Psycholinguistics: The architecture of the mental lexicon and the selection of lexical nodes

Florentina Halimi*, PhD Fulbright Research Scholar, Department of English Kuwait, Gulf University for Science and Technology, Mubarak Al-Abdullah, Kuwait

Abstract

This study presents the architecture of the mental lexicon of the third language learners focusing on three representation levels: letter, word and language. In particular, this analysis attempts to examine the amount of the influence from the first and second language known by bilingual learners of English. The study is guided by the Multilingual Interactive Activation model, and the hypothesis of language selective or language nonselective access of third language learners is tested. The method included in this analysis is the word translation task as a tool for investigating the organisation of the mental lexicon. The results obtained with translation task claim that trilingual speakers can operate with three languages during the process of learning.

Keywords: Psycholinguistics, mental lexicon, language typology.

* ADDRESS FOR CORRESPONDENCE: **Florentina Halimi,** PhD Fulbright Research Scholar, Department of English Kuwait, Gulf University for Science and Technology, Mubarak Al-Abdullah, Kuwait. *E-mail address:* florentinna@hotmail.com /
Tel.: +0-000-000-0000

1. Introduction

It is estimated that most of the people in the world speak more than one language (Aronin & Singleton, 2012), and in quantitative terms, monolingualism may be regarded as exception and multilingualism as a norm. However, in the last two decades, the issue of multilingualism started to be examined closely and systematically (Auer & Li, 2007). Beside theoretical studies, many empirical studies in multilingualism have been conducted. The most prominent ones of the recent studies are Jessner (2006) on language awareness; Lasagabaster and Huguet (2007) on language attitudes and use of multiple languages in European context; De Angelis (2007) on third or additional language acquisition; Hammarberg (2009) on the processes in third language acquisition; Aronin and Hufeisen (2009) on exploration of multilingualism and Cenoz (2009) on multilingual processing and education.

Multilingual language processing incorporates the mental lexicon which touches on all aspects of psycholinguistics. Psycholinguistics or the psychology of language is a sub-field of the general cognitive psychology and studies on what people acquire when they acquire a language, and how they acquire a language when producing and understanding messages. Psycholinguistic research follows the journey of human beings (Cowles, 2011) in the way they act as speakers-listeners in the real context of their lives and actions. It examines the way languages are acquired, produced, comprehended and lost.

One of the key challenges in psycholinguistics is language production (Scovel, 1998), which demands the synthetic talent of an imaginary mental chef, who selects the appropriate ingredients, weights them carefully and then stirs them together into a creative new dish. Within this context, this paper presents the architecture of the mental lexicon of the third language learners focusing on three representation levels: letter, word and language. In particular, this analysis attempts to examine the amount of the influence from the first and second language known by bilingual learners of English.

2. Key concepts

Apart from the process and factors involved in the research of multilingualism, it also accounts for a specific area of multi-competence, the multilingual lexicon. Research studies have focused on various aspects of multilingual lexicon which deal with interconnections between the different lexicons in the multilingual's mind, such as Multilingual processing (Dijkstra, 2003; Schonpflug, 2003); Transfer in multilinguals (Cenoz, 2003; Jessner, 2003; Wei, 2003); Specific aspects of multilingual learning (Cenoz, 2003; Jessner, 2003; Wei, 2003)

2.1. Multilingual processing

Multilingual processing has been studied by Dijkstra (2003) who focused the word selection problem during visual word recognition. Dijkstra's study was based on the monolingual Interactive Activation Model for visual word recognition (Cenoz, 2003; Jessner, 2003; Wei, 2003) and extended it to his view of bilingualism and multilingualism: (i) when extended to the bilingual domain, the Interactive Activation Model was linked with a mix of words from the two languages. In the view of language selective access, a selection mechanism, called 'input switch' shows to guide the visual words to the lexical L1 system. (ii) When extended to the trilingual domain, the Interactive Activation model included a greater number of words in the lexicon because of the third language added. In this domain, the word selection appears to be problematic because the learners would switch to the language relevant to the particular situation. On the basis of these evidence, Dijkstra concludes that there is no need for a specific multilingual model and suggests the extending of an existing monolingual or bilingual model.

Schonpflug (2003) study was aimed to clarify the organisation of the lexicon of trilinguals in a word-completion task. She tested the word completion in trilingual Polish speakers of German (L2) and English (L3). The results of the study indicate that the higher competence in their L3 is the later

uniqueness points for English and German words occur. Considering the evidence of this study, Schonpflug (2003) suggests (i) more languages a speaker knows, the more alternatives there are and the longer the decision process will take. (ii) Higher competence level in one of the languages, the more conceptually driven the word fragment will be and conversely, the lower the competence in one of the languages, the more perceptually driven.

