THE DEVELOPMENTAL MODEL FOR THE MENTAL LEXICON: EVIDENCE FROM GREEK LEARNERS OF ENGLISH

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Abstract

Με βάση τις συνειρμικές αντιδράσεις Γ1 και Γ2 ομιλητών σε τεστ λεκτικών συνειρμών, προηγούμενες έρευνες κατέληξαν στο συμπέρασμα ότι υπάρχουν σημαντικές δομικές διαφορές ανάμεσα στο νοητικό λεξικό των ομιλητών αυτών. Στο Γ1 λεξικό επικρατούν παραδειγματικοί συνειρμοί, ενώ στο Γ2 συνταγματικοί. Το μοντέλο ανάπτυξης του νοητικού λεξικού (Wolter 2001) αποδίδει τη διαφορά αυτή στο διαφορετικό βαθμό γνώσης των επιμέρους λεκτικών ερεθισμών. Η παρούσα μελέτη εξετάζει το μοντέλο του Wolter με μια σειρά δοκιμασιών που δίνονται σε Γ1 και Γ2 (Έλληνες) ομιλητές της Αγγλικής και αποδεικνύει την ύπαρξη σημαντικών ομοιοτήτων ανάμεσα στο Γ1 και Γ2 νοητικό λεξικό. Με βάση το μοντέλο του Wolter και τα αποτελέσματα της παρούσας μελέτης, προτείνεται η αναθεώρηση της πρότασης ότι οι παραδειγματικοί συνειρμοί αποτελούν ένδειξη μεγαλύτερης γλωσσικής ανάπτυξης ενώ οι διαφορές μεταξύ Γ1 και Γ2 συνειρμών ερμηνεύονται ως αποτέλεσμα ποσοτικής αλλά όχι δομικής διαφοράς μεταξύ των δύο λεξικών .

Keywords
word association test, mental lexicon, shift in response type, depth of individual word knowledge

Introduction

In the last thirty years there have been remarkable developments in lexical research as researchers have variously attempted to provide a model for the L1 and L2 mental lexicon. However, to date few things are absolutely clear regarding the structure of the lexicon or the relation, differences and similarities, between native (NS) and non-native speakers'(NNS) mental lexicon. According to Singleton, "L2 lexical development does not happen in a vacuum. By definition it takes place against the background of lexical development of at least one other language" (1999:41). Meara, based on the results of the Birkbeck Vocabulary Project, claimed (a) that the connections between words in the second language learner's mental lexicon are less stable than the connections of native speakers, and (b) that "the semantic links between words in the learner's mental lexicon are fairly tenuous ones, easily overridden by phonological similarities" (1982: 32). For the purpose of his study, Meara used a Word Association Test (WAT), a tool that has been similarly used by many researchers interested in probing into NS and NNS mental lexicon. Subjects' responses to stimulus words of WAT have been traditionally classified into one of the following types: (a) paradigmatic, (b) syntagmatic, and (c) phonological responses. One of the most important findings of the experiments that used WAT was that both NS and NNS demonstrate a shift from syntagmatic to paradigmatic responses as their language develops. This has come to be called the 'phenomenon of a shift in response type'.

Native speakers' patterns of response types

Ervin (1961), Entwisle (1966), Mc Neill (1970) and Palermo (1971) employed WAT with high frequency words in order to study differences in response patterns of native speaking school-children of different ages. What was commonly found was an increase in paradigmatic responses, a decrease in syntagmatic responses and a reduction in the number of clang associations as children grew up and acquired greater language experience. According to Ervin (1961), this shift in response is conditioned by the properties of the form class of the stimulus word, while Mc Neill (1970) explains the shift in terms of an increased knowledge of the semantic features of words with age.

Non-native speakers' shift in response type

WAT were similarly used by Meara (1978) and Soderman (1993), among others, in the study of the L2 mental lexicon. In particular, those researchers aimed to investigate whether early L2 learners tend to produce syntagmatic responses and clang (phonological) associations like young children learning their mother tongue, or whether, even at this early learning process, L2 learners typically produce 'adult' response patterns.

The results of Meara's studies indicated that early L2 learners actually resemble children learning their mother tongue rather than adult native speakers. Meara thus concluded that there are important differences between L2 learners' and adult native speakers' association patterns and that there are similarities in the lexical development of L2 learners and children acquiring their mother tongue.

Soderman (1993) provided a very interesting explanation for the shift in response type, as she suggested that this shift should be related to the development of individual words in the lexicon of a native speaker or foreign language learner – regardless of their level of proficiency. According to her, lexical development is a slow process affecting the individual words being incorporated in the lexicon. The data of her study seem to support her suggestion as even the most advanced L2 learners produced a surprisingly large number of syntagmatic responses as well as a number of clang associates.

