**concentrate**	**laugh**	**mean**	**allow**
Most typical response Phase 1	eltűnik (3) disappear (3)	figyel (6)	happy (3) boldogság (4)	szó (4) word (2)	szabad (3) parent (2)
Most typical response Phase 2	disappear (6) suddenly (2) hirtelen (2)	test (5) exam (3)	smile (7) happiness (7) happy (5)	-	parent(s) (7) let (5)

Prompt word	**foreign**	**able**	**successful**	**worth**
Most typical response Phase 1	country (6)	tud (4) can (2)	siker (2) actor (2)	expensive (2)
Most typical response Phase 2	country(ies) (13) abroad (7) people (6)	sport(s) (6) can (5)	work (5) job (4) business(man) (4) success (4)	money (8)

It was informative that there were stimulus words to which nine or more of the fourteen participants associated similarly: the stimulus word *grow* drew '*child*' or '*children*',

accident elicited the word '*car*' 10 times, *nature* evoked the response '*animal*' 9 and '*tree(s)*' 9 times, respectively. The most homogeneous response was '*country*' for the prompt word *foreign*; almost every student accessed this word in their lexicon; furthermore, in eight cases it was a primary response.

Moreover, when comparing the associations provided by the students in Phase 1, two interesting phenomena seemed to emerge. First, some of the responses mentioned earlier were also favoured in Phase 2 but increased in number: for the stimulus word *move*, the association 'house' appeared 13 times, as opposed to the 4 times in the first phase, and we can also observe this rise with the associations '*disappear*' (*appear*) and '*parent*' (*allow*). The second change might have been induced by language transfer in the mental lexicon as some of the common responses in Phase 2 were the translation equivalents of the most homogeneous Hungarian responses in Phase 1:

advantage → *verseny* (Phase 1), *race/racing* and *competition* (Phase 2)

interest → *érdekes* (Phase 1), *interesting* (Phase 2)

appear → *eltűnik* (Phase 1), *disappear* (Phase 2)

laugh → *boldogság* (Phase 1), *happiness* (Phase 2)

able → *tud* (Phase 1), *can* (Phase 2)

Similar to the first part of the study, it was the better-known stimulus words (in terms of depth of word knowledge) that conjured the highest number of identical associations in

English (see Table 5), such as *grow*, *accident*, *move* and *nature*. In sharp contrast to this, the prompt words *foreign* and *worth* also evoked identical responses although they were among the least known words. However, compared to Phase 1, their total depth of word knowledge increased significantly, as explained in sections 4.3.1, 4.3.2 and 4.3.3. These findings are in harmony with Wolter's (2001, 2002), who postulated that the rationale behind this might be that the better known a word is, the more similar associations it draws and the more central place it has in the mental lexicon. In sum, the decrease in the use of Hungarian and the growing similarity of responses are apparent and as the learners' proficiency developed, the links in their bilingual lexica seem to have become stronger, with English words directly linked to concepts rather than their Hungarian equivalents.

5.3.2 Language use

Concerning the two languages, the ratio of the responses in English and the total number of responses is high and does not seem to differ with regard to nouns (97%), verbs (95%) and adjectives (98%). Further differences in relation to paradigmatic and syntagmatic associations produced for the three word types are outlined in sections 5.3.3.1 and 5.3.3.2.

Due to the drastic decrease in the use of the Hungarian language, language transfer happened very rarely in the second phase and whereas earlier giving a response in one language then turning to the other and continuing giving responses in that language was often

triggered by translations, in the second phase the rationale behind opting for an L1 word appeared to be different. The majority of the 51 instances seem to have occurred in a failed attempt to trigger a less frequent word in English in a line of associations. For instance, associations such as 'következmény' *[pay attention]*, 'bevándorlás' *[immigration]*, 'szakkifejezés' *[technical term]*, szórakozás *[entertainment]*, 'látomás' *[apparition]* or növekedés *[growth]* were elicited by the prompt word. The last two might also serve as examples for word searches whereby the participant could have been looking for another form of the word but was unable to access it in English at that point.

5.3.3 Word association categories

As can be seen in Table 16, the mean number of words given in the two languages together for nouns, verbs and adjectives is nearly the same (total mean for all responses=60.33, and this number is slightly higher for adjectives and nouns) and the ratio of words associated in English (responses in English) and in the two languages (all responses) does not show any considerable differences either (total mean for responses in English=57.9, again with fewer responses in English for verbs); furthermore, due to the scattered use of associations in Hungarian, in any given word association category the mean number of responses in English almost equals the total number of responses in both languages. As a conclusion, from now on the most emphasis will be placed on L2 associations.

Table 16

Mean Number of Responses According to Word Types and Word Association Categories

Word class	**All responses**	**Responses in English**	**All paradigmatic responses**	**Paradigmatic responses in English**	**All syntagmatic responses**	**Syntagmatic responses in English**
Noun	61.71	59.80	42.29	40.86	19	18.57
Verb	59.40	56.1	12.9	12.5	45.9	43.1
Adj.	60.25	59	9.00	8.50	51.25	50.5
Total	60.33	57.9	21.95	21.19	38.09	36.33

5.3.3.1 Paradigmatic responses

Table 16 shows that in Phase 2 the mean number of total paradigmatic responses for nouns is 42.29, whereas for verbs it is 12.9 and for adjectives it is 9. This indicates that similar to Phase 1, paradigmatic responses were given by the participants distinctly more frequently for nouns than for verbs and adjectives. The mean ranks of paradigmatic responses were 2.93 for nouns, 1.86 for verbs and 1.21 for adjectives. Since sample size was small, and data were not equally distributed, Friedman's ANOVA was used and significant differences could be found between the three conditions ($\chi^2 = 17.23$, $df = 2$, $p < 0.001$). Wilcoxon Signed-rank tests with a Bonferroni correction were applied and the results showed that there is a significant difference in the paradigmatic associations between nouns and verbs ($Z = -3.11$, $p = 0.002$) as well as nouns and adjectives ($Z = -3.30$, $p = 0.001$), but not between verbs and

adjectives (Z = -1.64, p = 0.10). As for the use of English, there were similar differences with regard to the three word types, thus participants used fewer paradigmatic responses for verbs and adjectives than they did for nouns. The mean number of paradigmatic responses is 40.86 for nouns, 12.5 for verbs and 8.5 for adjectives.

On the basis of these, it can be concluded that although the tendency to associate with nouns did not fade, the fundamental change compared to Phase 1 is that eight months later, instead of the previous reliance on L1, the paradigmatic responses were produced in English. Again, this harmonizes with the hypotheses and findings of earlier research studies (e.g. Piper & Leicester as cited in Wolter, 2001) about the paradigmatic shift occurring with both native and non-native speakers, especially with regard to nouns.

5.3.3.2 Syntagmatic responses

The mean number of syntagmatic responses given in English for nouns is 18.57, whereas for verbs and adjectives it is considerably higher: 43.1 and 50.5 respectively (see Table 16). The mean ranks of syntagmatic responses were 1.07 for nouns, 2.18 for verbs and 2.75 for adjectives. Since sample size was small, and data were not equally distributed, Friedman's ANOVA was used and significant differences could be found between the three conditions (χ^2 = 20.76, df = 2, p < 0.001). Wilcoxon Signed-rank tests with a Bonferroni correction were applied and the results showed that there is a significant difference in the

syntagmatic associations between nouns and verbs (Z = -3.17, p = 0.001) as well as nouns and adjectives (Z = -3.30, p = 0.001), but not between verbs and adjectives (Z = -1.61, p = 0.11).

As the use of Hungarian diminished significantly in the second phase, these numbers are nearly the same for both languages: the ratio of syntagmatic responses in English and the total number of syntagmatic responses do not differ to a great extent (98% of such associations for nouns and adjectives are given in English, while it is 93% for verbs).

Similar to paradigmatic associations, the most important finding in comparison with Phase 1 is that while retaining a corresponding ratio of syntagmatic responses for verbs and adjectives, the participants produced these associations in English. The novel aspect of this category is the noticeable increase of syntagmatic associations in English given for nouns, indicating a move towards a more syntagmatically organized lexicon. The above-mentioned findings; however, only weakly support those of Wolter's (2001) as despite some definite improvement with regard to the vocabulary development nouns, the participants still failed to demonstrate a marked preference for syntagmatic responses at Phase 2.

5.3.3.3 Phonological 'clang' responses

Similar to Phase 1, it must still be said that the number of phonological responses is extremely low again and contradicts earlier research findings (Meara, 1982, 1984 as cited in Wolter, 2001, p. 42), which highlighted the importance of phonology in the organization of

the L2 lexicon. The reason for the different findings is three-fold. First, findings are in harmony with those of Wolter (2001), according to which L2 speakers do not necessarily produce more phonological responses than L1 users of a language. In his model of the mental lexicon he claimed that phonological links are peripheral, indicating that a word is simply not known well enough to have paradigmatic or syntagmatic connections with other words. Furthermore, the low number of form-based responses at this stage is also in line of Fitzpatrick's (2006) findings, where non-native speakers (as well as natives) demonstrated a strong preference for meaning-based and position-based associations. However, the fact that in the present study the participants were also able to produce words in Hungarian might indicate that they could still use this as a strategy of avoidance once they could no longer think of a word in English, although in the second phase they very rarely resorted to that.

5.3.3.4 Unclassifiable, unusual and analytic responses

There was a decline in both analytic and unclassifiable or unusual associations. Altogether there were 4 instances for each category, which is an insignificant ratio, which is why these instances do not appear in the tables. Again, similar to Phase 1, these associations were only mentioned by the students in an attempt to gain time.