2.2. Transfer in multilinguals

Transfer aspect of multilingual lexicon has been investigated by Jessner (2003), who emphasises the characteristics which can be found in multilinguals which are linked to variability in multilingual proficiency due to changes in language use. Considering the transfer phenomena and interference, borrowing and code-switching, thus bringing together typical areas of investigation in second language acquisition research and bilingualism research, she suggests using the umbrella term cross-linguistic interaction to account for various phenomena in multilingual research. In the Tyrol study with German–Italian bilingual learners of English, Jessner explains the way students used their previously learned languages, with the avoidance and simplification strategy, particularly, when cognates were involved in the task.

Wei (2003) has expressed a similar view when studying the nature of lemmas in the multilingual mental lexicon and transfer in the third language learning. While other studies were concentrated on learner's errors, Wei focused on the causes of the errors by explaining the L2–L3 transfer phenomenon in language learning and production processes by two adult native speakers of Chinese. On the basis of this study, Wei concluded that there is a single mental lexicon for multilinguals with lemmas assigned to each language.

Cenoz (2003) has drawn attention to the role of language typology in the organisation of multilingual lexicon and the selection of languages in cross-linguistic influence in third language production. Considering the different dimensions of cross-linguistic influence, Cenoz (2003, p. 107) suggested a continuum which presented two extreme positions: the interactional strategies and transfer lapses. The interactional strategies have been explained as intentional switches into languages other than the target language, while transfer lapses have been explained as non-intentional and automatic.

In the study conducted with bilingual Spanish and Basque learners of English, Cenoz found out that the learners used both the L1 and L2 as source languages of transfer or as supplier languages, which had played different roles. In cases of interactional strategies, the Basque-L2 has been identified as a default supplier, while Spanish-L2 was a supplier language in cases of transfer lapses. These results were explained with the typology or linguistic distance between Spanish, Basque and English.

2.3. Specific aspects of multilingual learning

The specific features of multilingual language processing were studied by Muller-Lance (2003) and developed a new connective model incorporating mental lexicon, language comprehension and language production. Considering the organisation of mental lexicon, three types of multilingual individuals have been identified: monolinguoid, bilinguoid and multilinguoid. The multilinguoid types have been identified to have strong cross-linguistic connections between mental representations of an individual's languages and who, at the same time, seems to be the most vivacious and daring language learner of the three types. The author points out that this situation cannot be found in bilinguals because the mental connection is limited to two languages, while in monolinguoids, interaction is with only one language. He concludes that existing monolingual models or their derivations which have been extended to bilingual or multilingual acquisitions do not adequately account for particularities of multilingual processing. He especially emphasises factors such as inference strategies, individual variation and cognitive control.

3. Research methods and procedures

The data were collected through proficiency tests and language background questionnaires, which were used to group bilinguals and to aid in the interpretation of data gained. The proficiency tests were conducted to 115 students for Macedonian and English. To form a homogeneous group of students with L1-Albanian, in terms of their language proficiency in L2-Macedonian, and L3-English, standardised placement test were used. The results of the proficiency test produced two groups of bilingual speakers with L2 Macedonian comprised of 48 Low Bilinguals (LB) and 67 High Bilinguals (HB), all at A2 English proficiency level, according to the Common European Frame of Reference. The different results of the number of participants between the two groups were considered in calculating transfer items from L1 Albanian and L2 Macedonian in L3 production. This is because of the weighted contributions expected from each bilingual group.

Considering the different number of participants in the two bilingual groups, the results were calculated by the transfer items from each language (L1 and L2), and then they were divided by the total number of the participants in each group resulting in an influence index for each category of the analysis. For example, the formula below shows that weights of the form

$$\text{Influence index} = \frac{\text{transfer items}}{\text{students'number}}$$

The measuring principle was based on the total transfer items in L3 production per occurrence from L1 or L2. The numbers of transferred items were then divided by the total number of the subjects in each bilingual group, which lead to the results of the index for each group with respect to the number of occurrences in code-switching categories. The calculated index for each bilingual group of L3 learners will show the role of the first and second language in the third language production.

The method included in this analysis is the word translation task as a tool for investigating the organisation of the mental lexicon. In this task, information was elicited regarding the bilingual learners' assumptions on the typological relationships (psychotypology) between the three languages. Based on their cognate status, 112 words were chosen from dictionaries of language pairs: Albanian–Macedonian; Albanian–English and Macedonian–English. In addition, the chosen cognate words were checked in the student's book to make sure that they had already been introduced to the form and meaning of the selected words.

