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FLÁVIA DE SOUSA DIAS DA SILVEIRA

WORKING MEMORY CAPACITY AND LEXICAL ACCESS IN ADVANCED STUDENTS OF

L2 ENGLISH

Porto Alegre

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Trabalho de conclusão do curso de graduação
Apresentado como requisito parcial para a
Obtenção do grau de Licenciado em Letras da
Universidade Federal do Rio Grande do Sul.
Orientadora: Profa. Dra. Ingrid Finger

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Aprovada em _____de _____de _____.

BANCA EXAMINADORA

Prof. Gabriel de Ávila Othero

_____

Profa. Maity Siqueira

_____

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I want to thank the nice teachers I had during this journey and all my students that helped me to become the teacher I am now. Thank you for showing me that there are some special moments that only a teacher can share with his/her students and that there is no salary that can pay for these moments.

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To my friends and co-workers from Cultural, thank you for sharing your knowledge and your days with me. I also want to thank Inês for her support and understanding during this semester. Thank you for the extra hours you let me spend with this article. Thank you my team from Zona Sul and my dear OP friends.

I would like to dedicate this essay to my husband, João,

to my parents, Jenivaldo and Vera,

to my sister, Camila, and to my brother, Mateus.

RESUMO

Este trabalho tem como objetivo investigar a relação entre a memória de trabalho e o acesso lexical em segunda língua. Acredita-se que a memória de trabalho, responsável pelo armazenamento de informações em curto prazo, desempenhe um papel importante no aprendizado de segunda língua (BADDELEY, 2003) e que quanto maior for a capacidade de armazenamento, maior será o vocabulário e mais rápido se dará o acesso a essas informações (TOKOWICZ, MICHAEL & KROLL, 2004). Utilizando modelos de testes de capacidade de memória de trabalho e de acesso lexical, alunos com alto grau de proficiência foram testados para tentar provar essa relação. Com a análise dos resultados, ficou provado que a capacidade da memória de trabalho interfere positivamente na acurácia dos participantes na tarefa de tradução em alunos com alto grau de proficiência em Inglês como segunda língua, mas não interfere de maneira significativa no tempo de resposta dos participantes.

Palavras-chave: Memória de Trabalho; Acesso Lexical; Segunda Língua.

ABSTRACT

This paper wants to investigate the relation between working memory and lexical access in a second language. It is believed that working memory, responsible for keeping information in a short time period, has an important role in second language acquisition (BADDELEY, 2003) and that bigger it is the working memory capacity bigger will be the vocabulary and faster will be the access to this information (TOKOWICZ, MICHAEL & KROLL, 2004). Using working memory capacity tests and lexical access tests, English students with a high level of proficiency in English were tested to prove this relation. After data analyzes, it was corroborated the hypothesis that working memory capacity interferes positively in participants' accuracy in the translation task, but not in a significant way in participant's response time.

Headwords: Working Memory; Lexical Access; Second Language.

SUMMARY

1. INTRODUCTION

There are many studies involved in Second Language Acquisition and I have been interested in many different topics since I started *Letras*, in 2006. Working Memory (WM) entered in my list of preferred topics just in my last semester but the texts I have read about it have convinced me that it is a really important topic regarding second language acquisition and many more studies should be carried out, specially to investigate its relation with lexical access. Because of this importance, I decided to study the influence working memory could have in lexical access with a group of Advanced students of English as a Second Language.

I started discussing the two main important models of Working Memory (BADDELEY & HITCH, 1974; COWAN, 1998) and their studies trying to correlate WM and language acquisition. After that, there is a discussion on lexical access (KROLL & CURLEY, 1988; CHEN & LEUNG, 1989; TALAMAS *et al.*, 1999) and its two models when talking about vocabulary acquisition in a second language.

After presenting the theory, two hypotheses were created and tests were conducted in order to see if they would be corroborated or not. We confirmed the interference of working memory in accuracy and discovered that the concreteness of the word in a translation task does not interfere in the accuracy or in the reaction time in an effective way.

I tried to understand why there was no interference of concreteness in the results of the translation task and I believe that the fact my subjects were advanced students of English could be a possible answer.

There are still many questions to be answered in the language acquisition area and I believe that they will always be. This paper is just a small piece in the huge puzzle that language acquisition is, but I believe that it can help to raise more and more questions and turn their answers in possible pieces to complete this amazing puzzle.

2. THEORETICAL FRAMEWOR

2.1. WORKING MEMORY DEFINITION AND MODELS

Several working memory (WM) definitions are found online and in many different medical dictionaries. MedicineNet.com, for instance, defines Working Memory as "a system for temporarily storing and managing the information required to carry out complex cognitive tasks such as learning, reasoning and comprehension"[1]. This system is responsible for keeping some information active in our minds and, in addition to that, allows this information to be manipulated in order to perform verbal and non-verbal tasks. The main importance of the working memory is not the storage part, but the fact that it keeps the information active to be manipulated.

There are two main theoretical models that try to describe the functioning of this system. The most known model was created by Alan Baddeley and Graham Hitch in 1974. In this essay, we will describe Baddeley & Hitch (1974)'s model, and will also present one of the most important alternative models of working memory, presented in Nelson Cowan (1998, 2005).

Alan Baddeley and Graham Hitch created their working memory model as an attempt to define a short-term memory model that was more accurate than the ones in vogue in that period. They proposed that working memory could be divided into three subsystems – Phonological Loop, Visuouspatial Sketchpad and Central Executive, each subsystem being specialized in one function. Baddeley (2003) defines them as

> one concerned with verbal and acoustic information, the phonological loop, a second, the visuouspatial sketchpad, providing its visual equivalent, while both are dependent upon a third attentionally-limited control system, the central executive. (p.189)

The authors divided working memory in these three components after running some tests and assuming that "they work together as part of a unified working memory system

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[1] http://www.medterms.com/script/main/art.asp?articlekey=7143 (accessed on December, 14th, 2011)

that served the function of facilitating the performance of a range of complex tasks" (BADDELEY, 2003, p. 199).

The Phonological Loop was also divided into two sub-components – a *phonological short-term store* and an *articulatory rehearsal component*. The first sub-component, the phonological short-term store, is believed to hold auditory memory traces for a few seconds, during which they decay, and after this time the second sub-component, the articulatory rehearsal component, starts refreshing these auditory traces (BADDELEY, 2003). The Phonological Loop is believed to be useful in vocabulary acquisition in a second language (BADDELEY, 2003).

The Visuouspatial Sketchpad is the subsystem that has the function of "integrating spatial, visual, and possibly kinesthetic information into a unified representation which may be temporarily stored and manipulated" (BADDELEY, 2003, p.200). People use the Visuouspatial Sketchpad to remember colors, shapes and also to plan spatial movements and these two types of functions are assumed to be separated into the system (for further information, see LOGIE, 1986). Lesion and neuroimaging studies (DELLA SALA & LOGIE, 2002; SMITH & JONIDES, 1997) suggest that the visuouspatial sketchpad depends, basically, on the right hemisphere of our brain.

The Central Executive is considered responsible for the attentional control and also for controlling and regulating our cognitive processes. According to Baddeley (2003), the Central Executive is also responsible for coordinating the slave systems. We can think of the Central Executive as the part in charge of selective attention and inhibition. It is this part that selects what is relevant to maintain in the memory and what is not, in the sense that it perceives what is relevant and how much attention we need to put in a task to be able to perform it. In addition, it also divides the person's attention between two or more tasks.

