LEXICAL REPRESENTATION AND PROCESSING IN EFL SPEECH PRODUCTION: A LOOK AT PROFICIENCY ISSUES

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ABSTRACT: The present paper reports on study conducted in order to investigate the influence of proficiency level on lexical representation and processing in the speech production of Brazilian learners of English as a foreign language (EFL/L2[1]). One hundred participants performed two proficiency tests – the TOEFL iBT and a Semantic Categorization task, and one lexical access task. Statistical analyses revealed that more proficient L2 learners named pictures faster than less proficient ones. The findings also indicated that greater knowledge of the L2 seems to lead to more automatized retrieval procedures as well as to the development of a more integrated L2 lexicon, with stronger connections at the semantic/conceptual level.

KEYWORDS: Lexical representation; lexical processing; EFL; speech production; proficiency level.

RESUMO: O presente artigo reporta um estudo conduzido a fim de investigar a influência do nível de proficiência no processamento e na representação lexical na produção oral de aprendizes brasileiros de Inglês como língua estrangeira (L2). Cem participantes realizaram dois testes de proficiência – o TOEFL iBT e a categorização semântica, e uma tarefa de acesso lexical. Análises estatísticas revelaram que os aprendizes de L2 mais proficientes nomearam as figuras da tarefa de acesso lexical mais rapidamente do que os aprendizes menos proficientes. Os achados também indicaram que um maior conhecimento da L2 parece conduzir à procedimentos de recuperação lexical mais automatizados assim como ao desenvolvimento de um léxico mais integrado em L2, com conexões mais consistentes a nível semântico/conceitual.

[1] In this article, no distinction is made between foreign and second language thus, the terms EFL, L2 and bilingual are used interchangeably. The same holds for the terms learners, participants and speakers; and L1 and monolingual.

PALAVRAS-CHAVE: Representação lexical; processamento lexical; EFL; produção oral; nível de proficiência.

1 INTRODUCTION

In 1989, Levelt put forward a comprehensive and ambitious model of speech production to explain speaking by monolinguals. The main thesis of the model is that speaking involves the conceptualization of a pre-verbal message which is further converted into external speech through formulation and articulation processes. Formulation processes, as advocated by Levelt, are lexically driven. That is to say that the lexicon mediates between what is conceptualized and what is linguistically formulated for all syntactic building procedures that will determine the construction of a noun- or a verb-phrase, for instance, are activated upon the selection of lexical items that match the conceptual specifications of the pre-verbal message.

Word selection or lexical access[2] is said to occur under competition. That is, when a concept, specified in the conceptual message, activates a word in the mental lexical, this activation spreads along the lexico-semantic network, and several related words (words that share meaning or any other related characteristic) also become activated, competing for selection. The extent to which such competition interferes with the selection of the appropriate word is said to be related to how strong the connections between words are (GROOT, 1992). How this competition is solved by the lexical retrieval system is still a matter of contention but, more important is that, because accessing words in L1 is so automatized, few selection errors are made and speech production generally proceeds smoothly to articulation.

[2] For the purposes of the present study, lexical access is the act of "retrieving a word [...] from the mental lexicon, given a lexical concept to be expressed" (LEVELT et al, 1999, p. 4). Throughout this paper, the term lexical access will be used interchangeably with the terms: word selection, lexical retrieval, and lexical selection.

The panorama seems to be a very different one when speech is produced in L2. It is now widely accepted that L2 speakers hold a great amount of explicit and underdeveloped knowledge of the second language, thus resorting to more controlled processing, especially in initial learning[3] phases (KORMOS, 2006). Because the L2 lacks automatization, speech production in the second language runs serially, thus causing L2 speech to be more hesitant, disfluent and open to L1 influence (POULISSE, 1997; FORTKAMP, 2000; KORMOS, 2006). Word retrieval, in this scenario, besides suffering from lack of automaticity, is also affected by lexical representations that lack strong connections with the L2 conceptual system, forming a less integrated lexicon in relation to L1(KORMOS, 2006; GROT, 1995), and by competition from other L2 and L1 related items.

With that in mind the present study aimed at investigating the effects of L2 proficiency on lexical retrieval in L2 picture-naming, by pursuing the following research question:

– Does proficiency level affect bilingual lexical access in terms of retrieval speed?

2 REVIEW OF LITERATURE

2.1 LEXICAL REPRESENTATION IN BILINGUALS

A model of lexical representation that has received great attention in bilingual lexical access research over the past decades is the mixed model, also called the hierarchical, three-component model. There are four versions of the hierarchical model – (i) the word association model; (ii) the concept mediation model; (iii) the developmental model; and the (iv) the asymmetrical model. As postulated by the word-association model, L2 meaning is accessed via L1 word meaning, which is, in turn, connected to the conceptual store. On the other hand, the concept-mediation model assumes

[3] Throughout this paper, the terms acquisition and learning will be taken as synonyms.

that the L2 is indirectly connected to L1. That is, L2 word meaning is accessed directly via the connection between the L2 word representation and the conceptual store. Combining these two models, the developmental model proposed by Potter et al. (1984) assumes that lexical representations in L2 develop as a function of proficiency in the language. Less proficient bilinguals supposedly have had less practice in the language and thus are likely to have more word-association links in memory. On the other hand, more proficient bilinguals are expected to have practiced the language to a greater extent thus developing more concept-mediation links among L2 words and their meanings.

In 1994, Kroll and Stewart proposed the revised hierarchical model (RHM) also known as the asymmetrical model. According to the revised version, with increased L2 proficiency, the connections between words of the two languages, which were initially at the lexical/word level, shift to connections at a conceptual level. The asymmetrical costs predicted in the model when translating from L1 to L2 and vice-versa are explained in terms of the strength of the connections between words in the two languages and the relative dominance of the L1 over the L2 (KROLL; STEWART, 1994, p. 157).