Wolter (2001) carried out a study with native and near-native speakers of English in order to test the hypothesis that the L2 mental lexicon is structurally similar to the L1 mental lexicon of NS. The major contribution of his study was the use of Depth of Individual Word Knowledge Test (DIWK) (Wesche and Paribakht, 1996), which aimed to relate subjects' type of responses to level of word knowledge. On the basis of his results, Wolter concluded that the depth of word knowledge is actually a key component for determining the degree of integration for the individual words that make up the structure of both the L1 and the L2 mental lexicon and he proposed a developmental model for the mental lexicon. The advantage offered by the DIWK model lies in its "ability to deal with seemingly incongruous data between native speakers and nonnative speakers, responses to high-frequency and low-frequency prompt words, and even the differences between NS children and adults" (2001: 48).

The use of low-frequency stimulus words in WAT

WAT traditionally include stimulus words that first appeared on the Kent-Rosanoff list (1910; cited in Postman & Keppel, 1970). These are highly frequent words with well-established native speaker norms. However, the use of so common words has serious disadvantages when one tries, on the basis of subjects' responses to them, to draw general conclusions about their whole lexicon. Unfortunately, few studies to date have attempted to study native speakers' responses to low-frequency stimulus words (e.g., Stolz and Tiffany, 1972). Such studies seem to suggest (a) that native speakers tend to give a number of non-nativelike responses (phonological or semantically unrelated) to the stimulus words when these are taken from the low-frequency list and (b) that the total number of different responses increases as the frequency decreases.

Similarities between L1 and L2 mental lexicon

The results of the WAT as these have been used in the above L1 and L2 studies seem to require a re-examination of the long-standing belief that NS and NNS association patterns differ. On the contrary, these studies have revealed two important systematic similarities which seem to point towards a structurally similar L1 and L2 mental lexicon.

In particular:

(1) both NS and NNS responses demonstrate a shift from syntagmatic to paradigmatic associations
(2) both NS and NNS produce a large number of phonological associations; the former when they are presented with low-frequency stimulus words; the latter especially when their proficiency level of L2 is not very high.

Factors affecting the organization of mental lexicon

The similarities presented above bring forth two important factors that can account for the structural organization of both L1 and L2 mental lexicons. The first one is word frequency. As has been shown, the frequency of the prompt words affects the type of association produced by both NS and NNS.

Another factor that seems to affect the organization of the mental lexicon is learners' proficiency level in L2. However, this factor cannot account for NS non-nativelike responses to certain stimulus words.

A third factor that has been proposed by Wolter is the depth of individual word knowledge. According to Wolter, the language proficiency or the word frequency itself cannot account for the structural organization of L1 and L2 mental lexicon; what actually conditions the connections in both the L1 and L2 mental lexicon is the degree (or depth) of knowledge of particular words (2001: 46).

The Depth of Individual Word Knowledge Model

On the basis of this proposition, Wolter constructed a developmental model for the mental lexicon, the Depth of Individual Word Knowledge Model. His model recognizes certain facts about the structure of the mental lexicon but it also accounts for basic differences and similarities between the L1 and L2 mental lexicon.

According to Wolter, the mental lexicon is unstable as words are acquired and develop individually, separately from the other words in the mental lexicon and this applies to both L1 and L2 mental lexicon. Wolter sees the mental lexicon as consisting of a core vocabulary which includes all the well-known words, as well as other layers of peripheral vocabulary which consist of words that are known to varying degrees. He suggests that the connections that different words form are determined by the depth of knowledge of the particular word, that is, by its proximity to the core vocabulary. Thus, paradigmatic associations are expected to be formed between words in the core vocabulary, syntagmatic associations between words that are slightly further out, and finally phonological associations between words on the periphery. In his experimental study, Wolter found evidence that supports his hypothesis that depth of word knowledge is related to patterns of response type for both NS and NNS (ibid: 65). In particular, his findings suggest that as words come to be better understood, their status progresses from a state where phonological and/or non-semantic connections are primary to a state where semantic, paradigmatic or syntagmatic, associations become dominant. Wolter actually disproves the syntagmatic-paradigmatic shift and instead he suggests that words shift from phonological and meaningless associations to meaningful ones; these can be both syntagmatic and paradigmatic. Actually, a large number of the associations made by NS are syntagmatic and, what is more, NNS tend to make syntagmatic, rather than paradigmatic associations, even with words they know very well (words of the core vocabulary). Thus, Wolter actually questions the belief that paradigmatic associations represent a nativelike or a higher degree of word knowledge. On the basis of his model and by combining the depth of word knowledge with the breadth of word knowledge (vocabulary size), he has tried to account for the differences found in the associations provided by NS and NNS. He thus suggests that when words are not well known and are on the periphery of the mental lexicon, the depth of word knowledge determines the mental connections; however, when words are well known and are near the core, it is the vocabulary size that plays the major role (ibid.).