More recently, Baddeley (2000) included a fourth component into his model called Episodic Buffer, because his three-part model did not account for all the processes related to the working memory, especially its relation with long-term memory. The Episodic Buffer is the 'storage part' of the working memory, being responsible for retaining around four pieces of information in a multidimensional code. Because of its capacity to retain information, it

can make connections between the other subsystems of the working memory and also connect these subsystems to the long-term memory.
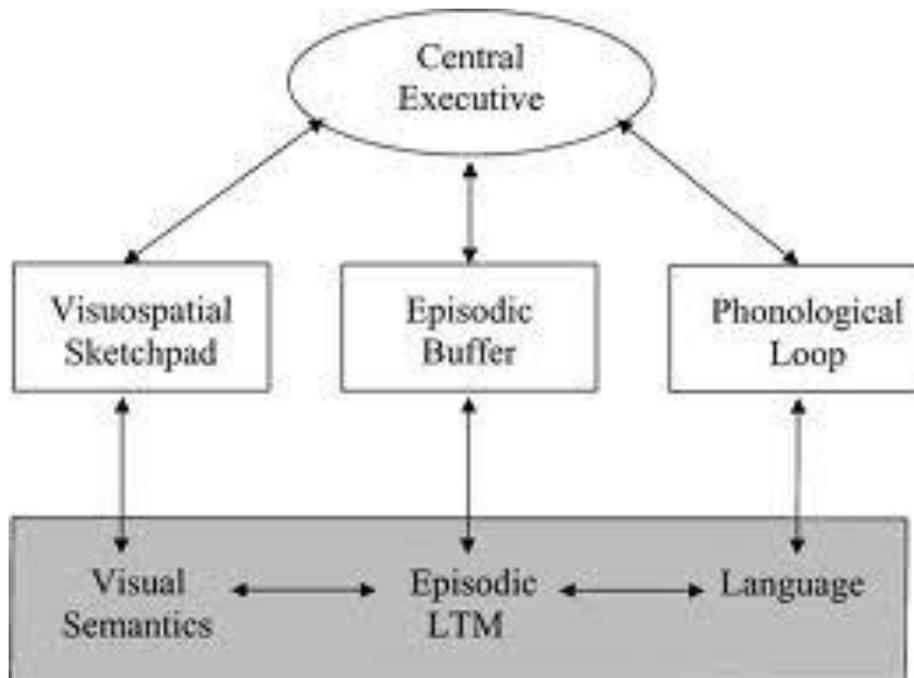
Figure 1: Working Memory Model (from Baddeley, 2000)

There is also another famous model of WM, the one proposed by Nelson Cowan (1998, 2005) and Randall Engle (2002). These authors argue that working memory is not about "systems that include multiple components" (ENGLE, 2002, p.20) but

> it is composed of a capacity-limited focus of attention, along with a temporarily activated portion of the information in permanent memory, which extends beyond the focus of attention to include some automatically activated information. (COWAN, 1998, p.77)

The authors posit that what really interferes in the process of keeping information active is the amount of attention the individual gives to the task. Individuals vary in their attention span and this will directly interfere in the information that can be kept active in

their working memory. According to them, people with high working memory capacity are better able to use attention to avoid distraction.

This perspective is discussed in several articles by Cowan and Engle. In Engle's (2002) article entitled 'Working Memory Capacity as Executive Attention', the author presents the idea that "WM capacity is not about individual differences in how many items can be stored per se but about differences in the ability to control attention to maintain information in an active, quickly retrievable state" (2002, p.20). According to him, working memory is related to memory "only indirectly" and the most important aspect in working memory is attention. In order to provide evidence to this theory, the author presents many studies involving different populations and tasks. In one of them, called the *Dichotic-Listening Task,* the subject is supposed to repeat aloud words presented in one ear while ignoring the information that is being presented in the other ear. At some point, the subjects name was presented as a word in the ignored message. The researchers wanted to know if subjects would report to have listened their names. High-WM subjects should be better in ignoring the words and were supposed to report less hearing their own names. Their hypothesis was confirmed, while 65% of low-WM subjects reported hearing their names. There was also a number of high-MW subjects reporting hearing their names, but the number was not significant when compared to the low-WM subjects.

Usually, working memory tests – also called Span Tasks – are formed by many sentences and the subject has to answer some questions about the sentences and remember the last word of each sentence.

Nelson Cowan (1998) presents some other examples from tasks and tests proving that attention has an enormous importance when talking about Working Memory. He mentions the example of George Miller's study that says a person can remember around seven pieces of information or seven independent 'chunks' at a time. Cowan points out that this number has changed during time accordingly to the details and the stimuli used in each test. It is clear that the memory has a limit, but this limit is not a simple number.

Cowan, Morey and Chen (2007) bring some interesting facts about this 'magical number'. They say that seven is supposed to be the maximum number of words, letters,

numbers a person can recall. Miller's (1956) article brings the idea that we have to think about chunking when we talk about recording items and this chunking transformation occurs because we need to reduce the number of items in order to remember them. The most famous example of chunking is with the sequence of letters USAFBICIA. If you look at it at once it seems difficult to remember the sequence, but if you divide it in USA, FBI and CIA it is much easier to remember because it became a structure.

Another aspect that can help the subject to remember a good number of items is the length of words. It is easier to remember small words, because then our brain has time to rehearse the items that have to be recalled. In the same article authors also pay attention to the fact that when the subjects were supposed to recall more words, they started creating larger chunks, not more chunks.

In the end of this article the most important question is: "Is there a magical number seven after all?" The authors conclude that we can think about number *four* plus or minus two and this variation will occur accordingly to the individual that is being tested. They also pointed out that the tests have to pay a lot of attention on the time subjects have to recall words. The idea to have a good working memory test is that the subject does not have enough time to rehearse the words or numbers.

The authors also say that the reason for this number – *four* – has not been determined, but the focus of attention can be one answer to the question of what determines the number of items that a person can recall in a Working Memory Task.

There are many studies that have established a relationship between intelligence and working memory. Kyllonen and Christal (1990) and Engle, Tuholsky, Laughlin and Conway (1999), for example, report a high correlation between IQ scores and WM. Within the same context, Conway, Kane and Engle (2003) also argue that WM capacity may account for a great percentage of the variability reported in tasks that measure general intelligence. The authors argue that "WM span tasks … require the active maintenance of information in the face of concurrent processing and interference and therefore recruit an executive attention-control mechanism to combat interference." (2003, p.5)

As we can see, working memory is an important topic to be studied because it interferes in the learning process. Many tests were performed in order to quantify the Working Memory Capacity (WMC) and both theories have helped the area to increase its studies.

2.2. LEXICAL ACCESS

The literature presents two main models that deal with lexical access in bilingualism: the *Word Association Model* (Kroll and Curley, 1988; Chen and Leung, 1989) and the *Concept Mediation Model* (Talamas *et al.*, 1999). According to the *Word Association Model*, L2 words have a direct connection with their equivalent in L1; that is, words in L2 are associated to words in L1 and we can only access the concept of each word in the L2 through L1 mediation. On the other hand, the defenders of the *Concept Mediation Model* posit that L2 words are connected to their meanings without the L1 mediation. In other words, we can access the concepts from L2 words directly, without interference or mediation from L1.

Word Association Model claims that when we are learning a second language, the new words we learn are going to be related directly to their correspondent in our first language. We only access the concepts of the words from L2 after they are mediated by our L1. This association is used to acquire and maintain vocabulary and to make us understand and speak in another language.

The other possible model for acquiring vocabulary in a second language states that second language words are not related to first language words. The L2 words are associated directly to the non-linguistic concepts and these concepts are common to both words, first and second language.

In order to analyze the lexical relation between L1 and L2, translation is one of the most used tasks. When performing tests there are two main points researchers look for: accuracy and reaction time. The first one is related to how accurate the answer given is and the second one is related to the time it takes the subject to give the answer. Researchers usually analyze the right answers subjects give, but the wrong answers could also give some important details of the relationship that is constructed between L1 and L2.

Kroll and Stewart (1994) investigate if there is any category interference in translation and in picture naming. In this article, they bring many ideas related to vocabulary in L1 and in L2. Some experiments from other researchers are also reviewed by them. These experiments were trying to prove the existence of a bilingual memory that is believed to have two different levels of representation that are hierarchically related. This bilingual memory was a result of two different ideas: one suggests a common memory system for both languages and another proposes an independent memory system for each language.