The four unclassifiable associations included '*clothes*' for the stimulus word *grow*, but there might have been a personal link involved. Another example is the response '*broading*'

for *foreign*, but as the association preceding this word was '*abroad*', it can be seen clearly that this link is a further phonological association to the second association *abroad*.

Interestingly, the few cases for analytic associations all involved the students' justification of how they accessed the word in question. Two instances concern the use of the word '*mean*' for the stimulus *mean*, but as it transpired, it was not merely a repetition of the original cue. In one case it was immediately followed by the bilingual explanation '*mean, mint gonosz [like unkind] sense*', while the other one elicited another word, too: '*mean of transport*', which are both other meaning senses of the word *mean*.

To conclude, in contrast with Phase 1, where the low number might have been due to the fact that a significant ratio of the responses were in Hungarian, at this stage the participants' associations demonstrate the strengthening of links between lexical items of different word classes.

5.3.4 Conclusions of Phase 2

As is indicated in Table 17, there was a significant associative development in eight months. The slight decrease in paradigmatic responses for verbs and adjectives might be explained by the rise in syntagmatic responses; furthermore, there appeared to be a spectacular increase in both paradigmatic and syntagmatic responses given to nouns, which points to the continuous extension of the mental lexicon of the participants.

Table 17

Mean Number of Responses According to Word Types and Word Association Categories in Phases 1 & 2

Word class	All responses		Responses in English		All paradigmatic responses		Paradigmatic responses in English		All syntagmatic responses		Syntagmatic responses in English	
	1017	**1267**	**398**	**121**								
			38%	**96 %**								
Noun	49	61.71	19.86	59.80	35.4	42.29	14.1	40.86	9.1	19	2.57	18.57
Verb	48.8	59.4	18.20	56.1	12.9	12.9	4.30	12.5	31	45.9	11.3	43.1
Adj.	46.5	60.25	21	59	9.25	9.00	1.75	8.50	31.5	51.25	13.75	50.5
Total	48.4	60.33	18.95	57.9	19.9	21.95	7.09	21.19	23.8	38	8.86	36.33

The main conclusions that can be drawn from comparing the associations of Phases 1 and 2 are the following:

First, in contrast to Phase 1, where a significant ratio of associations were given in Hungarian, in Phase 2 most associations were in English. This demonstrates that there is a strengthening of L2 links in the mental lexicon and there might be less need for L1 words as L2 proficiency develops. This is in line with *the revised hierarchical model of* Kroll & Stewart (1990, 1994), who postulated that the nature of the links between the L1 and L2 equivalents of words might change with increased proficiency.

Second, there was an increase in similar associations which indicated a more

standardized English network. This convergence is in line with Wolter's theory that, as there are more well-known words in the lexicon, there might be more similarities in their organization (2001).

Third, there was a significant increase in the use of syntagmatic associations for nouns, which implied that as the participants became more advanced, they could rely more and more on other word forms than nouns. The increase in position-based responses for nouns was also an indication of their evolving mental lexicon, where, instead of relying on 'word lists' as such, they may have begun to think more in terms of formulating sentences.

5.4 Analysis of word associations in Phase 3

What follows next is the second part of Research Question 5 (What changes take place in the mental lexicon of pre-intermediate learners in 16 months as their language proficiency develops?) as the changes between Phase 2 and 3 are highlighted, followed by an overall analysis of the sixteen months.

Phase 3 yielded a total of 1277 responses, out of which 1273 were in English, which demonstrates that the participants fully relied on their second language. The four associations in Hungarian were rather slips, indicating that the participants could have produced associations in both languages as the instructions were exactly the same as in the prior sessions. However, this being the third phase of the study, the participants' motivation to reply

in English could partly have originated from their determination to perform to the best of their abilities, which certainly does not detract from their achievement.

Interestingly, the four Hungarian words (*sérülés [injury/wound]*, *csomagolás [packing]*, *szótár [dictionary]* and *nyugalom [peace and quiet]*) were all words that the other participants listed among their associations so it appears to have been a momentary lapse that they could not recall them and, instead of selecting another word, they resorted to the use of Hungarian.

Due to the negligibility of the use of Hungarian, the analysis of the third phase will only focus on the associations provided in English. The Table 18 below summarizes all the details of the participants' accociative behaviour in Phase 3.

Table 18.1

Word Associations According to Word Types and Word Association Categories in Phase 3: Nouns

prompt word	total	paradigmatic responses*	syntagmatic responses*	responses in H	clang responses *	erratic responses *	unclassifiable response*
accident	80	63	16	1	0	0	0
nature	70	63	6	1	0	0	0
advantage	58	31	22	0	0	1	4
interest	67	50	16	0	0	0	1
reason	58	30	27	0	0	1	0
advice	59	27	31	0	0	1	0
experience	58	28	30	0	0	0	0
total	450	292	148	2	0	3	5

* Responses in Hungarian were so rare at this point that it was negligible which category they belonged to

Table 18.2

Word Associations According to Word Types and Word Association Categories in Phase 3: Verbs

prompt word	total	paradigmatic responses *	syntagmatic responses *	responses in H	clang responses *	erratic responses *	unclassifiable response*
develop	57	14	40	0	1	0	2
decide	58	10	45	0	1	0	2
grow	67	12	53	0	0	0	2
move	66	11	51	1	0	0	3
relax	67	21	46	0	0	0	0
appear	50	14	30	0	1	0	5
concentrate	57	8	48	0	0	0	1
laugh	65	11	54	0	0	0	0
mean	59	13	44	1	0	1	0
allow	56	18	33	0	1	0	4
total	602	132	444	2	4	1	19

* Responses in Hungarian were so rare at this point that it was negligible which category they belonged to

Table 18.3

Word Associations According to Word Types and Word Association Categories in Phase 3: Adjectives

prompt word	total	paradigmatic responses *	syntagmatic responses *	responses in H	clang responses *	erratic responses *	unclassifiable response*
foreign	64	4	60	0	0	0	0
able	56	10	46	0	0	0	0
successful	59	22	37	0	0	0	0
worth	46	10	36	0	0	0	0
total	225	46	179	0	0	0	0

* Responses in Hungarian were so rare at this point that it was negligible which category they belonged to

5.4.1 Typicality of responses

Concerning typicality in the responses, there are some discernible changes compared to Phase 2. Again, when decisions were made about commonality, the conceptual level of lexical access was taken into consideration, therefore responses such as '*child*'/'*children*' or '*race*'/'*racing*' were regarded as identical. Table 19 contains the most typical responses for each word.

Table 19

Most Typical Responses in Phase 3

Prompt word	**accident**	**nature**	**advantage**	**interest**	**reason**	**advice**	**experience**
Most typical response Phase 3	car (11) hospital (8) street/road (6) crash/ car crash (5)	tree (9) animal (7) flower (5)	good/better (5) disadvantage (4)	free time (5) hobby (4)	question (3)	good (6)	old (5)

Prompt word	**develop**	**decide**	**grow**	**move**	**relax**
Most typical response Phase 3	grow (6)	question (4)	child/children (9) plant (5)	house (12)	sleep (9) rest (7) stress (5)

Prompt word	**appear**	**concentrate**	**laugh**	**mean**	**allow**
Most typical response Phase 3	disappear (3) suddenly (3) surprise (3)	learn (6)	happy/ happiness (9) smile (7) joke (6)	word (6)	let (9) parent (5)

Prompt word	**foreign**	**able**	**successful**	**worth**
Most typical response Phase 3	country (12) abroad (4)	can (9)	work (4) money (4) star (3)	money (2)

First of all, identical associations tended to correspond to the ones elicited in English in the second phase. For example, '*car*' and '*street/road*' were popular choices for the stimulus word *accident* as well as '*child*/*children*' for *grow* and '*animal*' and '*tree(s)*' for the word *nature*, on both of these occasions. The most homogeneous responses were '*country*' for the prompt word *foreign* and *house* for '*move*' as almost every student accessed this word in their lexicon, similar to Phase 2. A few new identical associations also emerged, such as '*hospital*' for *accident* (6 instances), '*rest*' and '*stress*' for *relax* or '*smile*' for the stimulus word *laugh*.

Secondly, the number of identical associations decreased in comparison with Phase 2. Whereas earlier the participants demonstrated a tendency to associate similarly on 263 occasions (concerning approximately 21% of the total number of responses in English), there were 226 such instances recorded in Phase 3 (18% of the total sum of words in English). The change is not too drastic and although it seems to contradict the authors of earlier studies (Meara, 1983, 1996; Wolter, 2001, 2002), who claimed that non-native speakers tend to converge in responses as their proficiency develops. Meanwhile, Fitzpatrick (2006, 2007) expounded that this statement is mostly valid for frequent and concrete words. Accordingly, the participants at this level did not demonstrate any further tendency in using similar associations compared to Phase 2.

In fact, it emerged from the bulk of data that, whereas between Phases 1 and 2 an inclination to giving similar responses was traceable, in the last phase the participants' mental lexica appeared to be characterized by both convergence and divergence. In other words, more frequently used stimulus words elicited almost the same type and number of responses; however, at the same time, the participants drew from a distinctly wider pool of associations, producing less frequently used words that were part of their own individual lexical store. Some examples for this are '*firewall*' for *allow*, '*benefit*' for *advantage*, '*landmark*' for *foreign* or '*mocking*' for *laugh*. The fact that the participants were able to rely on more types of associations is in line with Wolter's (2001) assumption that with development in L2

proficiency, there are more words at the core of the mental lexicon.