The words were collected to get cognate word triplets in terms of lexical form or meaning and translation equivalents. The triplets involved etymologically motivated orthographic similarities and were exact or very close translational equivalents in the three languages. Thus, the cognate category included borrowings, i.e., words that have recently entered into one language from another but excluded such historical cognates whose meanings have diverged so much over time that they came to be translational nonequivalent, such as L1 > akcion; L2 > акција /akcija/ and L3 > action. Both bilingual groups were first asked to read a series of written words from L1 Albanian and L2 Macedonian as quickly as possible. Then, they were told to translate those words for which they had 15 minutes time allowed for the entire task. The time allowed for the translation task was 15 minutes. The task was analysed for the sets of cognates, the translation items that have form similarity and identical meanings (e.g., L1 > aktivitet; L2 > активност /aktivnost/; L3 > activity).

4. Results

The vocabulary test provided useful empirical data concerning the role of formal resemblance in the access and retrieval of lexical items in the English lexicon. The index number of different response types is illustrated in Table 1.

Table 1. Quantitative overview of cognate words

Type of transfer	Low Bilinguals			High Bilinguals		
Cognates	L1 Alb.	L2 Mac.	Mixed Utter	L1 Alb.	L2 Mac	Mixed Utter.
Number of transferred cognates	53	7	11	35	18	0.52
Index of cognate transfer	1.10	0.14	0.22	0.52	0.26	0.10
Total number of Cognates Influence index		71 1.47			60 0.89	
Recognized cognates Percentage		10 8.9%			16 14.2%	
Non translated cognates Percentage		31 27.6%			14 12.5%	

The quantitative results of cognates use are presented for both L1 Albanian and L2 Macedonian. The influence index is calculated according to the number of participants in each group of bilinguals. The data indicated that the L1 influence index in LB is 1.1, the L2 is 0.14 and the mixed utterance influence index in L3 written production is 0.22. On the bases of two-language selection L1 or L2, the results clearly point out to higher L1 influence on the L3 while L2 is dramatically lower for Low Bilinguals. The mixed utterance results display higher influence in comparison to L2.

When looking at the results in HB, it can be seen that the influence index of L1 is 0.52, L2 is 0.26 and the mixed language influence from both languages is 0.14. These results indicate a higher influence from L1, but in comparison to the L2 and mixed utterance productions, the L2 influence is almost doubled (L2 > 0.26; Mixed > 0.14). It must be noted that that the mixed utterances were basically with L2 influence, in the concluding remarks they will be considered as L2 influences. The results of the analysis also indicate the difference between two bilingual groups in respect to the amount of influence index pre-group.

As regards to the different number of participants in Low Bilinguals (48) and High Bilinguals (67) or the approximate ratio of 4–6, the influence index in Low Bilinguals is 1.48 and in High Bilinguals is 0.89 or an approximate ratio of influence index 2:1. These results show a considerable difference between the two groups, indicating that High Bilinguals are in advanced position when learning cognate words.

Pursuing the analysis further to the cases of recognised deceptive cognates and non-translated items, the results provide another evidence of the two bilingual groups' performance in L3. Considering that the general number of stimuli items was 112, the number of correctly provided items in Low Bilinguals was 8.9%, while in High Bilinguals was 14.2%. Adding the point of non-translated items, the results indicate 27.6% of non-translated items in Low Bilinguals and 12.5% in High Bilinguals. These results also indicate that High Bilinguals are in an advanced position in comparison to Low Bilinguals.

5. Findings and discussion

The data obtained from this study were analysed with a specific focus on word recognition. Of major interest was the activation of the second language with a different alphabet and its influence in L3 production. They will be discussed with the view of the above models of lexical organisation and explain the characteristics of each bilingual group. Three types have been given particular attention,

the influence of the first, the influence of the second language and the influence of both languages in a segment word of the third language production.

5.1. Type one: the influence of the first language

Language nodes: L1 Albanian English

Activated word nodes: Adrese Address

Activated letter nodes: Adres

When analysing the results following the Multilingual Interactive Activation (MIA) model, the process of production is linked with orthographically similar letters resulting in different spelling competition during the written translation process. This situation suggests that a parallel activation of both Albanian and English spelling rules take place.

5.2. Type two: The influence of the second language

Language nodes: L2 Macedonian English

Activated word nodes: фрижидер /frizhider/ refrigerator

Activated letter nodes: Frizhider

In the second type, the written production segment in L3 was derived from L2, that is a Macedonian word but with a different written form corresponding to the English > L3. For instance, the L2 word фрижидер/frizhider/'refrigerator' was produced as frizhider. This evidence supports de Groot's hypothesis that not only languages with the same alphabet can provide evidence that show parallel phonological activation, but activation of the languages that use different alphabet seems to be activated during the third language production.