After some time, they defined that both models were correct but they would work at different moments. There are two lexical memory systems – one per each language – and one abstract memory system that is responsible to store concepts – which work for both languages.

The lexical memory systems are responsible for storing words. Each language has its own lexical memory system so words are stored separately in L1 and in L2. The concepts, on the other hand, are stored in an abstract memory system that is shared by both L1 and L2.

They also review some experiments results to argue that words in first language are named faster than pictures in the first language. They assumed that this difference exists because when naming pictures, the subject needs time to access the concept, not just the word, and if the concept is storage in a different memory, it naturally takes more time to be accessed. This idea is totally connected with the *word association model* that predicts exactly that – translation from L1 to L2 will be faster than picture naming in L2 because the last task requires first a mediation through conceptual memory. On the other hand, the *concept mediation model* predicts that word translation between L1 and L2 and picture naming would have similar response times and that "any differences … should be attributable to the differences in the representation of the respective surface forms." (KROLL & STEWART, 1994, p.151)

In an experiment that tried to find which concept was more accurate, Potter et al, (1984) tested a group of highly fluent Chinese-English bilinguals for both translation and picture naming. The results supported the concept mediation model. Less proficient subjects were also tested and the results continue to corroborate the concept mediation model that

predicts translations into L2 and picture naming in L2 are similar because both of them require the same conceptual access of the L2 word. In both tests, the times to translate and name pictures were very similar. In some cases, the naming task required less time from the subject than the translation time, which contradicts what the word association models accept as true.

After these results were presented, some researchers thought that maybe those less fluent bilinguals had passed for an early critical period of second language acquisition which would influence the results. So Kroll and Curley (1988) replicated the same study with many subjects, some of them that had studied the second language for less than 2 years. Their results supported the developmental hypothesis, because those who had studied the language for less than two years produced data consistent with the word association prediction but those subjects that had studied the L2 for more than two years produced results consistent to the concept mediation model – the same result found in Potter et al. (1984) experiment. The authors concluded so that there is a developmental shift during the second language acquisition. In the first years of L2 acquisition there is a word-to-word connection between the two languages and after some years of study it moves into a concept connection, and the student does not need to make an association to the first language word to access the concept related to the word.

When they started to describe the third experiment they have performed – category interference in bilingual translation -, the authors designate that one of their goals was to prove that the translation from L2 to L1 is faster than from L1 to L2. They believed that it happens because "translation from L2 to L1 is accomplished in a lexical basis, whereas translation from L1 to L2 requires concept mediation." (KROLL & STEWART, 2004, p.157) If we need more time to name pictures than words in L1 because we have to access the concept, we also need more time to translate from L1 to L2, because the concept memory also need to be accessed.

In "Development of Lexical Fluency in a Second Language" the authors, Kroll, Michael, Tokowicz and Dufour (2002), affirm that "the more dominant language will influence the less dominant language more than the reverse. An effect of L2 on L1 would be

expected for only the most fluent bilinguals. (KROLL et al., 2002, p.143)" This is something interesting that does not seem to be so difficult to understand. It is really difficult for the L2 student do not make correlations between the new language and the one he/she dominates. These correlations can occur on lexical, syntactic and morphological level and will vary accordingly to the level of proficiency of the speaker.

2.3. RELATION BETWEEN WORKING MEMORY CAPACITY AND VOCABULARY ACCESS

There are many studies trying to figure out what exactly the relationship between Working Memory and Second Language Acquisition is. It is known that Working Memory capacity interferes in Language Acquisition, but we still do not know what the extension of this relationship is. Besides that, just few experiments were conducted trying to relate WM and Vocabulary Access.

Some studies have investigated other factors that can influence, besides WMC, Lexical Access. A study performed by Tokowicz, Michael and Kroll (2004) tried to investigate the roles of study-abroad experiences (SAE) and working memory (WM) in translations tasks. They analyzed the types of errors subjects made in order to see if subjects with higher WMC and more SAE would have a better performance in communication even though they did not know the right word/structure. Their task included a translation task from the dominant to the non-dominant language.

They concluded that if the subject has a high score in WMC, he/she can take advantage of this to create strategies to communicate even though he/she do not know the right word to be used in each situation when he/she is in a SAE.

This study conducted by Tokowicz, Michael and Kroll (2004) was used as an inspiration and although they have used the study-abroad experience to selected their participants, they also study the influence working memory capacity has in lexical access.

3. THE STUDY

In this chapter, first the objectives and hypotheses that guided the investigation will be presented. Next, the participants will be described. Finally, the tasks that were used as well as the procedures that were adopted for the data collection will be presented.

3.1. OBJECTIVES

3.1.1. GENERAL OBJECTIVES

Several studies have provided evidence that working memory capacity correlates with performance in language learning (ATKINS & BADDELEY, 1998; GATHERCOLE, SERVICE, HITCH, ADAMS & MARTIN, 1999), lexical access (TOKOWICZ, MICHAEL & KROLL, 2004) and translation tasks (KROLL, MICHAEL, TOKOWICZ & DUFFOUR, 2002).

3.1.2. SPECIFIC OBJECTIVES

Within this theoretical context the purpose of the present investigation was

(a)   to verify the effects of working memory capacity on L2 lexical access in a Translation Task.

(b)   to verify if concrete words have more accuracy when compared to abstract words.

3.2. HYPHOTESES

The following hypotheses were formulated:

(a)   Working memory capacity will positively influence the participants' performance in the Translation Task. More specifically, there will be a positive correlation between working memory capacity and accuracy scores in the Translation Task. In other words, the prediction is that the

higher the working memory scores the higher will be the accuracy scores in the task.

(b)   In addition to that, it is also expected that working memory capacity will negatively correlate with reaction time, in that higher scores in the working memory capacity the lower the participants' reaction time.

These predictions are based on the work of Tokowicz, Michael and Kroll (2004, p.257), according to whom "individuals with higher working memory capacity would know more words than individuals with lower working memory capacity because learning an L2 word requires co-activation of the L2 word form and either the concept for the L1 equivalent."

(c)   Concrete words are expected to obtain higher accuracy scores and lower reaction times than abstract ones in the Translation Task. This hypothesis is based on Tokowicz and Kroll (2007).The authors believe that

> "concrete words are more likely than abstract words to share semantic features across languages because concrete concepts are more likely to be similar across languages and cultures. Thus, the explanation given for concreteness effects is that translation is mediated by meaning activation and because the semantic features for concrete words have considerable overlap across languages, they are translated more quickly and more accurately than abstract words." (TOKOWICZ & KROLL, 2007, p.7)

3.3. PARTICIPANTS

The data collection took place at Universidade Federal do Rio Grande do Sul with 26 undergraduate students – 12 are English students at *Letras* and 14 are English Students at NELE (English Course from UFRGS). All participants have been studying English for over three years and have a high level of proficiency in English. A placement test was not used because we assumed students had a high level of proficiency. Students from *Letras* were studying the

language at UFRGS for about 4 years and the students from *NELE* were from the penultimate level of English. From these twenty-six students, twenty are women and six are men.

Their average age is 23.7 years old. The youngest participant is 19 and the oldest is 47. Seven participants are English teachers and only seven do not use English frequently at their workplace. Five participants speak another language at home and three have already lived in the United States for almost one year. Twenty-five participants answered that they use English in their free-time activities and twenty-three of them use English always or almost every day. Most of them also have the habit of studying English at home, besides going to class. The study time would involve solving exercises in grammar books, using English with friends or reading textbooks at home. Only four participants reported not having the habit of studying English outside the classroom.

3.4. MATERIALS

Initially, participants signed a consent form (Appendix A) and were asked to answer a language history questionnaire where they reported their second language experiences and habits (Appendix B). The questionnaire was in Portuguese, subjects' first language.