5.4.2 Word association categories

Compared to Phase 2, the least apparent change seems to have affected the types of word associations the participants opted for. As presented in Table 20, in a similar fashion to Phase 2, the participants demonstrated a preference for paradigmatic responses in the case of nouns and tended to use syntagmatic associations for verbs and adjectives. The mean ranks of paradigmatic responses were 2.71 for nouns, 1.5 for verbs and 1.79 for adjectives. Since sample size was small, and data were not equally distributed, Friedman's ANOVA was used and significant differences could be found between the three conditions ($\chi^2 = 11.29$, $df = 2$, $p = 0.004$). Wilcoxon Signed-rank tests with a Bonferroni correction were applied and the results showed that there is a significant difference in the paradigmatic associations between nouns and verbs ($Z = -3.17$, $p = 0.002$) as well as nouns and adjectives ($Z = -2.86$, $p = 0.004$), but not between verbs and adjectives ($Z = 2.83$, $p = 0.78$). On the other hand, the mean ranks of syntagmatic responses were 1.43 for nouns, 2.39 for verbs and 2.18 for adjectives and Friedman's ANOVA showed no significant differences in syntagmatic association use with regard to nouns, verbs and adjectives ($\chi^2 = 7.31$, $df = 2$, $p = 0.26$).

This points to a slow but gradual change whereby the slight decline in the number of paradigmatic responses for nouns seems to have been influenced by the increasing tendency

to use syntagmatic associations, that is, verbs and adjectives. Likewise, the slight decrease of syntagmatic responses for adjectives illustrates that the participants could rely more on adjectives when the stimulus word was an adjective. In other words, sixteen months into the study, nouns are no longer the only organizing factor in the mental lexica of the participants.

Table 20

Mean Number of Responses According to Word Types and Word Association Categories in Phases 1 & 2

Word class	**Responses in English**			**Paradigmatic responses in English**			**Syntagmatic responses in English**		
Time	Phase 1	Phase 2	Phase 3	Phase 1	Phase 2	Phase 3	Phase 1	Phase 2	Phase 3
Nouns	19.86	59.80	64	14.14	40.86	37.85	2.57	18.57	21.14
Verbs	18.20	56.1	60	4.30	12.5	13.2	11.30	43.1	44.4
Adj.	21.00	59	56.25	1.75	8.50	11.5	13.75	50.5	44.75
Total	18.95	57.9	60.62	7.09	21.19	22.38	8.86	36.33	36.71

5.4.3 Other response types: Phonological 'clang', unclassifiable associations

Due to the scarcity of phonological, unclassifiable and erratic responses, these are to be discussed together, under one heading. Firstly, the occurrence of phonological responses was very rare; there were only four instances and incidentally, they all concerned verbs (e.g. '*envelope*' for the word *develop* or '*apple*' for *appear*). Altogether there were 24 instances of unclassifiable associations, where the link was considered to be too personal for establishing a

semantic connection that would be understandable for everyone. To exemplify this, the associations '*clap*' and '*head*' for the prompt word *allow* or '*grandmother*' for *move* can be cited. The third type, erratic responses (as part of Fitzpatrick's taxonomy, 2006) had to be introduced at this stage due to the fact that they were clearly separable from the previously mentioned two categories. Although low in number, they signaled small flaws in lexical selection, as if the participant attempted to access a word that they did not possess enough knowledge of, hence the wrong words '*causion*', '*worthful*' and '*convient*'. All in all, these instances also seemed to demonstrate more risk-taking on the part of the participants.

5.4.4 Analysis of word associations in Phase 2 & 3 with Fitzpatrick's model

As demonstrated in the previous sections, the paradigmatic-syntagmatic system of classification gave an insight into the organization of the participants' mental lexicon with regard to the presence of word-types. However, Fitzpatrick's (2006) new framework was necessary in order to investigate the selection processes of the individuals and establish whether in Phases 2 and 3 the associations were meaning-based or position-based, that is, the links between the stimulus word and the target words were semantically or syntactically driven. The rationale behind analyzing only these phases was the distinctly lower number of English associations in Phase 1, when the responses were almost exclusively meaning-based and, in the majority of the cases, relied on translations. Table 21 shows the total number of

meaning-based and position-based responses for each noun, verb and adjective in Phases 2 and 3. Initially, it is important to note that the number of meaning-based responses is higher in both phases than that of paradigmatic associations (Phase 1 → nouns: 286, verbs: 125 and adjectives: 11; Phase 2 → nouns: 292, verbs: 132, adjectives: 46) for all the word types. This means that whereas paradigmatic responses only comprised identical word class lexical items (e.g., *accident → hospital; appear → disappear; successful → clever)*, with Fitzpatrick's (2006) taxonomy it is clearly visible that words from different word classes were also selected on the basis of semantic relations with the target word.

On the other hand, this implies that the number of position-based associations was lower than that of syntagmatic responses (130, 431 and 202 position-based responses in Phase 2 for nouns, verbs and adjectives and 148, 444 and 179 in Phase 3, respectively). With the disparities in the categories, the application of both classifications is justified as they point to different aspects of word selection: the first based on form, the second based on meaning or position in the sentence.

Table 21

Meaning-based and Position-based Associations in Phases 2 & 3

nouns	meaning-based Phase 2	meaning-based Phase 3	position-based Phase 2	position-based Phase 3
accident	48	51	16	16
nature	68	67	2	2
advantage	48	46	4	4
interest	56	50	5	14
reason	36	39	11	18
advice	40	38	19	19
experience	42	38	18	23
total	338	329	75	96

verbs	meaning-based Phase 2	meaning-based Phase 3	position-based Phase 2	position-based Phase 3
develop	31	18	17	33
decide	28	31	14	26
grow	25	24	35	39
move	29	15	32	43
relax	33	57	28	10
appear	27	27	24	18
concentrate	22	24	36	32
laugh	56	59	7	6
mean	37	56	14	1
allow	31	34	21	17
total	319	345	228	225

adjectives	meaning-based Phase 2	meaning-based Phase 3	position-based Phase 2	position-based Phase 3
foreign	35	33	24	31
able	44	43	10	13
successful	38	28	27	30
worth	44	36	16	8
total	161	140	77	82

Due to the fact that the words were low in number and were not normally distributed, the Wilcoxon Signed-Rank Test was used to compare the fourteen participants' meaning-based and position-based associations for nouns, verbs and adjectives. The analysis showed no significance with regard to nouns in the number of meaning-based and position-based associations on the two occasions. However, participants demonstrated a tendency to use significantly more meaning-based associations for verbs in Phase 3 than in Phase 2 (Z = -3.30, p = 0.001) and at the same time, they used significantly fewer position-based responses on the last occasion (Z = -3.30, p = 0.001). Exactly the same was found regarding adjectives: in Phase 3 there were significantly more meaning-based associations given by participants than in Phase 2 (Z = -3.30, p = 0.001) and the number of position-based responses was significantly lower than in the second phase (Z = -3.31, p = 0.001).

In order to establish the differences between the use of meaning-based and position-based associations for nouns, verbs and adjectives on each of the two occasions, Friedman's ANOVA was used. As Table 22 illustrates, there was a statistically significant difference in

meaning-based responses for nouns, verbs and adjectives in both Phase 2 and Phase 3. However, as for the use of position-based responses, significant difference was only found between nouns, verbs and adjectives in Phase 2, but not in Phase 3.

Table 22

Meaning-based and Position-based Associations for Nouns, Verbs and Adjectives

Meaning-based	Mean Rank **Phase 2**	Mean Rank **Phase 3**	**Position-based**	Mean Rank **Phase 2**	Mean Rank **Phase 3**
nouns	2.93	2.71	nouns	1.07	1.43
adjectives	1.21	1.5	adjectives	2.18	2.39
verbs	1.86	1.79	verbs	2.75	2.18
Chi-Square	21	11.86	Chi-Square	20.76	7.31
df	2	2	df	2	2
Asymp. Sig.	.000	.004	Asymp. Sig.	.000	.026

Post-hoc analyses were conducted with Wilcoxon Signed-Rank Tests with a Bonferroni correction applied, resulting in a significance level set at $p < 0.0017$. In Phase 2 there were significant differences in the use of meaning-based associations between nouns and verbs (Z = -3.11, p = 0.002) and nouns and adjectives (Z = -3.30, p = 0.001). In a similar fashion, significant difference was established for position-based associations between nouns and verbs (Z = -3.17, p = 0.002) and nouns and adjectives (Z = -3.30, p = 0.001) At the same time, no significant differences could be established in the use of either meaning-based or position-

based responses between verbs and adjectives. Phase 3 resulted in the same significance in differences between the use of meaning-based responses for nouns and verbs (Z = -3.17, p = 0.002) and nouns and adjectives (Z = -2.86, p = 0.004); however, no significant difference was found between verbs and adjectives.

5.4.5 Conclusion of Phase 3

Overall, the changes between the second and the third parts of the study appeared to be less marked than those between the first and second phases; however they indicate small but substantial modifications with regard to the structure of the mental lexicon. First of all, the participants relied fully on their L2 lexical store when associating. Moreover, although common responses are still apparent, less frequent words were also elicited. This signals the emergence of idiosyncratic features in the participants' bilingual lexica. Finally, the further increase in the number of syntagmatic associations for nouns as well as in the number of paradigmatic responses for verbs and adjectives points to the growing influence verbs and adjectives might play in the organization of the mental lexicon.

5.5 Mapping overall change in the use of associations between Phases 1 and 3

In order to complement the qualitative findings with quantitative analyses, an attempt was made to explore whether there was any statistical significance with regard to the

traditional classification of paradigmatic and syntagmatic associations on the three occasions. Since sample size was small, and data were not equally distributed, Friedman's ANOVA was used to analyse the database in which responses to all the words after all three sessions were entered and coded as paradigmatic or syntagmatic. The results indicated no significant change in the use of paradigmatic associations with regard to nouns; however, as Table 23 shows, significant differences were found between the three phases concerning both paradigmatic and syntagmatic answers for verbs as well as adjectives and syntagmatic responses for nouns.

