UNIVERSIDADE FEDERAL DE SANTA CATARINA
PROGRAMA DE PÓS-GRADUAÇÃO EM INGLÊS

Tayane de Paula Bastos Santos

THE INFLUENCE OF READING WHILE LISTENING TO NARRATIVES ON COMPREHENSION, SPOKEN WORD RECOGNITION AND LEXICAL MEMORY OF EFL BRAZILIAN LEARNERS

Dissertação submetida ao Programa de Pós-graduação em Inglês da Universidade Federal de Santa Catarina como requisito para a obtenção do Grau de Mestre em Letras. Orientadora: Prof.ª Dr.ª Roberta Pires de Oliveira

Florianópolis
2016

Tayane de Paula Bastos Santos

THE INFLUENCE OF READING WHILE LISTENING TO NARRATIVES ON COMPREHENSION, SPOKEN WORD RECOGNITION AND LEXICAL MEMORY OF EFL BRAZILIAN LEARNERS

Esta Dissertação foi julgada adequada para obtenção do Título de "Mestre em Letras" e aprovada em sua forma final pelo Programa de Pós-Graduação em Inglês: Estudos Linguísticos e Literários.

Florianópolis, 03 de março de 2016.

_____
Prof.ª Dr.ª Anelise Reich Corseuil
Coordenadora do Curso

Banca Examinadora:

_____
Prof.ª Dr.ª Roberta Pires de Oliveira
Orientadora
Universidade Federal de Santa Catarina

_____
Prof. Drª Rosane Silveira
Presidente
Universidade Federal de Santa Catarina

_____
Prof.ª Dr.ª Maria Luiza G.A. Cunha Lima
Universidade Federal de Minas Gerais

_____
Prof.ª Dr.ª Lêda Maria Braga Tomitch
Universidade Federal de Santa Catarina

_____
Profª. Drª. Mailce Borges Mota
Universidade Federal de Santa Catarina

ACKNOWLEDGEMENTS

"we make our world significant by the courage of our questions and the depth of our answers"

Carl Sagan, 1980

ABSTRACT

Interest in research and teaching on learning strategies (Oxford, 2003) for listening development in foreign language acquisition has increased over the past decade. Among the strategies discussed in the literature is reading while listening, in which the learner reads and listens simultaneously for example to songs along with lyrics, watch movies with subtitles in the foreign language, and listens to audiobooks following the written texts. The latter is the matter of discussion in this study. Following the predictions from reading strategies (Woodall, 2010; Montgomery, 2009; Chen, 2004; Harris & Casbergue, 1996) and teaching of listening (Chang, 2009; Brown, Waring & Donkaewbua, 2008) research, this study focused on investigating whether the aforementioned strategy would be of any advantage for listening and reading comprehension of intermediate level learners of English in terms of text comprehension, spoken word recognition and delayed word recall. Studies have suggested that by having contact with both input forms together, the recognition of spoken words can be enhanced, considering learners have the opportunity to gain awareness of spoken and written form relations, resulting in more effective word recognition and segmentation (Chang, 2009). In addition, it has been proposed that by reading while listening simultaneously, text comprehension is boosted, for studies in L1 thoroughly support that phonology plays a role in reading related cognitive processes (Ehri, 2005). This phonological knowledge is limited in a foreign language, thus the strategy could help to develop more efficient reading and parsing processes. Memory of words would also be increased, for the reason that words could be secured in long term memory permanently due to more information from different sources (Brown et al, 2008). Together, these predictions are the core hypotheses tested in the study. A within-subject design research was carried out. Three excerpts of contemporary science fiction short stories (Hamilton, 2013) and their correspondent unabridged audiobooks were selected for data collection. Narrative texts were selected because (1) audiobooks of stories are more popular than other text genres, (2) narrative texts may contribute for the development of listening and reading skills by promoting extensive reading and listening (Lao & Krashen, 2000; Woodall, 2010; Chang, 2009) and (3) narrative structure has cognitive processing advantage, thus any observable effect would not be related to text processing difficulty

x

Graesser, Golding & Long, 1996; DuBravac & Dalle, 2002). Three conditions were compared, reading while listening (LR), reading only (RO) and listening only (LO). A questionnaire assessed learners' language learning profiles. Three language tasks were administered: (1) a comprehension task, (2) a spoken word recognition task that measured reaction time and accuracy, and a (3) free delayed word recall task. Finally, a second questionnaire assessed learners' opinions concerning the strategy. Results did not show any statistically significant difference between conditions in any of the language tasks. The qualitative analysis however, showed that the unanimity of learners preferred reading while listening as an effective language learning strategy. Overall this study suggests that in terms of immediate gains to the comprehension of texts, recognition of spoken words and word recall for intermediate level learners, reading while listening is no better than reading only and listening only. In terms of learner perception, however, the strategy is well received and it can be used to promote vocabulary learning and extensive listening and reading in a foreign language.

Keywords: reading while listening, spoken word recognition, EFL, learning strategies, vocabulary learning.

RESUMO

O interesse em estratégias de aprendizagem (Oxford, 2003) para o desenvolvimento da compreensão oral em língua estrangeira tem aumentado, tanto na pesquisa quanto na pedagogia do ensino. Entre as estratégias discutidas na literatura está ler e ouvir simultaneamente, através da qual os aprendizes escutam e leem, por exemplo, músicas e suas respectivas letras, assistem filmes com áudio e legendas na língua estrangeira, e ouvem audiolivros acompanhando o texto escrito. Esta última modalidade é o tema do presente trabalho. De acordo com as predições das pesquisas em estratégias de leitura (Woodall, 2010; Montgomery, 2009; Chen, 2004; Harris & Casbergue, 1996) e ensino da compreensão oral (Chang, 2009; Brown, Waring & Donkaewbua, 2008), esse estudo investiga se a estratégia mencionada proporciona algum ganho para a compreensão oral e a leitura de aprendizes de inglês como língua estrangeira de nível intermediário, em termos de compreensão de texto, reconhecimento da palavra falada e recordação tardia de palavras. Estudos sugerem que ao ter contato com as duas formas de *input* ao mesmo tempo, o reconhecimento de palavras faladas pode ser aprimorado, considerando que os aprendizes têm a chance de perceber melhor as relações entre formas orais e escritas, resultando assim em reconhecimento e segmentação da fala mais efetivos (Chang, 2009). Além disso, a compreensão de textos também pode ser potencializada, visto que estudos em língua nativa estabeleceram fortemente que a fonologia desempenha um papel importante nos processos cognitivos atrelados à leitura (Ehri, 2005). O conhecimento fonológico tende a ser limitado numa língua estrangeira, portanto, a estratégia auxiliaria a desenvolver a leitura e os processos de *parsing* de forma mais eficiente. A memória para as palavras também aumentaria, pois as palavras estariam consolidadas na memória de longo prazo devido às informações de diferentes fontes (Brown et al, 2008). Em conjunto, essas predições são as hipóteses testadas neste trabalho. Um experimento com o *design within-subject* foi conduzido. Trechos de três histórias de ficção científica (Hamilton, 2013) e seus respectivos audiolivros foram utilizados para a coleta de dados. Textos narrativos foram selecionados porque (1) audiolivros de histórias são mais populares dos que os de outros gêneros textuais, (2) narrativas podem contribuir para o desenvolvimento da compreensão oral e leitura por promover a prática extensiva de ambas (Lao & Krashen, 2000; Woodall,

2010; Chang, 2009) e (3) a estrutura das narrativas proporciona vantagens cognitivas de processamento, assim, qualquer efeito observado não estaria diretamente ligado à dificuldade inerente à estrutura do texto (Graesser, Golding & Long, 1996; DuBravac & Dalle, 2002). Foram comparadas três condições, ler e ouvir, ler somente e ouvir somente. Um questionário levantou dados sobre o perfil de aprendizagem de línguas dos participantes. Três tarefas linguísticas foram administradas: (1) tarefas de compreensão de texto; (2) tarefas de reconhecimento da palavra falada, que media o tempo de reação e a acurácia, e (3) uma tarefa de recordação tardia e livre de palavras. Um segundo questionário sondou as opiniões dos participantes com relação às histórias, às estratégias e à experiência na pesquisa. Os resultados não mostraram nenhuma diferença estatisticamente significativa entre as condições nas tarefas linguísticas. A análise qualitativa, contudo, apontou que a unanimidade dos aprendizes preferiu ler e ouvir ao mesmo tempo como uma estratégia efetiva para a aprendizagem de línguas. De modo geral, este estudo sugere que em termos de ganhos imediatos para a compreensão de texto, o reconhecimento da palavra falada e recordação de palavras tardia, em aprendizes de nível intermediário, ler e ouvir ao mesmo tempo não é melhor que ler somente e até ouvir somente. Em termos de percepções dos aprendizes, entretanto, a estratégia é bem recebida e pode ser usada para promover a aprendizagem de vocabulário, a compreensão oral e leitura extensivas numa língua estrangeira.

Palavras-chave: ler e ouvir ao mesmo tempo, reconhecimento da palavra falada, EFL, estratégias de aprendizagem, vocabulário.

Número de páginas: 171   **Número de palavras**: 38.549

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ABREVIATIONS AND SYMBOLS

PPGI – Programa de Pós-Graduação em Inglês
UFSC – Universidade Federal de Santa Catarina
UEFS – Universidade Estadual de Feira de Santana
EFL – English as a Foreign Language
FL – Foreign language
L1 – Native language
L2 – Second language
H – Hypothesis
RQ – Research question
LR – Reading while listening
RO – Reading only
LO – Listening only
LLPQ – Language learning profile questionnaire
SWR – Spoken word recognition
RT – Reaction time
CEFR – Common European Framework of Reference
p – p value (probability level)
N – number of participants
X² – chi square
s – seconds
s – standard deviation
ANOVA – Analysis of variance
F – ANOVA symbol
ηp 2 – Effect size partial eta-squared

1 INTRODUCTION

Two years ago I was writing my undergraduate thesis on how the strategy of reading while listening could help to improve reading fluency in English. During the process, I found Chang's 2009 article *Gains to L2 listeners from listening while reading vs. listening only in comprehending short stories*, and, as an audiobook and stories lover, I was excited about the arguments she used on behalf of the strategy – with a focus on listening comprehension – many of which are discussed in this work. Her article inspired me to investigate if written information could affect the aural comprehension of words in a foreign language. In addition, as a teacher of English as a Foreign Language (EFL) I had noticed that listening was a big issue to my students. The extension programs that I was a member of usually prioritized oral, written and grammatical fluency. We were instructed by our supervisors not to direct much explicit attention to listening in the classroom, for the reason that students had to study it at home, considering that classroom time should focus on interaction and conversation. We teachers usually observed that our students had difficulty to follow native or native like speech at basic and intermediate proficiency levels. Our students many times reported not being strategic in regard to their own listening competence, dedicating more time to improve other language skills such as reading and speaking. Altogether, these conditions encouraged me to search for more explanations of why this was the case in the foreign language context I was inserted in, and how teachers could aid learners to overcome the initial obstacles that listening development imposes.

Research on listening in a second language has increased over the past forty years (Osada, 2004; Vandergrift & Goh, 2012). Amongst linguistic skills in second language processing research, however, listening is the one which still lacks deeper understanding of its functioning. Vandergrift (2007) suggests this is so "due to its implicit nature, the ephemeral nature of the acoustic input and the difficulty in accessing the processes" (p.191) related to it, being these processes internal. In other words, currently it is difficult to assess what occurs in the human mind with precision. Not only in research, dealing with listening decoding and comprehension elements is a challenge for learners, especially those at lower proficiency levels (Renandya, 2012).

Several factors may contribute for poor performance on aural processing. To understand what is being said, listeners must be equipped

with at least a certain amount of vocabulary in the target language. In fact, vocabulary knowledge plays an essential role in communication. Flowerdew and Miller (2005) affirm that " understanding is more dependent on the discrimination of key lexical items than syntactic forms and relationships"(p.37). Thus, it is crucial to recognize spoken words in order to make sense of meaning relations of spoken language. However, learners often face many barriers to master aural input at automatic [1] level in a foreign language, such as clustering, that is breaking down the speech in smaller groups; redundancy; reduced forms; performance variables; stress rhythm and intonation (Brown, 2001, p.252-253).

Another factor that significantly affects listening performance is the learning environment. English as a Second Language (ESL) settings usually provide more opportunities of aural input to learners than English as a Foreign Language (EFL) ones, since the first allows learners to be immersed and likely to depend on information in the second language (L2) for daily activities[2]. On the other hand, EFL settings are limited (Oxford, 2003, p.1) in terms of the frequency one might hear the target language and of second language usage on a daily basis. Considering this scenery, learners, teachers and researchers have been searching what strategies can be used to compensate for the reduced amount of input.

One of the possibilities to countervail the lack of enough input has been studied by strategy development – a research field which focuses on promotion of language learning strategies since they may influence learner's performance and cognitive capabilities (Chang, 2009, p.2). Among these strategies is *reading while listening,* in which language is presented simultaneously through two channels: auditory and written. In this study we focus on the strategy emphasizing its

---

[1] Here automaticity is seen as the ability to comprehend language without conscious effort (Brown, Waring & Donkaewbua, 2008).

[2] In the present work, the terms English as a Foreign Language (EFL) and English as a Second Language are understood as different, in order to emphasize the distinction between these language learning environments. However, when referring to a language a speaker knows other than the native (in this case, English) both terms "second language" and "foreign language" are used interchangeably.

possible role on listening improvement. It may be helpful to gradually develop better word perception and comprehension of aural language.

Strategies are constantly used by learners at all levels of proficiency, although at lower levels this use is intensified. Beginner and low intermediate level listeners face quite a challenge to comprehend spoken language, they are often confused by the speed rates of the auditory input, lack of mastery of the new language sound system or by not having enough vocabulary background. Only listening in this perspective may be confusing and even frustrating. With the aid of a written text, it becomes possible to see where a word starts and ends, by associating a written word boundary with its oral counterpart, which in turn may contribute to the recognition and comprehension of words even when one is just listening, one of the main hypothesis tested in this study.

Strategies are understood as "specific actions, behaviors, steps, or techniques (…)used by students to enhance their own learning" (In Oxford, 2003, p.2). The effects of reading while listening have been enthusiastically discussed in reading research (e.g. Chen, 2004; Harris & Casbergue, 1996; Woodall, 2010; Moody, 1989; Montgomery, 2009) although few studies (e.g. Chang, 2009; Brown, Waring & Donkaewbua, 2008) have drawn attention to its possible role on listening processing in a foreign language. In Brazil, for what is known, there is none up to the present date. Therefore, the present study aims at exploring the possible effects of the aforementioned strategy on listening related processes, more specifically by observing learners' performance on text comprehension, spoken word recognition and word recall tasks.

The organization of the thesis is as follows. Chapter two reviews the literature focusing on the cognitive aspect of listening as an interactive process, on the current findings regarding the strategy of reading while listening, and on the main recent findings of the spoken word recognition literature. In addition, we briefly discuss the knowledge of words and the mental lexicon, along with an introduction to audiobooks and narrative texts from the reading research and cognitive psychology perspective.

In chapter three we discuss the method of the study, whose four hypotheses predict that tasks performed when learners listen and read simultaneously have significantly better scores in comparison with other conditions. Three science fiction short stories, *The Last Underwater City*, *The Invisible Scientist* and *The Wormhole Effect*, by Zhanna

Hamilton (2013), were used in data collection. Care was taken to select authentic texts of intermediate difficulty, a little beyond participants' proficiency level, to avoid effects of facilitation. We carried out a within-subject experiment in which the same group of intermediate EFL learners was tested in three different conditions: reading while listening (LR), reading only (RO) and listening only (LO). The software PsychoPy (Peirce, 2007) was used to present the stimuli in the spoken word recognition tasks and to record reaction time and accuracy data. The text comprehension task had a multiple choice format and the free recall task was a sheet of paper with spaces destined to word completion.   Two questionnaires were administered, one in the beginning and another in the end of experimental sessions.

Chapter four brings the results and discussion based on the review of literature, as well as the limitations of the study. Surprisingly, results did not support any of the hypotheses proposed and we discuss why things occurred almost in the contrary direction of what it was expected. To conclude, we discuss the pedagogical implications of our findings and provide suggestions for further research.

1.1 SIGNIFICANCE OF THE RESEARCH

A study of this sort can shed light on if, and to what extent bimodal input (i.e. reading while listening) may affect learners' memory and spoken word recognition. It may contribute to the foreign language research field and have possible pedagogical implications towards listening in the classroom.   The study may contribute to broaden teachers' perspectives on what can be done to help learners listen more efficiently and better. Finally, it might be a starting point to promote the use of professionally recorded stories in English in foreign language instruction in Brazil, since stories have shown to boost motivation and engagement in language learning (e.g. Woodall, 2010; Chang, 2009).

2 REVIEW OF LITERATURE

In this chapter, several aspects of foreign language learning and listening processing literature are shortly reviewed. First we discuss what the listening process is under the interactive perspective. Then, reading while listening as a learning strategy literature is briefly reviewed. The three final sections review topics on spoken word recognition, the mental lexicon, audiobooks and narrative texts in language learning.

2.1 THE LISTENING PROCESS

Listening to language is part of our lives since a very young age. The time we have spent hearing language sounds –except those who have some kind of auditory impairment – naturally overtakes the amount of time we have been using other skills as speaking, writing and reading (Flowerdew & Miller, 2005) . Yet when it comes to second language (from now on L2) listening it was assumed from thirty years ago until recently that simple exposure could be sufficient to assure a good development of this skill, without direct instructional attention (Osada, 2004; Cutler, 2001). Exposure, that is, having contact with the language in its different modalities, is indeed one of, if not the main responsible variable for the development of learners' L2 complex linguistic system (Krashen, 2009; Renandya, 2012). However, exposure alone does not fully account for comprehension development, since humans actively use both cognitive and behavioral strategies, contextual, social and affective information to process and make sense of any aural linguistic input. In this chapter, we discuss the cognitive processes involved in listening comprehension and also other aspects including learning strategies and a specific type of text and material that can support the development of this skill in foreign language learners.