Two experimental tasks were used, a Memory-Span Assessment Battery (BAMT) (Appendix C) and a Translation Task. The Memory-Span Assessment Battery, was designed and validated by a group of psychologists from Universidade Federal de Minas Gerais (BAMT, WOOD et al., 2001). This battery is an adaptation from Salthouse and Babcok (1991). The subjects had to answer 3 different tasks involving verbal stimuli in their first language. Each task will be described below.

The first task, called *Alcance de Compreensão de Escrita,* consisted of groups of sentences that subjects had to hear and then answer a question related to the sentence and then recall the last word from each sentence. In the second task, called *Lista de Palavras*, subjects heard a list of words and were supposed to recall this list in the same order they were read to them by the experimenter. In the last task, called *Compreensão de Sentenças*, subjects were supposed to answer multiple choice questions in 20 seconds. There were 25

questions and subjects had to answer the questions as fast as they could. After answering these 25 questions, they were asked to answer the same 25 questions in another 20 seconds.

After taking the Working Memory Assessment Battery, each subject performed the Translation Task, designed in a Dell computer using *E-prime*[2] software. A word in English appeared in the middle of the computer screen and the subject had to provide a translation in Portuguese as fast as he\she could. There were 38 single words – verbs and nouns, half of them abstract and half of them concrete.

These words were adapted from Tokowicz, Michael & Kroll (2004). They were translated from Spanish and measure by their occurrences. The division between concrete and abstracts words were made by them and this division was maintained in this research.

Before the test was conducted, the tester read the instructions aloud to each participant and if he/she did not have any question, they were allowed to take the test.

The words (Appendix D) were presented in a randomized order that was generated by the computer program at the start of each run. Each trial began with a fixation cross appearing until the participant pressed the space key on the computer keyboard. A word was presented for 4000 ms or until the participant made a verbal response. They said the answer in a microphone which captured the answer and saved the time each subject took to say each word. Participants were instructed to respond as quickly and accurately as possible, and to say "no" when they were unable to translate a given word. The answers were also recorded to be transcribed, corrected and scored. Participants received *one* point each time they got their first answer right and *zero* if they could not give an answer or if their answer was incorrect. Students were asked to also think about other possible translations, but their extra answers were not scored for the data analysis presented here.

The participants were tested for their working memory capacity and the Translation Task. Two groups performed the BAMT and the Translation Task on the same day and

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[2] E-prime is a software used to design psycholinguistics experiments when accuracy and reaction time need to be measured (http://www.pstnet.com/eprime.cfm)

participants from the first group had four weeks between the two tasks. The BAMT was conducted in groups and the Translation Task was always conducted individually.

4. RESULTS

During the analysis, it was necessary to remove the accuracy results that were below 65%, which means that from the 26 subjects we had in the first moment, only 20 had their results analyzed. This action was necessary because 50% represents chance and studies usually analyze results between 60% and 70%. We choose 65% in order to have a good number of subjects to be analyzed.

In order to verify if there was a correlation between accuracy and Working Memory in the translation test, an analysis was conducted. Total scores for the translation test and the working memory measures were compared and a significant positive *Pearson* correlation was found (r= .030). This means that Working Memory influenced accuracy results.

This finding is really interesting and corroborates my first hypothesis that predicts working memory capacity positively influence participants accuracy in the translation task. This prediction also goes on the same direction of Tokowicz, Michael and Kroll (2004). The authors believed that because we need co-activation of the L2 word form and the concept for the equivalent word in L1 in translation tasks, individuals that have a high-WMC are more likely to know more words than individuals with low-WMC.

Besides the correlation that exists between the total score from the Translation Task and the Working Memory Capacity, there is also a correlation between the WMC and the separated results from the abstract and the concrete words as we can see in the figure below.
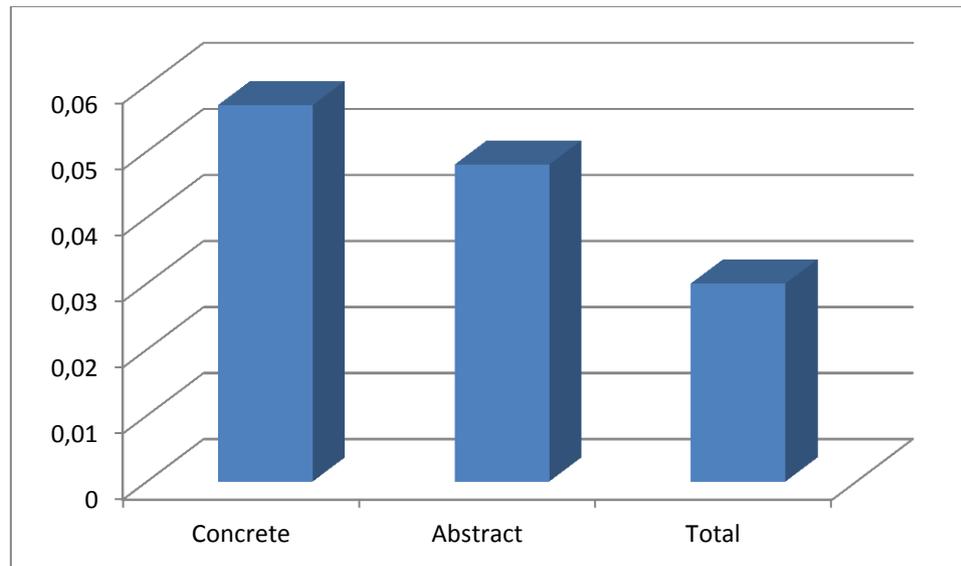
Figure 2: Accuracy Correlation Scores for Abstract and Concrete Words and the WMC Score

We also analyzed if there was any interference from the WMC in the reaction time – time subjects took to give an answer. Just the time reaction for the accurate words was considered.

We did not find any correlation between the Reaction Time and the WMC. The difference that exists between Concrete and Abstract words – besides its existence – is not significant (the Repeated Measures ANOVA was (p=.253)) - and it also goes on the contrary direction I had in mind in the beginning of the research. The average time students took to translate the abstract word was actually smaller than the time to translate concrete words.

Tokowicz and Kroll (2007) also wrote that concrete words would be translated faster than abstract words. When the results were analyzed we saw something different, and most of the time, abstract words were translated in less time than concrete words. I understand that because of their level of proficiency, the concreteness of the word does not interfere in the reaction time. Maybe if conducted with beginners' students the results could show different correlation and the concreteness would interfere more in the reaction time and also in the accuracy.

Figure 1 below presents the mean accuracy results from the Translation Task, as well as the separate results from abstract and concrete words.
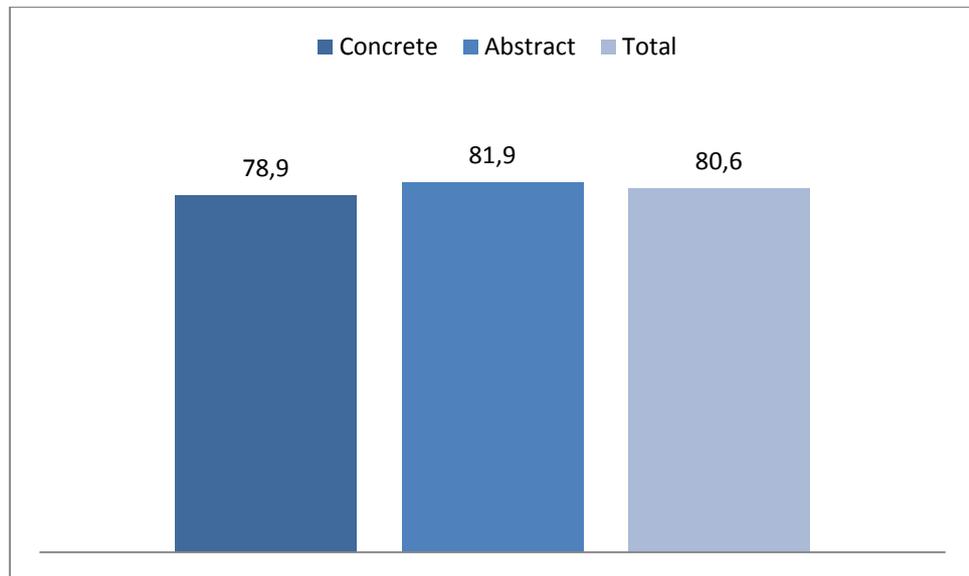

Figure 3: Mean Scores in the Translation Task

One of the hypotheses presented says that concrete words are expected to obtain higher accuracy scores when compared to abstract words. This hypothesis was not corroborated. As we can see in the graphic, abstract words were the ones that had a better score in the translation task.