In other words, based on previous models of bilingual lexicon representations, Kroll and Stewart propose that at initial stages of L2 learning, words in the second language are associated with words in the first language and therefore the connections from L2 to L1 words are supposedly stronger than the connections in the opposite direction. The model also predicts that the links from L1 to the conceptual store are stronger than the links from L2 to the conceptual store. This is so because, as proposed by the authors, L2 meaning is not fully developed at initial stages of acquisition. In this sense, the meaning of an L2 word, to put differently, is the meaning of an L1 word. As proficiency in L2 develops, it is assumed that conceptual links for L2 words are also acquired allowing for a direct access to meaning in the second language.

Assumptions of another, not very recent, model of lexical representation, were brought back into consideration by a new framework of bilingual speech production proposed by Kormos (2006) (see section 2.2 for details on the framework) - de Groot's (1992) distributed model. According to de Groot's proposal, the meaning of a word is composed by a set of primitives. Activating a word thus means activating its primitives, which are likely to be shared between L1 and L2. In a translation task from English into Portuguese, for instance, when the word **father** is presented, all the primitives for **pai** receive activation as well. As claimed by de Groot (1992), the more primitives are shared between a word conceptual meaning in L1 and in L2, the more activation is sent along the semantic network and consequently, the faster and more accurate performance will be.

The model also assumes that words in one language share conceptual primitives with semantically related words in the same language and with the translation counterparts of these words. Support for within language activation comes from lexical decision tasks showing faster reaction times for words primed by a semantically related word. For example, priming the word **father** activates the shared representations (primitives) of the word **mother**, thus facilitating performance. Priming effects for semantically related words are larger within a language than between languages. This is so because within a language these words share more conceptual primitives than between languages and therefore the greater the number of elements that overlap, the greater the activation the target word node will receive (de Groot, 1992).

Finally, de Groot (1992) argues that bilingual lexical representations (words in L1 and in L2) may have some of their conceptual representations stored in a language-specific memory and others stored in a language non-specific store. The extent to which words' primitives are shared between and within languages seems to determine the organization of lexical and conceptual representations in a bilingual memory.

2.2 LEXICAL PROCESSING IN L2 SPEECH PRODUCTION

Although L1 speech production models such as Levelt (1989) and Levelt; Roelofs; Meyer (1999) have provided a comprehensive account of the mental/cognitive processes involved in monolingual lexical access, several issues remain unresolved when turning to bilingual speech processing. Adding an L2 component to L1 models is far from being an easy and straightforward solution for it raises a number of questions particularly in relation to message conceptualization, mental lexicon organization and lexical retrieval.

As an attempt to address the issues involved in L2 speech production, Kormos (2006) proposed an L2 speaking model based on Levelt (1999) revised blueprint for the speaker. In this recent model, Kormos (2006) makes important assumptions regarding knowledge automatization in L2 and the way it affects speech production processes. According to her, because several lexical encoding procedures are not fully automatized in L2, it is paramount to propose that bilingual speakers have access to an additional knowledge store – a declarative store for syntactic L2 rules. With increasing proficiency the declarative knowledge of L2 rules may become automatized and then lexical processing may develop on a continuum, from serial to parallel processing, allowing for a more native-like speech production. As long as speakers depend on the use of declarative knowledge, lexical encoding can only be serially carried out, requiring more attentional control to be executed.

In Kormos' (2006) model, language is also selected at the conceptual level and is represented by a language cue which is added to the concepts in the pre-verbal message. The model consists of a long-term memory store which hosts a store for L1 and L2 episodic memory, the mental lexicon and the syllabary (a store for automatized gestural scores). The mental lexicon is assumed to be part of the semantic memory which stores linguistic and non-linguistic concepts and their respective meaning-related

memory traces. These memory traces would correspond to the primitives that make up lexical items.

L2 speech production, as proposed by Kormos (2006), initiates with the activation of the concepts that will convey the intended message. Each concept features its own language cue and is therefore language-specific. Thus, a preverbal message may contain some concepts specified in L1 and others in L2. The concepts are assumed to be shared between L1 and L2, but the extent to which this is true depends on, as proposed by de Groot (1992), whether words are concrete or abstract nouns, the L2 acquisition environment, and the proficiency level of the speaker. Most relevant for the present study is the effect of proficiency on conceptual representations in L2. According to de Groot, in the beginning of the learning process, L2 concepts are not yet fully specified. Access to meaning is then made possible through direct links between L2 and L1 concepts. As proficiency increases the L2 conceptual specifications develop and access to meaning is not mediated by L1 semantics anymore.

In the Formulator component, activated concepts pass activation on to the lemmas that match their specifications both in L1 and in L2. Semantically-related lemmas also receive activation and as a consequence compete for selection. The winning lexical item is the one the matches all the specifications of its corresponding concept plus the language cue.

3 DATA COLLECTION AND ANALYSIS

Data for the present investigation were collected with L1 Brazilian students of English as a foreign language. Participants were 27 males and 73 females, averaging 22,5 years old. The one hundred participants performed two proficiency tests: a sample of the TOEFL iBT Speaking Test and a semantic categorization task in L2; and a picture-naming task designed so as to assess lexical retrieval in L2 speaking.

3.1 TOEFL iBT

One measure of learners' proficiency level in L2 speaking was obtained with a sample task of the TOEFL iBT Speaking Test. The task selected for eliciting participants' speech production was an independent task in which learners were asked to talk about a familiar topic – giving opinion about the best way to get the news – drawing on their own personal experience and knowledge of the world. The task was taken from a CD-Rom containing samples of speaking tasks from Barron's TOEFL iBT Audio Book, by Pamela Sharpe (2006), and, as in the original version, it was divided into two parts – (1) a pre-speaking planning session of 15 seconds and (2) a speaking session of 45 seconds. Participants listened to the question and had their answers recorded for further analysis.