Table 23

The Mean Ranks of Paradigmatic and Syntagmatic Associations in Phases 1, 2 & 3

	Mean Rank **nouns** Paradigmatic	Mean Rank **nouns** Syntagmatic	Mean Rank **verbs** Paradigmatic	Mean Rank **verbs** Syntagmatic	Mean Rank **adjectives** Paradigmatic	Mean Rank **adjectives** Syntagmatic
Phase 1	1.64	1.39	1.46	1.82	1.5	1.89
Phase 2	1.89	2.50	1.54	2.89	1.5	2.89
Phase 3	2.46	2.11	3.0	1.29	3.0	1.21
Chi-Square	5.35	9.69	21.42	19.09	21.78	21.09
df	2	2	2	2	2	2
Asymp. Sig.	.07	.008	.000	.000	.000	.000

In order to reveal when the fundamental changes were induced, post-hoc analyses with Wilcoxon Signed-rank Tests for each word type were conducted and Bonferroni corrections

were applied, resulting in a significance level set at $p < 0.0017$. First, significant change was observed for nouns between Phases 2 and 3 with regard to syntagmatic responses ($Z = -2.89$, $p = 0.004$). As for paradigmatic associations, the most significant increase for both verbs ($Z = -3.30$, $p = 0.001$) and adjectives ($Z = -3.30$, $p = 0.001$) occurred between Phases 2 and 3 and between 1 and 3 ($Z = -3.30$, $p = 0.001$ for both word classes). Second, as for the syntagmatic responses for verbs, significance could be established between Phases 1 and 2 ($Z = -3.08$, $p = 0.002$) as well as 2 and 3 ($Z = -3.30$, $p = 0.001$). Likewise, syntagmatic associations for adjectives had a significant difference in Phases 1 and 2 ($Z = -2.94$, $p = 0.003$), as well as 2 and 3 ($Z = -3.30$, $p = 0.001$).

In sum, the findings of word association use illustrate important changes in the mental lexicon of these pre-intermediate learners. In Phase 1 of the study the participants relied on their mother tongue and gave more translations for nouns and concrete words than for verbs, adjectives and abstract words. L2 nouns were found to have a significant organizing role in pre-intermediate learners' bilingual lexica. Over time, with a steady decrease in the use of the mother tongue, the links between L2 words seemed to strengthen and the convergence in association use implied a more standardized L2 network, where nouns, verbs and adjectives all play important roles. In Phase 3, in addition to the commonalities in associating, less frequent words were also provided. This might indicate that, within a more standardized network, there might be individual elements in the mental lexicon as L2 proficiency increases.

6 Conclusion

6.1 Summary of findings

Based on the tenets of previous studies which highlighted the importance of investigating the role of individual words in the discovery of the mental lexicon (Schmitt, 1998a; Wolter, 2001), the present study was guided by the aspiration to give an insight into the changes that take place in the the depth of word knowledge and mental lexicon of the fourteen participants of the research study within the period of sixteen months. To achieve this, the participants in this longitudinal study were given the same target words in English three times (September, 2005; May, 2006 and January, 2007), and changes in the depth of their word knowledge as well as their word associations were analysed in order to investigate the types of connections that exist between L1 and L2 words in pre-intermediate learners' bilingual memory as their language proficiency developed.

Eventually, six research questions were formulated in an attempt to explore the depth of word knowledge development of the twenty-one target words, through examining all the word knowledge types (spoken form, spelling, grammatical and collocational behaviour, other forms, other meanings and sentence formation) with a special emphasis on word associations.

The first research question concerned the participants' depth of word knowledge at the beginning of the study. Word selection could be considered successful as there was potential for vocabulary development in the long run for at least 20 words out of 21. It was shown that

the participants demonstrated deeper word knowledge of verbs than adjectives. As regards the different word knowledge types, part of speech and written form were the most known, followed by spoken form and word meaning. In general, simple but meaningful sentences were provided. At this level, productive aspects, such as other word forms, collocations and other meanings proved to be difficult. As regards the interrelationships between the word knowledge types, correlation was found between the word meaning and spoken form as well as between spoken and written form.

The second research question referred to the depth of word development of the 21 words during the course of sixteen months. For word types it emerged that the deep word knowledge of all the nouns, verbs and adjectives developed significantly in the three phases of the study and this increase in knowledge was more significant in the case of verbs and nouns than adjectives. There was significant improvement in the knowledge of six of the eight lexical components: word meaning, spoken form, spelling, the knowledge of other word forms, sentence formation as well as collocation use. However, no progress was visible with regard to the knowledge of other meaning senses and part of speech was already known by the students at beginning of the study. However, both receptive and productive aspects of word knowledge developed significantly between Phase 1 and 3.

The third research question was formulated about the possible developmental hierarchy between the word knowledge types. As opposed to lack of evidence by Schmitt

(1998a), in the present study it was discovered that certain types of word knowledge might be acquired earlier than others. The first categories appeared to be part of speech and written form, followed by spoken form and word meaning. Next, the lexical components sentence formation and collocation use were shown to progress. The last word type to develop was found to be the knowledge of other word forms. In this particular study no development in the knowledge of other word meanings could be traced but further research would be needed to elaborate on whether it might be the last component to be acquired or the results may also be attributed to the format of the interview applied in the study.

The fourth research question focused on how words were organized and connected in a pre-intermediate learner's mental lexicon at the beginning of the study. On the one hand, the participants' reliance on their mother tongue was apparent. On the other hand, it was also shown that more paradigmatic associations were elicited in English for nouns than for verbs and adjectives, and the participants gave more translations for nouns and concrete words than for verbs, adjectives and abstract words.

The fifth questions aimed to shed light on the changes that would take place in the mental lexicon of pre-intermediate learners in 16 months as their language proficiency developed. First, the participants seemed to rely more on their second language when associating. Second, from Phase 1 to Phase 2, both paradigmatic and syntagmatic associations for nouns were found to increase, and slightly more paradigmatic associations were provided

for verbs and adjectives. There was an increase in similar associations, as well. From Phase 2 to 3 the changes were not so substantial; however, L1 was almost neglected and more syntagmatic responses were used for nouns and more paradigmatic associations were given for verbs and adjectives.

The sixth question attempted to reveal what the changes in the depth of word knowledge and association use imply about the organization of the bilingual lexica of learners with lower levels of proficiency. At the beginning of the research project, L2 words that were better known by the participants appeared to have more established links with other L2 words, and the associations of well-known words also tended to converge more. Second, the fact that these pre-intermediate learners gave more translations of concrete words and nouns might be an indication that these word pairs are the first to be stored together in the mental lexicon. Third, the significantly higher ratio of paradigmatic associations for nouns than for verbs and adjectives indicated that nouns might have a pivotal role in the organization of a less advanced learner's mental lexicon. As for the depth of word knowledge components, the receptive aspects were better known by the participants, especially the component part of speech and written form.

In contrast with the first phase, a strengthening of L2 links in the mental lexicon was apparent in the second phase, which might explain the need for fewer L1 words as the participans' L2 proficiency developed. Secondly, there was an increase in commonality,

pointing to a more standardized English network. With the increase in the number of syntagmatic associations for nouns, the participants were also shown to rely more on other word forms than nouns. As for their depth of word knowledge, significant development could be traced in the receptive aspects of word knowledge, such as word meaning and spelling. However, the most salient progress was made with regard to productive aspects of lexical depth, namely, in the knowledge of other word forms, collocation use as well as sentence formation.

In Phase 3, the tendencies observed in Phase 2 seemed to continue. There was a high number of common associations but at the same time, less frequent words were also elicited, indicating the emergence of idiosyncratic elements in the participants' bilingual lexica. Finally, there was a further increase in the use of other word forms than nouns, which show the growing significance of verbs and adjectives in the mental lexicon. Regarding the types of word knowledge, both receptive and productive aspects progressed, primarily spoken form, word meaning, written form and sentence production. This might be an indication that individual words are known receptively and productively to varying degrees and might develop parallel to each other.

6.2 Pedagogical implications

It is my personal belief that the findings of the present study are in no way representative of the Hungarian context. The primary reason for this is the emphasis the participants' teacher places on vocabulary teaching, and especially on its productive aspects. Unfortunately, it was outside the scope of the present study to explore the actual teaching and learning processes that might explain the rationale behind the changes in vocabulary development; however, an informal interview conducted with the teacher at the end of the research project about his teaching methods and experience brought to light the following distinctive principles.

1. A great emphasis is laid on *authentic materials* and *incidental vocabulary learning*, which certainly aid the acquisition of collocations and other word forms, as well as sentence formation. For example, through providing examples of native language use, learners are exposed to formulaic language, which they are excouraged to incorporate into oral and written texts that they produce, enhancing *productive vocabulary development*.
2. Apart from focusing on the written and spoken form, *word formation and collocations* of words are *taught explicitly* and *revised regularly*.
3. *Autonomous learning with guidance* is advocated. This way the learners can also select the words that might be useful for them and relevant to their interest and needs.

In sum, it emerged from this particular project that aspects of deep word knowledge develop continually, there is no threshold between receptive and productive knowledge and effort is needed to stimulate productive use. Although further empirical evidence is needed, I believe that more emphasis should be given to the incremental nature of vocabulary development with a special focus on productive use and how it can be best triggered.

6.3 Limitations

There are several limitations to the study, both in relation to depth of word knowledge and the use of word associations. In hindsight, Schmitt's (2010) caution about the difficulties this type of research posits proved to be justified, such as the influential factor of word selection and the monotony and tediousness of high school students having to be intervied three times for as long as an hour on each occasion. In the following I would like to explain how these aspects of the research design might have affected the outcome.