Aims

This study aims to test Wolter's developmental model for the mental lexicon and thus confirm or disprove his experimental findings. In particular, the following hypotheses will be tested:

(a)   there are systematic similarities between the L1 and L2 mental lexicon
(b)   depth of word knowledge is related to patterns of response type for both NS and NNS

Methodology

Participants

The participants of this study consisted of 40 Greek speakers of English as a foreign language and 10 native speakers of English. In Wolter's study non-native participants were only advanced L2 learners. The present study aims to test the second hypothesis on NNS of different levels and for this purpose nonnative participants were divided into groups according to language proficiency levels. In order to assess prospective participants' L2 proficiency level, the Oxford Placement Test was given to 48 Greek learners of English. On the basis of the results three groups of ten participants each were formed: (a) beginners, (b) intermediate, and (c) advanced. A fourth group included near-native speakers of English. Nonnative participants were students from various university departments and instructors of the English department of the Aristotle University of Thessaloniki.

The NS in this experiment served as a control group but they also provided data for analysis of the words appearing on the list of low-frequency stimulus words. All of them had at least completed an undergraduate degree and the majority of them were also holders of a postgraduate degree. They belonged to different age groups and came from various cultural backgrounds.

Materials

In order to test Wolter's Developmental Model for the Mental Lexicon, it was necessary to employ the material he designed and used in his own study. Thus, two types of materials were employed: (a) a WAT, and (b) the Depth of Individual Word Knowledge Test.

(a)   The Word Association Test

Two single WAT[i] were used. As the number of both native and nonnative participants in this study is much bigger than the corresponding number in Wolter's experiment, the collection of data in both tests followed the written-written method. The wordlists of both tests were compiled on the basis of word frequency data (Appendix I)[ii].

The first test included 48 prompt words and was taken by both native and nonnative participants (list1). The second one included 48 infrequent prompt words and was given only to native participants (list 2). List 1 gave 1920 responses for the nonnative group and 480 responses for the native group. List 2, which was completed only by native participants, gave 480 responses. The responses were scored and subjected to analysis.

Participants were not given any time limit to complete the test and were encouraged to respond to as many prompt words as possible.

All responses were classified as 'paradigmatic', 'syntagmatic', or 'clang/ other' and assigned a score on the basis of this classification. In case participants gave no response to a prompt word, the indication 'no response' was given. The scoring procedures were as follows: The paradigmatic response was assigned a score of 3, the syntagmatic a score of 2 and the clang/ other responses were given a score of 1. If no response was given, the score of 0 was assigned.

(b)   The Depth of Individual Word Knowledge Test

The Depth of Individual Word Knowledge Test determines how well a word is known to an L1 or L2 speaker (Appendix II). The DIWK scores are expected to reflect the degree of integration of a particular word in the mental lexicon and this in turn is expected to account for the connections between the particular word and other words in the mental lexicon. The DIWK test was assessed using the Vocabulary Knowledge Scale (VKS) (Wesche and Paribakht, 1996). The VKS instrument combines self-report and performance items so as to elicit both self-perceived and demonstrated knowledge of specific words (ibid: 30).

The scale ratings range from complete unfamiliarity, through recognition of the word and some idea of its meaning, to the ability to use the word with grammatical and semantic accuracy in a sentence. In particular, a score of 5 is assigned when the word is used with semantic appropriateness and grammatical accuracy in a sentence; a score of 4 is given to a word when it is used with semantic appropriateness in a sentence; a score of 3 when a correct synonym or translation is given; a score of 2 when the word is familiar but the meaning is not known, and finally a score of 1 is assigned when the word is not familiar at all (ibid).

The DIWK test was given to participants immediately after the WAT. All participants were provided with a copy of the scale for each of the 48 prompt words that appeared on the WAT and were asked to rate each word according to the scale. The words were presented in a different order from the order on the WAT and once more the written-written method was followed. The nonnative participants did the DIWK test only for list 1, while native participants did the same test only for list 2. It was assumed that words appearing on list 1 were well known to all native speakers who participated in this experiment and therefore this procedure was omitted. On completion of the test, scores were awarded for each word using the ratings described above.