Broadly speaking, listening refers to the "complex process that allows us to understand spoken language" (Rost, 2001, p.7). Several fields of study have dedicated time and effort to explain how this process occurs (see Rost, 2001 for a review), for example, research on speech processing; listening in second and foreign language acquisition; listening as a cognitive process and learning strategies related to

listening. The works reviewed here consider the last three areas, being the learning strategy of reading stories while listening to their respective audiobooks the focus of our discussion.

At the cognitive domain, many explanations of how listening occurs derived from reading research (Bonk, 2000; Lund, 1991). One of them regards two types of processing necessary to build comprehension: bottom-up and top-down processes. Bottom-up processes concern the segmentation of the sound stream into meaningful units (Vandergrift & Goh, 2012). In this view, listeners comprehend language through their linguistic knowledge of the combination of the smallest units of speech, the phonemes (i.e. individual sounds) and other suprasegmental (non-phonemic) information of the sound stream such as intonation, stress and rhythm (Vandergrift & Goh, 2012; Flowerdew & Miller, 2005) . Comprehension would be a result of the linear combination of phonemes into larger units, that is, syllables, then words and sentences, which in turn would be converted into ideas and concepts. Although bottom-up processes, which occur mostly at the decoding level of the acoustic signal, are essential for language recognition, they do not explain comprehension in its totality. A classical evidence for the insufficiency of bottom-up processes to explain listening comprehension comes from the phoneme restoration effect, first documented by Warren in 1970. He explored how listeners heard words when a phoneme was replaced by noise (i.e. a cough) in phoneme-level tasks. Listeners not only heard the words but also reported not having noticed the noise, as if the words were being clearly produced. This is to point that although we hear language often in the presence of background noise, the comprehension is perfectly possible even with minimal acoustic evidence (Warren, 1970; Cutler, 2012). In addition, the phoneme restoration effect is stronger when experimentally comparing how listeners discriminate noise in high-frequent, low-frequent and pseudo-words. High-frequent words are more susceptible to the masking effect of the noise, that is, discriminating the noise in these words is more difficult (Cutler, 2012). As we will briefly see later (chapter 3, section 3.4.1), this is also the case in L2: high-frequent words do have processing advantages in a variety of language tasks. With this in mind, comprehension largely depends on other types of knowledge of the listener, once the acoustic signal may not always be clean to allow the extraction of meaningful units from it.

The additional knowledge of the listener in this sense is covered by top-down processes, which are "the application of context and prior knowledge to interpret the message" (Vandergrift & Goh, 2012, p.18).

Listening processing naturally demands more than decoding linguistic units, for listeners are also able to infer meanings based on previous life experiences and contextual knowledge (Flowerdew & Miller, 2005). Previous knowledge can be usually referred in the literature as schemata, or conceptual frameworks, which are seen as complex mental structures that group knowledge regarding specific concepts (Vandergrift & Goh, 2012, p.18) and that allow predictions for the interpretation of discourse (Schmidt-Rinehart, 1994). To put it into perspective, several studies have investigated the effect of topic familiarity, an element of schematic knowledge (Kamas & Reder,1995) on listening comprehension (Schmidt-Rinehart, 1994; Othman & Vanathas, 2004). For example, Schmidt-Rinehart (1994) tested native speakers of English who were learners of Spanish as L2 at different proficiency levels. She operationalized topic familiarity as the previous exposure to the information contained in the students' Spanish textbook that was also present in one of the listening passages (i.e. familiar topic) and non-familiarity as the non-previous exposure to the topic of the other listening passage (i.e. novel topic). Using immediate recall protocols, she found a significant difference between the mean scores for the familiar and the non-familiar passages, with the familiar condition generating scores almost three times higher than the scores of the non-familiar condition. Topic familiarity helped students of all proficiency levels to achieve better task performance. A similar result was found by Othman and Vanathas (2004) with intermediate level students of English as L2. It has long been assumed that contextual knowledge also supports inference of non-automatically processed elements, that is, it supports the identification of the most probable word candidates when recognition of the aural input is not completely effective (Smyth, Collins, Morris, & Levy, 1994, p. 233; Zeeland & Schmitt, 2012, p.5).

In spite of the role of background knowledge in listening processing, again, only top-down processes do not explain listening comprehension as a whole. Listeners may have little or no knowledge on a certain topic to build an accurate interpretation of what is being said. Still, they may be able to understand novel information by simple decoding (Vandergrift & Goh, 2012, p.18). Both bottom-up and top-down processes are complementary, although some researchers (e.g. Zeeland & Schmidt 2012; Lund, 1991) suggest that overall, listeners tend to rely more on top-down processes than readers, primarily because listeners do not access linguistic information in speech at the same speed

rate than that of readers and in appropriate surrounding conditions, that is, without background noise and other distractors. It is also possible that L2 listeners rely more on top-down processes precisely because of the difficulty with decoding the sounds of the other language.

How much of each process is necessary to build comprehension then? It is difficult to determine the exact portion of both bottom-up and top-down information used by listeners, although it has been suggested that the amount of information needed from each source will largely depend on listening purpose and goals (Vandergrift & Goh, 2012; Flowerdew & Miller,2005). Whether for specific details (e.g. listen to someone giving you an address) or a more general comprehension (e.g. understand the main idea of an academic talk), listeners will direct their attention and linguistic knowledge according to the demands of listening events (Vandergrift & Goh, 2012). These demands play a crucial role in the type of processing along with important individual differences such as language proficiency, age and working memory capacity[3] (Vandergrift & Goh, 2012; Linck, Osthus, Koeth & Bunting, 2013).

2.1.1 A model of listening comprehension

Given the complexity of observing how the listening processes occur in the human mind, there is no unified theory of listening comprehension currently available (Vandergrift & Goh, 2012). What exist are working models (see Brown, 2001 for an early interactive description) that try to illustrate what may be going on when a learner is processing language. Far from being a passive process, listening is acknowledged as an active set of processes for it depends of both external sources and mainly on internal mechanisms, that is, what happens in the listener's cognition. Vandergrift and Goh (2012) proposed a descriptive model of listening comprehension in an attempt to shed light on these internal mechanisms based on Levelt's (1995) model of speech production[4]. They selected Levelt's model, among

---

[3] These individual differences are not discussed in depth in this work.

4 His 1995 model describes first language speech production, it does not address second language.

other reasons, for the productive number of experimental findings that support the model in general.

Levelt's (1995) working model also includes a speech comprehension system. In order to understand the listening comprehension model, let us first very briefly describe the four major components involved in speech production first proposed by Levelt. In the superior part of the model there is (1) a conceptualizer, which serves as a preparation space of concepts, speaker's intentions, administration of the demands of the situation and speaker's knowledge. Down below there is (2) a formulator, which retrieves grammatical and phonological/phonetic encoding. As it follows, (3) an articulator coordinates the articulatory apparatus to produce speech sounds. Finally, there is (4) the self-monitoring element, especially responsible for analyzing errors in our own speech, evaluating subsequent to be produced items and for keeping track of the speech of others (Levelt,1995).

It is important to notice that the organization of Levelt's model suggests modularity between and within the processes of its components, that is one happening after the other without apparent interference of other factors. He acknowledges, however, that these components co-operate with one another and are affected by other components of human intelligence (e.g. by the use of metaphors, rhetoric, politeness), especially the conceptualizer (Levelt,1995, p.14-15). On the other hand, there is evidence for the linearization of linguistic operations inside the components, that is humans do "order information for expression"(p.15). In other words, speakers do choose a path to organize and combine the items that will communicate the concepts through language, and listeners may do exactly the same in the contrary direction. The grammatical encoding for instance must account for the selection of the right words from the mental lexicon, which turns out to be an automatic process in proficient language users. Each word has a specification for syntactic combinations and morphological selections. Levelt compares these processes with the resolution of simultaneous mathematical equations. The grammatical encoding would initially ignore semantics in the sense that, when analyzing some speech errors the syntax is accurate but the semantics is not[5]. In his view,

---

[5] He illustrates the argument with the example: "*Seymour sliced the knife with a salami*", where the sentence structure is intact, although its meaning is inaccurate. Speech errors like this are quite frequent in language production. However, in language comprehension there is still an

retrieving the appropriate word from the mental lexicon[6] activates the lemma level first. Lemmas are nodes that represent the syntactic properties of words (e.g. identifying the word as a noun). When a lemma is activated it can also spread its activation to other semantically related concepts[7.] After the lemma is selected, the lexeme level, where the phonological properties of words are stored, comes into play (p.18).

Although the author proposes the interaction between, for example grammatical and the phonological encoding, at some point speech production seems to be an incremental process. Certainly all of these processes occur very rapidly, at the millisecond level. It is indeed difficult, although not impossible, to determine precisely which layer of processes is more likely to occur first, and researchers have different opinions about it. There has been a great debate on modular vs. interactive views in speech production, spoken word recognition and listening research (Anderson, 2015; Dahan & Magnuson, 2006) and it is out of the scope of this study to review these issues. An interesting idea that has been around for a bit more than a decade is that human cognition may work of both modular and interactive ways (for a review, see Hulstjin 2003). In this study we favor an interactive perspective of human language, that is by considering that several layers of processing interfere with the operations of another, mainly because we are interested in looking at whether knowledge of written word form, even after a brief exposition, can affect spoken word recognition and lexical memory of EFL learners.

Now that we sketched how the speech production model works, we can proceed to Vandergrift and Goh's (2012) adaptation of Levelt's model, stressing that their model was designed to describe general

---

ongoing debate because it is not clear which comes first, syntax or semantics or whether both depend on one another. There is evidence, for example, that semantics in terms of plausibility may guide parsing and interpretation of ambiguous sentences (for a detailed discussion see the immediacy of interpretation section in Anderson, 2015, chapter 13)

[6] See section 2.4.

[7] Evidence for the arguments discussed in this paragraph comes from reaction time experiments, in which for example, the reaction time in picture naming tasks is higher when participants are asked to name a word after having a semantically related word presented before in comparison with having a not-semantically related word. For instance, naming sheep after seeing a goat takes longer than naming sheep after seeing an apple(Levelt,1995).

process of L2 listening. It is possible to observe that they developed the speech comprehension component of the original model and added more elements to the conceptualizer. Their listening comprehension model is also mainly governed by similar four major components. In the inferior part of the model (1) an acoustic-phonetic processor is responsible for the recognition of sound signals. In this component, listeners must separate language sounds from other sounds, an intrinsically bottom-up process, that turns out to be automatized with practice and language experience. The processor activity is mediated by the incoming speech and phonetic representations. Here, they point that the processor has more interference from L1 regarding the perception of sounds, for the phonetic representations of the L2 may not be fully developed, especially in listeners at initial stages of language learning[8]. Up above, a second component, (2) the parser, segments an utterance "according to syntactic structures or semantic cues to create a mental representation of the combined meaning of the words" (p.42). The processes in the parser are fed by the mental lexicon. Information from lexemes (i.e. morphophonological forms) extracted from phonological decoding and lexical selection allows the grammatical decoding of lemmas (i.e. word properties) and vice-versa. Both phonological and grammatical decoding are mediated by lexical-prosodic representations. The parser manages this process through an analysis of the bottom-up information based on top-down information from the conceptualizer and the listener's mental lexicon. It is important to stress here that limited L2 vocabulary may drastically constrain an accurate segmentation of speech and the creation of a coherent mental representation[9] of the aural input (Cutler, 2001), thus possibly leading to misinterpretation of the L2 input. The third component is (3) a conceptualizer, which main process is the utilization, that is the creation of mental representations based on the parsing processes and information derived from long-term memory. Processes in

---

[8] The authors do not explore more precisely the dynamics between L1 and L2 in their model.

[9] A mental representation or sometimes a mental model is a representation "in which the structure maps directly onto the structure of the real-word situation that is represented" (Jones, 1995, p.335). It "represents things and their interrelations"(p.335) and may not be always accurate to what it really intends to describe. A mental representation can contain images, sounds, propositions, concepts and other elements and is usually transformed when time passes (see Jones,1995 for an in-depth discussion).

the conceptualizer also involve inferred intentions and elaboration of intended meanings. Finally, the last component of the model is (4) metacognition which is the regulation of the whole listening process by listeners. More specifically, metacognition involves anticipating, monitoring, problem-solving and evaluating (p.43). Figure 1 depicts the listening model.
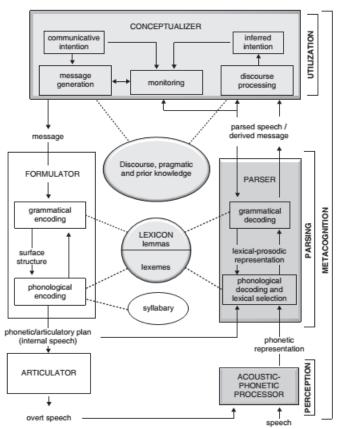
Figure 1. Model of listening comprehension by Vandergrif and Goh (2012)

Vandergrift and Goh's model strongly supports the idea of parallel processing (Brown, 2001), that is one level of the model influences the processes of another, especially at the utilization and parsing levels. This parallel processing is valid for both one way

listening, that is when listeners do not interact directly with an interlocutor and interactive listening, in which listener engages in dialogue with an interlocutor.

The model also has several limitations. One of them is that it describes mainly the cognitive aspect of listening without taking into account affective factors and social context influences that interfere with language comprehension, for example the emotional proximity with the interlocutor and whether the listening context involves a formal or an informal situation (Vandergrift & Goh, 2012). Another limitation, which is not a particularity of this model, but, to our knowledge, of the majority if not all models of listening comprehension, speech recognition and spoken-word recognition (Kolinsky, Pattamadilok & Morais, 2012; Weber & Scharenborg, 2012) is that they have not addressed the influence of orthographic information on the recognition of aural language. This is a problem in the field, because there is now compelling evidence that knowledge of orthographic information, gained through formal instruction either by reading or writing, significantly affects the way we process spoken language (Taft, Castles, Davis, Lazendic & Nguyen-Hoan, 2008; Pattamadilok, Knierim, Duncan & Devlin, 2010; Petrova, Gaskell & Ferrand, 2011) . This gap in the field has been a matter of recent discussion, although how exactly the role of orthography can be incorporated in current cognitive models of language comprehension remains a mystery. Pattamadilok et al (2010) investigated two hypotheses of how learning to read would cognitively affect spoken language processing. The first one is that "learning to read alters preexisting phonological representations" (p.8435) and this restructuration would affect a "purely phonological level" of processing. The second view states that "strong functional links between spoken and written word forms automatically activate visual representation of words"(p.8435). The authors affirm that the two hypotheses are not necessarily exclusive, but that they are difficult to separate in terms of behavioral research. Therefore, they used transcranial magnetic stimulation data to observe participants' performance in an auditory lexical decision task and found evidence supporting the first hypothesis. The authors concluded that "the awareness of phonemes appears to result from reading experience" (p.

8442) and that this experience affects the very core of phonological representations[10].

In the process of learning a new language, literate learners often are exposed to both spoken and written forms of words. Many times this exposure is simultaneous. Thus, it is plausible to suggest that the contact with written and aural word forms together may influence the recognition of spoken words in a foreign language, the comprehension of texts and the learning of new words, for the combination of these forms may strengthen the connections of how a word is phonologically and visually represented, as we shall elaborate more on the following section.

2.2 READING WHILE LISTENING: A LEARNING STRATEGY

Reading while listening is a learning strategy that allows simultaneous contact with written and aural word forms. Learners use it many times throughout their learning process, for example, by following a recording and the text on their language textbooks; by listening and singing along their favorite songs and lyrics; by watching films and TV series with both audio stream and subtitles in English; by listening and reading audiobooks[11] (Chen, 2004). This last one is of main interest of this study for three reasons; the first is that there are audiobooks for a variety of text genres, being narratives and fiction – the genre we are interested in looking at – more popular than other text genres among audiobook users in general (APA, 2013). The second reason considers the cognitive and language learning perspectives, audiobooks and narrative texts may contribute for the development of listening and reading skills by promoting extensive reading and listening, which in

---

[10] I do not discuss further the details of such interference, however, the researchers suggested that "literacy introduces a novel input route that maps visual (i.e., orthographic) stimuli onto phono-articulator codes. For words with consistent spellings, this is essentially as efficient as mapping an auditory input. For words with rimes that can be spelled in multiple ways, however, the mapping is less efficient" (Pattamadilok et al, 2010).

[11] Certainly, these options of listening and reading simultaneously are not equally comparable, for the reason that music has strong melodic features and films have an additional element, image.

turn can aid vocabulary learning (Krashen, 2003; Chang, 2010) and also contribute to learning motivation and interest (Lao & Krashen, 2000; Woodall, 2010; Chang, 2009). The third reason is that narrative structure has cognitive processing advantage, thus any observable effect would not be related to text processing difficulty (Graesser, Golding & Long, 1996; DuBravac & Dalle, 2002.

As a crucial part of the reading while listening strategy, reading is also a very complex skill which involves several cognitive processes from decoding the written text to constructing meaning from it. Reading comprehension

> includes three dimensions: the cognitive components involved, the outcomes, and reader differences. These three dimensions define a phenomenon that occurs within a larger sociocultural context, which shapes and is shaped by the reader, and which comes into contact with each of the dimensions, influencing knowledge, processing, purposes, outcomes, and the nature of reader differences. (RAND,2002,p.8)

Reading, in other words, involves highly problem-solving skills, for readers have (a) to consistently organize the information they read in a coherent mental representation by updating its content, (b) to be able to keep track of opposing information, (c) to make predictions, (d) to identify the main propositions of texts, among many other factors that are constrained by variables such as background knowledge, language proficiency, age and working memory capacity (Tomitch, 1996; Anders, 2002).