In order to see if the difference between these scores was significant, a Repeated Measures Analysis of Variance (ANOVA) with scores for accuracy for both concrete and abstract words and for working memory as a covariate was carried out. The analysis revealed no significant difference between the scores for concrete and abstract words ($p=$ .648).

So, although the difference exists and abstract words were translated with more accuracy, this difference is not significant. One thing that can be understood is that maybe, for advanced students in a second language, the concreteness of the word does not interfere

in accuracy. All the participants from this study were studying the language for a long time and almost all of them use English outside the classroom. It is something that can interfere in the result, because the student has more contact with words in the second language and it can facilitate his/her performance in translation tasks.

The final result is interesting because, although I have discovered that the concreteness does not interfere in the results participants had in the Translation Task, I found out that that Working Memory interferes positively in translation accuracy and this result can be used in other researches trying to analyze what can interfere in this relation.

Working memory results and its correlation with accuracy was not a surprise in the sense that it goes on the same direction of other studies that were mentioned. The surprise is that concreteness did not interfere in the accuracy results. We decided to analyze this item because in other tests we can see that the difference between concretes and abstracts were significant. Although it is really hard to define words in these two categories, we used the same categorization the Tokowicz, Michael & Kroll (2004) had used and maybe, because the categorization of words in these two categories is really hard to do, the results would be different with a different characterization was used or we could also understand that this categorizations does not deal with polysemy what can possibly interfere in the accuracy result.

5. FINAL CONSIDERATIONS

The main objective of this study was to analyze if working memory would interfere in the accuracy and reaction time of advanced students of English performing a Translation Task. The participants were all Brazilians that were studying English as a second language for more than 3 years. Some of them were also teachers and had lived abroad, in an English Speaking country, for almost twelve months.

The participants had two tasks. One of them was used to measure their WMC – we used the BAMT from UFMG – and the other was a Translation task in which students had their answers analyzed looking for their accuracy and reaction time.

Two hypotheses were created and one of them was corroborated. Accordingly to the results, Working Memory positively interferes in participant's accuracy. So, higher the WMC of the subject was, higher was its accuracy in the Translation Task. When the WMC was not too high, the accuracy was not high either.

The other hypothesis said that concreteness would have some interference in the results, in the sense that concrete words would be accessed faster than abstract words. It was not confirmed, because the difference between abstract and concrete words accuracy and reaction time was not significant.

This research was an important moment for learning. Collecting and organizing data is something really interesting but it can also be really hard. I had a lot of limitations in time and subjects. Students did not want to participate and also when they knew that the research was something important and data needed to be collected, they did not care and did not show up on the day they had schedule to have their data collected. The path was though. In some moments I thought that it would be impossible to collect all the data I needed in the time I had, but in the end I had enough data to analyze.

When we start a project like this, we do not think that we can have many problems during the way. After having collected data from twelve participants in the translation task, I realized that their results could not be used in the research because the computer was not collecting their reaction time. The twelve first participants could not re-do the task because

they already knew the words, so I had to put all these results away and start testing individuals for their working memory capacity and then for the translation task again. I finished collecting data on December 3rd, just a few days before presenting the results.

This paper taught me many interesting things and made me just more interested in Linguistics and their influence in Second Language Acquisition. I would like to continue studying in this area because many more studies can be conducted trying to understand the influence Working Memory has in Language Studies.

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Appendix A – Consent Form

UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL
INSTITUTO DE LETRAS
GRUPO DE PESQUISA (CNPq): Cognição e
Aquisição/Aprendizagem de L2 – Uma Perspectiva
Psicolinguística
PROFESSORA ORIENTADORA: Profa. Dra. Ingrid Finger
ALUNA PESQUISADORA: Flávia de Sousa Dias da Silveira

UFRGS
UNIVERSIDADE FEDERAL
DO RIO GRANDE DO SUL

INSTITUTO
DE LETRAS
U F R G S

Participante n° _____

TERMO DE CONSENTIMENTO LIVRE E ESCLARECIDO

A pesquisa da qual você vai participar é intitulada "Efeitos da memória de trabalho na tradução de palavras em L2". *Neste estudo, o participante será solicitado a realizar uma tarefa de associação semântica no computador. No teste, palavras serão apresentadas em inglês no centro da tela do computador e o participante deverá pensar em possíveis traduções em português para essas palavras.* Vale salientar que este não é um teste de inteligência, mas sim um instrumento de avaliação de aspectos cognitivos do bilinguismo. A tarefa será realizada no computador e serão medidas a velocidade e a acurácia de suas respostas.

Sua participação é livre e voluntária. Os participantes desta pesquisa terão seus nomes mantidos em sigilo quando da divulgação geral dos dados em artigos científicos.

Pelo presente Termo de Consentimento Livre e Esclarecido, declaro que autorizo a minha participação neste projeto de pesquisa, pois fui informado, de forma clara e detalhada, livre de qualquer forma de constrangimento e coerção, dos objetivos desta pesquisa e do teste a que me submeterei, acima listado. O Pesquisador Responsável por este Projeto de Pesquisa é a Dra. Ingrid Finger (fone 51-9380-2944).

Fui, igualmente, informado:
- da garantia de receber resposta a qualquer pergunta ou esclarecimento a qualquer dúvida acerca dos procedimentos, riscos, benefícios e outros assuntos relacionados com a pesquisa;
- da liberdade de retirar meu consentimento, a qualquer momento, e deixar de participar do estudo, sem que isto traga prejuízo à minha pessoa;
- da garantia de que não serei identificado quando da divulgação dos resultados e que as informações obtidas serão utilizadas apenas para fins científicos vinculados ao presente projeto de pesquisa.

Li e entendi a informação acima a respeito deste estudo e concordo em participar.

_____   _____

NOME DO PARTICIPANTE   ASSINATURA
Porto Alegre, ___/___/ 2011

Appendix B – Language History Questionnaire

UNIVERSIDADE FEDERAL DO RIO GRANDE DO SUL
INSTITUTO DE LETRAS
GRUPO DE PESQUISA (CNPq): Cognição e
Aquisição/Aprendizagem de L2 – Uma Perspectiva Psicolinguística
PROFESSORA ORIENTADORA: Profa. Dra. Ingrid Finger
ALUNA PESQUISADORA: Flávia de Sousa Dias da Silveira

Participante nº: _____

Prezado participante do estudo,

Por favor, preencha as lacunas abaixo e responda às perguntas:

(1) Idade: _____   (2) Sexo: (   ) F   (   ) M

(3) Profissão (se for professor(a), especifique a série, a disciplina e o local de trabalho):

_____

_____

(4) Que idade você tinha quando começou a estudar inglês?

_____

(5) Onde você estudou inglês antes de ingressar na UFRGS? (Favor, citar todos e informar idade e por quanto tempo)

_____

_____

(6) Que línguas você estudou formalmente e como foi a sua experiência de aprendizagem?

_____

_____

(7) Você fala outras línguas em casa além do português?   (   ) SIM   (   ) NÃO

(8) Se sim, quais e com quem?

_____

(9) Você utiliza o inglês em seu local de trabalho? (   ) SIM   (   ) NÃO

(10) Com que frequência (caso tenha respondido SIM na questão anterior)?