First of all, I would like to take word selection into consideration. Due to practical reasons, on all three occasions, all the words were tackled in a short interval of approximately one hour in the case of every participant. This way each participant listened to the 21 prompt words as well as all their own associations given to these simuli, which must have influenced the participants as quite frequently they listed either the prompt word or earlier accociations. Had each stimulus word been more separated from each other, this would not have occurred, but at the same time, conducting the interview would have taken impossibly long. Word selection, which was primarily guided by the aspect of complete depth of word knowledge, can also be considered problematic in terms of the kind of associations the prompt words stimulated. Some of the words yielded very context-specific data (e.g., the prompt words relax, concentrate, successful or allow), in that participants' responses centered around school life. Perhaps this would also have happened with other words. As far as word types are concerned,

unfortunately, there were no cognates and no concrete words among those selected, which would have enabled the researcher to draw comparisons with non-cognates and abstract words used in the study. Again, this shortcoming is a consequence of placing more emphasis on the complete depth of word knowledge aspect than thinking in terms of only word associations. However, in the next version I would definitely include at least two concrete words and two cognates.

As for the monotony of the interviews, I feel that there is a controversy between the research paradigm that the nature of investigating depth of word knowledge in this particular study and the characteristics of the population participating in it. First of all, it was difficult to conduct such a long interview with teenage students and although they matured during the sixteen months of the research, by the second and third time, they were aware of the length and expectations of the interview (except for the individual words themselves) and some of them displayed signs of impatience towards the end of the session. The lack of novelty by the third time might have been the reason that there were slightly fewer associations given by the participants than on the second occasion. However, I still do not know of any better solution to overcome this problem of longitudinal research methodology and, considering all the above-mentioned diffulties, I am hopeful that these conditions did not affect the inclination of the participants to respond to their best of knowledge.

6.4 Directions for further research

Despite all the limitations, the findings of this study imply several avenues for further research. Firstly, in order to discover a more precise nature and structure of the mental lexicon, measures for the analysis of association responses are still in need of refinement. Secondly, it would be informative to investigate further changes in the mental lexicon through word associations as well as the depth of individual word knowledge with increasing proficiency, over longer periods of time. As the setting of the present investigation was quite particular and concerned one age group, it would be interesting to compare the results with those of other settings and institutional contexts. Finally, the most evasive and unobservable factor, that is, the actual learning and teaching processes behind these changes, call for further investigation as they might give an insight into the reasons for the changes in the depth of vocabulary knowledge.

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Appendices

Appendix A: Vocabulary Levels Test

Part 1

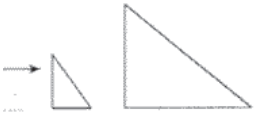
*In the first part of the test there are 39 questions. Circle "**T**" if a sentence is **true**. Circle "**N**" if a sentence is **not true**. Circle "**X**" if you **do not understand** the sentence. The first one has been answered for you.*

*A teszt első része 39 kérdésből áll. Kérlek karikázd be a "**T**"-t, ha úgy gondolod, hogy a mondat **igaz**. Karikázd be az "N"-t, ha szerinted a mondat **nem igaz**, és jelöld "**X**"-el, ha **nem érted** a mondatot. Az elsőt megcsináltuk helyetted.*

T = True **N = Not true** **X = I do not understand the question**

Example: We cut time into minutes, hours, and days. T N X

1. This one is little. T N X



2. You must look when you want to find the way. T N X
3. Some children call their mother Mama. T N X
4. *Show me the way to do it* means 'show me how to do it.' T N X
5. This country is part of the world. T N X
6. Dogs can keep people away from your house. T N X
7. When something falls, it goes up. T N X
8. Most children go to school at night. T N X
9. It is easy for children to remain still. T N X
10. One person can carry an elephant. T N X

11. A scene is part of a play. T N X

12. People often think of their home, when they are away from it. T N X

13. There is a mountain in every city. T N X

14. Every month has the same number of days. T N X

15. A chief is the youngest person in a group. T N X

16. Black is a colour. T N X

17. You can use a pen to make marks on paper. T N X

18. A family always has at least two people. T N X

19. You can go by road from London to New York. T N X

20. You can eat silver. T N X

21. You can see more when you are on a hill. T N X

22. Your child will be a girl or a boy. T N X

23. We can be sure that one day we will die. T N X

24. A society is made up of people living together. T N X

25. An example can help you understand. T N X

26. Some books have pictures in them. T N X

27. When some people attack other people, they try to hurt them. T N X

28. When something is ancient, it is very big. T N X

29. Big ships can sail up a stream. T N X

30. It is good to keep a promise. T N X

31. People often dream when they are sleeping. T N X

32. This is a date – 10 o'clock. T N X

33. When something is impossible, it is easy to do it. T N X

34. Milk is blue. T N X

35. A square has five sides. T N X

36. Boats are made to travel on land. T N X

37. Cars cannot pass each other on a wide road. T N X

38. When you look at something closely, you can see the details. T N X

39. A handle is part of our body. T N X

Appendix B: Dictionary entries of the 21 words

(based on Lázár, A. P. & Varga, Gy. (2000). Angol – Magyar kéziszótár. Budapest, Hungary: Aquila Kiadó.)

Word*	Written form & Word meaning	Part of sp.	Other word forms	Other meaning senses	Collocations
baleset	accident	noun	accidental; accidentally	véletlen, szerencsétlenség	by accident have an accident car/street/road accident
természet	nature	noun	natural, naturally, naturalist, naturalistic	jelleg; minőség	go back to nature, the wonders of nature
előny	advantage	noun	advantageous	hasznára válik	have/gain advantage (over), take advantage of, at an advantage
érdeklődés	interest	noun	interesting; interested; interestingly	érdek; kamat; érdekel	take/lose interest in sth; have an interest in sth
ok	reason	noun	- (only related to its other meaning senses)	ész/értelem; érvel	for some reason, the reason for/that/why; give a reason for
tanács	advice	noun	advise; adviser	értesítés	take sb's advice; give advice, good advice
tapasztalat	experience	noun	experienced; experiential	élmény; átél	have (some) experience in sth

* The Hungarian word was given first

Word*	Written form & Word meaning	Part of sp.	Other word forms	Other meaning senses	Collocations
fejlődik	develop	verb	developing; developed; development; developmental	fejleszt; mutatkozik; elkap (betegséget)	a company develops

eldönt	decide	verb	decision; decided; decidedly; decisive	meggyőz	decide to do sth; decide on sth; decide for sth
nő	grow	verb	growing; growth; grower	termel; növeszt	grow up; grow into; her hair grows; the company is growing
költözik	move	verb	mover	mozog; meghat; mozdulat	move house; move to a place; move in/out; move in with sb
pihen	relax	verb	relaxing; relaxed; relaxation	ellazít; gyengül	relax somewhere
feltűnik	appear	verb	appearance	fellép	appear to be; appear somewhere
koncentrál	concentrate	verb	concentration	tömörül; sűrít	concentrate on (doing) sth; concentrate hard
nevet	laugh	verb	laughter	nevetés	laugh at sth/sb; laugh to oneself
jelent vmit	mean	verb	meaning; meaningful; meaningless	zsugori; gonosz szándékozik/akar; valahogyan ért	this (word) means…; What does … mean?
megenged	allow	verb	allowance; allowable	ad/szán vmire; elismer	allow sb to do sth; be allowed to do sth… allow for

* The Hungarian word was given first

Word	**Written form & Word meaning**	**Part of sp.**	**Other word forms**	**Other meaning senses**	**Collocations**
külföldi	foreign	adj.	foreigner	idegen; furcsa	foreign country/language/people
képes vmire	able	adj.	ability; enable; abled	ügyes/rátermett	be able to do sth
sikeres	successful	adj.	success; successfully; succeed	-	be successful in/at sth
érdemes, megéri	worth	adj.	worthy; worthless; worthwhile	érték	be worth some money; it's worth doing/a try

* The Hungarian word was given first

Appendix C: Questions asked about each word

1. Do you know how to say the word *baleset* in English? (accident) – *to elicit the spoken form + word meaning*
2. Can you spell it? – *to elicit the written form*
3. What words come to your mind when you hear this word? (either in English or in Hungarian) – *to elicit associations*
4. Do you know what part of speech this word is? – *to elicit grammatical behaviour*
5. Do you know any other forms of this word? – *to elicit other forms of the same word*
6. Can you think of any other meanings of this word? – *to elicit other meaning senses*
7. Could you say a sentence with this word? – *to elicit productive knowledge*
8. Can you think of any collocations of this word? – *to elicit collocational behaviour*

Appendix D: Interview protocol (original, in Hungarian)

Ez egy olyan felmérés ami azt szeretné megnézni, hogy az angolban melyik szó nehéz, ezért egyáltalán ne izgulj, ha bármelyik kérdésre nem tudod a választ. Viszont kérlek, hogy ha kimész innen, a társaidnak ne áruld el ezeket a szavakat. *Neved:* _____

1. Tudod esetleg, hogy hogy mondják azt a szót angolul, hogy ...? (*ha nem tudja, megmondani*)

2. Le tudod betűzni vagy írni? (*papír a diák előtt a számával; ha helytelenül írja, javítani, hogy helyesen legyen a diák előtt a szó. Ezt nézheti egészen a köv. szóig, akkor a papírt behajtani*)

3. Milyen 5 másik szó jut eszedbe erről a szóról? (angolul, esetleg magyarul)

4. Tudod esetleg, hogy milyen szófajú ez a szó? (tudod, van főnév, melléknév, határozó, ige) (*válaszol, aztán*) Ismersz esetleg más szófajú alakjait?