Data analysis

The first hypothesis was tested by comparing types of associations (i.e., syntagmatic, paradigmatic, clang/ other, no response) between all groups (i.e., native, near-native, advanced, intermediate, beginners) for each VKS category. The assumption here is that within each VKS category those groups would not show a significant difference in the types of responses provided. Such a finding would indicate a structurally similar L1 and L2 lexicon.

In order to test the second hypothesis, i.e., that depth of word knowledge conditions the connections formed by individual words in both the L1 and L2 mental lexicons, the number of response types was assessed with relation to the five categories derived from the five possible scores on the DIWK test; the assumption here is that VKS scores would have a significant effect on all participants' types of responses.

Results

Response patterns of all groups

Even though patterns of responses for all groups are not directly related to the hypotheses tested in this study, a comparison of the response types given by both NS and NNS to list 1 is shown in figure 1. This comparison seems to confirm only partly the results of previous research. What is confirmed is the decrease in the number of clang/ other responses and the corresponding increase of both syntagmatic and paradigmatic associations as the level of proficiency increases in the non-native group. What is also confirmed is the larger proportion of syntagmatic associations in relation to paradigmatic ones made by NNS (53,4% vs. 38,3%, respectively). However, in contrast to the results of past research, the native speaker group has given more syntagmatic associations than the advanced group and almost an equal number of syntagmatic responses as the near-native group. What is more, the native participants have given comparatively more syntagmatic associations than paradigmatic ones (51% vs. 43%, respectively).

In addition, NS responses to list 1 and list 2 (lower-frequency prompt words) do not confirm the findings of previous research. In particular, even though the number of clang responses increases in list 2 (13% vs. 5,8%), the expected increase of paradigmatic associations in list 1 with relation to list 2 is not found. The comparison of NS responses to the prompt words of the two lists reveals a larger number of syntagmatic associations (51% vs. 31%) and correspondingly a smaller number of paradigmatic responses (43% vs. 54,7%) in list 1 (figure 2).
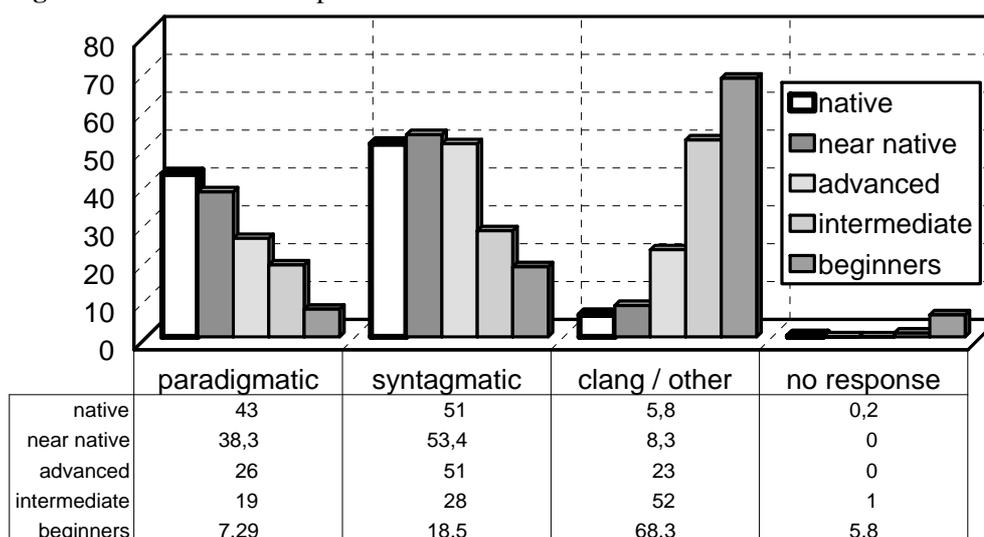
Figure 1: NNS and NS responses to list 1