The variables that affect either reading or listening comprehension are similar, although there are modality-specific differences between the two skills. For example, in free recall protocols, in which participants are asked to recall information from texts or listening passages, it is possible to assess L2 learners comprehension and compare the two modalities. This was done by Lund (1991), who found that reading generates better recall protocols, that is, L2 learners recalled more propositions and detailed information from written texts than from listening passages. According to him, this difference can be attributed to the ephemeral nature of the aural text, which has to " be perceived as it is uttered, and the listener, who generally cannot control

the pace, is forced to comprehend at the same time new material is being perceived" (p.201). In other words, "spoken language requires fast processing, meaning that listeners simply have less time than readers to focus [on] linguistic information" (Zeeland & Schmitt, 2012, p. 611). In addition, the second language phonological system is a limitation, and Lund noted in his study that participants appeared to be as if "grasping at words" (p.201) . Even when mentioning cognates, the author points that the pronunciation of these words may be so different from the L1 that comprehension is equally difficult in comparison to a non-cognate, a problem that does not happen with reading. Additionally, accurate segmentation is a problem in oral language, for the stream of speech is continuous and the inaccurate perception of word boundaries, especially in L2, tends to hamper the whole comprehension process, again not a problem for reading comprehension (Zeeland & Schmitt, 2012; Weber & Scharenborg, 2012; Altenberg, 2005). Thus, it is reasonable to point that listening in L2 is more cognitively demanding than reading in terms of recognition and retention.

Considering the peculiarities of each modality, what are the arguments that favor joining both of them in reading while listening as a strategy, and what sort of linguistic gains could be expected from this combination? Previous studies (Bird & Williams, 2002) observed that information presented through more than one channel seems to be held in memory for a longer period of time and it is better recalled in relation to those presented in one way input. In Dual Coding Theory (DCT), for example Paivio (2006) remarks that linguistic and non-linguistic information, namely imagery, when used together help to enhance and accelerate comprehension by activating mnemonic devices. As for two linguistic stimuli such as reading while listening this evidence has also been found (see Bird & Williams, 2002; Brown et al., 2008; Chang, 2009; Woodall, 2010).

Among studies that advocate for the use of simultaneous aural-written input in language instruction it is agreed that bimodality may provoke an impact on the representation of the word in one's mind: by reading what they are listening to learners can be sure of what they hear and can thus solve the difficulty and "inability to match aural and written forms, and in addition help develop aural vocabulary and so facilitate recall of the meaning of spoken forms when listening" (Chang, 2009, p.654); the written text in this sense would be used to improve the auditory recognition of a word when it is presented later without its written correspondent (Bird & Williams, 2002, p. 510).

In writing systems aural-written relations can be fairly random, for "the same phoneme may be spelled more than one way, and the same letter may stand for more than one phoneme" (Ehri, 2005, p.170). Phonemes often vary in their graphic representations, and learners must find opportunities to gain awareness of these changes and relations, another reason to favor bimodal input as a learning strategy. Although research has indicated that literacy makes reading and listening systems interact, they do not necessarily depend on one another (Sticht & James, 1984, p.294, p.308).

In the end of the previous section we mentioned that orthography would impact the phonological representations. In contrast, some researchers support the claim that phonemes affect directly how the visual form of a word is secured in memory, and even meaning is mentally fixed in memory more rapidly by means of both phonological and graphical information (Ehri, 2005, p. 170)[12]. Taking into account these considerations, several experiments have suggested that reading while listening impacts positively on human cognition, and may contribute to learning a foreign language, although in empirical terms the impact is considered low in comparison with reading only, but in comparison with listening only the impact is higher (Chang, 2009; Brown et al, 2008). Few studies have investigated these impacts on listening, albeit Chang (2009; 2010) has found evidence that this strategy may be helpful to listeners and by means of its use they may be able to " develop auditory discrimination skills, refine word recognition and gain awareness of form–meaning relationships" (Chang, 2009, p.652). Chang (2009) used a gap filling task to assess whether spoken word discriminatory skill of L2 learners for reading while listening improved in comparison to listening only. She found that their gain, that is, the performance in the task improved in 10%, which was considered by her as a moderate effect, though statistically significant. Although the quantitative data did not show a strong effect, the impact of the strategy affected in a great deal the learners' perceptions, whose majority chose reading while listening as a preferred strategy.

---

[12] There are studies which compare both deaf and hearing participants' reading performance which show that deaf people also read well(see Kleiman, 1975, as cited in Sticht & James, 1984). Ehri's propositions in this sense should neither be seen as clear-cut statement nor misinterpreted, for example, by assuming that without auditory information reading would be impossible.

Similarly, Brown et al (2008) compared reading while listening, this time with reading only and listening only in L2 learning context. They found that the difference between reading while listening and reading only in terms of vocabulary learning was small, but still that reading while listening mode generated more vocabulary learning. In comparison to listening only, the difference was significantly higher, with listening only leading to poorer performance, almost a half less effective. In terms of learners' perception, the result repeated and the majority of their participants (72%) chose reading while listening as the preferred mode. In terms of text comprehension, the defenders of the strategy argue that joining both narration and written text helps poor readers, for instance to better chunk the sentences, for the rhythm, pauses and pace of the narrator may facilitate syntactic parsing of the text.

In spite of the evidence for linguistic benefits in regard to reading while listening for auditory perception, current findings still present several limitations, more specifically concerning meaning. The relations between meaning, form and bimodality have not been clearly specified. Another uncertainty remains on whether and how the strategy affects meaning retention, especially because only later models of spoken-word recognition have started to consider semantic information as a relevant element of the decoding process (Weber & Sharenborg, 2012, p. 395). Existent models of spoken-word recognition usually prioritize "particular aspects of lexical processing" (Weber & Sharenborg, 2012, p. 396) such as the perception of individual sounds and activation, making it difficult to test elements that include both bottom-up and top-down skills in a continuous flow of speech. Finally, less proficient L2 listeners tend to not have satisfactorily refined skills to focus on form and meaning simultaneously (see Vandergrift, 2007, p.193). Studies have indicated that low proficiency listeners rely more on bottom-up decoding strategies (Chang, 2009;2008) during test tasks, for they try hard to follow the key words of a listening passage. Therefore, it is not possible to conclude precisely from the studies reviewed so far whether or how bimodal input in the sense presented here directly impacts conceptual and meaning representation in learners' mental lexicon.

Apart from the cognitive influences of the strategy, one of the tendencies on current research is to focus on learners rather than only on the nature, level and peculiarities of the input. Two possible approaches to this are extensive reading and extensive listening (see Renandya, 2012; Krashen, 2009; Brown et al, 2008) which basically support the

view that for fluency improvements in L2 the more input, as long as it is enjoyable and pleasurable for the learner, the better. According to Chang (2009b), extensive listening

> refers to learners accessing massive amounts of easy aural input by means of television, radio, video and Internet sources, or audio books and magazines, to improve listeners' automaticity in recognizing spoken text and enjoying listening. Chang, 2009b, p.22)

In this section, we discussed why reading while listening as a learning strategy can be beneficial, especially for less proficient learners. The main aspects include a probable interference on discriminatory skills, namely spoken word recognition, word learning (lexical memory) and also text comprehension. In the next sections , it is discussed what it means to recognize a spoken word, followed by an explanation of lexical memory, and what is involved in text comprehension, since they are elements that will be tested in our experiment. It is important to emphasize we are not directly interested in studying the process of listening or that of reading, but in the use of reading while listening as a learning strategy in L2.

2.3 SPOKEN WORD RECOGNITION

Most research on auditory language processing has discussed recognition under the perspective of phonological perception, probably because "phonology plays a more immediate role" (Cutler, 2001, p.1) in speech decoding. Comprehending a second language is a challenge, since the phonological system is different from that of the native. Also, lexical knowledge is more limited for lower proficiency levels and acoustic variations and language-specific prosody may drastically interfere in the auditory recognition of words.

Spoken word recognition is viewed as the

> process of classifying an auditory stimulus as belonging to one "word-form" category, chosen from many alternatives. As this description stresses, this process requires matching the spoken

> input with mental representations associated with word candidates, and selecting one among several candidates that are at least partially consistent with the input. (Dahan & Magnuson, 2006, p.261).

Certainly this definition embraces many aspects that go beyond phonological word form representations and that are directly driven by conceptual representations. However, in this study when we refer to spoken word recognition, we are specifically interested in the matching of aural word form with written form, which is what our task was designed to assess (see chapter 3, section 3.6.2). This does not imply that the meaning of the words tested did not interfere with recognition. We are aware that these variables cannot be completely isolated from what we are testing, especially because learners will take into account the plausibility of their answers in a given sentence context during the task .

In the past three decades, several models (e.g The Cohort Model, TRACE, Shortlist, Neighborhood Activation Model, Distributed Cohort Model, etc. for a summary see Weber & Scharenborg, 2012) were developed moving from the phonological perception to a categorization of perception at the word level, primarily in L1 research. According to Weber and Scharenborg (2012) the common predictions of these models are that

> multiple word candidates are activated in parallel as a word is being heard, activation of word candidates varies with the degree of match between the speech signal and stored lexical representations, and activated candidate words compete for recognition (Weber & Scharenborg, 2012, p.387)

In second language acquisition, it is clear that new efforts (e.g. discriminating contrasting sounds, identification of recurring patterns) are demanded from the listener in order to recognize spoken words. Weber and Cutler (2004) pointed that "[t]he processes involved in spoken-word recognition are presumably universal", thus "there will be competition during spoken-word recognition in a non-native language just as in the native language" (Weber & Cutler, 2004, p. 1-2). According to them, there is also evidence which suggests that "speakers

of more than one language seem not fully able to keep language vocabularies apart" (p.2), and consequently the competition of word candidates is higher in speakers of more than one language.

One of the factors inherent to spoken-word recognition is speech segmentation, or the perception of word boundaries. Knowledge of how L2 learners segment non-native speech at word level is still limited. According to Altenberg (2005), it is not clear for example to what extent the first language syllable structure influences syllable structure of the second. In spite of that, both native and second language listeners consider several cues to segment incoming speech, among lexico-semantic, syntactic, acoustic-phonetic, morphological cues and phonotactic rules (Altenberg, 2005, p.327) – that is the probabilistic knowledge of what sequences of sounds are likely to occur in the beginning and the end of words (McQueen, 2007). For example, words of Portuguese origin do not end with the fricative consonant /v/. When speakers of Portuguese hear the sentence *as pessoas viram um pássaro* (people saw a bird) they either will decode the phoneme /v/ as the beginning of a new word, which is the case, or as belonging to middle-word position, the only positions that /v/ can occupy in Portuguese words.

These cues are language-specific, which means that different languages activate different kinds of information to segment speech (Cutler, 2001, p.8). These differences among languages may also contribute to make listening in a second language a hard skill to be developed. A commonly accepted view is that segmentation is primarily possible by means of well-stocked vocabulary in memory (see Cutler, 2001; Weber & Cutler, 2004). Therefore, segmentation is also seen as a by-product, or consequence of word recognition (Cutler, 2001, p.5).

Segmentation skills are inherent to the learner, not exclusively to the nature of the speech signal (Cutler, 2001, p.9). Cutler (2001) exemplifies by demonstrating that if listeners encounter the sentence *they may drink rum* all words with these same phoneme patterns will be activated (e.g. *aid, maid, rink, crumb*). Possible ambiguities would be solved by contextual information and prosody. Although word knowledge plays a vital role in spoken word recognition, well-stocked vocabulary does not fully guarantee accurate recognition. Cutler's example illustrates what is called in the literature as the embedding problem, that is the same sequence of sounds may form different words (McQueen, 2007). In spite of this problem, listeners are able to avoid inefficient segmentation strategies while their language experience

increases. In other words, the more proficient the more processing efficiency (Cutler, 2001,p.15).

One of the functions of distinguishing one word from the other in ongoing speech is to " to store acoustic or phonological word forms in memory"(Endress & Hauser, 2010, p.183). Considering spoken word recognition and segmentation as cognitive processes essentially dependent on lexical knowledge, the following section addresses the mental lexicon and memory.

2.4 KNOWLEDGE OF WORDS AND THE MENTAL LEXICON

According to Sousa and Gabriel (2012), the lexicon is a set of units conveyed in human language. The authors assert the relevance of distinguishing the terms lexicon and vocabulary. The first being a designation used to refer to the language system, and the latter being a reference to discourse. This distinction between lexicon and vocabulary, however, is blurred many times in the second language acquisition literature. Nation (2001) for example, states that vocabulary consists of all the words of a language, which in turn may be grouped in specialized vocabularies (e.g. in physics, linguistics, law). Vocabulary learning never stops, for there will always be new words a person can learn in a lifetime (Kersten,2010). Lexicon is usually a reference to the words in a language user's mind (Sousa & Gabriel, 2012; Pavlenko, 2009; Singleton, 2000). The term "units" is at first sight general and vague, and in this section we briefly illustrate why. The study of the mental lexicon is a rich, though still an imprecise field, especially in terms of delimiting accurate definitions.

To begin with the scope of the limitations, determining what is a word exactly is a difficult enterprise. There are many ways to approach this question, and these several perspectives have notorious constraints (Takac, 2008). From an orthographic perspective for example, a word can be seen as a sequence of letters separated by space or punctuation marks (p.5). This view is limited because, among other reasons, it does not account for differences in meaning and also languages that use other representation symbols, such as ideograms, or languages that do not have a writing system. From a semantic perspective, a word could be viewed as the smallest meaningful unit of a language (p.5). One of the troubles of this perspective is that, as Takac pointed, "some units of

meaning consist of several words (e.g. bus conductor)" (p.5) and some parts of words, in spite of not being able to stand on their own, still mean something (e.g. re- in retell) (p.5). Thus, a "complete" word may not always be the smallest unit of meaning. Takac points to another definition in which "a word is a minimal free form, i.e. the smallest form that has a meaning when standing on its own" (p.5). However, there is a problem with this view, when we think for example of idiomatic expressions composed by more than one orthographic word and that the lack of one of them changes the meaning completely (e.g. English phrasal verbs) (p.5). There are many other more elaborate attempts to define what a word is (see Takac,2008; Kersten, 2010), but according to Takac one of the reasons why it is so difficult to find a consensus among the views is that words themselves are a complex phenomenon. They change forms and are still seen as the same element. On the other hand, they may have the exact same form but completely different meanings. Also, they may have the exact same form, similar meanings, but different grammatical functions. According to the author, this is when the term lexical unit or lexeme comes into play, as an attempt to neutralize this problem of definition. The lexeme

> is an abstract unit that includes various orthographic, phonological, grammatical and semantic features of a 'word'. Thus, this term covers inflections, polysemy, as well as multi-word items with different degrees of fixedness, such as compounds, phrasal verbs, and idioms. (Takac, 2008, p.5-6)

Indeed, a comprehensive description of a word must include these features mentioned by Takac, therefore the term lexical unit attempts to embrace these multiple aspects of word knowledge. Not differently, when a speaker knows a word s/he accumulates knowledge of several aspects related to that particular item. Nation (2001) points that words are not isolated units, for they are linked by many systems and levels. He introduces the idea of degrees of knowledge to try to cover how much of a word one can have. He identified almost twenty different aspects of word knowledge, divided into receptive use, that is "perceiving the form of a word while listening or reading and retrieving its meaning" (p.38) and productive use, that is the need "to express a meaning through speaking or writing and

retrieving and producing the appropriate spoken or written word" (p.38). Both receptive and productive knowledge interfere with one another in a continuum (Nation, 2001;Browne, 2013), although research in the field has shown that receptive knowledge is indeed easier than productive knowledge, since more time and effort are needed to learn vocabulary for speaking and writing. Evidence for this claim is that scores of different types of receptive tests usually reveal significantly more correct responses than those of productive tests (see Nation, 2001, p.48; Browne, 2013).

Nation also discussed three key elements necessary to build vocabulary knowledge, which are the knowledge of word form, meaning and use. In regard to form, he distinguishes between spoken and written forms, and word parts, or constituents like prefixes, suffixes and headwords. In meaning he addresses the connections between form and meaning, concepts and referents, and associations a word activates. In use, he analyzes the role of grammatical functions, collocations and constraints of use related to context and frequency, for example (Nation, 2001). In this work we are interested in the connections between written and spoken forms, to be more specific. Again, we stress that this does not imply that other elements such as those mentioned by Nation are not influencing the recognition and recall of words in our tasks. Some authors (e.g. Craik & Lockhart, 1972), argued that knowledge of written and spoken forms involve shallow levels of processing, that is, these types of knowledge tend to be automatized for being intrinsically related to sensory levels. A deeper level of processing, following this rationale, would require semantic levels in terms of structure analysis and meaning compatibilities. The deeper the processing level, the longer one would recall and retrieve a given lexical item (Browne, 2013).

Having illustrated briefly what knowledge of lexical units involve, we now turn our attention to the complete structure that orchestrates the operations between these units, the mental lexicon. Several metaphors and models have arisen to explain what the mental lexicon is and how it works (see Pavlenko, 2009, for a review). A classical comparison is that the mental lexicon works as a sort of mental dictionary, and why not say a memory system of its own (Sousa & Gabriel, 2012; Takac, 2008) in which we store and manage all the words we know (VanPatten & Benati, 2010). The problem with this metaphor is that it does not illustrate well what may be actually going on in the lexical access process: a dictionary reminds us of listed and organized patterns that take time to be consulted, and humans usually retrieve and

recognize lexical items in less than a second. The dictionary also is associated with fixed contents, it does not grasp the rapid changes of the most various sources on lexical knowledge (e.g phonetic variations, changes of meaning through time). Additionally, the information on lexicon is much deeper than that of a dictionary, for it contains not only linguistic aspects but patterns of use, frequency, register and many others (Sousa & Gabriel, 2012; Aitchison, 1987).

Current perspectives see the mental lexicon as a fluid structure, that is interconnected in semantic networks and with several layers of information that are richly integrated. This structure would be deeply attached to autobiographic memory, also referred as encyclopedic knowledge (Sousa & Gabriel, 2012; Pavlenko, 2009). In addition, some researchers stress that the mental lexicon can be seen as a process, drawing from neural studies that acknowledge that brain activation patterns are in flux (Pavlenko, 2009). Given the amount of specific and highly detailed information on the lexicon to be stored in the mind, other views even considered the non-existence of the lexicon as a fixed structure, but that lexical representations would be driven by contextual processes integrated with other linguistic information (see Sousa & Gabriel, 2012).