5. Ismersz-e esetleg más jelentését ennek a szónak?

6. Tudnál egy mondatot mondani ezzel a szóval?

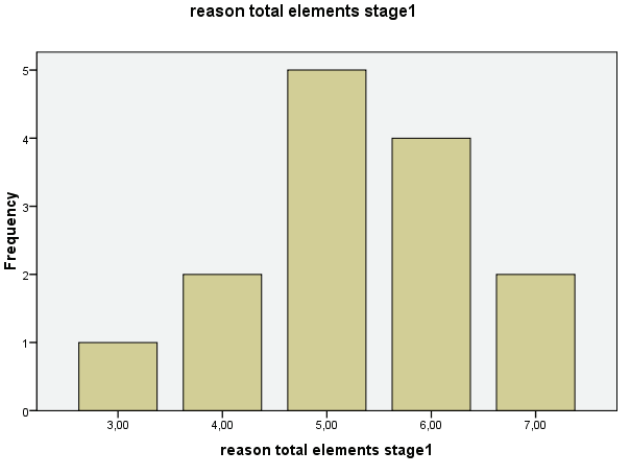
7. Ismersz szókapcsolatokat ezzel a szóval?

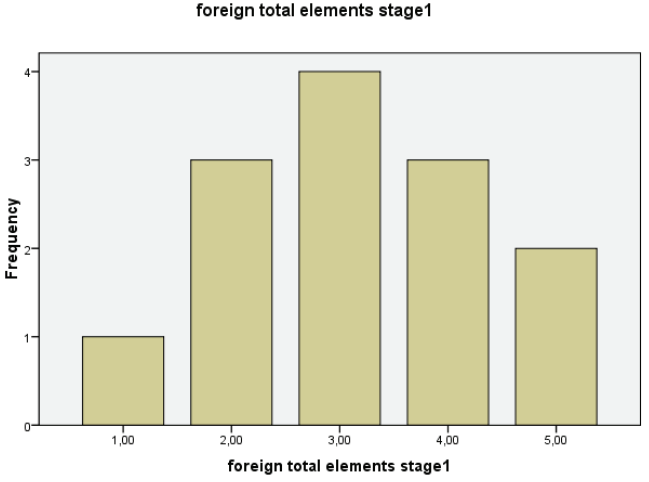
Szavak:

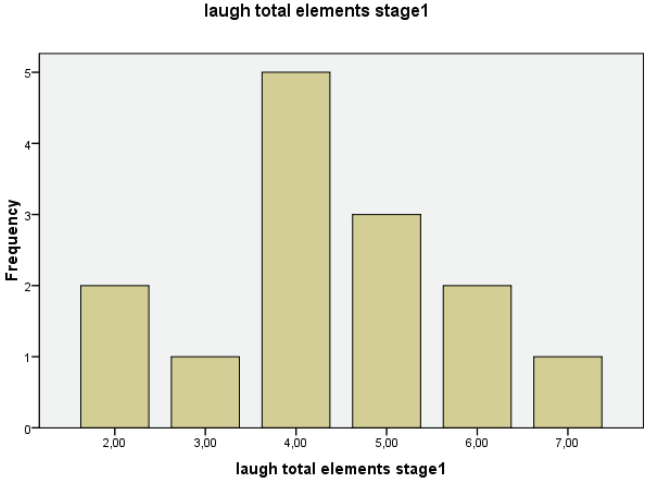
1. BALESET – ACCIDENT
2. FEJLŐDIK – DEVELOP
3. ELDÖNT – DECIDE
4. NÖVEKSZIK, NŐ – GROW
5. KÖLTÖZIK – MOVE
6. TERMÉSZET – NATURE
7. PIHEN – RELAX
8. ELŐNY – ADVANTAGE
9. MEGJELENIK, FELTŰNIK – APPEAR
10. ÖSSZPONTOSÍT (KONCENTRÁL) – CONCENTRATE
11. KÜLFÖLDI – FOREIGN
12. ÉRDEKLŐDÉS – INTEREST
13. NEVET – LAUGH
14. OK (VALAMIRE) – REASON
15. JELENT VALAMIT – MEAN
16. KÉPES VALAMIRE – ABLE
17. (JÓ)TANÁCS – ADVICE
18. TAPASZTALAT – EXPERIENCE
19. SIKERES – SUCCESSFUL
20. ÉREMES, MEGÉRI – WORTH
21. MEGENGED – ALLOW

Appendix E: Examples of histograms for word difficulty

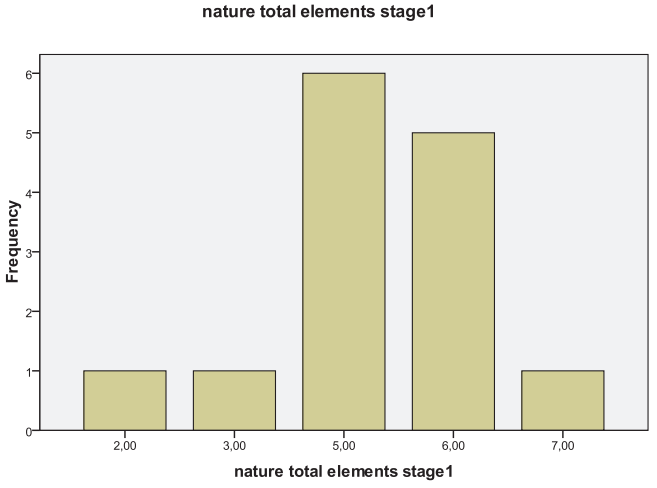
Group 1 – examples of words with normal distribution



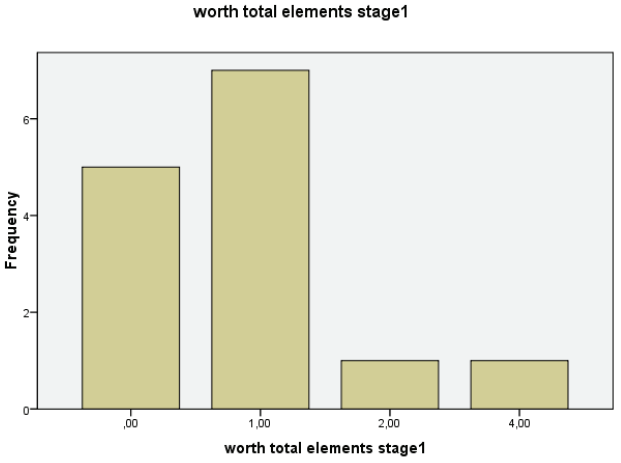


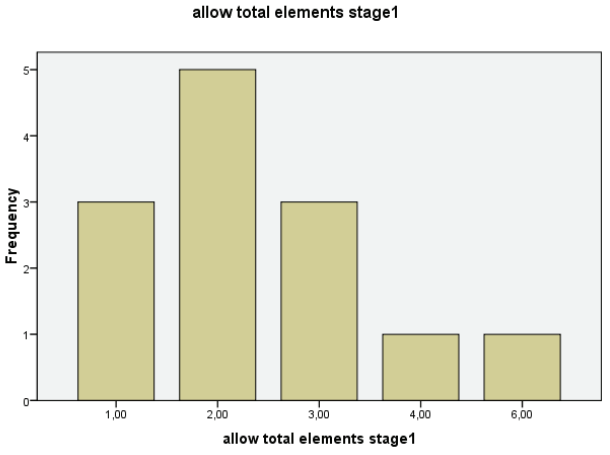


Group 2 – examples of words with uneven distribution: an easy word



Group 3 – examples of words with uneven distribution: difficult words





Appendix F: Students' responses to the words

Extracts from the transcript for one noun (accident), verb (develop) and adjective (foreign) in Phases 1,2 &3

ACCIDENT (Phase 1 – Oct, 2005)

	tr	spoken	written	Part of speech	other form	other meaning	sentence	collocations
Gábor	1	1	1	1	0	0	I have an accident yesterday. 1	0
Jocó	0	0	1	1	0	0	I had an accident. 1	0
Panna	1	1	1	1	0	0	In the London road there was an accident. 2	Car accident 1
Zsófi	0	0	1	1	0	0	I had an accident yesterday. 2	0
Barbi	1	1	1	1	0	0	There is an accident in the morning. 1	Car accident 1
Laci	1	1	1	1	0	0	My friend had an accident yesterday. 2	0
Viki	1	1	1	1	0	0	Yesterday I saw an accident. 2	0
Norbi	1	1	1	1	0	0	I had an accident last year. 2	0
Bori	1	1	1	1	0	0	I had an accident last week. 2	0
Szilvi	1	0	1	1	0	0	There were an accident on the Váci street. 1	0
Timi	1	0	1	1	0	0	Yesterday have an accident. 0	Car accident 1
Niki	1	1	1	1	0	0	I have an accident yesterday. 1	Have an accident 1
Julcsi	0	0	0	1	0	0	We saw an accident. 2	0
Eszter	1	1	1	1	accidentally 1	0	Yesterday I had an accident. 2	Have an accident 1