    (   ) sempre   (   ) frequentemente   (   ) às vezes   (   ) raramente

(11) Você já morou no exterior?   (   ) SIM   (   ) NÃO

(12) Se sim, em que país?

_____

(13) Por quanto tempo?

_____

(14) Você já viajou para o exterior?   (   ) SIM   (   ) NÃO

(15) Se sim, para onde e por quanto tempo?

_____

_____

(16) Você utiliza o inglês em seus momentos de lazer?   (   ) SIM   (   ) NÃO

(17) Em que atividades (caso tenha respondido SIM na questão anterior)?

    (   ) internet   (   ) televisão/cinema   (   ) leitura de livros/revistas

    (   ) ouvir música   (   ) vídeo games   (   ) outros _____

(18) Com que frequência (caso tenha respondido SIM na questão anterior)? _____

(19) Seu estudo extraclasse consiste em:
    (   ) estudar e praticar as estruturas da língua em livros de exercícios e gramáticas
    (   ) conversar com amigos e colegas que falam inglês
    (   ) ler as unidades do livro-texto trabalhadas em aula
    (   ) não tenho o hábito de estudar fora do contexto de sala de aula

(20) Você joga vídeo games? (   ) SIM (   ) NÃO   Se sim, com que frequência?_____

MUITO OBRIGADO POR PARTICIPAR DO EXPERIMENTO!!

Appendix C – Memory-Span Assessment Battery

Bateria de Avaliação da Memória de Trabalho - BAMT

Caderno B

Nome:..

Data:........**/**........**/**..........   Idade:..............   Sexo: (M)/(F)

Escolaridade (anos):...

Não abra ainda este caderno!

Quando autorizado pelo aplicador, abra o caderno na página que lhe for indicada e preste atenção ao que for pedido fazer. Use lápis ou caneta para responder as questões. Não é necessário utilizar borracha.

Não escreva no espaço abaixo. Ele é reservado para a correção de seu teste.

Nº do teste	
ALCESC	
APRP	
CPRSENT	

Alcance de Computação na Escrita

Quem?	Pôs o quê?	Quem?
(　) O galo	(　) O ovo	(　) O namorado de Eunice
(　) Juca _____	(　) O cachorro _____	(　) João _____
(　) Óculos	(　) O vento	(　) O tio de Eunice

Quando?	Quem informou?	Quem?
(　) Na sexta-feira	(　) O Diretor	(　) O homem
(　) No mês passado _____	(　) O repórter _____	(　) O garoto
(　) Ontem	(　) A secretária	(　) A menina _____
Quem?	**Quando?**	**Recebeu o quê?**
(　) Papai	(　) Semana que vem	(　) A mesa
(　) O cachorro _____	(　) Ontem _____	(　) Notícias _____
(　) Cecília	(　) De manhã	(　) O caixa

Quem?	O quê?	Quem?
(　) Os peões	(　) A qualidade de vida	(　) Suas amigas
(　) Eu _____	(　) As curvas _____	(　) Maria _____
(　) O dono da terra	(　) As florestas	(　) Sua tia
Onde?	**Procurava quem?**	**Recebeu o quê?**
(　) No banco	(　) Serviço	(　) Um bilhete
(　) Longe da rua _____	(　) Casas _____	(　) Um cheque _____
(　) Perto da praça	(　) Amélia	(　) A roupa
Quem sabe?	**Desceu de onde?**	**Quem?**
(　) Seu amiguinho	(　) Da escada	(　) O médico
(　) O homem _____	(　) Do poste _____	(　) Mamãe _____
(　) Pedro	(　) Do ônibus	(　) Eu

A maior parte do quê?	Quem elogiou?	Quem?
(　) Da cerca	(　) A professora	(　) O ladrão
(　) Dos marinheiros _____	(　) A menina _____	(　) Celso _____
(　) Dos assuntos	(　) Os meninos	(　) A multidão
Quem?	**Quando?**	**Exigiu de quem?**
(　) Marina	(　) Durante a semana	(　) De seu secretário _____
(　) A cunhada _____	(　) Ontem _____	(　) Do senador
(　) Cláudia	(　) Hoje	(　) Do motorista
Quem?	**Confiou o quê?**	**Quem?**
(　) Os plantadores	(　) Jóias	(　) Um garoto
(　) O gato _____	(　) Passarinho _____	(　) Rogério _____
(　) O seu vizinho	(　) Barco	(　) Um amigo
Como?	**Deu o quê?**	**Onde?**
(　) Bem	(　) Trabalho	(　) No serviço
(　) Amarrotado _____	(　) Alegrias _____	(　) No passeio _____
(　) De calção	(　) Dinheiro	(　) Nos feriados

Quem pensou?	Perguntou o quê?	Quem?
( ) O remo	( ) A matéria	( ) A garota
( ) Ela _____	( ) Meu nome _____	( ) Nossa tia _____
( ) O cachorro	( ) O preço	( ) Todos

Quem?	Quem?	O quê?
( ) O livro	( ) Marcela	( ) Paulo
( ) O repórter _____	( ) O gato _____	( ) O carro _____
( ) Armando	( ) O rato	( ) A casa

Amiguinhos de quem?	Dependemos de quê?	Quem?
( ) Tiago	( ) Do açúcar	( ) O professor
( ) Carro _____	( ) Do cozinheiro _____	( ) As plantas _____
( ) Marta	( ) Do molho	( ) A zeladora

Para o quê?	Quanto tempo?	O quê do Afonso?
( ) Bolo	( ) Uns minutos _____	( ) Primo
( ) Construção _____	( ) A noite inteira	( ) Cunhado _____
( ) Envelope	( ) Horas	( ) Um vizinho

Quem?	Quem o abandonou?	Quem?
( ) Pérola	( ) João	( ) O porteiro
( ) O motorista _____	( ) O partido _____	( ) O homem _____
( ) Papai	( ) À vegetação	( ) O leão

Que beijou quem?	Quando?	Quem?
( ) Saci	( ) Toda semana	( ) Dona Maria
( ) Cordélia _____	( ) Sábado _____	( ) O modelo _____
( ) Afonso	( ) Nas férias de Julho	( ) Os índios

Quem?	Quem?	Quem gosta de gado?
( ) Os macacos	( ) Os meninos	( ) Os homens
( ) Muitas rochas _____	( ) O treinador _____	( ) O patrão _____
( ) Terra	( ) O padre	( ) A natureza

Quando?	Quantos filhos?	Tio de quem?
( ) Ontem	( ) Metade	( ) Do menino
( )Na semana passada _____	( ) Todos _____	( ) De Raquel _____
( ) Hoje	( ) Apenas um	( ) De um amigo

Deu o quê?	De onde?	Quem?
( ) Animais	( ) Da escola	( ) O camelo
( ) Um carro _____	( ) Do orelhão _____	( ) Os três _____
( ) Uma ilha	( ) De casa	( ) Os dois

Quem?	Quem explicou?	Quantos convidados?
( ) João	( ) Todos os garotos da rua	( ) Só os amigos
( ) Ela _____	( ) A professora _____	( ) Todos _____
( ) Laura	( ) Eu	( ) Alguns

Ministro de quê?	Garoto o quê?	O quê?
( ) Minas e Energia	( ) Apressado	( ) O carro
( ) Transportes _____	( ) Dormindo _____	( ) O gato _____
( ) Agricultura	( ) Com raiva	( ) A luz

Quem?	Quem disse?	Esperou quem?
( ) À janela	( ) Aurélio	( ) Luís
( ) Paulo _____	( ) A gerência _____	( ) Alberto _____
( ) Os meninos	( ) Ninguém	( ) Um amigo

Fez o quê?	Vizinha de quem?	Procuram quem?
( ) Suspirou	( ) Do padeiro	( ) A casa
( ) Embriagou-se _____	( ) Do jornaleiro _____	( ) Seu tio _____
( ) Perdeu-se	( ) Do papai	( ) A avenida