The criteria for scoring and rating participants' speech mirrored the criteria of the original test. According to The Official Guide to the New TOEFL (2006), speech samples are to be rated holistically taking into consideration speech delivery, language use and topic development. Following the original rubrics for the TOEFL iBT Speaking Test then, participants' speech samples were rated from 0 (no attempt from participants to respond to the question) to 4 (maximum score) (see Appendix A for the original test rubrics) by three external raters. A mean rating score was calculated for each participant based on the individual scores of each rater (see Appendix B for rating scores) by using the formula RATER1+RATER2+RATER3 divided by 3. The resulting scores were labeled as PROFToe and were further converted into z scores so as to be used in the ANCOVA procedure, yielding a measure herein called zPROFToe.

3.2 THE SEMANTIC CATEGORIZATION TASK

The second proficiency measure was provided by a semantic categorization task devised based on Dufour and Kroll (1995). In this task, participants were presented with names of

L2 superordinate categories followed by L2 subordinate target nouns. Their task was to decide whether the subordinate nouns belonged to the superordinate categories. The stimuli for the task consisted of 50 English concrete nouns divided into 10 categories: clothing, color, occupation, fruit, transportation, drink, body part, vegetable, school object and animal (all nouns used in this task can be seen in Appendix C). There were 6 target categories – animal, body part, fruit, transportation, vegetable and school object – and 4 filler categories – clothing, color, drink and occupation. All categories were randomly chosen and defined as targets or fillers. All superordinate categories and subordinate nouns were extracted from a picture dictionary[4] used by the researcher in her private classes to teach vocabulary to beginners. In the whole semantic categorization experiment, each category appeared 10 times and all 50 subordinate nouns were displayed twice – once for the same-category condition and once for the different-category condition, summing up a total of 100 responses – 50 affirmative and 50 negative. The 100 trials were displayed in 5 blocks of 20 trials each, 10 trials belonging to the same-category condition (YES response trials) and 10 to the different-category condition (NO response trials).

The proficiency measure resulted from the Semantic Categorization task was called TOTCateg - total number of subordinate nouns correctly categorized for target superordinate categories (see Appendix D for individual scores on this measure). This measure was converted into standardized scores yielding a new index of L2 proficiency herein named zTOTCateg. Finally, a third proficiency index was obtained by calculating the average of z scores for zTOTCateg and zPROFToe (standardized scores for PROFToe), yielding a new variable herein referred to as Meanz. The standardized variables – zTOTCateg, zPROFToe and Meanz yielded, in turn, three other variables, namely PRO1, PRO2 and PRO3. These variables were computed by checking for the upper and lower quartiles of the distributions for zTOTCateg, zPROFToe,

[4] 1000 plus pictures for teachers to copy by Wright (1994)

and Meanz, respectively, and aimed at sorting out more and less proficient bilinguals. PRO1, PRO2, and PRO3 were included in the ANCOVA procedures conducted so as to answer the research question pursued in this investigation, as between subject factors.

3.3 THE PICTURE-NAMING TASK

The picture-naming task was designed to assess participants' lexical access in L2 in terms of retrieval speed following most studies conducted under the picture-word interference paradigm (ROELOFS, 1993; DAMIAN; MARTIN, 1998; COSTA et al., 1999). In this task, participants were required to name pictures in the presence and absence of word distractors (the experimental and control conditions, respectively). Pictures portrayed concrete objects visually displayed as black line drawings on a white computer screen and were to be named as fast and accurately as possible. Word distractors also referred to concrete objects and were semantically related to the name of the picture. For instance, the picture of a DOG appeared with the word distractors such as cat and horse. Distractors were presented 100 ms before picture onset. Word distractors were presented in capital letters, Arial font, bold, 25 point. To avoid the matching of pictures and letters, all word distractors were displayed in blue font.

The task was divided into two different testing sessions – a control and an experimental session - in order to avoid practicing effect. That is, 50 participants were run in the control session first, followed by the experimental session, and 50 were run in the inverse order. Pictures were divided into 3 sets – a set of 25 target pictures displayed in the experimental and control conditions, a set of 30 filler pictures to complete the experimental condition, and a set of 20 training pictures to be presented in the training session. Fillers and training pictures were paired with unrelated word distractors presented at picture onset. The pictures and word distractors of the training session were not used in the main experiment (see the stimuli used in the whole experiment in Appendix E).

Two lexical access measures were obtained through the picture-naming task: reaction time scores for the control and experimental conditions – RTctr and RTexp, respectively. Only the RT's for pictures correctly named were included in the calculations for the mean, thus pictures named inaccurately or not named at all were excluded from analysis (see the individual scores on these variables in Appendix F). RTctr and RTexp were then considered as within subject factors for the dependent variable herein defined as COND (conditions) in the analyses carried out to answer the research question of this study. Still for the same analyses, a new variable herein defined as TASKOrder was created by assigning participants who performed the control condition first to the group CTRfirst and the ones who performed the experimental condition first to the group EXPfirst.

4 RESULTS

The hypothesis tested in this study was that more proficient bilinguals would outperform the less proficient ones regardless the order in which the control and experimental conditions were performed. To test this hypothesis, 2 x 2 x 1 analyses of covariance (ANCOVA) were run with condition as a within-subjects factor (RTctr and RTexp), proficiency as a between-subjects factor (more and less proficient bilinguals), and task order as a covariate (CTRfirst and EXPfirst). The first ANCOVA was run with the proficiency index based on TOTCateg highest and lowest quartiles – PRO1. The second procedure was computed considering the proficiency index based on PROFToe highest and lowest quartiles - PRO2. Finally, the third ANCOVA analyzed the variable PRO3 – the proficiency index based on Meanz (the mean standardized scores for TOTCateg and PROFToe) highest and lowest quartiles. Table 1 displays the means and standard deviations for the variables included in the analyses of covariance.