Again, researchers have not found the ultimate answers for these many aspects yet. However, there are detailed descriptions of how bilingual and multilingual lexicon are organized, and how they interact with the first language lexicon, especially in terms of lexical access and word activation (See Dijkstra, 2003; Pavlenko, 2009). We do not cover these aspects here, although more research has suggested that the structures of different lexicons may share features and at the same time have peculiarities that are not shared between the different language systems, but are retrieved efficiently and rapidly by users of multiple languages (Dijkstra, 2003).

As we stress in chapter three, one of our hypothesis consists of predicting that when written and aural information of words are combined, that will probably result in the storage of that word for a longer period of time in long term memory. Memory is the core of lexical knowledge, seen in this study " as a neurocognitive capacity to encode, store and retrieve information" (Jesus, 2012, p.29). In listening research, Flowerdew and Miller (2005) suggest that a possible model to explain spoken language processing in memory is the Human Information-Processing System, developed by Bourne, Dominowski, and Coftus, in 1979 . This model categorizes memory stores as

sequential sensory memory, short-term memory, and long-term memory (p.24). The sensory memory is responsible for capturing speech signals, which in turn go to the short-term memory[13]. There, the message is actively processed, regarding new and old information in order to establish comprehension. By comprehending the message, information once started by the speech signals is going to be stored in long-term memory, depending on its relevance and significance.

In long-term memory, "special syntactic, semantic, and phonological features of the message" (Flowerdew & Miller, 2005, p. 24) are going to be stored. It is in long-term memory that information is held "in a more permanent manner" (Jesus, 2012, p.32). Since the human mind deals with large amounts of information, short-term memory is essential to avoid an overload of the whole system (Jesus, 2012, p.32).

Considering the mentioned aspects of human memory, we suggest reading while listening can affect recall of words in a long term manner, because the bimodal input may strengthen the connections between visual and aural word forms, thus affecting the representation of these words in long term memory.

2.5 AUDIOBOOKS AND NARRATIVES: AN OVERVIEW

In this final section of our review, we discuss why we chose audiobooks and narratives to test our hypotheses that reading while listening can be beneficial for listening and reading in a foreign language. Audiobooks are defined as "any spoken word recording of books, periodicals or other printed materials" (Rubery, 2011, p.1) They have been around since the invention of the phonograph by Thomas Edison in 1877, a machine that made possible the recording of sounds

---

[13] Short-term memory was also referred as working memory in early research (Tomitch, 2003; Jesus, 2012). Here, Flowerdew and Miller use the term short-term memory in the sense of working memory. Currently, many researchers prefer not use the two terms interchangeably, and we do not mix them here either. Working memory is related to an active processing memory with a storage component that has received remarkable attention in the past four decades, and its measures are usually highly correlated with the performance in tasks regarding language processing, acquisition and learning in general (for a review, see Linck et al 2013; Anderson, 2015).

(Rubery,2011;Blake,1990). In the following years, the machine opened the way to the improvement of recording equipment and technology, and since its very emergence it was used to record works of literature (for a historical review, see Blake,1990). In addition to entertainment purposes, recordings of books and periodicals have been used (a) to support blind and visually disabled people (Blake, 1990; Menezes & Franklin, 2008); (b) to help children with reading disabilities such as dyslexia (Learning Ally); (c) and more recently, to contribute to foreign language learning and instruction (Chang, 2009; Woodall, 2010; Brown et al. 2008, Montgomery, 2009). Today recorded books move a billion dollar industry (Boretz, 2013), and it has growing popularity among people of different ages, languages and literary preferences.

In 2013, the Audio Publishers Association released the results of a survey that showed that narratives are the most sold genre of audiobooks, being fiction responsible for 78,4% of the sales (APA, 2013). This number points to the fact that humans love narratives. According to Bold (2012), "[n]arrative is central to human experience and existence, providing opportunity to share the nature and order events at particular times in history. It helps to define self and personal identity" (p.17-18). Narratives are studied by several fields of knowledge, including literature, sociology, anthropology, cinema and cognitive psychology to name a few (Graesser, Golding & Long, 1996). There is a lot of research in these different fields, and here we briefly focus on some aspects of narrative comprehension derived from reading and cognitive psychology research.

To begin, it is necessary to specify what is considered as narrative. There is not a single definition that embraces all of what a narrative is, for it is a very complex genre with innumerous features and social applications. As an example of such complexity, it is usually hard to strictly classify a story as belonging to a single type among the different existent types of narratives, that is myths, epic, fables, folk tales, short stories, novels and many others (Graesser et al,1996). However, from the cognitive psychology perspective, narratives in spite of their variety, share a common based structure. For practical purposes, thus, we adopt Graesser et al.'s(1996) view that

> [n]arratives are expressions of event-based experiences that (a) are either stored in memory or cognitively constructed, (b) are selected by the teller/writer to transmit to audience/reader, and (c)

are organized in knowledge structure that can be anticipated by the audience (Graesser et al, 1996, p.174).

One of the strengths of this definition is that it accounts for knowledge that is not embedded in the culture of those who read a given narrative. As we shall see later (chapter 3) it adjusts to practically all narrative genres, including science fiction – the genre we used to collect data in this study – for the reason that its main focus is on event, sequence and structure. Science fiction components violate the actual reality (e.g. creatures that are half shark half men in one of the stories) and explore other fictitious dimensions. Yet these violations do not compromise narrative structure, what makes this sort of story still easy to comprehend and recall (Graesser et al, 1996). As Bold (2012) remarks, narratives function as a way to organize and establish sequences between events and therefore its structure and intrinsic relations are well known to human beings even before having access to formal education and other text genres, such as expository texts (Graesser et al. 1996; DuBravac & Dalle, 2002; Stein & Glenn, 1975). This knowledge structure is also referred as a story schema, that is a "network of categories and the logical relations which exist between these categories"(Stein & Glenn, 1975, p.8). Some components of this schema are for example the characters, temporal relations, setting, complications and resolutions of the plot, cause and effect relations, affect patterns (which capture audience/readers emotions, if a story elicits joy, sadness, anger, etc.), morals, themes, symbols, among other elements (Graesser et al., 1996).

Consistent with this perspective of narratives as event sequencing and knowledge structure, a great number of studies in reading research have found that narratives usually generate better recall scores and more knowledge-based inferences in comparison to other text types (e.g. expository texts) in a variety of tasks (DuBravac & Dalle, 2002; Graesser, Singer & Trabasso, 1994). These knowledge-based

inferences are predictions[14] made by readers based on the common world knowledge shared between tellers/writers and audience/readers (for a review on inference generation for narratives and types of inference , see Graesser & Kreuz, 1993) . The higher density of this sort of inference in narrative texts would explain the familiarity and ease of comprehension that they elicit (DuBravac & Dalle, 2002, p. 218). In other words, narratives are strongly backed up by world knowledge and daily life experience. The inherent ease of processing for narratives contributes to make this sort of text highly relevant to learning in general, for it is usually less cognitively demanding and strongly tied with motivation and emotional responses of pleasure.

In second and foreign language learning and teaching research, narratives have been particularly used to argue that literary texts can enrich language learning and vocabulary development, especially for the exploration of culture and for being authentic language material, with language produced by real speakers and writers to convey a real message, taking into account the context of production (for an in-depth discussion, see Gilmore, 2007). Whether to use literature or not in language classrooms has been a matter of debate in research for over three decades (see Paran, 2008 for a review). At one side, defenders stand that extensive reading is one of the best ways to improve students' proficiency. The appeal of literature relies not only in language structure but in its cultural exploration and high affective connections with the language learner (Hess, 2006; Kelly & Krishnan, 1995; Lao & Krashen, 2000).

There is empirical evidence for these claims, Lao and Krashen (2000) for example examined vocabulary learning and literacy comprehension in Chinese EFL learners. They found that students who were assigned to the experimental group who had training with popular literature books performed significantly better in relation to vocabulary gain and reading speed in comparison to their counterparts who only had access to regular academic skill classes. Their study emphasized reading

---

[14] As well put by Baretta, Tomitch, MacNair, Lim & Waldie (2009) inferences are vital for the comprehension of texts, since not all relations present in a text are explicit in it. According to them, inference making is "a constructive cognitive process in which the reader strives for meaning and expands knowledge by formulating and evaluating hypotheses about the information in the text" (Baretta et al, 2009, p.138), in other words, content anticipation and prediction.

assigned narratives and reading optional ones for pleasure, which in turn served as a boost for students' confidence in reading entire books in the second language and that also revealed to have increased their interest in reading in general. In addition, the defenders of literature for language teaching have noted that there has been a tendency for an excessive focus on more practical use aspects of language learning. Paran (2008) calls this tendency as the isolating position, in which language teaching and learning focus only in L2 acquisition. Shanahan (1997) pointed such trend as the reductively utilitarian logic in which language is mostly seen as a training instrument for career and academic development, possibly disregarding it as a means of education and social awareness. In his view, the language teacher's role is also to expand students' perceptions of life in society. And literary texts offer an exquisite opportunity to do so.

Early critics, however, pointed that literary texts were not many different from other sorts of texts for teaching in terms of cultural, social and humanist content, and that in addition they could be very difficult, demotivating, complex, unnatural to daily life language and therefore not appropriate for FL/SL language classrooms (Horowitz, 1990; Edmondson, 1997). This argument may seem plausible with canonical literature, although it may not be sound enough if we consider texts of popular and contemporary literature, for they indeed have circulation and the esthetic of its language highly matches with daily life language of our current society. While some researchers are firmly against its use (Edmondson, 1997) others acknowledge that teachers who choose to use literature in the language classroom must critically analyze this use considering students' needs and course demands (Horowitz, 1990).

In sum, this work believes that literature and stories can be positive for language learning and provides empirical reasons to stimulate the use of these materials, along with its audiobooks in EFL classrooms. By means of stories and audiobooks, with simultaneous listening and reading, learners may gain not only in terms of content, but mainly in terms of vocabulary development and listening proficiency. The next chapter discusses how we quantified and investigated these predictions.

3 METHOD

This chapter initially presents the research questions, hypotheses, and study design used to investigate whether reading while listening impacts learners' foreign language listening, text comprehension, and lexical memory. Sequentially, information about the materials are provided. We describe in detail the instruments of data collection, including tasks and questionnaires. Procedures for the pilot study, experimental sessions and data analysis are discussed in the final sections.

3.1 OBJECTIVE

Our main objective is to investigate possible effects of reading while listening to short stories on EFL learners' listening and reading comprehension – at intermediate proficiency level, who are young adults and native speakers of Brazilian Portuguese. More specifically, this study aims at verifying to what extent reading while listening strategy may affect learners' general text comprehension scores, how fast and how accurate it may affect spoken word recognition, and whether more words can be recalled when using this strategy in comparison to only listening and only reading.

3.2 RESEARCH QUESTIONS AND HYPOTHESES

RQ1: Do comprehension scores measured by the comprehension tasks of the experimental condition reading while listening (LR) differ from comprehension scores of the control conditions listening only(LO) and reading only (RO)?
H1: Based on the predictions that reading while listening helps with parsing of the text and reading in a foreign language in general (Woodall, 2010; Montgomery, 2009; Chen, 2004; Harris & Casbergue, 1996) it is hypothesized that participants will have better comprehension scores in the experimental condition than in the control conditions.

RQ2: Does the reaction time of the spoken word recognition task in the experimental condition differ from reaction times in the control conditions?

H2: Considering the discussion that orthographic information influences phonemic perception (Taft et al, 2008; Pattamadilok et al, 2010) and that by having contact with both written and aural forms of a word together it is possible to develop greater awareness of relations between these forms (Chang, 2009), it is predicted that reaction times of the spoken word recognition task of the experimental condition will be shorter than reaction times of the control conditions, that is, shorter RTs in LR condition indicate that bimodal input speeds up spoken word recognition.

RQ3: Does the number of correct answers (accuracy) of the spoken-word recognition task in the experimental condition differ from the accuracy in the control conditions?

H3: If the predictions that bimodal input may influence the way a word is represented in memory (Bird & Williams, 2002; Brown et al, 2008), the accuracy in the spoken word recognition task in the experimental condition will be higher in relation to the control conditions, indicating that participants will recognize more target words in the SWR task in a more immediate manner.

RQ4: Is the number of recalled words in the free delayed recall task different in the experimental condition and the control conditions?

H4: Similarly to H3, if bimodal input influences how the word is represented in memory, participants will recall more lexical items in the experimental condition than in the control conditions in the free delayed recall task, indicating that LR affects recall in a long term manner.

3.3 STUDY DESIGN

In addition to taking primarily a quantitative approach, this study includes qualitative measures, for it acknowledges that one type of data may support the other (Dörnyei, 2007, p.43). We added qualitative measures by using questionnaires to explore individual varieties among participants that might interfere with quantitative data from the language tasks (Dörnyei, 2007).

A within-subject study was carried out. In this sort of study, every participant is tested in all experimental and control conditions. Reading

while listening (LR) is the experimental condition we have interest in looking at; listening only (LO) and reading only (RO) are control conditions. There is one categorical independent variable, which is the condition with three levels (LR , LO, RO). The four continuous dependent variables are: reaction time (RT), accuracy (i.e. number/score of correct responses in the SWR task), comprehension task score and delayed recall task score (i.e. number/score of words recalled). We compared the experimental condition with two control conditions, RL and LO, on account of the high probability of having very low performances in LO.   Brown et al. (2008) showed that not only vocabulary acquisition, but also word recognition is harder and slower from listening alone in comparison to reading. These researchers compared the vocabulary acquisition of Japanese EFL learners in a similar design, with the same experimental conditions and their general results for the LO condition presented lower scores[15]. Thus, comparing LR with LO alone could not be appropriate due to highly predictable low scores of a task in the LO condition, in other words, we could have floor effects [16], especially considering that our study controls for the frequency of recurrence of a word in the text[17].

The within-subjects design was chosen due to local limitations on the number of people that might be available to voluntarily participate in the study. Assigning learners with the expected features in three different groups with at least twenty participants each would be difficult in terms of time constraints and not feasible in relation to the infrastructure of the university. In addition, there was a need for less experimental sessions[18]. The current design requires fewer participants

---

[15] The authors suggest that for a new word to be recognized from listening alone it should be met more than 20 times (Brown et al, 2008, p.153).

[16] A floor effect occurs when a given task is too difficult and the majority of participants score in the lowest threshold predicted for the task (Hessling, Schmidt & Traxler, 2004; Goodwin, 2010, p.176). Having such an effect would imply that the low scores were not a result of the condition, but of the difficulty in the task itself, therefore risking the validity of the results (Hessling et al, 2004).

[17] A brief explanation about frequency of recurrence can be found in section 3.6.1.1a. We selected words that appeared only once in the excerpts of the stories used.

[18] This was opted in order to prevent participants from quitting sessions. Certificates of participation were offered (college extra credits) and books on English Pronunciation were raffled among the participants who came to all data collection sessions.

than the between-subject design, that tests differences between independent groups (Shuttleworth, 2009). There is also the advantage of increased sample size and the reduction of statistical error variability in the results, caused by individual differences (Schneider, Eschman & Zuccolotto, 2002, pA-32).

The within-subjects design has some disadvantages, among them the carry-over effects, which correspond to the possible influences that a level of the independent variable may have in another level. This effect can interfere with the performance and results of the second and third conditions, since the participant cannot "delete" what he or she had learned in the first condition (Schneider et al, 2002, p. A-32). Thus, there may be a learning effect when participants perform the same task several times, resulting in better performance for the upcoming tasks in relation to the first. However, the contents of the stories are different. Stimuli were created in accordance with each story, causing these effects to be reduced. In addition to different content, the tasks involving recognition and decision necessarily depend on the stimulus presented. Another procedure to reduce these effects consists of counterbalancing (Goodwin, 2010; Schneider et al., 2002) the conditions and stories.

In order to reduce learning and order effects in the data analysis, the following condition order was arranged considering the three stories[19] used as materials and the three conditions (LR, RO, LO). Nine different combinations are possible. Participants were assigned to each sequence in the counterbalancing list from top to bottom order. After reaching the final sequence, we restarted assigning them from top to bottom. Table 1 illustrates this organization:

Table 1

Conditions and stories counterbalanced

Condition (story) ; TIS = The Invisible Scientist; TLUC = The Last Underwater City; TWE= The Wormhole Effect		
Beginning	Middle	End
LR(TIS)	RO (TLUC)	LO (TWE)

---

[19] See section 3.5 for details.

LR (TLUC)	RO (TWE)	LO (TIS)
LR (TWE)	RO (TIS)	LO (TLUC)
RO (TIS)	LO (TLUC)	LR (TWE)
RO (TLUC)	LO (TWE)	LR (TIS)
RO (TWE)	LO (TIS)	LR (TLUC)
LO (TIS)	LR (TLUC)	RO (TWE)
LO (TLUC)	LR (TWE)	RO (TIS)
LO (TWE)	LR (TIS)	RO (TLUC)

A second disadvantage of the within-subject design is fatigue. By engaging in multiple tasks and tests, participants may get tired and have their attention levels decreased, a factor that can consequently decline their performance in subsequent tasks (Goodwin, 2010; Shuttleworth, 2009). To reduce this effect, we divided the study into three blocks with intervals of three minutes between each condition.

The complete data collection occurred in two individual sessions. In the first session, participants performed the spoken word recognition and the comprehension tasks, preceded by a language learning profile questionnaire. In the second session, placed seven days after the first session, participants responded the free delayed word recall task and a second questionnaire that explored learners' perceptions towards the strategies (conditions) used in the study. Including the pilot study, it took four months to collect data from all participants[20], from the end of June to September, 2015.

---

[20] The two public universities where the data was collected were facing problems with strikes from staff and professors. In addition, one of the cities went through a serious strike in public transportation services. Thus, it was difficult for students to come to the universtities.