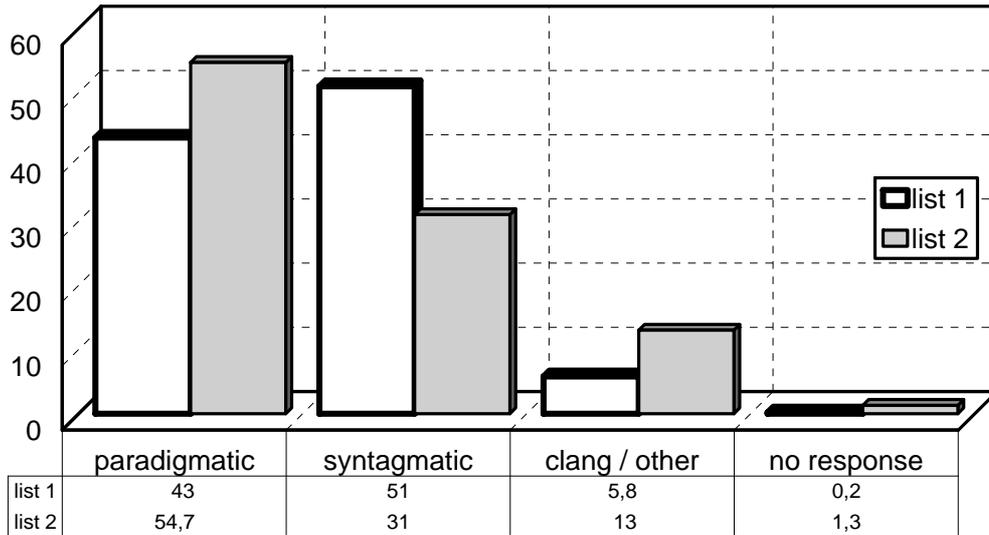|	paradigmatic	syntagmatic	clang / other	no response
native	43	51	5,8	0,2
near native	38,3	53,4	8,3	0
advanced	26	51	23	0
intermediate	19	28	52	1
beginners	7,29	18,5	68,3	5,8

Figure 2: NS responses for list 1 and list 2

	paradigmatic	syntagmatic	clang / other	no response
list 1	43	51	5,8	0,2
list 2	54,7	31	13	1,3

Patterns of Response and VKS Scores

The effect of the depth of word knowledge on the response patterns was assessed by classifying NNS responses to list 1 and NS responses to list 2 according to the corresponding VKS score for each word and patterns of responses were analyzed within the categories designated by the VKS scores (figures 3,4,5,6,7).

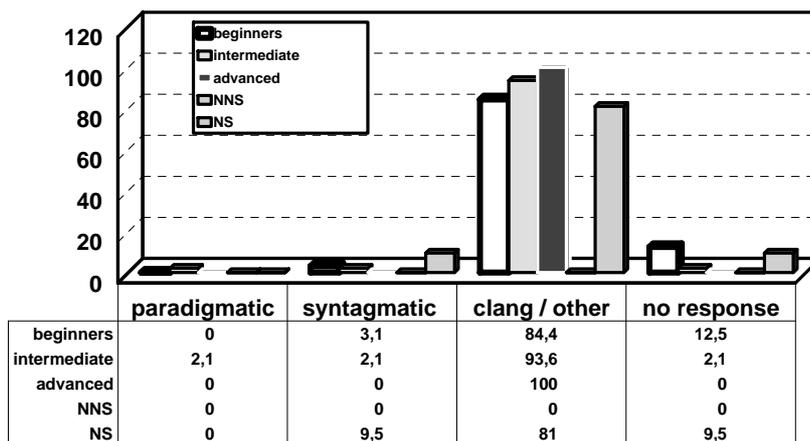**Figure 3**: NNS and NS response types for prompt words that elicited a VKS score of 1

	paradigmatic	syntagmatic	clang / other	no response
beginners	0	3,1	84,4	12,5
intermediate	2,1	2,1	93,6	2,1
advanced	0	0	100	0
NNS	0	0	0	0
NS	0	9,5	81	9,5

Figure 4: NNS and NS response types for prompt words that elicited a VKS score of 2

	paradigmatic	syntagmatic	clang / other	no response
beginners	4,5	13,2	76,2	6,03
intermediate	3,95	9,03	85,3	1,7
advanced	9,8	19,7	70,4	0
NNS	13,3	33,3	53,33	0
NS	20,4	30,6	46,9	2,04
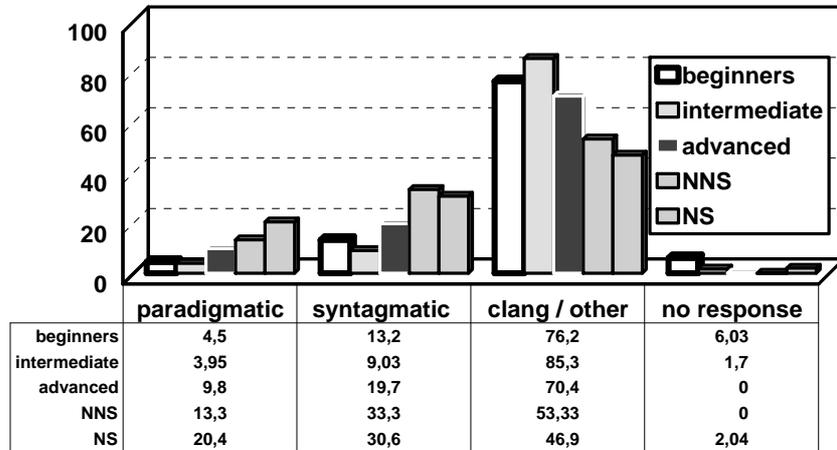
Figure 5: NNS and NS response types for prompt words that elicited a VKS score of 3