Table 1 – Means and standard deviations by Condition and Proficiency

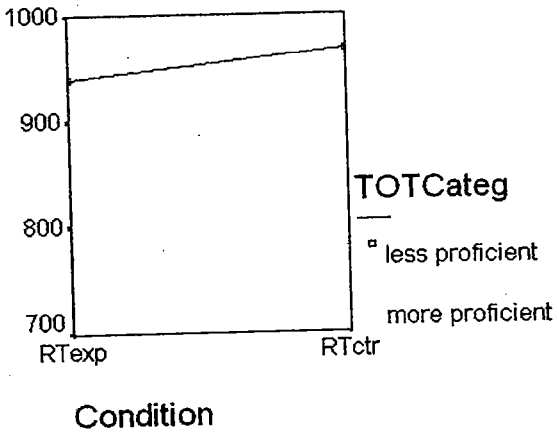
		Condition	
		RTctr	**RTexp**
PRO1	**More proficient**		
	M	786.69	775.77
	SD	138.85	102.30
	N=26		
	Less proficient		
	M	962.77	938.23
	SD	151.78	133.81
	N=26		
		RTctr	**RTexp**
PRO2	**More proficient**		
	M	779.19	755.24
	SD	146.59	110.59
	N=21		
	Less proficient		
	M	963.82	938.64
	SD	151.18	135.50
	N=22		
		RTctr	**RTexp**
PRO3	**More proficient**		
	M	812.96	771.29
	SD	153.23	111.18
	N=24		
	Less proficient		
	M	984.42	956.29
	SD	160.60	130.29
	N=24		

Results for the first ANCOVA revealed that the main effect for proficiency based on PRO1 scores was significant: $F(1, 49) = 27.94$, p=.000. Partial η2 indicated that 36% of the variance in Condition was accounted for by L2 proficiency, after partialling out task order effects. Regarding the results for PRO2, the second ANCOVA revealed a main effect for proficiency: $F(1, 40) = 28.95$, p=.000, after partialling out task order effects. The partial η^2 of .42 also suggests a strong relationship between Condition and Proficiency. A similar pattern was found for PRO3 since the main effect was also statistically significant: $F(1, 45) = 27.75$, p=.000, controlling for task order effects. Partial η^2 indicated that 38% of the variance of the dependent variable (Condition) was accounted for by proficiency, holding constant the covariate (Task order).

In sum, as can be seen in Table 1, the means for the more proficient bilinguals as measured by all three proficiency indexes were higher than the means for the less proficient ones. Mean differences proved to be statistically significant after partialling out the effects of task order, as revealed by the ANCOVA procedures. These results support the main hypothesis, showing that more proficient bilinguals were faster than less proficient ones irrespective of performing the control or the experimental condition first, as can be observed in Figures 1, 2 and 3.

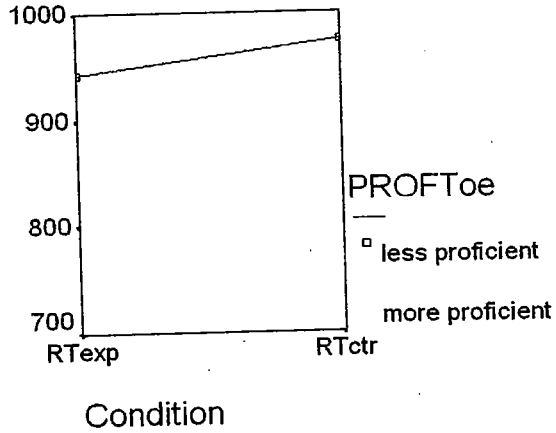
PRO1

Figure 1. Less and more proficient bilinguals' behavior in RTctr and RTexp based on TOTCateg standardized scores



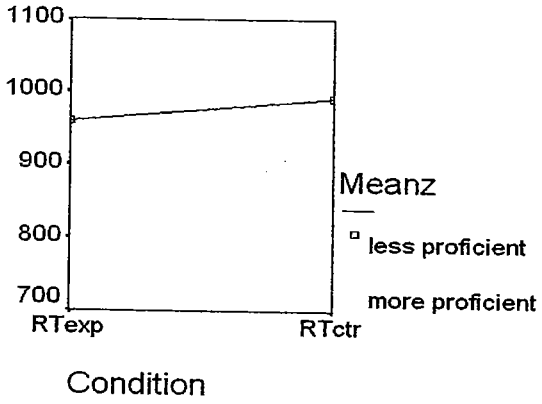
PRO2

Figure 2. Less and more proficient bilinguals' behavior in RTctr and RTexp based on PROFToe standardized scores



PRO3

Figure 3. Less and more proficient bilinguals' behavior in RTctr and RTexp based on the mean standardized scores for TOTCateg and PROFToe



5 DISCUSSION

5.1 BILINGUAL LEXICAL ACCESS AND PROFICIENCY

Research on bilingual word representation has theorized that different types of word-meaning connections co-exist in a bilingual mental lexicon. In a less proficient bilingual memory, L2 words are weakly connected to their meaning representations due to lack of knowledge of the language. As knowledge of the L2 begins to accumulate and proficiency increases, the initially weak connections become stronger allowing for an easier and faster access to L2 meaning (KROLL; STEWART, 1994; GROOT, 1995; GROOT; HOEKS, 1995). Prebianca (2007) already demonstrated that more proficient bilinguals differ from less proficient ones in terms of naming accuracy, and tend to present faster retrieval time. As suggested by the researcher, these findings may be a consequence of language automatization, not only in terms of meaning connections in the lexicon, but also in respect to the

procedures needed to retrieve these meaning representations and their respective words from memory.