3.4 MATERIALS
3.4.1 Stories

Three excerpts from the science fiction stories *The Last Underwater City*, *The Invisible Scientist* and *The Wormhole Effect*, written by Zhanna Hamilton (2013), were selected (see Appendix A). The first tells the story of humans who lived underwater after the Earth's land was completely flooded, and their way of life was being threatened by alien creatures that looked like sharks and men. The second story portrays a young scientist who was developing a formula of invisibility, and who despite being discredited by his colleagues from the lab, succeeded. The third story is about a Ph.D. student who supposedly solved the mystery of black holes, by trying to prove that there are wormholes beyond the horizon of black holes, and who also has a crush on her research colleague.

The amount of words in the excerpts was constrained by the narration times of the audiobooks. Each story in its complete version takes approximately 50 minutes to be read by the narrator, therefore working with them in their full versions would not be feasible for time constraints. All the excerpts correspond to the beginning of the stories and they were interrupted in paragraphs that conclude the initial moment of the plot, resulting in approximately 1000 words per excerpt.

These stories were primarily chosen by taking into account the following criteria: (1) the stories had to be designed for English language learners, which is the case. At intermediate proficiency level, it could be arduous for learners to read highly elaborate narrative texts of writers like Oscar Wilde and Virginia Woolf, for example. Thus, we selected stories of high intermediate level vocabulary that have a balanced number of low and high frequency words in English. It is well acknowledged in the literature that word frequency is a crucial variable in language tasks, the more frequent a word is, the faster it is recognized and the easier it is recalled in memory tasks (Dahan & Magnuson, 2006; Brysbaert & New, 2009). Stories with great amount of high frequent words (i.e. with low level of difficulty) would not be appropriate to create the target sentences for the spoken word recognition task. In addition, they could favor ceiling effects in the

comprehension and recall tasks[21]. The growing popularity of science fiction in current media was a second criterion (2) to select these stories. Their content and features would probably not be completely extraneous to participants. A third criterion (3) relates to the popularity of the writer herself. Zhanna Hamilton is little known in Brazil, the possibility of someone having read her stories, particularly the ones mentioned here, was minimal. Her books are not available at local libraries and book stores and one cannot find them on the internet for free download. Thus, participants would have to buy the books in international book stores in case they felt curious to read the complete stories in the one-week interval between the tasks, and even if they did, shipping delay would prevent them to have the stories in the meantime. In short, we needed to make sure that participants would not have access to the stories in the interval between the experimental sessions, for it could influence the recall task (Brown et al, 2008; Chang, 2009; Woodall, 2010).

3.4.2 Audiobooks

All stories were purchased in audiobook format. They are professionally narrated by a male voice in standard American English. Each excerpt takes around 6 minutes to be read in a speech rate of approximately 100 words per minute. Table 2 summarizes the information regarding the stories and the audiobook excerpts.

Table 2

Excerpts and audiobooks

Story	Words	Narration time (minutes)
The Last Underwater City	1081	5:32

---

[21] Ceiling effects are the contrary of floor effects. The former occur when the majority of participants score in the highest threshold predicted for a task, again compromising the validity of the results (Hessling, Traxel & Schmidt, 2004; Goodwin, 2010)

| The Invisible Scientist | 1092 | 6:14 |
| The Wormhole Effect | 1099 | 5:12 |

3.5 INSTRUMENTS OF DATA COLLECTION
3.5.1 The language learning profile questionnaire (LLPQ)

This questionnaire was designed to gather participants' information related to EFL learning and it was divided into seven sections (see Appendix E). Sections I and II asked for contact information, birth city, and about their previous contact with English language before doing a regular English course. It was also asked whether and for how long participants had been abroad to an English speaking country. Section III inquired the motivations for their learning, whether for travelling, professional goals, personal achievements, and how many hours they used to spend studying English out of the classroom. Sections IV and V were directed to learning styles and learning strategies respectively. The learning styles surveyed, that is, the general approaches or patterns that give directions to learning behavior (Oxford, 2003) were styles regarding sensory preferences, classified as visual, auditory, sensorial/tactile (Oxford, 2003, p.3). A brief description of each style was provided and participants had to choose in a scale from 1 to 7 how much they believed that description fit to their own learning style. The higher the number, the more they believed that style described them. The same procedure was done with learning strategies. We listed eighteen learning strategies, adapted from the work of O'Malley and Chamot (1990, p. 119-120) and participants had to choose from 1 to 7 to indicate how frequent they used a given strategy. The higher the number, the more they used a strategy (e.g. watching movies with audio and subtitles in English, studying grammar, translation of texts from English to Portuguese and vice-versa). We choose scales to assess these information for the reason that learning styles are neither entirely present nor absent, they operate continuously in higher or lower intensity (Oxford, 2003). A similar reasoning can be applied to strategies, since learners often use multiple strategies when learning a language. Section VI explored learners previous contact with narrative texts in English, asking whether they had read a complete story

in English before, if yes, how many of them and which were their favorite ones. Section VII investigated learners' perceptions in regard to their language skills, that is which of the skills mentioned (listening, reading, speaking, writing) they found they needed to put great effort to master. Finally, it was asked which variety of spoken English participants were more familiar with, once "familiar accents are easier to understand than unfamiliar accents" (Bloomfield et al, 2011, p.ii; Fox, 2002).

3.5.2 Comprehension tasks

Three comprehension tasks were designed in Portuguese, one for each story (see Appendix C). All of them contained 10 multiple-choice questions related to explicit contents stated in the texts[22], each question with three answer options in which only one was the correct answer. These tasks intended to test hypothesis H1, in which the total amount of correct answers per task was computed as the task score. We chose this format of task mainly because of time constraints, considering the amount of tasks participants had to perform in a single session. We are aware, however , that free recall tasks and think aloud protocols are preferred to demonstrate more accurately the text comprehension process, although they take much longer to be completed.

3.5.3 Spoken word recognition tasks

These tasks were especially designed to test hypotheses H2 and H3, by measuring reaction time (RT) and accuracy (Appendix I). There was one spoken word recognition (SWR from now on) task for each story. The participant listened to a sentence and after the audio stimuli was played, three options of response appeared on a screen, in which only one was the correct answer, being his or her task to choose among these options which word was heard, as fast and as accurate as possible.

---

[22] That is, these questions did not require the use of elaborative inferences to be answered (see Gagné, Yekovich & Yekovich, 1993, p. 278 for a description).

Reaction time (response time or latency) has been vastly used in experimental psychology and second language research to test predictions from cognitive theories, as a measure that accounts for processing demands of mental events (Goodwin, 2010; Jiang, 2012; Baayen & Milin, 2010). This measure is very sensitive for examining cognitive processes, and it minimizes the involvement of explicit knowledge in responses, for it praises speed and automaticity (Jiang, 2012). In this study, RT can be defined as the "time from stimulus onset until a key is pressed indicating a response" (Schneider et al, 2002, p. A-25). The participant sees distractors in addition to the correct response, that is multiple answer options that should not be responded, an important feature of recognition RT experiments (Baayen & Milin, 2010; Kosinski, 2013).

The rationale for using RT as a measure in this task is to suggest that the faster the participant responds, the faster he or she had recognized the word tested, a possible indication of ease of processing. However, this assumption is not as straightforward as it might seem. Many variables that are hard to be controlled interfere with the time that participants take to choose a response option, among them individual differences in motor coordination and language processing speed (Jiang, 2012; see Kosinski, 2013 for a list of other variables that affect RT). It is necessary to point that multiple answer options also increase RT, for the participant will need more time to process and decide for only one item (Schneider et al, 2008).

In addition, higher latencies may be a reflection of confusions in the mental computation of phonological and orthographic matches (Tanenhaus, Flanigan & Seidenberg, 1980; Taft, Castles, Davis, Lazendic & Nguyen-Hoan, 2008; Petrova, Gaskell & Ferrand, 2011) between answer options and the target words heard which in turn could influence a learner's decision. Evidence for such confusions was found for example in early studies using rhyming paradigms, in which participants were asked to select a word in an "auditorily presented list that rhymed with a cue word. Rhymes that were orthographically similar to the cue (e.g. pie-tie) were detected faster than words that were orthographically dissimilar (e.g. rye-tie)." (Tanenhaus, Flanigan & Seidenberg, 1980, p.513). More recent behavioral approaches such as the auditory priming paradigm (Taft et al, 2008), auditory lexical decision tasks (Petrova et al, 2011) and even studies on the neural mechanisms of orthographic influences in speech processing (Pattamadilok, Knierim, Duncan & Devlin, 2010) have also observed

similar patterns.   The interference of orthographic information on latencies of spoken word recognition has been found in a variety of tasks and across different languages (Petrova et al, 2011; Kolinsky, Pattamadilok & Morais, 2012). Such interference invites caution when examining whether participants recognized the word when they heard it at the time the auditory stimuli was being played and before seeing the answer options on the screen or after they saw answer options.

Certainly, mechanisms other than cognitive are involved in learners' decisions (e.g. sentence context). The total response time then does not account for the exact recognition time of the word, but for a sum of individual variables and the decision time as well (Jiang, 2012). There are other drawbacks of working with RT, for example the speed-accuracy trade off, when participants may sacrifice accuracy for speed, resulting in higher error rates. The trade-off is not very common though, and it can be avoided by instructing the participant that accuracy, that is responding correctly, is as equally important as speed (Schneider et al, 2008; Jiang, 2010) and that only correct responses are computed in data analysis.

3.5.3.1 Stimuli

Forty-two experimental sentences in English were used as stimuli for the spoken-word recognition tasks, fourteen for each condition. The double of filler sentences (Gries, 2013, p.50) and six practice (trial) sentences were included, a total of one hundred and thirty-two sentences. All words used as targets, including the ones in the practice session were extracted from the story excerpts. Unfortunately, we could not select only one word category (e.g. nouns) to compose each sentence for the reason that the excerpts were too short. Therefore, we used nouns, adjectives and verbs in the task (see Appendix B for the list of experimental, fillers and practice items). The sentences were recorded by a male native speaker of American English in order to have homogeneity in the task, since the audiobooks were also narrated in American English.

One could argue why we did not use pseudo-words as stimuli. Working with pseudo-words would be of great advantage in terms of strictly controlling variables that affect spoken-word recognition, such as word frequency and phonological neighborhood (described in the

next section 3.5.1.1a). However, pseudo-words were not used in a similar manner to that of Brown et al's (2008) study because we would not have a professional narrator to record the excerpts keeping the audiobook style to account for the replaced words in the story. Additionally, pseudo-words lose in terms of the naturalness of the task in comparison to real words, and there is neuropsychological evidence that they elicit more brain activation to be processed in comparison to real words in phoneme monitoring tasks (Newman & Twieg, 2001). A possible explanation is that pseudo-words do not have semantic associations and also can be more difficult to understand, thus increasing attention demands on the lexical access system (Newman & Twieg, 2001, p. 45-46). Considering the amount of tasks participants already had to perform as well as their proficiency level, testing with pseudo-words could be an additional load to the participants' memory in the experiment. In sum, we used the words in the story in the exact form they appeared, according to some criteria that are explained as follows.

3.5.3.1a Experimental sentences

The initial selection of the words for the experimental sentences was done with a frequency of recurrence counter (*http://www.writewords.org.uk/word_count.asp*), a software that retrieves how many times all the words of a text appear in that text. We selected as targets words that appear only once in the excerpt, to make sure recognition effects would not be due to frequency of recurrence.

A second trimming was done following four criteria. The first was that all experimental target words should be neither orthographic nor phonological cognates with words in Portuguese. Research has found that "in the presence of highly similar orthography the activation of the cross-language phonological representation would be particularly strong" (Schwartz & Kroll, 2006, p.976). Cognates are usually named and recognized faster and more accurately than non-similar words (Schwartz & Kroll, 2006), thus it would not be possible to detect condition effects if we had used cognates along with other English words. The second criterion was that all experimental target words should have two syllables, for monosyllabic words tend to be constituents of larger words (e.g cat-cattle) meaning that they could

activate more competitors (i.e. probable answers) (Vitevitch, 2007), thus delaying recognition . The third criterion was looking at the word frequency value Sfreq (in words per million) of SUBTLEXus frequencies which are based on a corpus 51 million words from English subtitles (Brysbaert & New, 2009) and were retrieved by the Irvine Phonotactic Online Dictonary, version 2.0 (IphOD 2.0) (Vaden, Halpin & Hickok, 2009). Not using monosyllabic words was also an influence of Sfreq values. For example, many monosyllabic words in the stories have high Sfreq values (e.g. *fool* = 1667,62; *laughed* = 1368,47) meaning that they are very frequent words in English and would probably be recognized more rapidly. This is to say that it would be difficult to predict whether fast response times for this sort of word was due to experimental treatments (LR, LO, RO) or word frequency. Two syllable words, on the other hand, tend to have much lower Sfreq values (e.g *drawing* = 16.02). It is important to note that words with extremely low Sfreq values (e.g. *cower* = 0.31) were not included, unless we had no option left because of the limitations of the material (e.g. as the target *scribbled* Sfreq = 0.51). Finally, the fourth criterion was to look at the phonological neighborhood density values, also retrieved by IphOD 2.0. Phonological neighborhood (also known as similarity neighborhood and neighborhood density) can be defined as "the number of words that sound similar to a given word" (Vitevitch, 2007, p . 166; Luce & Pisoni, 1998). More specifically, neighbors differ from the given word by a single phoneme, either by substitution; deletion or addition (also referred as insertion) (Luce & Pisoni, 1998). For example, phonological neighbors for the word *corner* include *corker* (substitution), *corn* (deletion), *cornered* (addition), etc. This variable was taken into account during word selection because there is increasing evidence that phonological neighborhood influence aspects of spoken language processing including production (Munson & Solomon, 2004) and recognition (Vitevitch, 2007; Luce & Pisoni, 1998). High frequency words have processing advantages in both visual and auditory recognition tasks, however, words with higher densities do not share this advantage. On the contrary, it has been shown that the more neighbors a word has, the longer it will take for it to be aurally recognized. A possible explanation for this phenomenon is given in terms of competition processes of lexical candidates involved in spoken word recognition (Luce & Pisoni, 1998). To illustrate this matter in the context of our task for example, we could not select a great amount of words like *make* (used as filler), that has 50 phonological neighbors

(IphOD 2.0), and of words like *universe* (also a filler), that does not have any phonological neighbors(0) , to create experimental sentences. That discrepancy of values could generate lots of variation on RT data.

Considering word frequency (Sfreq) and phonological neighborhood as continuous variables, two Kruskal-Wallis H tests were conducted to see whether target words across stories would differ in terms of these variables. The tests were unable to find statistically significant differences in word frequency values with $X^2 = .284$, p = .868, mean ranks of 21.38 for The Last Underwater City; 22.79 for The Invisible Scientist and 20.32 for The Wormhole Effect; and phonological neighborhood values with $X^2= 2.652$, p=.266, mean ranks of 18.86 for The Last Underwater City; 25.79 for The Invisible Scientist and 19.86 for The Wormhole Effect. These results suggest that targets from all the stories can be treated as relatively homogeneous. In other words, the selected words of a given story are neither easier nor more difficult than the selected words of another story.

After selecting the 42 target words, we created the experimental sentences. One of the limitations of these sentences relies on their syntactic structure. Research on native language has suggested that one of the roles of syntactic information in spoken word recognition is to restrict incompatible word candidates at the activation level (Salasoo & Pisoni, 1985). In spite of this assumption, we had words from different grammatical categories, consequently we could not have the same sentence structure in all targets without compromising the naturalness of the sentences.

To minimize this structure issue, we opted to control for the number of syllables of the experimental sentences. Sentences in which nouns were the target word had 12 syllables. Adjective target sentences had 14 syllables and verb target sentences had 16 syllables. Target words were placed in the middle of the sentence (i.e. having an equal number of syllables before and after them) to avoid primacy and recency effects[23]. The rationale is that by manipulating the position of the target

---

[23] "The primacy effect refers to the finding that the items presented first in a series are better recalled than items presented later, independent of whether the test follows immediately after the presentation of the series or after a distraction task that depletes short-term memory. The recency effect refers to the finding that the items presented last are better recalled when the test immediately follows the series presentation but not when a distraction task intervenes". (Szmalec, Brysbaert & Duyck, 2012, p.84)

word and the number of syllables, participants' possible sensitivity to sentence structure would not interfere in a significant level. We are aware, however, that sentence structure must be controlled whenever possible.

Judgment task

All target sentences were submitted to a judgment task (or acceptability task). In this task, native speakers explicitly judge "whether a particular string of words is a possible utterance of their language, with an intended interpretation either implied or explicitly stated" (Schütz & Sprouse, 2013, p. 28). Judgment tasks usually measure through Likert scales the behavioral perceptions that can indirectly reveal underlying cognitive processes. In sum, they are useful to distinguish possible from impossible utterances that can be naturally produced in a language (Schütz & Sprouse, 2013). The judgment task with the experimental sentences was applied in order to prevent any distortions in participants' performance due to the artificiality in sentence structure and word collocation of the stimuli. Taking into account that we controlled for the number of syllables, possibilities of creating meaningful sentences were constrained.

Six adult native speakers of English, 4 from The United States and 2 from Canada rated each of the 42 targets in a Likert-type form (from 1 to 7, in which 1-completely unacceptable 2- very unacceptable 3- unacceptable 4 – neutral 5- acceptable 6-very acceptable 7 – totally acceptable). The form was sent via private messages or e-mails exchanged between the speakers and the researcher, with most previous contact being established via social networks. The native speakers were instructed to rate how acceptable a given sentence sounded to them, implying whether it would be naturally uttered by them. Instructions defined that the higher the number in the scale, the more natural the sentence sounded. The lower the number, the less natural. The form contained blank spaces for each sentence that was of optional filling, in which the speakers could explain why they found a given sentence unacceptable and suggest how they would say it.

For the purposes of our study, the numbers in the scale of the judgment form items were nominally associated with their labels (e.g. very acceptable, unacceptable). They were treated like nominal data,

meaning that the relation between the labels very acceptable and unacceptable, for example, do not represent an exact numerical relation. In this case, the numbers indicate order (Boone Jr. & Boone, 2012). Thus, the analysis of the data from this task was computed using the medians (Boone Jr. & Boone, 2012; Larson-Hall, 2010). Based on the results, 18 sentences with medians between 5 and 7 were not modified. Three sentences with median 2 were completely modified. Twenty-one sentences with medians ranging from 2 to 7 were slightly modified according to the native speakers' suggestions. In spite of the modifications, the number of syllables and the position of target words in the sentences remained intact.