	paradigmatic	syntagmatic	clang / other	no response
beginners	15,6	44,7	39,5	0
intermediate	44,9	26,08	28,9	0
advanced	37,5	41,6	20,8	0
NNS	28,5	64,2	7,03	0
NS	65	30	5	0
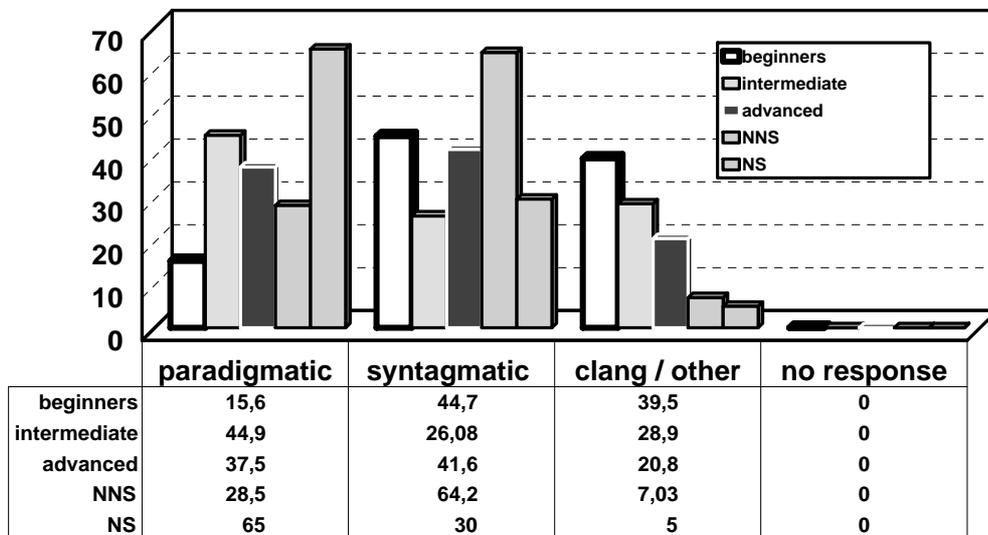
Figure 6: NNS and NS response types for prompt words that elicited a VKS score of 4

	paradigmatic	syntagmatic	clang / other	no response
beginners	0	100	0	0
intermediate	30,7	46,1	23,07	0
advanced	42,8	57,1	0	0
NNS	0	0	0	0
NS	0	100	0	0
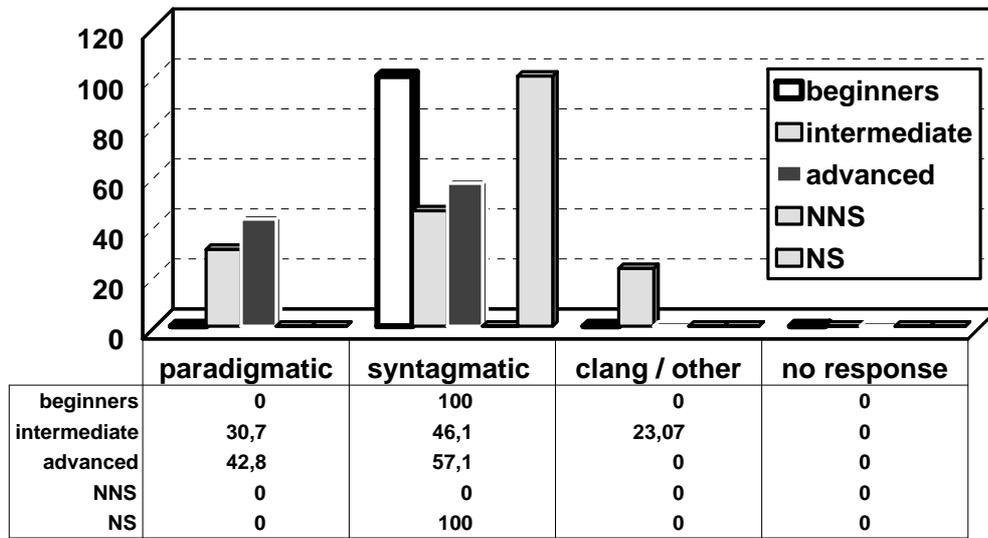
Figure 7: NNS and NS response types for prompt words that elicited a VKS score of 5