Based on these claims, it was expected that more proficient bilinguals would retrieve lexical items faster than less proficient bilinguals irrespective of performing the control or the experimental condition first. The analyses of covariance run in order to partial out the effects of task order, revealed that the mean retrieval speed of lexical access for more and less proficient bilinguals proved to be statistically different for all three measures of proficiency investigated in this study – PROFToe, TotCateg and Meanz. In other words, less proficient bilinguals were slower than more proficient ones regardless of performing the control or the experimental condition first, thus reaffirming the tested hypothesis.

The fact that more proficient bilinguals were faster to retrieve L2 names relative to less proficient bilinguals may be a consequence, as already suggested by Prebianca (2007), of their more automatized L2 retrieval procedures. According to Kormos (2006), in the beginning of the learning process, several L2 lexical encoding procedures are not fully automatized yet and tend to be represented in a declarative, explicit fashion□. This reasoning is in line with Kormos' (2006) proposal of a declarative store for L2 rules in her bilingual speech production model. If that is true, it is feasible to suggest that less proficient bilinguals were slower to retrieve L2 names because their procedures to do so were underdeveloped and/or incomplete. In other words, retrieval for them was based on knowledge of the L2 which was explicitly stored and processed serially instead of in parallel. As a consequence, learners took longer to execute the retrieval procedures involving delimiting the search set, sampling the right lexical item and checking for adequate selection. It is also worth mentioning that these lexical retrieval procedures in L1 are supposed to be part of the encoding system and stored implicitly.

Therefore, accessing words in L1 is a highly automatic process which runs in parallel to other sub-processes involved in

the production of speech. As explained by Levelt (1989), the great speed with which speaking is produced in L1 can only be accounted for by what he calls incremental processing. That is, the components responsible for processing speech are made up of sub-components able to work in parallel at different stages from message generation to articulation as long as each component is instantiated with a fragment of its characteristic input.

In L2 speech production, because of the status of the L2 (being the less practiced language), processing is likely to be less incremental, which implies that the processing in one component may only start when the complete output of the previous component is delivered. Once again, the reason for that is the less automatized nature of L2 speech procedures - including lexical access ones -, and underdeveloped L2 knowledge, rendering the speech process a slow, attentional consuming serial task.

Another argument appealing to the idea that level of language automatization may affect lexical retrieval mechanisms is the one proposed by Roelofs (1998). According to him, the retrieval of L2 words is made possible through production rules that specify the concept to be verbalized and the language in which it is to be produced. An example of such rules would be: IF the concept is DOG and the language is Spanish, THEN select "perro". Productions of this kind are similar to the productions proposed by Anderson (1983) in his ACT* model of skill acquisition. Anderson advocates that a skill only becomes automatic when the procedures for its execution are created and retrieved from memory as a whole, without recourse to declarative knowledge. What determines the probability with which these productions will be retrieved over and over again so as to become automatic is a processing Anderson (1983) called strengthening, that is, practice. The more practiced a production rule is, the greater the likelihood it will be used again when the context calls for it.

On this view, the production rules proposed by Roelofs for L2 lexical retrieval can evolve from an explicit, declarative stage

of representation to a stage where they are performed effortlessly, leading then to quantitative and qualitative changes in performance. In other words, as knowledge of the L2 develops, it is possible that not only the speed of processing is altered during lexical retrieval but also the way in which the underlying processes are organized and/or carried out by the bilingual speaker. As noted by Segalowitz and Hulstijn (2005), automatic processing should not reflect faster cognitive functioning only, but rather may encompass a set of modifications that can occur beneath the cognitive process surface. It might be, then, that the more proficient bilinguals of the present study retrieved L2 words faster than the less proficient ones because they have been restructuring, reorganizing and re-elaborating the underlying processes involved in retrieval during their longer run in learning the L2 (see CHENG, 1985 for a similar view).

According to Kormos (2006), bilingual lexical access can be considered automatic when the to-be-verbalized concepts strongly activate their corresponding words. Under this reasoning, successful lexical access seems to depend only on the development of well established connections between the conceptual and the lexical store, as suggested by the RHM mentioned previously in this discussion session. Clearly, a well established network of concepts and lexical items seems to be of great help when one needs to select a word to match the conceptual specifications of the pre-verbal message (this point will be discussed in details later). However, there seems to be more than meets the eyes. If we consider that bilingual lexical access entails generating relevant cues for delimiting the search set appropriately, serial search and monitoring, it appears safe to suggest that each one of these underlying processes may be automatized to a different extent depending on the quantity and quality of L2 knowledge one possesses.

Therefore, I suggest that less proficient bilinguals, for instance, due to their poorer experience in using the L2, may face greater difficulties in noticing the contextual cues needed to select the set of words from the most adequate category (semantic field)

in the lexical network to start searching from. Besides, they may also execute the binding by checking process (LEVET, 1999) call the process in charge of checking for the match between concept and the lexical item selected for verbalization), which basically searches for the correct lexical item, in a more serial fashion, by looking for each primitive that makes up any possible lexical candidate and the overlap of these primitives with the primitives of the intended concept.

Monitoring for mismatches, in the case of less proficient bilinguals, also tends to be defective since their reduced L2 knowledge makes it more problematic for them to decide whether the selected item is the correct one. Support in favor of this argument comes from the view that L2 word knowledge evolves as a function of L2 proficiency, as discussed previously (KROLL; STEWART, 1994; GROOT; HOEKS, 1995). To reiterate, I hypothesize that, in the present study, more proficient learners accessed L2 lexical items faster than less proficient ones because they were able to perform the underlying processes involved in retrieval more efficiently, that is, more automatically.