Quem?	Quem?	Quem da oficina?
( ) Eulália	( ) Pedro	( ) O dono
( ) Minha tia _____	( ) Seu filho _____	( ) O aluno _____
( ) Roberto	( ) O bombeiro	( ) Ninguém

De onde?	Quem?	Quem o surpreendeu?
( ) Daquele bairro	( ) A filha do Aldir	( ) A lancha
( ) Da esquina _____	( ) O porco _____	( ) O anzol _____
( ) Da cidade	( ) Aldir	( ) O peixe

Quem encontrou?	Tinha o quê?	Convenceu quem?
( ) Vocês	( ) Os brinquedos	( ) Animais
( ) Eustáquio _____	( ) Farofa _____	( ) Zezé _____
( ) A escola	( ) Um barco	( ) O dono do bar

Quem a espera?	Quando?	Entregou o quê?
( ) O táxi	( ) No ano passado	( ) Os documentos
( ) Seu colega _____	( ) Ontem _____	( ) Um carro _____
( ) A amiga	( ) Sábado	( ) Açúcar

Juntou o quê?	Quem?	Quem?
( ) A lenha	( ) Uma tia	( ) Papai
( ) Água _____	( ) Ruth _____	( ) Os moradores _____
( ) O amigo	( ) Edinéia	( ) O homem

Filho de quem? ( )Ninguém ( )Do caseiro _____ ( )Do padeiro	**Quem surpreende?** ( ) Seu marido ( ) Leão _____ ( ) O lenço	**Onde?** ( ) Na pia ( ) No tanque _____ ( ) No rio
Quando? ( )Domingo ( )Sábado _____ ( )No parque	**Filho de quem?** ( ) Maria ( ) Da fazendeira _____ ( ) Da professora	**Vendeu o que?** ( ) A casa velha ( ) O sítio _____ ( ) O perfume
Quem? ( )A roupa ( )O professor _____ ( )Ana	**Dedicou o que?** ( ) A casa ( ) A planta _____ ( ) A vitória	**Adversário de quem?** ( ) Do piloto ( ) Do coelho _____ ( ) Do enxadrista
Quem? ( )A moça ( )O homem _____ ( )O ator	**Quem?** ( ) A coruja ( ) A moça da padaria _____ ( ) A dona do carro	**Quem?** ( ) Ele ( ) A menina _____ ( ) O cientista
Adora o que? ( )Correr ( )Brincar _____ ( )Pular	**Quem espera?** ( ) O gato ( ) O menino _____ ( ) O dançarino	**Quem?** ( ) As horas ( ) O filho _____ ( ) Vinícius
Quem? ( )A maquiagem ( )Marcela _____ ( )O cabelo	**Quem?** ( ) Joana ( ) Flávia _____ ( ) A mesa	**Pegar o que?** ( ) O chapéu ( ) O sapato _____ ( ) A bola
Sobrinha de quem? ( )Do pássaro ( )Da tia _____ ( )Do palhaço	**Limpou o que?** ( ) A casa ( ) O envelope _____ ( ) O quarto	**Quem?** ( ) Tiago ( ) O pai _____ ( ) Eu
Quem? ( )O médico ( )O técnico _____ ( )A mamadeira	**Quem?** ( ) O aluno ( ) João _____ ( ) O menino	**Quem?** ( ) O telefone ( ) A pasta _____ ( ) O homem

Cantou com quem?	Confessou o que?	Marido de quem?
( ) A parede	( ) O pecado	( ) Maria
( ) A banda _____	( ) O medo _____	( ) Joana _____
( ) Os meninos	( ) O defeito	( ) Minha tia
Puxou o que?	Estagiária de que?	Deu o que?
( ) A carroça	( ) Enfermagem	( ) Um presente
( ) O homem _____	( ) Pedagogia _____	( ) Uma bala _____
( ) O carro	( ) Educação física	( ) Um prato
Quem?	Quem?	Quem viu?
( ) Minha mãe	( ) O pedreiro	( ) O piano
( ) Ela _____	( )A mulher _____	( ) O bicho _____
( ) A secretária	( ) A modelo	( ) A aranha
Durante o que?	Quem?	Não fez o que?
( ) A colheita	( ) A moça	( ) Obedeceu
( ) O dia _____	( ) Raquel _____	( ) Bateu _____
( ) A semana	( ) Dentista	( ) Cortou
Avó de quem?	Onde?	Quem comprou?
( ) Mariana	( )No ônibus	( ) Seu pai
( ) Pedro _____	( )Na escola _____	( ) O namorado _____
( ) Ana	( ) No carro	( ) O tio
Quando?	Quem?	Pagou o que?
( ) De madrugada	( )O rato	( ) O salário
( ) Pela manhã _____	( ) O homem _____	( ) O sapato _____
( ) Na cama	( ) O marinheiro	( ) O almoço
Fez o que?	Cabelereiro de quem?	Quem?
( ) Lavou	( )Mamãe	( ) A loja
( ) Consertou _____	( ) Do gato _____	( ) O prédio _____
( ) Pintou	( ) Minha tia	( ) O menino
Quando?	Mora onde?	Devolveu a quem?
( ) De dia	( ) Curitiba	( ) Ao Luís
( ) Durante a aula _____	( ) Belo Horizonte _____	( ) Ao secretário _____
( ) No clube	( ) Brasília	( ) Ao professor
Quem brinca?	Quem?	Quem?
( ) A freira	( ) Cachorro	( ) O papai
( ) Todos _____	( ) Clara _____	( ) A raposa _____
( ) Paulinho	( ) Cecília	( ) A tia

Quando?	Sabe o que?	Quem?
( ) Mês passado	( ) A hora	( ) A bailarina
( ) Segunda-feira _____	( ) A matéria _____	( ) O mágico _____
( ) Depois da aula	( ) O lugar	( ) Os amigos

Quem?	Quando?	O que?
( ) Miguel	( ) Na corrida	( ) A garrafa
( ) Túlio _____	( ) De dia _____	( ) O senador _____
( ) O ladrão	( ) Durante a noite	( ) Sua chave

Quem?	Onde?	Quem?
( ) A vaca	( ) No museu	( ) O tio
( ) O pedreiro _____	( ) Na praia _____	( ) Carlinhos _____
( ) O pescador	( ) Na praça	( ) A criança

Onde?	Mandou quem?	Lavador de que?
( ) Na porta	( ) Seu primo	( ) De carro
( ) Na floresta _____	( ) O cachorro _____	( ) De janelas _____
( ) No zoológico	( ) O porteiro	( ) De bolas

Onde?	Gosta de que?	Dono de que?
( ) Na rua	( ) Açúcar	( ) Do canguru
( ) No teatro _____	( ) Música _____	( ) Do caminhão _____
( ) Na capela	( ) Livro	( ) Da lata

Ficou como?	Fez o que?	Quem?
( ) Dormindo	( ) Correu	( ) A lavadeira
( ) Triste _____	( ) Levou _____	( ) A namorada _____
( ) Alegre	( ) Buscou	( ) A bota

Água de onde?	Perdeu o que?	Quando?
( ) Da banheira	( ) A coleira	( ) À tarde
( ) Do rio _____	( ) O osso _____	( ) Durante a semana _____
( ) Da televisão	( ) O ovo	( ) Depois da natação

Pegou o que?	Quem?	Quem?
( ) O ônibus	( ) A atriz	( ) O garoto
( ) A jarra _____	( ) O amigo _____	( ) O frango _____
( ) O livro	( ) A escola	( ) O calção

Tia de quem?	Quem acredita?	De quem?
( ) Minha	( ) Minha colega	( ) De Gustavo
( ) Da moto _____	( ) A menina _____	( ) De Raul _____
( ) De Bruno	( ) Carla	( ) A camisa

Quem?	Onde?	Quem?
( ) O viajante	( ) Em casa	( ) O mecânico
( ) O passageiro _____	( ) No palco _____	( ) A aluna _____
( ) Alguns	( ) De noite	( ) O cavalo