	paradigmatic	syntagmatic	clang / other	no response
beginners	30	35	35	0
intermediate	29,3	51,1	19,5	0
advanced	28,5	59,07	12,4	0
NNS	39,02	54,1	6,8	0
NS	61,6	32,6	5,65	0
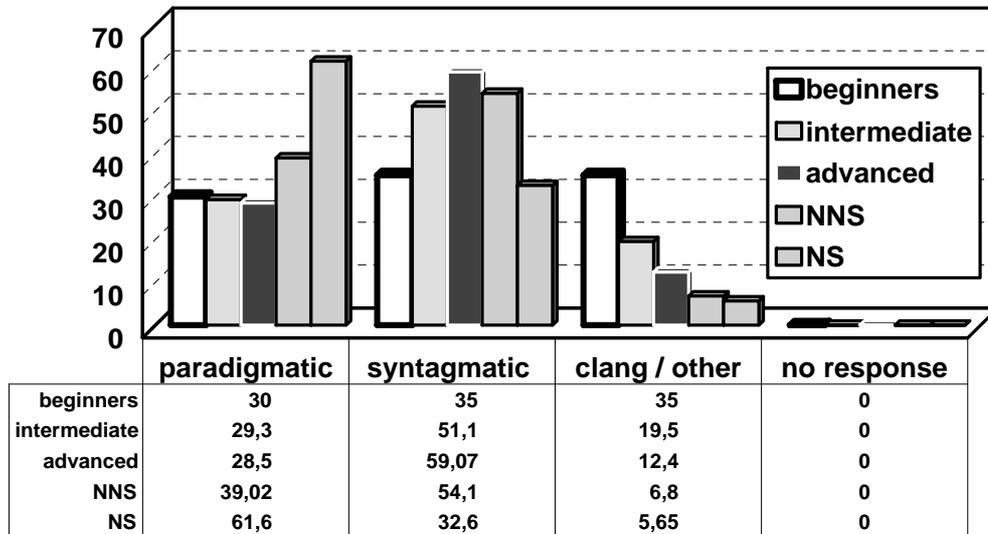
Discussion

L1 vs. L2: Similar or different?

The results of this study do not provide unambiguous answers to this question. In comparing the distribution of responses within each VKS category, the following can be noted:

(a) The remarkable similarity in patterns of responses given by all groups – except for the near native participants - for words that were not known (i.e., prompt words that elicited a VKS score of 1); it has to be noted that no prompt words scored 1 in the responses of the near native group (figure 3).

(b)   The similarity between NS and near-native speakers' patterns of responses for words that were not well known (responses in the VKS 2 category) and a corresponding similarity in the patterns of responses given by beginners, intermediate and advanced learners in the same category (figure 4).

(c)   A mirror-image effect between the near-native and native group in the proportion of paradigmatic and syntagmatic responses for the words that were rated as moderately known and for words that were rated as well known (i.e., the responses in the VKS 3 and VKS 5 categories, respectively) (figures 5 and 7).

(d)   A systematic increase in the number of paradigmatic and syntagmatic associations and a corresponding decrease in the number of clang/ other responses given by the advanced group as words come to be better known (figures 3,4,5,6,7,)

(e)   The lack of any systematic development in the patterns of responses given by beginners and intermediate learners across the five categories.

Regarding the patterns of responses for the VKS 1 and VKS 2, i.e., for words that are not known, both NS and NNS gave a lot of clang/ other responses (figures 3 and 4). This finding contrasts with results of previous research which tested native speakers on prompt words that were highly frequent, and presumably, well-known to them. In that case, major differences were reported between the associations made by NS and NNS to whom the prompt words were not equally well known. In the present study native participants gave a large number of clang/ other responses as they were required to provide associations for words with low-frequency occurrence. It seems therefore that phonological associations predominate in both L1 and L2 mental lexicon when words are not well known. When words become better integrated, phonology loses its importance and associations become semantic, either syntagmatic or paradigmatic (figures 5, 6 and 7). It is interesting to note that for beginners and intermediate learners, phonology is relatively more important across all categories. It seems therefore that below a certain level of language proficiency both students' level and the depth of individual word knowledge affect their patterns of responses. The present findings therefore seem to suggest that the differences found in previous studies were not evidence of the fact that L2 and L1 lexicons were differently structured; they rather indicated that the L2 lexicon, compared to the L1 lexicon, is at an earlier stage of development.

Regarding the type of association for words that are well known (VKS 5), NS tend to give more paradigmatic responses and fewer syntagmatic ones than near-native participants for the same category (figure 7), and this finding is consistent with results of previous research.