Another interesting way to exemplify the changes that may occur in underlying retrieval processes as L2 proficiency increases is to look at how the connections between words and their meaning representations develop in a bilingual memory. The revised hierarchical model proposed by Kroll and Stewart (1994) postulates that the connections between L2 words and their meanings are established through associative links to L1 words. Access to meaning in initial L2 learning phases is then accomplished only by accessing L1 meaning first. In the same vein, de Groot and Hoeks (1995) claim that different lexical representations co-exist in a bilingual memory: word-association and concept-mediation representations – and develop as proficiency in L2 increases. That is to say, the lexical connections in the bilingual mental lexicon develop in a somewhat continuous fashion, from weak and indirect links to strong and direct links between words and their conceptual

representations (meanings). A less proficient bilingual memory, in this case, would consist of two word stores (L1 and L2 lexicons) and a single common conceptual store with access to meaning occurring via L2/L1 associative links (the word-association hypothesis). Because the conceptual store would be shared between the two languages and because the L1 lexicon is likely to contain stronger, direct and automatic links with the conceptual store (HEREDIA, 1996), it is likely that in order to understand and produce L2 words, a less proficient bilingual needs to access L1 meaning first.

On the other hand, in a highly proficient bilingual memory, although the L1 and L2 mental lexicons also share the same conceptual store, access to meaning is not mediated by L1 lexical representations anymore. Instead, conceptual meaning is accessed via strong and direct connections between words and the conceptual store in each of the languages (the concept-mediation hypothesis). That is to say, comprehending and speaking in L2 for high proficiency bilinguals is likely to occur in a similar fashion as comprehending and producing speech in L1. According to de Groot (1995) and de Groot and Hoeks (1995), bilingual speakers would start accessing L2 meaning via L1 representations at the word level, but with practice they would develop stronger and direct connections between the L2 lexical and conceptual stores.

Because more proficient bilinguals have a greater amount of L2 practice than less proficient ones, it is likely that they have more L2 words represented, and consequently, processed in a concept-mediation mode. For less proficient bilinguals, who presumably have practiced the L2 for a lesser extent, L2 representation and processing probably relies more on a word-association mode, since the connections between words and their conceptual representations will still be weaker in relation to the same connections in a more proficient L2 memory. Consequently, it seems reasonable to argue that for word processing (accessing and retrieving) through a word-association mode, more controlled attention is necessary. Because the connections are weaker, a more serial search is required, and

consequently biding by checking and monitoring processes will take longer to be performed. Together, these factors might have contributed to the inferior performance of less proficient bilinguals in L2 picture naming in this study.

6 FINAL REMARKS: LIMITATIONS OF THE STUDY AND SUGGESTIONS FOR FURTHER RESEARCH

The aim of the present study was to investigate whether lexical retrieval speed was affected by L2 proficiency level. Results showed that more proficient bilinguals retrieved lexical items faster than less proficient bilinguals, regardless of task order. That is, partialling out the effects of task order, the mean retrieval speed of lexical access for more and less proficient bilinguals proved to be statistically different for all 3 measures of proficiency investigated, which means that less proficient bilinguals were slower than more proficient ones regardless of performing the control or the experimental condition first. In order to explain these results, it was suggested that more proficient bilinguals performed the underlying processes involved in L2 retrieval more automatically than less proficient bilinguals. In addition, less proficient bilinguals may have accessed and retrieved L2 words by associating them to their L1 lexical and conceptual representations – a process which is likely to be more attentional demanding and slower compared to the concept-mediation processes carried out by more proficient bilinguals.

The most important conclusion one can draw from the present research is that learning a second language after some critical period (especially in adulthood) is quite a challenge. The literature on SLA and applied linguistics has consistently raised the point that L2 knowledge is usually less automatized than L1 knowledge with procedures operating under attentional control (MCLAUGHLIN, 1987; POULISSE, 1997; FORTKAMP, 2000; KORMOS, 2006). Likewise, L2 lexical items are in a smaller number and weakly established in the mental lexicon as compared

to their L1 counterparts (KROLL; STEWART, 1994; POULISSE, 1997). Following from that is the fact that the development of automatization as well as strong lexical representations is intimately related to practice.

As regards to the limitations of the present study, it is necessary to take the following issues into consideration:

- *The nature of the population investigated*: participants of this study were all native speakers of Brazilian Portuguese learning English as a foreign language. Further studies might investigate native speakers of other languages and also speakers of a different L2.
- *The language of the picture-naming task*: the lexical retrieval task used in this study was conducted only in participants' L2. In order to have a deeper understanding of lexical access processes, future studies should include a picture-naming task in L1, so as to allow for across language comparisons.
- *Kinds of word distractors*: the word distractors of the present investigation were all semantically related to the name of the picture. However, other types of connections may also play a role in L2 lexical access such as phonological ones.
- *Time of presentation of word distractors*: the word distractors were all displayed before picture onset in the L2 picture-naming task. Future studies should consider implementing a different time interval between the presentation of the picture and the distractor.

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APPENDIX A – TOEFL iBT test rubrics

TOEFL iBT Speaking Scoring Rubric

Independent Tasks (Questions 1 & 2)

Score	General Description	Delivery	Language Use	Topic Development
4	The response fulfills the demands of the task, with at most minor lapses in completeness. It is highly intelligible and exhibits sustained, coherent discourse. A response at this level is characterized by all of the following:	Generally well-paced flow (fluid expression). Speech is clear. It may include minor lapses, or minor difficulties with pronunciation or intonation patterns, which do not affect overall intelligibility.	The response demonstrates effective use of grammar and vocabulary. It exhibits a fairly high degree of automaticity with good control of basic and complex structures (as appropriate). Some minor (or systematic) errors are noticeable but do not obscure meaning.	Response is sustained and sufficient to the task. It is generally well developed and coherent; relationships between ideas are clear (or clear progression of ideas).
3	The response addresses the task appropriately, but may fall short of being fully developed. It is generally intelligible and coherent, with some fluidity of expression though it exhibits some noticeable lapses in the expression of ideas. A response at this level is characterized by at least two of the following:	Speech is generally clear, with some fluidity of expression, though minor difficulties with pronunciation, intonation, or pacing are noticeable and may require listener effort at times (though overall intelligibility is not significantly affected).	The response demonstrates fairly automatic and effective use of grammar and vocabulary, and fairly coherent expression of relevant ideas. Response may exhibit some imprecise or inaccurate use of vocabulary or grammatical structures used. This may affect overall fluency, but it does not seriously interfere with the communication of the message.	Response is mostly coherent and sustained and conveys relevant ideas/information. Overall development is somewhat limited, usually lacks elaboration or specificity. Relationships between ideas may at times not be immediately clear.