Listas de palavras

_____   _____   _____

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COMPREENSÃO DE FRASES

Os meninos brincaram muito de peteca e de bola.
Quem?
( ) À janela
( ) Paulo
( ) Os meninos

Os vaqueiros sabem que o patrão gosta de gado.
Quem gosta de gado?
( ) Os homens
( ) O patrão
( ) A natureza

A qualidade de vida se revelou boa naquela ilha.
O quê?
( ) A qualidade de vida
( ) As curvas
( ) As florestas

Sempre me surpreendo com tanta terra.
Quem?
( ) Os peões
( ) Eu
( ) O dono da terra

Os meninos queriam ganhar o jogo.
Quem?
( ) Os meninos
( ) O treinador
( ) O padre

O médico que tinha um barco nos ajudou na cheia.
Tinha o quê?
( ) Os brinquedos
( ) Farofa
( ) Um barco

O partido do senador exigiu dele um sinal.
Exigiu de quem?
( ) De seu secretário
( ) Do senador
( ) Do motorista

Aquela senhora recebeu um bilhete e procurou o moço.
Recebeu o quê?
( ) Um bilhete
( ) Um cheque
( ) A roupa

Madalena lembrou que vocês encontraram o bicho.
Quem encontrou?
( ) Vocês
( ) Eustáquio
( ) A escola

Suas amigas acham que se confundiram com a roupa.
Quem?
( ) Suas amigas
( ) Maria
( ) Sua tia

Ontem, João Ricardo capinou todo o mato.
Quando?
( ) Na sexta-feira
( ) No mês passado
( ) Ontem

Ele entregou os documentos ao porteiro da noite.
Entregou o quê?
( ) Os documentos
( ) Um carro
( ) Acúcar

No comício, todos devem ficar antes da faixa.
Quem?
( ) A garota
( ) Nossa tia
( ) Todos

De casa, Lúcia telefonou ao pai.
De onde?
( ) Da escola
( ) Do orelhão
( ) De casa

Sua tia confiou a chave ao vizinho.
Confiou o quê?
( ) Jóias
( ) Chave
( ) Barco

Todos os meus filhos fazem o dever de casa.
Quantos filhos?
( ) Metade
( ) Todos
( ) Apenas um

Pedro sabe que seu amiguinho perdeu o papel.
Quem sabe?
( ) Seu amiguinho
( ) O homem
( ) Pedro

Para o bolo, precisamos de leite.
Para o quê?
( ) Bolo
( ) Construção
( ) Envelope

O ladrão tentou levar o dinheiro do caixa.
Quem?
( ) O ladrão
( ) Celso
( ) A multidão

Mariana devolveu o carro com defeito para a loja.
O quê?
( ) Paulo
( ) O carro
( ) A casa

O primo do Afonso perdeu o baile.
O quê do Afonso?
( ) Primo
( ) Cunhado
( ) Um vizinho

Hoje, o chefe de vendas apresentou o novo milho.
Quando?
( ) Durante a semana
( ) Ontem
( ) Hoje

Agora só dependemos do molho para o pato.
Dependemos de quê?
( ) Do acúcar
( ) Do cozinheiro
( ) Do molho

A galinha pôs o ovo e saiu do ninho.
Pôs o quê?
( ) O ovo
( ) O cachorro
( ) O vento

Todos os convidados receberam um brinde e uma rosa.
Quantos convidados?
( ) Só os amigos
( ) Todos
( ) Alguns

COMPREENSÃO DE FRASES

Os meninos brincaram muito de peteca e de bola.
Quem?
( ) À janela
( ) Paulo
( ) Os meninos

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( ) Eu
( ) O dono da terra

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( ) No mês passado
( ) Ontem

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( ) Do orelhão
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( ) Chave
( ) Barco

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Quantos filhos?
( ) Metade
( ) Todos
( ) Apenas um

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( ) Seu amiguinho
( ) O homem
( ) Pedro

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Para o quê?
( ) Bolo
( ) Construção
( ) Envelope

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( ) Celso
( ) A multidão

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O quê?
( ) Paulo
( ) O carro
( ) A casa

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O quê do Afonso?
( ) Primo
( ) Cunhado
( ) Um vizinho

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( ) Ontem
( ) Hoje

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( ) O ovo
( ) O cachorro
( ) O vento

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Quantos convidados?
( ) Só os amigos
( ) Todos
( ) Alguns

Appendix D – List of words for the Lexical Access Test

Stimuli	Concreteness	Cognate status	Ambiguity in English	Translation ambiguity	Celex	Length
ashamed	abstract	noncog	unamb	no	21,79	7
border	abstract	noncog	unamb	no	36,03	6
butter	concrete	noncog	unamb	no	27,37	6
chew	concrete	noncog	unamb	no	5,36	4
chicken	concrete	noncog	unamb	no	30,45	7
clothing	concrete	noncog	unamb	no	35,03	8
co-worker	abstract	noncog	unamb	no	0	8
crazy	abstract	noncog	unamb	no	30,84	5
desire	abstract	noncog	unamb	no	63,13	6
disease	abstract	noncog	unamb	no	63,35	7
dog	concrete	noncog	unamb	no	71,73	3
duty	abstract	noncog	unamb	no	65,25	4
easy	abstract	noncog	unamb	no	150,06	4
eyeglasses	concrete	noncog	unamb	no	0,61	10
flag	concrete	noncog	unamb	no	19,89	4
frame	concrete	noncog	unamb	no	26,82	5
friend	abstract	noncog	unamb	no	172,46	6
haircut	concrete	noncog	unamb	no	2,18	7
laugh	abstract	noncog	unamb	no	56,93	5
lightning	concrete	noncog	unamb	no	14,13	9
money	concrete	noncog	unamb	no	403,69	5
murder	abstract	noncog	unamb	no	50,5	6
nest	concrete	noncog	unamb	no	13,74	4
opening	concrete	noncog	unamb	no	61,68	7
pants	concrete	noncog	unamb	no	15,75	5
path	abstract	noncog	unamb	no	50,84	4
picture	concrete	noncog	unamb	no	106,42	7
research	abstract	noncog	unamb	no	120,73	8
sadness	abstract	noncog	unamb	no	8,6	7
screen	concrete	noncog	unamb	no	28,77	6
ship	concrete	noncog	unamb	no	45,25	4
smell	abstract	noncog	unamb	no	60,5	5
suitcases	concrete	noncog	unamb	no	6,37	9
summer	abstract	noncog	unamb	no	120,95	6
to change	abstract	noncog	unamb	no	0	8
to fall	concrete	noncog	unamb	no	0	6
trade	abstract	noncog	unamb	no	165,75	5
whole	abstract	noncog	unamb	no	421,56	5

Appendix E – Instructions for the Lexical Access Test

Nesta tarefa você verá algumas palavras em inglês, apresentadas no centro da tela do computador, uma de cada vez. Após cada palavra, você deverá traduzir em voz alta a palavra para o português. Por exemplo, se você vir a palavra "*give*" você poderá dizer "dar".

Diga a tradução da palavra o mais rápida e corretamente possível. Se você não disser uma palavra dentro de 4 segundos, a palavra desaparecerá da tela. Se você não se lembrar da palavra em português, simplesmente diga "não".

Jamais diga "ummm" ou faça qualquer outro som antes de dizer a palavra, pois isso atrapalhará a gravação das suas palavras.

Depois que você traduzir a palavra, você verá uma tela em que aparecerá a pergunta "você consegue pensar em mais alguma tradução?" Essa é a oportunidade de você dizer quaisquer outras palavras que conseguir pensar. Quando você estiver pronto, e não souber outras traduções, simplesmente aperte a tecla de espaço no teclado.

Se tiver qualquer dúvida pergunte agora.

Quando estiver pronto para iniciar, pressione a tecla de espaço.