ACCIDENT (Phase 2 – May, 2006)

	tr	spoken	written	Part of speech	other form	other meaning	sentence	collocations
Gábor	1	1	1	1	accidentally	0	I had an accident yesterday.	have an accident
Jocó	1	1	1	1	accidentally	0	I had an accident last	0

							week.	
Panna	1	1	1	1	0	0	Joe had an accident yesterday.	0
Zsófi	1	1	1	1	0	0	I had an accident last week.	0
Barbi	1	1	1	1	0	0	Yesterday was an accident.	car accident
Laci	1	1	1	1	0	0	Paul had an accident yesterday.	have an accident
Viki	1	1	1	1	accidentall y	1	He had an accident yesterday.	Have an accident
Norbi	1	1	1	1	0	0	John had an accident a year ago.	have an accident
Bori	1	0	1	1	0	0	My sister had an accident two days before.	have an accident
Szilvi	1	0 (asszi dent)	1	1	0	0	There was an accident on the street on M.	car accident bus accident
Timi	1	0	1	1	0	0	She had a car accident yesterday.	car accident
Niki	1	1	1	1	0	0	We had an accident.	have an accident
Julcsi	1	1	1	1	accidentall y	0	We had an acident last Sunday.	have an accident
Eszter	1	1	1	1	accidentall y	0	The accident was huge.	(Accidentall y in love) 0

ACCIDENT (Phase 3 – January, 2007)

	tr	spoken	written	Part of speech	other form	other meaning	sentence	collocations
Gábor	1	1	1	1	1	0	2	1
Jocó	1	1	1	1	1	0	2	0
Panna	1	1	1	1	1	0	2	0
Zsófi	1	1	1	1	1	0	2	0
Barbi	1	1	1	1	1	0	2	1
Laci	1	1	1	1	0	0	2	1
Viki	1	1	1	1	1	0	2	1
Norbi	1	1	1	1	0	0	2	1
Bori	1	1	1	1	0	0	2	1

Szilvi	1	1	1	1	0	0	2	0
Timi	1	0	1	1	0	0	2	1
Niki	1	1	1	1	0	0	2	1
Julcsi	1	1	1	1	1	1	2	1
Eszter	1	1	1	1	1	1	2	1

DEVELOP (Phase 1 – September, 2005)

	tr	spoken	written	Part of speech	other form	Other meaning	sentence	collocations
Gábor	0	1	1	1	Developing Developer 2	0	0	0
Jocó	0	0	0 develope	0	Developing 1	0	I developed a lot. 1	0
Panna	0	0	0	1	0	0	The children will develop. 1	0
Zsófi	0	0	0	1	0	0	0	0
Barbi	0	0	1	1	0	0	The trees are develop. 0	0
Laci	0	1	1	1	0	0	0	0
Viki	0	0	1	0	0	0	0	0
Norbi	0	1	1	1	0	0	Our ... is developed a lot. 0	0
Bori	0	0	0	1	0	fejleszt	... wants to develop the tarnsport system. 2	0
Szilvi	1	1	1	1	0	0	The city is developing. 1	0
Timi	0	0	1	1	0	0	The flower is developed. ?	0
Niki	0	0	1	1	0	0	I develop in English. 1	0
Julcsi	0	0	1	1	0	0	The plant develops. 1	0
Eszter	0	0	0	1	Development 1	0	The develop is a long folyamat. 0	0

DEVELOP (Phase 2 – May, 2006)

	tr	spoken	written	Part of speech	other form	Other meaning	sentence	collocations
Gábor	0	1	1	1	developed	fejleszt valamit	I'd like to develop my skills.	develop my skills
Jocó	evolve 1	1	1	1	0	0	I developed a lot.	0
Panna	0	0	1	0	development	0	The company had a great develop	0

							this year.	
Zsófi	0	0	1	1	0	0	0	0
Barbi	0	0	0	1	0	0	The plants are developing.	0
Laci	1	0	1	1	developm ent	vmit fejleszt	The plant I developed ...	0
Viki	Progre ss Nem	1	1	1	Developed	-	“nem hiszem”, h tudok mondani ? People develop from a child to an adult.	-
Norbi	0	0	1	1	0	0	I developed a lot in my growing years.	0
Bori	0	0	0	1	0	0	My little brother developed very fast when he was a little baby.	0
Szilvi	1	1	1	1	developm ent developin g	0	My sister developed a lot when she was four.	0
Timi	0	0	1	1	0	0	Every children develop when they start the school.	0
Niki	0	0	1	1	developm ent	0	Children develop into tall person.	0
Julcsi	1	1	1	1	developed	0	The council developed the stage.	0
Eszter	-	Nem jó (deve lop) 0	Jó 1	Ige 1	Developm ent 1	-	Our company is developing.	-

DEVELOP (Phase 3 – January, 2007)

	tr	spoken	writ ten	Part of speech	other form	Other meaning	sentence	collocations
Gábor	0	1	1	1	0	0	2	0
Jocó	1	1	1	1	1	0	2	0
Panna	1	1	1	-	1	0	2	0
Zsófi	1	1	1	0	1	0	-	0
Barbi	1	1	0	1	1	0	-	0
Laci	1	0	1	1	0	0	2	1
Viki	0	1	0	1	1	0	2	0
Norbi	1	1	1	1	1	0	2	0

Bori	1	1	1	1	1	0	2	0
Szilvi	1	1	1	1	1	0	2	0
Timi	0	0	1	1	1	0	2	0
Niki	0	0	1	1	1	0	2	0
Julcsi	1	1	1	1	1	2	0	0
Eszter	-	0	1	1	2	0	0	0

FOREIGN (Phase 1 – September, 2005)

	tr	spoken	written	Part of speech	other form	Other meaning	Sentence	Collocations
Gábor	0	0	1	1	0	1	I'm a foreign in England. 0	0
Jocó	0	0	1	1	0	0	Do you know any foreign languages? 2	0
Panna	1	1	1	1	0	0	I'm a foreign when I'm ... 0	0
Zsófi	0	0	1	1	0	0	0	0
Barbi	0	0	0	1	0	idegen	I have a foreign friend. 2	0
Laci	0	0	0	0	0	0	Mark is a foreign – he comes from Colombia. 0	0
Viki	1	0	1	1	0	0	I like learning foreign languages. 2	Foreign language 1
Norbi	0	0	0	0	0	0	I never hitchhike in a foreign country. 2	Foreign country 1
Bori	1	0	1	1	0	0	I visited lots of foreign countries. 2	0
Szilvi	1	0	1	1	Foreigner 1	0	My sister is a foreign people in London. 1	0
Timi	0	0	1	1	0	0	Italian people speak foreign language. 1	Foreign language 1
Niki	0	0	1	1	0	0	I visit my foreign uncle. 0	0
Julcsi	0	0	0	1	0	0	There are so many foreign in my country. 0	0
Timea Noémi	0	0	0	1	0	0	In the town a lot of the foreign ... 0	0
Eszter	0	1	1	1	0	0	My best friend is foreign. 0	0

FOREIGN (Phase 2 – May, 2006)

	tr	spoken	written	Part of speech	other form	Other meaning	Sentence	Collocations
Gábor	1	1	1	0	0	idegen	I'm a foreign person in Germany.	0
Jocó	1	1	1	1	foreigner	0	I have been in a foreign country.	0
Panna	1	0	1	0	foreigner	idegen	My friend, Tom, came from a foreign country.	0
Zsófi	0	0	0	1	0	0	0	foreign country
Barbi	1	0	0	1	0	idegen	I want to go to a foreign country.	foreign country, foreign people
Laci	0	0	0	0	0	0	England is a foreign country.	0
Viki	1	1	1	1	foreigner	-	He came from a foreign country.	Foreign languages Foreign countries
Norbi	0	0	1	1	0	0	I hitchhiked in a foreign country.	foreign country
Bori	1	1	1	0	0	0	Last summer we visited lot foreign country.	0
Szilvi	1	0	1	1	foreigner	0	He went to a foreign country.	foreign country, city
Timi	0	0	1	1	0	0	I want to know a lot of foreign language.	foreign language, country
Niki	1	1	1	1	foreigner	0	The people that travel to Hungary they are foreigner.	0
Julcsi	1	1	1	1	0	idegen	I don't want to go to foreign country.	foreign country
Eszter	1	1	1	Mn. "Vagy külföld?" ? 1	-	-	She's foreign. She's a foreign. (kérdően néz)	-

FOREIGN (Phase 3 – January, 2007)

	tr	spoken	written	Part of speech	other form	Other meaning	Sentence	Collocations
Gábor	1	1	1	0	0	0	2	0
Jocó	1	1	1	1	1	0	2	1
Panna	1	1	1	1	1	0	1	0
Zsófi	1	1	1	1	0	0	2	0
Barbi	1	1	1	1	1	1	2	2
Laci	1	1	0	1	1	0	2	1
Viki	1	1	1	1	1	0	2	1
Norbi	1	1	1	1	0	0	2	1
Bori	1	1	1	0	1	0	2	1
Szilvi	1	0	1	1	1	0	2	1
Timi	1	0	1	1	1	0	2	2
Niki	1	1	1	1	1	0	2	1
Julcsi	1	1	1	0	1	0	2	2
Eszter	1	1	1	1	1	0	2	0