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TOEFL iBT Speaking Scoring Rubric

Independent Tasks (Questions 1 & 2)

Score	General Description	Delivery	Language Use	Topic Development
2	The response addresses the task, but development of the topic is limited. It contains intelligible speech, although problems with delivery and/or overall coherence occur; meaning may be obscured in places. A response at this level is characterized by at least two of the following:	Speech is basically intelligible, though listener effort is needed because of unclear articulation, awkward intonation, or choppy rhythm/pace; meaning may be obscured in places.	The response demonstrates limited range and control of grammar and vocabulary. These limitations often prevent full expression of ideas. For the most part, only basic sentence structures are used successfully and spoken with fluidity. Structures and vocabulary may express mainly simple (short) and/or general propositions, with simple or unclear connections made among them (serial listing, conjunction, juxtaposition).	The response is connected to the task, though the number of ideas presented or the development of ideas is limited. Mostly basic ideas are expressed with limited elaboration (details and support). At times relevant substance may be vaguely expressed or repetitious. Connections of ideas may be unclear.
1	The response is very limited in content and/or coherence or is only minimally connected to the task, or speech is largely unintelligible. A response at this level is characterized by at least two of the following:	Consistent pronunciation, stress, and intonation difficulties cause considerable listener effort; delivery is choppy fragmented, or telegraphic; frequent pauses and hesitations.	Range and control of grammar and vocabulary severely limit (or prevent expression of) ideas and connections among ideas. Some low-level responses may rely heavily on practiced or formulaic expressions.	Limited relevant content expressed. The response generally lacks substance beyond expression of very basic ideas. Speaker may be unable to sustain speech to complete task and may rely heavily on repetition of the prompt.
0	Speaker makes no attempt to respond OR response is unrelated to the topic.			

APPENDIX B – TOEFL iBT – Rating scores

Participant	RATER 1	RATER 2	RATER 3	Média
01	1	1	2	1,33
02	1	1	1	1,00
03	1	1	2	1,33
04	1	1	1	1,00
05	2	2	2	2,00
07	1	2	2	1,67
08	1	2	2	1,67
09	3	4	3	3,33
10	4	4	4	4,00
11	4	4	4	4,00
12	3	4	3	3,33
13	4	4	4	4,00
14	2	2	3	2,33
15	2	3	3	2,67
16	4	3	4	3,67
17	4	4	4	4,00
18	3	2	3	2,67
19	3	3	4	3,33
20	2	3	2	2,33
21	2	3	2	2,33
22	1	2	3	2,00
23	1	2	2	1,67
24	3	3	2	2,67
25	3	4	3	3,33
26	2	2	3	2,33
27	4	4	4	4,00
28	3	3	4	3,33
29	1	2	3	2,00
30	2	3	3	2,67
31	1	1	2	1,33

32	2	3	3	2,67
33	3	3	3	3,00
34	3	3	3	3,00
35	2	2	3	2,33
36	3	1	2	2,00
37	4	4	4	4,00
38	3	3	3	3,00
39	4	4	4	4,00
40	2	2	3	2,33
41	3	3	4	3,33
42	4	4	4	4,00
43	4	4	4	4,00
44	4	3	4	3,67
45	2	2	2	2,00
46	3	3	3	3,00
47	3	3	2	2,67
48	3	4	4	3,67
49	2	3	3	2,67
50	4	4	4	4,00
51	3	3	3	3,00
52	3	3	4	3,33
53	3	3	3	3,00
54	1	2	2	1,67
55	1	1	1	1,00
56	3	3	4	3,33
57	3	4	3	3,33
58	1	1	2	1,33
59	1	1	1	1,00
60	4	3	4	3,67
61	2	3	2	2,33
62	3	3	4	3,33
63	1	3	1	1,67
64	2	2	3	2,33

65	3	3	4	3,33
66	2	1	3	2,00
67	1	1	2	1,33
68	1	1	2	1,33
69	1	1	1	1,00
70	1	1	2	1,33
71	2	2	2	2,00
72	2	2	2	2,00
73	1	2	2	1,67
74	1	2	2	1,67
75	2	2	2	2,00
76	1	1	2	1,33
77	2	2	3	2,33
78	2	2	3	2,33
79	2	2	3	2,33
80	1	1	2	1,33
81	2	2	2	2,00
82	3	3	4	3,33
83	3	3	4	3,33
84	3	4	4	3,67
85	3	3	3	3,00
86	3	3	4	3,33
87	2	3	3	2,67
88	3	3	3	3,00
89	3	4	4	3,67
90	4	4	4	4,00
91	2	3	2	2,33
92	2	3	3	2,67
93	1	1	2	1,33
94	3	3	3	3,00
95	3	3	3	3,00
96	2	2	3	2,33
97	4	3	4	3,67

98	3	3	2	2,67
99	4	4	4	4,00
100	3	4	4	3,67
101	4	4	4	4,00

APPENDIX C – Semantic Categorization Task – list of words

Superordinate Nouns	Subordinate Nouns
TRANSPORTATION	Ferry
	Taxi
	Motorcycle
	Ship
	Subway
FRUIT	Lemon
	Orange
	Pineapple
	Strawberry
	Watermelon
ANIMAL	Sheep
	Whale
	Camel
	Rabbit
	Snake
SCHOOL OBJECT	Ruler
	Pencil
	Eraser