After analyzing the data, the native speakers were explained about the task via e-mail and thanked for their participation and suggestions. Pie-charts with the results were sent so that they could compare how their answers matched with other participants' responses.

3.5.3.1b Filler and practice (trial) sentences

Most fillers were created using words with high frequency of recurrence in the text and cognates (e.g food, thought, president). Filler sentences are not related to the research questions, therefore we did not strictly control for cognates, word frequency, phonological neighborhood and number of syllables of their target words. Fillers are important in experimental design to disguise the critical feature of the stimuli (Jiang, 2010, p.66), that is the target word in the middle of experimental sentences, and to avoid processing strategies such as guessing and prediction (Jiang, 2012). We also used fillers to observe whether the participant was in fact paying attention to the task, since filler target words sometimes appeared in the beginning and in the end of the sentences. The number of syllables was similar to the one in the experimental sentences, and in addition to nouns, verbs and adjectives, filler sentences tested other word categories, such as adverbs, pronouns and prepositions. The sentences were extracted and adapted from the websites *Vox, The Huffington Post, The New York Times* and the online dictionary *Linguee*, so that it would not be necessary to have them judged by native speakers. Practice items, that is sentences used in the practice session, were created following the same features of fillers.

3.5.3.2 Answer options

The IphOD 2.0 retrieves an extensive list of phonological neighbors for each word typed. The neighbors are organized by insertion, substitution and deletion. We used these data to select the answer options for experimental, filler and practice words. We did not include insertion and deletion neighbors as answer option. For example, the word *harmful*, used as experimental target for the story The Last Underwater City*,* has only one phonological neighbor by deletion, *harm*. In face of that, answer options for that word were orthographic or aurally proximal words (*horrible* and *helpful*). We opted not to use insertion and deletion neighbors because on one hand it could favor facilitation effects to have identical words as answer options, or, on the other hand it could be more demanding and confusing for participants to distinguish what form of the word they had just heard. Both possibilities could be reflected on RT data, and we decided to not take that risk.

3.5.3.3 Sentence recording

Stimuli were recorded at UFSC's laboratory of applied phonetics, in an acoustic isolated booth to avoid external sources of noise in the sentences. The audio plaque MOTU Ultralite mk3 Hybrid was connected to an iMac computer and to a Shure microphone (model SM48). The software Ocenaudio (version 2 rc1) was used to record and split the audio files, with record settings of 44100Hz, stereo, 16 bits. All audio files (stimuli) were saved into .wav format. The speaker was a male American graduate student of the university, aged 27, that voluntarily agreed to record the sentences. He was instructed to read the sentences silently before reading them aloud and to read aloud at a normal speech rate. The sentences were presented in slides and the speaker was oriented to repeat the reading aloud in case of eventual mistakes or interruptions. The recording session took twenty minutes.

3.5.3.4 The software

The SWR tasks were developed and presented in PsychoPy (Peirce, 2007), version 1.81.01, a free stimuli presentation software that registers reaction time in seconds, accuracy, as well as other types of data.   Stimuli were pseudo-randomized manually, in Excel lists and imported to the program. Participants listened to the stories and stimuli through a Philips headphone, model SHL 3060, with closed acoustic system and 10 – 22.000 Hz of frequency. The experiment was run in an Acer computer, processor AMD C-60 APU with Radeon™ HD Graphics 1.00 GHz, 64-bit, OS Windows 7. See Appendix I for pictures of the task running in the computer.

3.5.4 Free delayed word recall task

Participants were instructed in Portuguese to write down all the words in English that he or she could recall from each story, one week after the first experimental session (see Appendix D). Words with spelling mistakes were not counted for the LR and RO conditions, for in these conditions participants had access to word written forms. For the LO condition, however, misspelled words were included as correct responses. The score of this task correspond to the number of correct words recalled for each condition.

3.5.5 Retrospective questionnaire

The retrospective questionnaire explored learners' perceptions on the research experience as a whole (see Appendix F). It was composed of a single section with five questions concerned with their view on the conditions (LR, LO, RO) in terms of preference and their opinions about the stories. It was also asked whether they had seen the stories before. In addition, a sixth item of optional filling was included so that participants could make comments, critics and suggestions.

3.6 DATA COLLECTION
3.6.1 Ethics review board

Before recruiting participants and collecting data, a project for this thesis was submitted to the ethics review board CEP- HEMOSC (Comitê de Ética e Pesquisa do Hemocentro de Santa Catarina)[24], and approved under the protocol number 986.995.

3.6.2 Procedures

Data collection occurred in individual sessions. In the first session, each participant initially answered the learning profile questionnaire. Sequentially, the researcher instructed the participant (1) about the condition he or she was about to be exposed to, depending on the counterbalancing order presented in section 3.3; (2) that he or she would be given a story and great attention was required because we would have the participant respond a comprehension task on the content of the story and a vocabulary task. The objective of the instruction (2) was to give a reading/listening objective to the participant, a way of controlling that participants approach the texts with the same goal, in this case, of responding tasks. It has been evidenced that reading purpose has an impact on learners' cognitive processes, when reading for study (in our case for performing test-like tasks), there is a tendency to recall more paraphrased information from the texts (Linderholm & van den Broek, 2002). Paraphrased information is related to explicit text content, which is exactly what we are testing in the comprehension task. Participants read a short summary with the title of the story in English, brief descriptions of each story in Portuguese and the name of the characters before reading while listening, reading only or listening only to the stories. Participants read the summaries only before having

---

[24] The referred Ethics Review Board, although from health and medical care field, evaluated proposals from the humanities primarily because several review boards went on strike during the period the proposal was submitted, including the board of UFSC. The national research service then redirected the proposal according to their online platform criteria and the availability of other review boards in Florianopolis.

access to the stories. The rationale for the summaries was to provide readers with a short general background on story content, in order to activate any previous schema related to it, aiming at avoiding possible floor effects[25]. Care was taken so that the information in the summaries did not reveal much about the stories.

After having read, listened and read, or listened only, participants performed the comprehension task and then the spoken word recognition task. We chose this order for two reasons, the first is that the explicit information from the texts could decay from working memory with time in case of having an intervening task in the middle. The second reason was a conclusion taken from the pilot study, and will be explained in the next section. Participants were instructed to go out only if necessary (e.g. going to the bathroom) and were asked to switch off their mobiles or electronic devices.

In the second session, we applied the free delayed word recall task and the retrospective questionnaire. Participants were given the recall task first, and after returning the task to the researcher they were given the questionnaire. The researcher thanked their participation and those who asked received a certificate for participating in the study. The researcher sent their results after all data collection, via e-mail. In case of low performances, participants were told this result was previously expected for they had performed demanding tasks. Table 3 summarizes the study sessions.

Table 3

Study sessions

First session	Second session
	(seven days after the first)
Consent form →	Free delayed word recall task →
Language learning profile	Retrospective questionnaire

---

[25] The adoption of short descriptions of the stories was a procedure extracted from Brown et al's(2008) study.

73

questionnaire →	
Listen and read, read only, listen only (three story excerpts) →	
Perform three comprehension tasks →	
Perform three SWR tasks	

3.6.3 Pilot study

A pilot study with 6 participants that were not part of the main study was conducted in Florianópolis, at UFSC . One participant was a 30 year old graduate level woman with advanced level of English (language course certificate). She performed the tasks with ease and her scores were high, meaning that the content of the tasks and stories was not difficult. The other 5 participants (4 females) were students of the university language course English level 3 of Extra Curricular (a threshold between A2 and B1 levels, CEFR, 2000), with graduate and undergraduate level, aged between 20 to 25 years old. The pilot study objectives were (1) to adjust details in the design , (2) to test the clarity of tasks and procedures, (3) to possibly make changes in the instruments of data collection, (4) to check the duration of each session and finally (5) to perform a small scale data inspection.

The adjustments in the design considered the order of the tasks mentioned in the previous section. We changed the order for 2 participants by having them respond the spoken word recognition tasks after reading and listening to all stories and all comprehension tasks first. This means they responded spoken word tasks in a row. The change apparently did not seem to interfere with the data, although these two participants showed more clear signs of fatigue, impatience or anxiety (e.g. yawning, shaking legs) in comparison to the other four. Therefore, that is the second reason we mentioned in the previous section to keep the order we first established.

The procedures were clear and participants had no difficulty in understanding the instructions. However, one of them, when responding the SWR task, positioned the hand under the chin in the small interval of stimulus reproduction and response screen appearance, and the latency

of the hand movement between the chin and pressing the keyboard reflected on RT data, thus making us add a written instruction next to the keyboard which warned to keep the hand on the keyboard during the whole task. The volume of the headphone was adjusted to a comfortable level before all audio material was presented to participants. Participants were also instructed and monitored neither to pause nor repeat any audio file.

In regard to the instruments of data collection, after the pilot, we only changed the summary of the stories in Portuguese and reformulated the phrasing of some questions of all comprehension tasks in an attempt to make it more difficult, for all participants overall had performed above average regardless of the condition in these tasks.

The duration of the sessions varied between 75 to 90 minutes for the first session and 30 to 40 minutes for the second session. Considering the average time of each participant to perform the individual tasks, we established that: (a) the interval between conditions should be of 3 minutes; (b) the reading only time should be of maximum 7 minutes, otherwise participants would have extra time to reread the story; (c) and the comprehension task was supposed to be performed in maximum 8 minutes; (d) the time for the free word recall task should be of maximum 20 minutes (e) and finally that the two questionnaires did not need to have a strict time control, for participants responded them relatively fast.

A small scale data inspection on the results of the pilot was performed. Only one participant had been studying English for less than 6 months, and the others had been studying it for more than a year. All participants reported being more familiar with American English and considered themselves more visual (minimum 6 and maximum 7 in the scale) and auditory (4 to 7). Overall they rated in all scale points the strategies that involved listening comprehension , being the strategy of reading while listening to texts in English (item H, section II of the LLPQ) mostly rated with values lower than 4 in the scale. The comprehension task mean scores were LR = 7,2; RO=6,8 and LO=6,6. The reaction time (in seconds) mean scores for the SWR task were LR=3,16; RO= 3,22; and LO=3,49. Surprisingly, the accuracy mean scores for the same task were LR=10,2; RO= 9 and LO= 10,8. And also unexpected, the free word recall mean score were LR=7; RO= 7,2 and LO=4. In relation to the retrospective questionnaires, only one participant chose the story of the RO as the favorite, while the others favored the story of the LR condition. All participants responded that the

stories they liked less was the story they had contact with in the LO condition. Only one participant selected reading only as the preferred mode, while the others selected reading while listening as the mode they had most enjoyed.

Here we do not provide a detailed explanation of the results of the pilot study, although we can have a picture of what to expect in the main study. As hypothesized, the comprehension task scores were higher and reaction times were shorter for LR condition. However, participants recognized more words in the LO condition and recalled more words in the RO condition, contradicting what was first hypothesized.

3.6.4 Main study
3.6.4.1 Participants

Eighteen EFL learners (6 female) took part in the main study that was conducted in Feira de Santana, at a state university (UEFS). Data of one participant was cut out from the data analysis for the reason that it was not possible for the person to complete the first session. Participants were aged between 19 and 30 years old (N=17, mean=22.43, s=3.79). Fifteen participants (88,2%) were at undergraduate level, and two (11,8%) were at graduate level. The learners were recruited in online groups of the university and also at a local language school. Their varied college majors include engineering, computing, languages, biology, psychology, law, physics, physical education and chemistry.

3.6.4.2 Proficiency test

Taking into account that the main study was not conducted with a single level class of an EFL course, except for two participants recruited at a local language school (level B – intermediate), participants were required to take a short proficiency test online[26] before scheduling data

---

[26] The mentioned test can be found in the following website: *http://www.ef.com.br/test1/#/* , the first option (pink button). It is a 25 item test developed by the Cambridge English Language Assessment. This test was chosen primarily for being online, that is, participants were not required to schedule a session to take it. In addition, it contained audio questions. This test

collection sessions. Fifteen participants (88,2%) have B level of proficiency and two (11,8%) have A level, according to the proficiency test. The A level learners were kept in the analysis because their performances were not very different from the B level learners'. We selected intermediate students mainly because full stories in English may be too demanding for beginners, while for advanced learners the high proficiency level could mask possible effects.

According to the Common European Framework of Reference, a B level learner

> [h]as enough language to get by, with sufficient vocabulary to express him/herself with some hesitation and circumlocutions on topics such as family, hobbies and interests, work, travel, and current events, but lexical limitations cause repetition and even difficulty with formulation at times. (…) (CEFR, 2000, p.110)

In the next chapter, the data analysis, discussion and results of the main study are presented. We also analyze whether the patterns that occurred in the pilot study repeated and whether the differences found between conditions are significant, readdressing the literature reviewed in chapter 2.

---

classifies learners proficiency into the three categories of the CEFR, A - basic, B - intermediate and C - advanced.

4 RESULTS AND DISCUSSION

This chapter is divided as follows: first we present the results and statistical procedures. Second, we discuss the findings readdressing the hypotheses in the light of the literature reviewed in chapter 2.

4.1 THE LANGUAGE LEARNING PROFILE QUESTIONNAIRE

Fourteen participants (82.3%) had been studying English for more than a year and only three of them for less than a year (17.7%). Six participants (35.3%) mentioned all the motivations for learning. Eight others reported to be learning English mostly for professional reasons and willingness to travel (47%) and three replied to be learning for fun and study alone (17.7%). Most participants (70,6%) dedicated 2 hours or more a week to learn English. Table 4 shows the medians for learning styles, which reveal that these participants considered themselves more visual and auditory learners. It also shows that they were indeed used to reading while listening related strategies, but not so familiar with reading while listening audiobooks.

Table 4

Medians from the LLPQ

N=17	Visual	Auditory	Kinesthetic/ Tactil	Movies/ Subtitles	Songs/ Lyrics	Books/ Audiobooks
Median	6,00	6,00	3,00	7,00	7,00	5,00

Those who have read 1 to 5 narratives in English were the majority (58,8%) while 23,5% have not read any narrative in English before and 17,7% have read more than 10 narrative texts. Among the stories mentioned by participants were the *Harry Potter* series; *The Fault in our Stars*; *A Game of Thrones*; *The Lord of the Rings* series; *Anarchy Evolution*; *Pride and Prejudice*. Reading skill was the most selected choice in terms of better proficiency (70,6%), while the most

difficult skills were listening (41,2%), followed by speaking (35,3%) and writing (23,5%). Practically all participants reported being more familiar with American English (94,1%) and only one reported being more familiar with British English (5,9%). Overall, they rated their English level as average (52,9%) and good (41,2%). Most of them were learning only English as a foreign language (58,8%) while 41,2 % reported to be studying other languages (e.g. Italian, Spanish, French, Hungarian). From this data we can conclude that participants reported being engaged and proactive language learners, and this reflected in their data and willingness to take part in the research.

4.2 COMPREHENSION TASKS

The difference between conditions for these tasks was small. The means showed that LR generated means smaller than RO, with LO presenting the lowest means. Table 5 and Figures 1 and 2 provide both numerical and graphical summaries of the comprehension task data. A repeated measures ANOVA was conducted and the results revealed that there was not a significant difference between conditions F $(2,32)=1.343$, p=.27 with a small effect size ($\eta p 2 = .07$). Considering the ANOVA results as non-significant, we did not carry out a post-hoc analysis (Larson-Hall, 2010). The analysis was performed in SPSS Statistics 22.0 (IBM Corp, 2013).

Table 5

Numerical summary of the comprehension task data

Condition	N	Mean	Standard Deviation	Variance	Shapiro-Wilk	Mauchly's test
LR	17	6.76	2.251	5.066	.089	
RO	17	7.06	2.749	7.559	.044	.90
LO	17	6.06	1.638	2.684	.162	
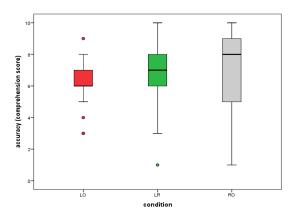
Figure 2. Boxplots of the comprehension task data
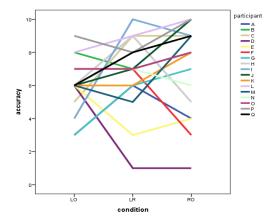
Figure 3. Scores of the comprehension task per participant

4.3 SPOKEN WORD RECOGNITION TASKS
4.3.1 Reaction time data

Before performing any test in RT data we established a cut off value of 5 seconds, that is, responses that exceeded this value were excluded. Extremely long responses are likely to be results of interference from uncontrolled variables, and we selected this value considering our task format (Baayen & Millin, 2010, p.7). It was not necessary to establish a minimum cut off value because the shorter RTs registered (i.e. 0.6 and 0.51s) where within the acceptable margin discussed in RT literature (Jiang, 2012).