5.3. Type three: The influence of the first and second language as 'competitors' in the third language production

Language nodes: Albanian Macedonian English

Activated word nodes: urgjente ургентно/ urgentno / urgent

Activated letter nodes: urgentation

The third type of L3 productions resulted with L1 and L2 influences in a word L3 segment, for example, the word segment of English production urgentation is assumed to be produced in the following way:

the root of L1 'ur' + the infix from L2 'gent' + the English suffix 'ation' = urgentation

Such word production can also be explained by the common root 'ur' in all three languages, but assuming that the first stimuli word was in L1 Albanian 'ur', is considered to be from the first language. Next, assuming that the infix 'gent' results from Macedonian word, and when counting the number of letters in the word it, shows more letters coming via L2, the word production is than considered to as L2 influence. For this reason, in the calculating of the final results of the study, they will be counted as L2 influence.

The results obtained with translation equivalents task claim that trilinguals can operate with three languages during the process of learning. All three languages belong to the Indo-European language family and share many lexical similarities and share typological similarities, they differ in their closeness. Considering the lexical representations that share orthographic information with a

stimulus, all languages can also be simultaneously activated independently of which language they belong to. The data elicited through this study contains a great deal of evidence for cross-linguistic influence allowing insights into the mechanisms used by bilingual Albanian students when producing L3. The L1 Albanian is more closely related to L3 English, while the L2 Macedonian is less closely related. Facilitation effects are, therefore, seen as more likely to occur if the learner has considerable L2 proficiency.

Based on Dijkstra's (2003) and his MIA model consisting of three representation levels: letter, word and language, the results of this analysis suggest that all nodes at a given representational level can be interconnected between three languages. During the process of learning, cases of such interconnections can be found in the L3 utterance production, as shown in the following example with the word *urgentation*. This finding suggests that the English word production gave rise to parallel language activation in all three languages and in readiness to compete. In other words, language's spelling-to-grapheme conversion of produced written L3 words is language non-selective.

References

Aronin, L. & Hufeisen, B. (2009). *The exploration of multilingualism: development of research on L3, multilingualism and multiple language acquisition*. John Benjamins Publishers.

Aronin, L. & Singleton, D. (2012). *Multilingualism*. Amsterdam, Netherlands: John Benjamins.

Auer, P. & Li, W. (2007). Multilingualism as a problem? monolingualism as a problem?. In P. Auer & W. Li (Eds.), *Handbook of multilingualism and multilingual communication* (pp. 1–12). Berlin, Germany: Mouton de Gruyter.

Cenoz, J. (2003). In J. Cenoz, B. Hufeisen & U. Jessner (Eds.), *The role of typology in the organization of the multilingual lexicon* (pp. 57–70). Dordrecht, The Netherlands: Kluwer.

Cenoz, J. (2009). *Towards multilingual education. Basque educational research from an international perspective*. Clevendon, UK: Multilingual Matters.

Cowles, H. W. (2011). *Psycholinguistics 101*. Springer [a very brief and basic introduction].

De Angelis, G. (2007). *Third or additional language learning*. Clevedon, UK: Multilingual Matters.

De Groot, A. (2010). *Language and cognition in bilinguals and multilinguals. An introduction*. New York, NY: Psychology Press.

Dijkstra, T. (2003). In J. Cenoz, B. Hufeisen & U. Jessner (Eds.), *Lexical processing in bilinguals and multilinguals: the word selection problem* (pp. 11–26). Dordrecht, The Netherlands: Kluwer.

Hammarberg, B. (2009). *Process in third language acquisition*. Edinburgh, Scotland: EUP.

Jessner, U. (2003). In J. Cenoz, B. Hufeisen & U. Jessner (Eds.), *The nature of cross-linguistic interaction in the multilingual system* (pp. 45–56). Dordrecht, The Netherlands: Kluwer.

Jessner, U. (2006). *Linguistic awareness in multilinguals: English as a third language*. EUP.

Lasagabaster, D. & Huguet, A. (2007). *Multilingualism in european bilingual contexts. language use and attitudes*. Clevedon, UK: Multilingual Matter.

Muller-Lance, J. (2003). In J. Cenoz, B. Hufeisen & U. Jessner (Eds.), *A strategy model of multilingual learning* (pp. 117–132).

Scovel, T. (1998). *Psycholinguistics*. OUP.

Schonpflug, U. (2003). In J. Cenoz, B. Hufeisen & U. Jessner (Eds.), *The transfer–appropriate–processing approach and the trilingual's organization of the lexicon* (pp. 27–44). Dordrecht, The Netherlands.

Wei, L. (2003). In Cenoz, Huffeisen & Jessner (Eds.), *Activation of lemmas in the multilingual mental lexicon and transfer in third language learning* (pp. 57–70).