It seems therefore that an important difference between the L1 and L2 mental lexicon concerns the type of semantic associations native and non-native speakers prefer to make with words that they know very well. Indeed, there is vast literature that confirms the existence of a syntagmatic-paradigmatic shift which is considered to be typical of adult native speakers and reflect a higher level of lexical development. In this case the implication is that the L2 lexicon of near-native participants in this group is somehow inferior to the L1 lexicon of the native participants. However, two points should be made with respect to this implication: (a) the near-native group who participated in the study are highly proficient users of English; therefore, the

suggestion that their mental lexicon may be inferior cannot be supported; (b) the native group has given a large number of syntagmatic responses to words that are well known (VKS categories 4 and 5) (figures 6 and 7). As syntagmatic associations seem to be an important part of NS mental lexicon, even with words that are well known, they cannot be regarded as indicative of a lower degree of lexical knowledge. What the results of these study actually indicate is a shift from phonological responses to semantic ones (cf. Wolter, 2001), rather than from syntagmatic to paradigmatic associations. The response type, syntagmatic or paradigmatic, seems to depend on various factors; apart from the depth of individual word knowledge and the speaker's level of language proficiency, other variables, such as the form class of the stimulus word or even the idiosyncratic associations it may invoke for individual speakers may actually affect their choice. Wolter, also, has suggested that the predominance of paradigmatic associations in NS responses to words that are well known may be related to the breadth rather than to the depth of their vocabulary knowledge (ibid: 65). However, this is another hypothesis that needs to be tested.

The results of this study seem to support the second hypothesis, namely that depth of word knowledge is related to patterns of response type for both NS and NNS. It becomes obvious from the figures 3-7 that as words come to be better integrated in the mental lexicon, they form associations in a systematic way: initially these are predominantly phonological, while later on, as words come to be better known, associations become either paradigmatic or syntagmatic. Thus, syntagmatic associations should not be regarded as an indication of an inferior mental lexicon; instead, both syntagmatic and paradigmatic associations should be interpreted as signs of deeper knowledge of individual words and potentially as an indication of a high level of language proficiency.

Conclusion

By using Wolter's developmental model for the mental lexicon, the present study has attempted to provide a better understanding of the structure of the L1 and L2 mental lexicons. The results of the present study indicate that the L2 mental lexicon is not less structured than the L1 and actually confirm Wolter's findings. In particular, similarities between the two lexicons have been pointed out as the depth of individual word knowledge model proved that they both follow a common developmental route. Differences between the L1 and L2 mental lexicons have also been indicated and these seem to concern the greater proportion of paradigmatic associations usually made by native speakers in comparison with non native ones, especially when prompt words are well known. Finally, the present study clearly suggests that the predominance of paradigmatic associations by NS is not indicative of higher lexical development and that any differences between NS and NNS word associations should be interpreted in the light of the fact that the L2 mental lexicon is usually smaller than the L1.

Appendix I

List 1

Attach, cherish, startle, pathetic, truth, reactor, limitation, conductor, rely, vast, genuine, suspicious, useful, volatile, loyal, prohibit, doorway, anticipation, human, cartoon, serious, assist, fragile, trend, container, vacant, express, recreation, disciple, powerful, divert, thrive, enjoy, temporary, venue, concentrate, regulate, undertake, multiple, beneficial, tolerate, brave, discovery, tourist, exert, confine, foolish, hill

List 2

Permeate, rejoice, audacious, cringe, supplant, pith, imbibe, rapport, unfurl, scour, jaunt, incipient, painstaking, propensity, horst, cloister, utensil, apprehension, blatant, enrage, opulence, purveyor, rostrum, gleeful, extrapolate, wrath, irascible, narcissism, pander, putative, surmount, interject, enigmatic, inept, kindle, noxious, miraculous, tome, profane, judicious, innovate, salivate, dowry, facile, ulterior, amplitude, ensnare, boisterous

Appendix II

The following activity will ask you to assess how familiar you are with the words you have just read. This time you will be asked to rate each word you read on how well you know it. Please answer as accurately as you can. For items III and IV you can use either an English synonym or a Greek translation. The scale is as follows:

I. I don't remember having heard this word before.

II. I have heard this word before, but I don't know what it means.

III. I have heard this word before, and I *think* it means …………………..

IV. I *know* this word. It means ……………………..

V. I can use this word in a sentence (If you do this section, please do section IV as well):

…………………………………………………………………………………

Σημειώσεις

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[i] Single WAT require testees to provide only one response to each stimulus word.

[ii] For details regarding the principles of the selection of prompt words, see Wolter (2001)

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