We used R (R Core Team, 2014) to perform the analysis with a linear mixed model (Magezi, 2015; Jiang, 2012; Kliegl, Wei, Dambacher, Yan & Zhou, 2011), using the package lme4 (Bates, Maechler, Bolker & Walker, 2014).We modeled reaction time as a function of condition. Participants and items were included as random effects, that is, those which variation is clear though unpredictable. We also had intercepts and random slopes for participant and item, while our fixed effect was condition. RT data did violate the assumption of normality for the residuals and slightly deviated from homoscedasticity (equality of variances), but we did not perform any data transformation. A p-value was obtained by likelihood ratio test (Winter, 2013). We compared a full model with the effect of condition with a model without the effect of condition. The rationale is that if the difference between the models with and without the effect of condition is significant, the effect of condition itself is significant (Winter, 2013). The results showed what we can already see on numerical (Table 6) and graphical summaries (Figures 4 and 5), there was not a significant influence of condition on RTs $X^2(0)=0$, p=1. Here is the full model we entered in R, followed by its output and coefficients per participant (Figure 3).

$$RT \sim condition +(1+condition|item)+(1+condition|participant)$$

```
REML criterion at convergence: 890.6

Scaled residuals:
    Min      1Q  Median      3Q     Max
-3.3185 -0.5913 -0.1480  0.4373  4.3113

Random effects:
 Groups      Name        Variance Std.Dev. Corr
 item        (Intercept) 0.09980  0.3159
             conditionLR 0.01399  0.1183   -0.24
             conditionRO 0.01214  0.1102    0.08 -0.99
 participant (Intercept) 0.07765  0.2787
             conditionLR 0.24725  0.4972    0.35
             conditionRO 0.23895  0.4888    0.69  0.92
 Residual                0.31339  0.5598
Number of obs: 447, groups:  item, 42; participant, 17

Fixed effects:
            Estimate Std. Error t value
(Intercept)  1.79727    0.09685  18.558
conditionLR  0.11121    0.13993   0.795
conditionRO  0.21616    0.13743   1.573
```

```
$participant
  (Intercept)    conditionLR conditionRO
A    1.906810 -0.0648158770  0.16365415
B    1.663453 -0.2382169817 -0.14746591
C    1.482083 -0.1419699164 -0.20845632
D    2.324979  0.8425482034  1.16010778
E    1.986570  0.1337370505  0.37302860
F    1.585998 -0.0868125321 -0.08991826
G    1.975463  0.9978856262  1.01973335
H    1.983551 -0.2024551198  0.11601169
I    1.488480 -0.2523919946 -0.28741668
J    1.926132 -0.0001159526  0.22695607
K    2.030938  1.0399612625  1.09258585
L    1.858168  0.1040166839  0.25568653
M    1.599727 -0.3711557566 -0.29527388
N    1.430078  0.0978426786 -0.06511393
O    1.510531 -0.1285969146 -0.17731398
P    1.973378 -0.2604772418  0.06452659
Q    1.827199  0.4215600897  0.47347215

attr(,"class")
[1] "coef.mer"
```

Figure 4. Linear mixed model output

Note the random effects. The variance per participant is higher than for item, for people just naturally vary. This is true for LR and RO conditions, though for LO (intercept) the variance per item was higher (0.99s). This may mean that participants overall may have just pressed the button faster in this condition because they had not seen the written forms, so they could have guessed more, in other words, they may have sacrificed accuracy for speed, although the difference for accuracy in this task is extremely small (see next section). The residuals show that about 0.31s of variation in the data cannot be explained either by item or participant and that are likely to occur due to uncontrolled factors. As for the fixed effects we can see that the estimate RT of the intercept (LO) is 1.79s. From this condition to the others we have an increase of 0.11s for LR and 0.21s for RO, with similar error margins. In Figure 3, coefficients per participant reveal what exactly happened with RTs for each condition. Note that the negative sign indicates that that number of seconds decreased in that condition, while a lack of sign indicates a positive relation, that is, an increase of RT. Only six participants (A, B, H, J, M and P) behaved as first hypothesized, that is who had a decrease in RT for LR condition in comparison to LO (intercept) and RO. This can be also seen in Figure 5 observing their mean patterns.

In addition to the mixed model analysis, we performed a Friedman test with the means of RTs per participant. As expected, the results were similar between the tests $X^2(2)=.118$, p=.94.

Table 6

Numerical summary of the RT data

Condition	N	Mean	Standard deviation	Variance	Shapiro-Wilk
LR	17	1.72	.78	.61	.000
RO	17	1.86	.91	.84	.000
LO	17	1.71	.67	.45	.000
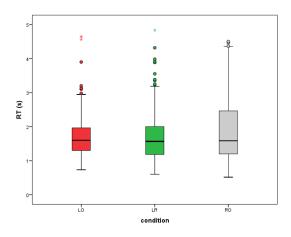
Figure 5. Boxplots of the RT data
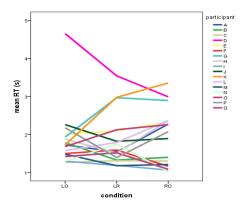
Figure 6. RT means per participant

4.3.2 Accuracy data

The number of correct responses in this task was computed regardless of the cut off value. For instance, if a correct response of a target word had RT=7s , it was included in the analysis for being correct, no matter how long it took participants to respond. Again, there was practically no difference between conditions. In fact, the means for LR and RO were exactly the same, while LO had a slightly lower mean value. Table 7 and Figures 6 and 7 present both numerical and graphical summaries of the accuracy data. The repeated measures ANOVA again revealed that results did not approach significance $F(2,32)=.165$, $p=.84$ with a small effect size ($\eta p^2=.01$).

Table 7

Numerical summary of the accuracy data

Condition	N	Mean	Standard deviation	Variance	Shapiro-Wilk	Mauchly's test
LR	17	9.00	2.806	7.875	.325	
RO	17	9.00	2.693	7.250	.397	.97
LO	17	8.76	2.251	5.066	.680	
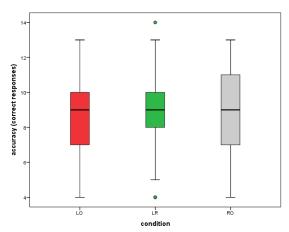
Figure 7. Boxplots of the accuracy data
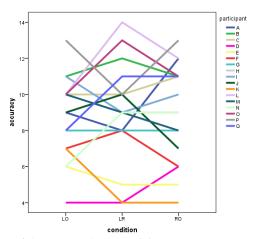
Figure 8. Accuracy of the SWR task per participant

4.4 RECALL TASK

Data analysis procedures for this task were explained in section 3.5.4. Results showed that more words were recalled in LR. The results almost approached significance, although the difference between conditions was small just like the other variables, as revealed by the repeated measures ANOVA $F(2,32)=2.573$, $p=.09$ with a small effect size ($\eta p\ 2=.13$). See Table 8 and Figures 8 and 9 for both numerical and graphical summaries of free recall data.

Table 8

Numerical summary of the free word recall data

Condition	N	Mean	Standard deviation	Variance	Shapiro-Wilk	Machly's test
LR	17	7.00	4.108	16.875	.392	
RO	17	5.94	3.699	13.684	.080	.59
LO	17	5.29	3.917	15.346	.039	
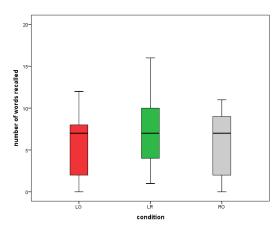
Figure 9. Boxplots of the free word recall data
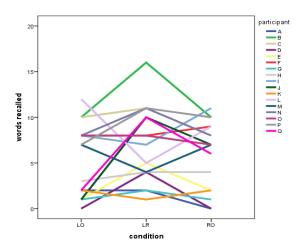
Figure 10. Number of words recalled per participant

4.5 RETROSPECTIVE QUESTIONNAIRE

The results of the qualitative analysis sound far more optimistic: 64, 7% of participants found the experience of taking part in the research was good and 35,3% found it great. Regardless of condition, The Last Underwater City was chosen as the best story (41,2%) and both The Invisible Scientist and The Wormhole Effect were equally rated (29,4% each) as the stories they liked less. The condition for the story they liked most was LR (47,1%), followed by RO(29,4%) and LO (23,5%). On the other hand, the condition chosen for the story they liked less was LO(52,9%), followed by RO (35,3%) and LR(11,8%). As for the preferred condition, almost all participants rated LR as a preferred mode (94,1%). In regard to their opinion in relation to their own performance in the tasks 70,6% of them responded that their performance was better in the SWR task for the stories that they listened and read simultaneously. For the comprehension task the responses were more even between listening and reading and reading only, 47, 1% for LR and 35,3% for RO. And finally for the recall task, 70,6% of stories from LR condition were chosen. None of the participants had ever read the stories before. Table 9 shows the most mentioned reasons participants gave for choosing LR as their preferred conditions

translated from Portuguese. The translations focus on the relevant ideas from participants' responses. Note that more than one participant gave the same response.

Table 9

Participants' justification for choosing a preferred condition

better comprehension, if you don't understand a word you can clarify it with reading	LR
It's easier to understand the text, better than only reading	LR
I have a hard time sometimes with comprehension and pronunciation, so this is the best way for comprehension	LR
I have more practice in reading, and this way I can associate the written form with the oral form of words	LR
it facilitates comprehension and enhances vocabulary with both forms together	LR
it facilitates learning in context	LR
it facilitates word identification	LR
it is more visual to follow the written story, it helps to create a setting. The audio helps too.	LR
it makes me pay more attention to the details, and the interpretation of the narrator helps to comprehend better.	LR
it makes one practice both comprehension skills, one helps the other.	LR
it's better to see the pronunciation and also to understand the text.	LR
this way is very efficient to comprehend the text and the words, plus the context is clearer with the intonation of the narrator.	LR
with only reading I can explore the imaginative capacity of my brain. Many times I can imagine better when I read.	RO

In the next two tables we present the comments from participants on why they chose a given story as the one they liked more followed by

the one they liked less. Here participants were asked to focus on the stories, there was not any direct reference to the conditions.

Table 10

Participants' reasons to select a preferred story

- clear text; easy interpretation
- great story, with a great topic, easy to comprehend
- interesting for being post-apocalyptic
- interesting story
- it called my attention, although its vocabulary was sort of specific
- it is about something that happens more in the academic environment, and the narration was clearer
- it triggered my imagination with the fictitious world; with action and a probable conspiracy
- it was a fun and light story, I laughed and visualized better
- nice story
- nice topic and interesting story
- nice topic and quite different, I could remember more content from this story and I found it easier than the others
- nice topic, but could not understand well reading only once
- nice topic, nice narration and I knew most words
- nice topic; easy language
- the topic called my attention. I could picture the characters, the world they were in, and how the events occurred
- the vocabulary was easy and the narration was simple

Table 11

 Participants' reasons to select a less preferred story.

- basically, the problems and conflicts of the characters were the main point of the passages, it was too dramatic.
- complex plot and I could not imagine much, neither create mental images of the text and context
- could not fully comprehend the story
- I did not like the text
- I did not like the topic and could not understand some parts of the story

- I did not like the topic very much; could not understand the story well
- It has difficult language; I did not like the topic
- I could not follow the audio, it was too fast, the topic did not interest me
- I could not follow the text; I could not hear some words clearly
- I wasn't very interested in it, and its content was specific
- it didn't make me imagine much, so it did not call my attention
- the story is a bit confusing and difficult to comprehend
- the text reminds something scientific, but it is more about the relations between the characters
- the text was confusing, I didn't like the topic much
- the text was too difficult to comprehend. The narrator spoke very fast
- the topic was nice too, but the text itself was confusing. There were some words I did not know, and that made it difficult to comprehend
- there were more specific and technical words from physics

To finish this section , Table 12 brings the optional comments from participants regarding the experience with the research. Next section presents the discussion of both quantitative and qualitative data from the study.

Table 12

Participants' additional comments on the research experience.

- it was great to participate, I hope the research can be useful to promote English language learning
- it was an interesting experience; I liked the tasks and I could reflect on my own learning strategies.
- it was a good and enjoyable experience; I could not manage the time very well, so that probably affected my performance
- it would be nice to have pictures and comics along with the stories
- the texts were well chosen, although some of them had specific vocabulary. I think this kind of text can really help one to learn foreign languages
- this experience made it clear to me that reading texts with its audio is very efficient to acquire vocabulary and to practice the words we can't understand from listening.

4.6 DISCUSSION: READDRESSING THE HYPOTHESES AND RESEARCH QUESTIONS

In the comprehension task – that tested hypothesis H1 – the structure of narrative texts allied with the task format (i.e. it was probably too easy) heavily suggests why differences were practically inexistent between conditions. Narratives, as explained in chapter 2, usually generate high test scores because of its world knowledge related structure. In addition, the summaries of the stories in Portuguese, although with minimal and non-detailed information, may have triggered a flush of inferences that guaranteed good performances in all conditions. However, another possibility is that learners would probably comprehend well the stories even without the summaries due to their proficiency level and the current popularity of science fiction related content. The RO condition generated a slightly higher mean, and this can be explained in several ways: (1) considering the values revealed by the statistical test, the first possibility to keep in mind is that of common random error in the study, having nothing to do with linguistic reasons. The second is that (2) these participants were more used to reading only, and this practice may be a reflex of the way language teaching is done in our country, which tends to prioritize written academic performance, grammatical knowledge and reading proficiency. The third way (3) acknowledges that LR may be more demanding in terms of attention for some learners. Moussa-Inaty, Aires and Sweller (2011) found exactly this result when testing the differences between reading while listening, reading only and listening only. Their participants, native speakers of Arabic, performed better in listening tests, in a counterintuitive manner, when exposed to only reading. They investigated the relations between modalities (conditions) in a set of three experiments that were developed within the cognitive load framework – which main contribution to bimodal input testing is the prediction that redundant information (in this case, the audiobook in reading while listening) may unnecessarily consume working memory resources by forcing it

> to attend to both sources of information and possibly to integrate the two sources of information. This additional processing generates what cognitive load theorists call extraneous cognitive load in the sense that it has been created

by the instructional designer and [is] likely to interfere with learning, by diverting attention away from schema formation. (Moussa-Inaty, Aires & Sweller, 2011, p.391)

Similarly to our study, it is important to point that their participants already had prior exposure to spoken English in school, college and media, meaning that this knowledge may have assisted them to perform slightly better by only reading the texts.

A free recall task − in which participants recall everything they can right after reading or listening to a text − would have probably pointed to a larger difference, for participants would not have any clues on text content, as they did by reading the questions and propositions in the answer options of our multiple choice comprehension task. See figure 4.2. Participants D And E, surprisingly had a much better performance on LO, probably because they paid more attention than usual in this condition. Again, by inspecting the mean line graphs per participant it is noticeable that, although their proficiency test indicates the same level, they highly vary between each other in terms of performance. This was not exactly a homogeneous group, in spite of all care taken while recruiting participants. A working memory measure and a more strict proficiency test may account for the homogeneity aspect in future studies.

Do these results mean that there is no effect of LR on performance, that the three conditions are really the same? The answer to this question will depend on many variables, including the individual differences such as memory capacity, learning style, how learners approach the stories and tasks, and proficiency level. Few participants performed slightly better in LR condition, while the majority performed better in RO and LO. If there is an effect on text comprehension − and the results of this study clearly suggest that there is not − a task like ours is not appropriate to detect it. Surprisingly, contrary to what the literature indicates, the comprehension performance for LO was not poor. Participants performed equally fine when only listening to the story, in both text comprehension and spoken word recognition tasks. This means that, even if we had excluded RO and compared only LR with LO, we would still not have significant differences between conditions. Why is this the case? Considering that conditions were counterbalanced, we cannot explain the findings in terms of order effect. Apparently, learners' proficiency played a role in task performance.

Their level, B, as indicated by the proficiency test, depicts learners who are already able to use English with some confidence. We cannot be certain, however, whether this lack of difference is a major consequence of proficiency alone for we did not compare intermediate level learners with beginner and advanced learners. Another possibility is that, although we did not have order effects, participants read and listened to texts that were very similar in terms of structure and that were written by the same author in the same style. Possibly, these cues may have unconsciously activated schemas and related words that interfered with their judgments and predictions when performing subsequent tasks after having contact with the first story. In other words, a learning effect that we tried to avoid but that may have occurred. A between-group design could have indeed better detected possible differences without this drawback.

The spoken word recognition task results for reaction time were also contrary to what we predicted in hypothesis H2. The condition LO was supposed to have higher values in comparison to LR and RO, but in fact, it had the shortest values. As previously stated in the data analysis section, we suspect that participants guessed more in this condition, which in turn made them press the response button faster. From the cognitive point discussed in the literature, considering the segmentation and word recognition issues (e.g. the embedding problem and competition of word candidates) that foreign language learners face, it would not be wise to suggest that listening only here would have a small processing advantage, for the reason that the mean accuracy for this condition was slightly smaller and that participants had not seen the written form of the words tested as in the other conditions. The results from the mixed model showed that only six of the seventeen participants behaved as expected, having a shorter response time in the LR condition, followed by higher response times in RO and LO. It is important to stress here that the difference between conditions, although present, was not significant. In sum, with our task, LR was not able to show any processing advantage in terms of response time in comparison to the other modes. Cognitive processes occur at millisecond level, and although this difference is seen in the mean RTs for example, the values are still very similar from one condition to another. This may imply that those who advocate the strategy of reading while listening may be using a misguided argument to emphasize that the use of the strategy itself would cognitively impact word recognition when a given listened and read word appears later in a different context. As we saw with our data,

the minority of participants behaved that way, possibly because those had a higher processing capacity (although this variable was not measured). It is important to point out again that the words tested appeared only once in the text, suggesting that what may be going on when one reads and listens to an entire audiobook is difficult to be distinguished as an effect of strategy from a frequency effect, for instance. Learners that are used to listening and reading simultaneously may be just having a mixture of frequency effect and constant repetition of words, topics and materials they enjoy to learn with, as well as gaining awareness of the probabilities of words appearing together influencing their performances. It is very likely that this awareness can be achieved by other means, as only reading for example, although RO mode generated slightly higher reaction times.

In chapter 2 we reviewed studies that indeed found that written information affects spoken word recognition. Why then, in our main study, did we not have a significant difference in RT for the LR condition? Our first supposition is that Portuguese and English share the same alphabetic system, thus a possible influence of orthography may be hard to perceive or even make any difference, for the learners tested are already highly educated and proficient readers. It is true though that it could take more time for them to connect spoken and written word forms in English than in Portuguese, especially because the phonotactic knowledge of the foreign language is still under development. This process is initially backed up by repetition, that is, learners would need to listen and read words over and over until they internalize them. How this process is regulated is a complex matter, for the reason that some words are easier to learn than others (read about the learning burden in Nation, 2001), and this facility may vary from individual to individual, all affected by frequency of use, connections to biographical memory and so on.