	Notebook
	Map
BODY PART	Leg
	Arm
	Head
	Knee
	Back
VEGETABLE	Lettuce
	Carrot
	Eggplant
	Pea
	Onion

Filler nouns
Ladder
Comb
Guitar
Kite
Pie
Jar
Button
Vase
Stove
Sofa
Cup
Blender
Gate

Feather
Rope
Riffle
Vest
Lipstick
Shirt
Skirt
Plate
Rocket
Iron
Hammer
Sword
Flag
Towel
Rug
Blanket
Lock

APPENDIX D – Semantic Categorization Task – Individual scores on TOTCateg

Participant	TOTCATEG
1	35
2	42
3	46
4	45
5	55
7	50
8	44
9	50
10	56
11	53
12	51
13	59
14	58
15	45
16	52
17	51
18	54
19	49
20	42
21	51
22	44
23	51
24	60
25	56
26	53
27	56
28	56
29	47
30	47
31	44
32	54
33	55
34	55
35	47
36	46
37	55
38	37
39	49
40	54
41	52
42	55
43	60

44	45
45	44
46	54
47	52
48	53
49	52
50	60
51	56
52	55
53	58
54	54
55	46
56	52
57	52
58	53
59	37
60	53
61	40
62	38
63	49
64	55
65	40
66	36
67	52
68	32
69	32
70	30
71	45
72	46
73	42
74	47
75	51
76	30

77	43
78	50
79	52
80	52
81	43
82	45
83	55
84	56
85	50
86	60
87	43
88	50
89	56
90	46
91	52
92	57
93	49
94	49
95	55
96	46
97	54
98	51
99	58
100	51
101	59

APPENDIX E – Stimuli for the picture-naming task

TARGET PICTURES	SEMANTICALLY RELATED WORD DISTRACTORS	PHONOLOGICALLY RELATED WORD DISTRACTORS
1. Ball	Soccer	Tall
2. Bee	Honey	Fee

3. Bell	Church	Well
4. Cake	Chocolate	Take
5. Car	Bus	Far
6. Cat	Dog	Fat
7. Chair	Table	Fair
8. Clock	Time	Block
9. Cow	Milk	Now
10. Dog	Cat	Fog
11. Door	Window	Floor
12. Egg	Chicken	Beg
13. Eye	Mouth	Tie
14. Fish	Ocean	Niche
15. Glass	Water	Mass
16. Hand	Foot	Band
17. Heart	Love	Art
18. House	Apartment	Mouse
19. Key	Door	Tea
20. Knife	Fork	Wife
21. Leaf	Tree	Brief
22. Moon	Sky	Soon
23. Pen	Pencil	Ten
24. Nurse	Doctor	Purse
25. Sun	Rain	Fun

FILLERS	UNRELATED WORD DISTRACTORS
Bag	Vase
Bear	Hotel
Bed	Ice
Belt	Mop
Bird	Leg
Book	Tie

Box	Tail
Boy	Wind
Bread	Shirt
Chess	Rope
Plant	Vest
Cup	Neck
Finger	Rat
Flower	Beer
Fork	Doll
Frog	Knee
Ghost	Sofa
Grape	Night
Hat	Rose
Horse	Coin
Lamp	Brush
Monkey	Wine
Ring	Bike
Pear	Castle
Pig	Bank
Plane	Hair
King	Road
Sock	Kite
Table	Lake
Train	Lip

TRAINING PICTURES	**UNRELATED DISTRACTORS**
Bat	Towel
Boat	Fox
Bomb	Rice
Boot	Meat
Bus	Mask

Bull	Gas
Fire	Bean
Foot	Bill
Hook	Rug
Rat	Oil
Kiss	Ant
Mug	Grass
Pan	Clown
Chicken	Ash
Rain	Lunch
Roof	Film
Shark	Mind
Tree	Pilot
Tent	Art
Wall	Flea

APPENDIX F – Individual scores on the picture-naming task

Participant	Rtexp	Rtctr
01	1147	1150
02	1096	1037
03	1080	1082
04	1021	1134
05	783	885
07	877	863
08	806	1134
09	713	728
10	720	686
11	750	988
12	659	799
13	689	781
14	726	887

15	958	901
16	835	1106
17	676	717
18	813	946
19	674	1043
20	758	1034
21	1006	1108
22	1147	1138
23	1022	842
24	691	680
25	1019	999
26	828	950
27	824	907
28	853	729
29	862	955
30	870	917
31	970	905
32	871	918
33	741	766
34	748	684
35	892	872
36	767	991
37	744	836
38	858	1108
39	562	579
40	516	591
41	727	890
42	748	669
43	824	762
44	820	831
45	951	931
46	862	966
47	882	964

48	739	910
49	618	503
50	709	824
51	706	813
52	770	725
53	846	1040
54	792	1002
55	892	941
56	880	949
57	812	688
58	835	1016
59	778	929
60	844	879
61	853	809
62	700	760
63	738	818
64	857	932
65	944	808
66	955	915
67	961	993
68	972	990
69	994	1041
70	1300	1216
71	900	732
72	1032	1028
73	884	954
74	889	1021
75	908	1147
76	826	613
77	918	1014
78	991	1138
79	1118	936
80	856	890

81	1042	1165
82	908	922
83	687	796
84	755	820
85	938	1014
86	890	1031
87	888	861
88	860	1068
89	906	668
90	909	785
91	877	592
92	764	585
93	914	633
94	922	664
95	811	598
96	1090	783
97	633	607
98	935	747
99	890	879
100	814	657
101	469	472