Appendix G: Extracts from students' associations to the words

2 examples for each word class

NOUNS

ACCIDENT	Phase 1	Phase 2	Phase 3
Gábor	mentő, autó, kórház hospital, car, death, túlélés	police, ambulance, have an accident, make an accident	car, street racing, hospital, wound, bike
Jocó	kocsi, út, éjszaka, eső, sár	road, car, human, seat, night	car, road, speed, police, angry
Panna	hospital, doctor, help, rendőrség, ??	hospital, mentők, people, blood, train	happening, car, road, unfortunately
Zsófi	hospital, doctor, nurse, headache, toothache	hospital, plane crash, doctor, nurse, medicine	car, hospital, doctor, nurse, road,
Barbi	incidens,	car, people, street, hospital, blood	car, street, people, ambulance, hospital
Laci	hospital, kórház, mentőkocsi, seb, orvos, sebészet	car, fire, people, road, way	car, bus, road, tree, fire
Viki	halál, sebek, sérülés, összetört autó, kétségbeesett emberek	death, car, suffering, blood, crash	car, crash, brake, hospital, death
Norbi	sebesülés, karambol, autó, halál,	death, car,man	health, stress, ambulance, hospital, car
Bori	mentőautó, ambulance, kórház, hospital, car crash, autóbaleset, lábtörés, betegállomány	car crash, hospital, ambulance, police, pain	ambulance, carcrash, hurt, pain, suffer
Szilvi	tram, street, car, people, traffic lamp	car, street, people, person, dog, blood, hospital	car, crash, street, people, red
Timi	blood, hospital, doctor, nurse,	car, hospital, blood, street, people	hospital, sports, car, motorbike, emergency
Niki		blood, crash, car, street, news	sérülés, car, police, street, crash
Julcsi	szerencsétlenség, crash, katasztrófa	injury, disaster	trouble, bad, hospital, police, death
Eszter	fájdalom, hurt, pain, blood, car, mentők, szenvedés, passion	car, people, violent, blood, crime	car, crash, hospital, doctor, death

NATURE	Phase 1	Phase 2	Phase 3
Gábor	animals, erdő, grass, fű, érintetlen természet	animals, esőerdő, forests, trees, animals, butterflies	trees, rest, silence, animals
Jocó	növény, szbad, tisztaság, zöld	tree, bush, grass, green, spring	plants, grass, trees, valley, green
Panna	állatok, növények, természetes, vadvilág	natural, animals, plants, flowers, light	animal, outside, tree, person, green
Zsófi	hegy, növények, állatok, falevél	tree, animal, plants, sky, water	tree, bush, animal, bird, wind
Barbi	natúr, future, culture, kultúra	plants, trees, walk, forest, animal, travel	tree, grass, flower, picnic, animals
Laci	animals, flower, fák, felhők, égbolt	life, animals, trees, water, sky	animal, lake, sea, ocean, forest
Viki	növények, állítok bio kaják, környezetvédelem	air, flowers, animals, pollution, clouds	trees, trip, animals, weather, forest
Norbi	natural, flowers, dress, wood, star	tree, grass, flowers, bush, még 1 fn	flower, countryside, air, green, mountain
Bori	környezetvédelem, természetes, emberi természet, teremt	forest, air, plants, life, animals, water	environment, air, forests, life, valuable
Szilvi	nature boy, plan, forest, tree, garden	forest, plan, green, branch, leaf, animal	grass, garden, butterfly, ladybug, warm
Timi	tree, flower, forest, mountain, river	trees, forest, adventure, trip, summer	tree, flower, fresh air, tour, adventure
Niki	állatok, növények, megvéd, megóv	plants, world, forest, grass, tree	plant, nyugalom, trip, weekend, forest
Julcsi	élővilág, életközösség	natural, grass, flowers, animals, trees	flower, tree, animal, human, wood
Eszter	flóra, fauna, flowers, trees, animals, bees, blue sky, sun, birds, green grass	environment, forest, lands, birds, green	tree, flower, bee, greenpeace, brown

VERBS

DECIDE	Phase 1	Phase 2	Phase 3
Gábor	elhatároz, döntést hoz, határozatlan, határozott, döntéshozó	döntés, deciding, decide where to go, döntésképtelen	advice, questions, doing sth, issue
Jocó	elhatároz, határoyat, feladat, iskola, beiratkozás	medicine, human, boy, girl, school	choice, difficult, life, business, people
Panna	határoz, eldönt, kérdés, válasz	choose, sort (of), opportunity, kétféle választás	choice, must, right, important, where
Zsófi	tárgyalás, bíróság, tanú, bíró	championship, határozott	question, school
Barbi	desire, beside, dentist	sing, people, talk, planning	write, what, person, answer, ask
Laci	döntés, eredmény, fontos dolog, kevésbé fontos,	school, döntés, válasz, reponse, irány, lecke, homework	teacher, president, boss, king, question
Viki	elhatároz,	decision, experienced, question, answer, problem	risk, advice, chess
Norbi	??, feeling, true or false	question, answer, még két fn	question, answer, meaning, hesitate, true
Bori	határozatot hoz, meghatároz, perdöntő,	advice, problem, think about sth	elect, choose, reason, advice, serious
Szilvi	a thing, a question, fizikai erővel nem, kérdés, döntés, döntést hoz	leave a country, move away, something,	colour, depend, boy, girl, favourite
Timi	think, question,	question, thinking	thinking, choice, task, school, entertainment
Niki	organize, szervez,	difficult, serious, eredmény, people, word	difficult, school, life, always, deal
Julcsi	választ,	döntés, elhatározás	decision
Eszter	choose, guess, thought, thinking about sth, megfontol, meggondol, alszik rá egyet	choose, guess , suppose, think, to mind about sg	choose, make, one or two, think, mind

MOVE	Phase 1	Phase 2	Phase 3
Gábor	mozgás, ház, bútorszállitás, felfordulás, rendetlenség	house, flat, teherautó, költözködés, moving	house, flat, grandmother, car, books
Jocó	travel, megy, lakás, búcsúzás	house, live, money, car, room	family, house, new area, school
Panna	mozogni, menni, elköltözni,	mozog, change place, movement, place	change, go, live, house, new
Zsófi	lakás, költözés, autó, bútorok, szék	house, family, city, car, books	house, car, neighbour, garden, street
Barbi	mean, make, út, movie	house, baggage, room, car	house, family, town, air, furniture
Laci	walking, jár, ház, utazás, állatok, madarak, kocsi	house, car, people, walking, road	walk, house, road, foot, car
Viki	csomagok, új lakás, teherszállító autó, festék	luggage, house, flat, town, garden	house, town furniture, family
Norbi	house, flat, street, road,	flat, house, jump, sports, még 1 fn	house, body, dance, road, foot?
Bori	mozi, költöztetés,	old, new, house, furnitures, rooms	new, leave behind, ahead, place
Szilvi	city, house, people, man, woman,	building, house, garden, country, city	sport, body, house, Earth, land
Timi	people, house, school, friends, city	house, family, ?, room, country	house, school, room, money,body
Niki	lakni, lakás, ház	house, children, room, cars, bags	house, bag, live, life, csomagolás
Julcsi	helyváltoztatás, lakcímváltozás	house, flat, apartment	house, body
Eszter	költözni, house, van, autó, pack, bags, boxes, stressful, it needs a lot of time	going, coming, house, van (wen) suburbs	dance, step, walk, crawl, active

ADJECTIVES

ABLE	Phase 1	Phase 2	Phase 3
Gábor	tud, jóképességű	sports, learning	task, ability, learning
Jocó	tudás, advantage, do, study, csinálni	can, ability, advantage, money, afford, bird	ability, can, free
Panna	képes valamire, hajlam, lehet tehetséges	do sth, ügyes, good at sth, önálló	can, solve, problem, want, task
Zsófi	feladat, megoldás	confident	can, strong
Barbi	éber, end, ablak	work, study, travel, speak, sport, love	do, can, thing, think, to
Laci	tehetség, képesség,	sports, physical activity, learning, brain, experience	intelligent, chance, write, good, advantage
Viki	nehéz feladatot meg tud csinálni, jövő idő	can, achieve, speak, blind, understand	can
Norbi	can, do, make,	break, record, school, sports, future	something, can, do, great, cool
Bori	tehetség, képesség,	can, do, talented, clever, intelligent	can, know, intelligent, clever, do
Szilvi	tornagyakorlat, feladat, megoldani,	activity, sport, school, p.e lesson, swimming	move, walk, think, run, speak
Timi	swimming, reading, writing,	sport, learning, ambitious	ability, learning, work, thinking, talent
Niki	képtelen, tudja, tanul,	learn, difficult, champion, win, lose	can, people, stress, know, future
Julcsi	can, vmit tud	can, could	capable, can, could
Eszter	meg tudja csinálni, tehetséges, talent, bátor, elszánt, összpontosit törekszik	can, could, shall (soll), know everything, nothing	skill, task, learn, study, genetic

FOREIGN	Phase 1	Phase 2	Phase 3
Gábor	idegen, állampolgár, idegennyelv	man, abroad, other countries	countries, stranger, language, travelling
Jocó	külföld, country, human, utazik, holiday	country, language, people, holiday, sunshine	country, hitchhiking, language
Panna	tourist, museum, trip, túra, látványosság,	country, space, bevándorlás, stranger,	country, continent, land, passport, stranger,
Zsófi	utazás, tenger, nyelv, segíteni, ember	abroad, trip, plane, sea	country, world, people, language
Barbi	for, forint	country, speaking, travel, study, building, school	city, country, people, baggage, plain
Laci	ország, country, repülő, utazás, voyage, új ember	travelling, people, countries, sea, sky, plane	stranger, country, continent, bag, sea
Viki	idegen nyelv, repülőtér,	abroad, other countries, foreigner tourist, landmarks	abroad, tourists, landmark, summer, communication
Norbi	country, town, city,	country, people +3 fn	country, Spanish, far, hitchhiking, men
Bori	utazás, idegen, ismeretlen	abroad, countries, travelling, plane, guests	abroad, country, stranger, travelling, tourism
Szilvi	country, town, people, difficult, language	country, abroad, people, holiday, spare time, free time, activity	abroad, travel, bus, train, tram
Timi	language, country, people, food, travel	country, language, people, city, travel	language, country, people, alien, speak
Niki	helyi, messze, távol, ország,	country, town, travel, plane, people	local, people, country, hate, love
Julcsi	turista, más állampolgár	other countries, abroad	abroad, country
Eszter	stranger, ufo, outdoor, country, land, another place, idegen, unkown	stranger, abroad, travelling country, europe	alien, stranger, UFO, country, passport