In short, LR in the spoken word recognition task was slightly beneficial for only a minority of the learners in the group tested. Comparing these results with the pilot study, if we had all participants behaving like the five from the pilot and the six from the main study, then we could keep the hypothesis of the processing advantage of the bimodal input. Thus, only a larger sample size with these eleven learners' features and another sample with the eleven learners' features who did not benefit from the strategy would be desirable, so that we could see whether the pattern found in our data for the main study – that

is, LR in fact does not provoke any significant impact on spoken word recognition – is really representative for intermediate learners in general.

As for the accuracy in the spoken word recognition task, a variable that tested hypothesis H3, there was practically no difference between conditions, which means that under specific situations intermediate level participants will identify words regardless of condition considering their previous vocabulary knowledge. From the fourteen targets they identified approximately nine words per condition, which is a high number. Even though we took care not to have ceiling effects, their proficiency level allowed them to perform similarly in the three stories. Possibly, the narrative structure influenced their performance, making it easier to recall and identify the words tested in the task. LR and RO with the exact same mean may indicate that reading only can be as effective as LR for spoken word recognition. Recognizing spoken words is a process affected by innumerous variables. Reading while listening did not significantly interfere with this process, for if it did so, learners would have had shorter response latencies in this condition. We mentioned that LO RTs were shorter because learners were possibly guessing, additionally, it is also possible that for not having seen the written word forms, they activated less competitors when responding the task, resulting them to respond faster.

The free word delayed recall task had results a bit more similar to what we hypothesized in H4. The means of LR condition in fact indicated that recall for this condition was higher in relation to RO and LO. The comparison between conditions almost approached significance, although results clearly show a non-significant difference. We can suggest that the difference between means was due to random error; to the fact that bimodal input had participants recall more words, for it affects word representations in memory, or we can suggest that for being more engaged and interested in this mode, as indicated by the retrospective questionnaire, participants draw more attention and interest to the stories in this condition, consequently recalling more words. It is important to stress here that the words recalled were the ones with high frequency of recurrence in the texts, words that were triggered by key words from the summaries or comprehension tasks but that were not present in the story (e.g. world, disappointed), and words that are very frequent in English as a whole (e.g. sad, work, mouse, theory). Interestingly, participants recalled various synonyms that described a concept, but not the exact word of the story related to it (e.g. wind for breeze, trees for grass, galaxy for universe, governor for president etc.),

meaning that they recalled words that were probably already consolidated in their mental lexicon and that were used more frequently by them. The recall task also sheds light on how text representation is kept in memory, certainly not by the exact same words from the story, but key concepts. Only one word from the experimental target words was recalled: the word research, which is easily explained by the fact that participants are members of an academic community, therefore, this word is highly frequent in their environment. The prediction from the literature that in order to recall words more efficiently it is necessary to have a deeper level of processing is kept. Certainly, as the results showed, it is improbable for learners to recall words they had seen only once, and that had not been explored in terms of meaning and associations to other sources of knowledge. This finding supports the fact that explicit vocabulary instruction may be desirable for better word recall and learning.

In chapter 2, section 2.1.1, we briefly introduced Vandergrift and Goh's model to illustrate the cognitive aspect of listening processing. The results and tasks of this study do not allow us to make further generalizations regarding their model, as it was not our goal. The results showed that text comprehension, spoken word recognition and delayed word recall of the learners tested were not affected by the external manipulation of conditions, which reinforces that these processes mobilize multiple knowledge sources that cannot be reduced to matching forms and meanings or simple exposition. The influence of reading while listening on listeners performance was primarily qualitative.

5 FINAL REMARKS

This work aimed at investigating whether the learning strategy of reading while listening to short stories in English was of any advantage for intermediate EFL learners' performance on three language tasks that involved listening comprehension. Our main interest was in the use of this strategy as tool for foreign language learning. To evaluate its possible impact, we compared three conditions, reading while listening, reading only and listening only, using three different science fiction stories. Three different types of tasks were created to test our hypotheses: (1) a comprehension task; (2) a spoken word recognition task; and a (3) free word delayed recall task. The tasks were chosen based on the predictions found in the literature. In addition, two questionnaires were administered, the first in order to gather information about participants' learning profile and the second with the intention to assess participants' thoughts on the strategies (conditions) used in the experimental sessions. Following predictions from the literature, our first hypothesis was that participants would perform significantly better in the comprehension task in LR condition. Likewise, the second and third hypotheses predicted that participants would have shorter reaction times (H2) and higher accuracy scores (H3) in the SWR task for LR condition. Finally, the fourth hypothesis predicted that participants would recall more words from LR condition in the free word delayed recall task. Surprisingly, none of our hypotheses was confirmed neither obtained significant results in the statistical tests performed. The differences between the three conditions tested were minimal, and only the fourth hypothesis approached significance in the repeated measures ANOVA. Our results showed that in terms of having performance improved in the tasks, reading while listening as a strategy was not effective in the immediate circumstances tested, although in qualitative terms they showed that learners enjoy using it to study a foreign language, thus still making it relevant for learning purposes. In addition, only reading and only listening to short stories specifically can be as effective as bimodal input in task performance of intermediate level learners.

We reviewed what makes listening difficult and the many aspects that interfere in this essential element of our cognitive architecture. It was clear how difficult it can be to assess what is interfering with a

learner's performance. The many sources of knowledge that involve listening, the spoken word recognition process complexities and the vastness of the mental lexicon and its operations contribute to categorically say that it is not straightforward as it sounds to suggest that a strategy alone is mainly affecting performance. This very same strategy is attached to a package of other active variables that are difficult to isolate (e.g. word frequency, probabilistic patterns, memory capacity). Our experiment had an exploratory nature, pointing in the direction of more studies.

5.1 LIMITATIONS OF THE STUDY AND SUGGESTIONS FOR FURTHER RESEARCH

This study was mainly limited for time and local constraints. It would be necessary to run at least two additional studies with changes such as not having the summaries in Portuguese, and a different comprehension task by adopting the free recall format. Another possibility of testing reading related processes is to measure and compare reading times of different groups after receiving training with the three conditions tested. A between-subject design is essential to make sure learning effects do not interfere with data. A larger sample size and the inclusion of a working memory measure could shed light on what type of learner can benefit from reading while listening strategy, and what type cannot (i.e. to see whether the cognitive load prediction discussed in section 4.6 sustains). Further adaptations in the SWR task should also be verified, for maybe this task format is not the most appropriate to detect differences in spoken word recognition. Finally, a more strict proficiency test, a measure of vocabulary size and another of listening ability could have thoroughly reduced the variability among participants. With proper replication across different proficiency levels, these results may strongly suggest that reading while listening as a strategy has a strong effect in qualitative terms, but in terms of cognitive gains on tasks involving comprehension, recognition and word recall, it can be a language learning myth when aimed at highly educated language learners. For a different sample profile, as children and high school students for example, the results will probably vary. How, it needs to be tested.

5.2 PEDAGOGICAL IMPLICATIONS

Finally, considering what has been discussed so far, should one support reading while listening strategy in the foreign language classroom? From the quantitative data, not necessarily, since it is not different from the other conditions in terms of performance with narrative texts. From the qualitative data, definitely yes. Teachers should consider stimulating all modes, and help students to find out the ones they feel more comfortable with, especially the one learners believe that help them to develop listening. The reception of audiobooks in general was good with the young adults tested, probably because the stories used are from contemporary literature.

The surprising outcome of our study was that only reading can be as effective to improve spoken word recognition at these learners' level, for they have probably an average knowledge of how a given unknown word is pronounced. Only listening as seen here can also be positive in terms of performance, but in terms of preference it is not always desirable , for it can be stressing or generate more anxiety, as observed in the study sessions. Learners do find it harder to listen alone in order to extract meaning from the story, so this mode may not be the most appropriate or productive for learning situations.

In sum, stories can be very helpful and exciting in foreign language instruction, as the responses from the retrospective questionnaire suggest. They can be used in a variety of ways, and are an entertaining source of vocabulary learning, for in stories words repeat several times in context. Listening proficiency will consequently increase along with vocabulary knowledge. Teachers and researchers have been constantly looking for new sources to encourage learners' interest and engagement in learning a foreign language, thus we highly recommend, considering the qualitative side of this study, that they should give a try to these accessible and alternative materials such as audiobooks and short stories.

REFERENCES

Aitchison, J. (1987). *Words in the mind: an introduction to the mental lexicon*. Oxford: Blackwell.

Altenberg, E. P. (2005). The perception of word boundaries in a second language. *Second Language Research*, *21*, 325-358. Retrieved from: http://peer.ccsd.cnrs.fr

Anders, P.L. (2002). Toward an understanding of the development of reading comprehension instruction across the grade levels. In C.M. Roller (Ed). *Comprehensive reading instruction across the grade levels: a collection of papers from the reading research 2001 conference* ,111–132.

Anderson, J.R.(2015). *Cognitive psychology and its implications*.8th Ed. USA:Worth Publishers.

APA (2013). *Audiobooks industry showing enormous growth: The Audio Publishers Association releases results from annual sales survey*. Access July, 2015. Retrieved from http://www.audiopub.org/2013SalesSurveyPR.pdf

Baayen, R.H. (2008). *Analyzing linguistic data: A practical introduction to statistics using R*. New York: Cambridge University Press.

Baayen, R.H.& Milin, P. (2010*).* Analyzing reaction times. *International Journal of Psychological Research*, 3(2), 12-28.

Baretta, L., Tomitch, L.M.B, MacNair, N., Lim, V.K. & Waldie, K.E. (2009) . Inference making while reading narrative and expository texts: An ERP study. *Psychology & Neuroscience, 2,*137 – 14.

Bates, D., Maechler, M., Bolker, B. & Walker, S. (2014). _lme4: Linear mixed-effects models using Eigen and S4_. R package version 1.1-7, <URL: http://CRAN.R-project.org/package=lme4>.

Bird, S.A. & Williams, J.N (2002). The effect of bimodal input on implicit and explicit memory: An investigation into the benefits of within-language subtitling. *Applied Psycholinguistics, 23*, 509–533. doi: 10.1017.S0142716402004022

Bold, C. (2012). *Using narrative in research*. London: SAGE Publications Ltd.

Bonk, W.J. (2000). Second language lexical knowledge and listening comprehension. *The International Journal of Listening, 14*, 14-31. doi: 10.1080/10904018.2000.10499033

Boone, Jr. H. N. & Boone, D. A. (2012). Analyzing Likert data. *Journal of Extension, 50*. Retrieved from http://www.joe.org/joe/2012april/tt2.php

Boretz, A. (2013). Audiobooks: billion-dollar industry shows steady growth. Retrieved from http://blogs.publishersweekly.com/blogs/ListenUp/?tag=listen-up&paged=2 . June 8, 2015.

Blake, V.L.P.(1990). Something new has been added: aural literacy and libraries. *Information literacies for the twenty-first century*. G. K. Hall & Co., 203–218, retrieved from https://archive.org/details/SomethingNewHasBeenAdded May 12, 2015.

Bloomfield, A., Wayland, S.C., Rhoades, E., Blodgett, A., Linck, J. & Ross, S. (2011). *What makes listening difficult? Factors affecting second language listening comprehension*. University of Maryland. Retrieved from http://www.casl.umd.edu

Brown, H.D. (2001). *Teaching by principles: an interactive approach to language pedagogy* (2nd ed.). New York: Longman.

Brown, R., Waring, R. & Donkaewbua, S.(2008). Incidental vocabulary acquisition from reading, reading-while-listening, and listening to stories. *Reading in a Foreign Language, 20*, 2, 136-163.

Browne, C. (2013). Word knowledge. In Robinson, P. (Ed) The Routledge encyclopedia of second language acquisition. New York: Routledge.

Brown, R., Waring, R. & Donkaewbua, S.(2008). Incidental vocabulary acquisition from reading, reading-while-listening, and listening to stories. *Reading in a Foreign Language, 20*, 2, 136-163.

Brysbaert, M. & New, B. (2009). Moving beyond Kučera and Francis: A critical evaluation of current word frequency norms and the introduction of a new and improved word frequency measure for American English. *Behavior Research Methods*, 41 (4), 977-990. doi:10.3758/BRM.41.4.977

Chang, A.C-S. (2008). Listening Strategies of L2 Learners with Different Test Tasks. *TESL Canada Journal,*25 (2), 1-26.

Chang, A. C.-S. (2009). Gains to L2 listeners from listening while reading vs. listening only in comprehending short stories. *System, 37*, 652-663. Retrieved from www.sciencedirect.com

Chang, A. C.-S. (2009b). EFL listeners' task-based strategies and their relationship with listening performance. *The Electronic Journal for English as a Second Language*,*13*, 1 − 28.

Chang, A. C.-S. (2010). Second-language listening anxiety before and after a 1-yr. intervention in extensive listening compared with standard foreign language instruction. *Perceptual and Motor Skills, 100,* p. 355-365.

Chen, S-H. L. (2004). Improving reading skills through audiobooks. *School Library Media Activities Monthly 21.1*, 22-25. Retrieved from http://www.audiopub.org/resources/Chen_SLMAM2004.pdf

Council of Europe. (2001). *Common European Framework of Reference for Languages: Learning, Teaching, Assessment (CEFR)***.** Official document. Europe. Retrieved from http://www.coe.int/t/dg4/linguistic/cadre1_en.asp

Craik, F.I.M & Lockhart, R.S. (1972). Levels of processing: a framework for memory research. *Journal of Verbal Learning and Verbal Behavior, 11*, 671-684.

Cutler, A. (2001). Listening to a second language through the ears of a first. *Interpreting*, 5, 1-23. doi: 10.1075/intp.5.1.02cut

Cutler, A. (2012). *Native listening: language experience and the recognition of spoken words*. USA: MIT Press.

Dahan, D. & Magnuson, J.S. (2006). Spoken word recognition. In Traxler, M.J.; Gernsbascher, M.A (Orgs) *Handbook of psycholinguistics.* 2nd Ed. Burlington, MA: Academic Press, p. 249 – 273.

Dijkstra, T. (2003). Lexical processing in bilinguals and multilinguals: the word selection problem. In Cenoz, J., Hufeisen, B. & Jessner, U.(Eds). *The multilingual lexicon*. USA: Kluwer Academic Publishers.

Dörnyei, Z. (2007). *Research methods in applied linguistics*. Oxford: Oxford University Press.

DuBravac, S. & Dalle, M. (2002). Reader question formation as a tool for measuring comprehension: narrative and expository textual inferences in a second language. *Journal of Research in Reading, 25*, 217 – 231.

Edmondson, W.(1997). The role of literature in foreign language learning and teaching: Some valid assumptions and invalid arguments. In A Mauranen. & K. Sajavaara (eds.), *Applied linguistics across disciplines. AILA Review, 12, 1995/6.* 42–55.

Ehri, L. C. (2005). Learning to read words: theory, findings and issues. *Scientific Studies of Reading, 9(2),* 167–188. Retrieved from http://www.wce.wwu.edu/Depts/SPED/

Endress, A.D. & Hauser, M.D. (2010). Word segmentation with universal prosodic cues. *Cognitive Psychology, 61*, 177-199. Retrieved from www.elsevier.com/locate/cogpsych

Flowerdew, J. & Miller, L. (2005). *Second language listening: theory and practice*. New York: Cambridge University Press.

Fox, C.A. (2002). Incorporating variation in the French classroom: A pedagogical norm for listening comprehension. In Gass, S., Bardovi-Harlig, K., Magnan, S.S. & Walz, J. *Pedagogical norms for second and foreign language learning and teaching.* The United States of America: John Benjamins Publishing Co.

Gagné, E.D., Yekovich, C.W. & Yekovich, F.R. (1993). *The cognitive psychology of school learning.* New York: Harper Collins College Publishers.

Graesser, A.C. & Kreuz, R.J. (1993). A theory of inference generation during text comprehension. *Discourse Processes, 16,* 145-160.

Graesser, A., Golding, J.M. & Long, D.L. (1996). Narrative representation and comprehension. In Barr, R., Kamil, M.L., Mosenthal, P.B. & Pearson, P.D. *Handbook of reading research, volume II.* New Jersey: Lawrence Erlbaum Associates.

Graesser, A.C., Singer, M. & Trabasso, T. (1994). Constructing inferences during narrative text comprehension. *Psychological Review, 101*, 371-395.

Gilmore, A. (2007). Authentic materials and authenticity in foreign language learning. *Language Teaching, March*, doi: 10.1017/S0261444807004144.

Goodwin, C.J. (2010). Research in psychology methods and design. USA: John Wiley & Sons, Inc.

Gries, S.T. (2013). *Statistics for linguistics with R*. Germany: De Gruyter Mouton

Harris, K. & Casbergue, R.M. (1996). Listening and literacy: audiobooks in the reading program. *Reading Horizons, 37*, 48-59. Retrieved from http://www.audiopub.org/resources

Hamilton, Z. (2013). *The wormhole effect: a collection of science fiction stories.* United States: Blue Rose Productions.

Hess, N. (2006). The short story: Integrating language skills through the parallel life approach. In Paran, A (Ed). *Literature in teaching and learning: case studies in TESOL practice*. Alexandria, VA: TESOL, 27–43.

Hessling, R.M., Schmidt, T.J. & Traxel, N.M. (2004). Floor effects. In *The SAGE encyclopedia of social science research methods*. doi: 10.4135/9781412950589.

Hessling, R.M., Traxel, N.M. & Schmidt, T.J. (2004). Ceiling effects. In *The SAGE encyclopedia of social science research methods*. doi: 10.4135/9781412950589

Horowitz, D. (1990). Fiction and nonfiction in the ESL/EFL classroom: Does the difference make a difference? *English for Specific Purposes, 9*, 161–168.

Hulstjin, J. H. (2003). Connectionist models of language processing and the training of listening skills with the aid of multimedia software. *Computer Assisted Language Learning,16*, p.413-425.

IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.

Jesus, D.B. (2012). The effect of L2 proficiency on the declarative and procedural memory systems of bilinguals: a psycholinguistic study. Masters thesis. Florianópolis: UFSC.

Jiang, N. (2012). *Conducting reaction time research in second language* studies. New York, NY: Routledge.

Jones, C.M.(1995). Construction of a mental model. In Lorch, R.F. & O'Brien, E.J. Sources of coherence in reading. New Jersey, USA: LEA.

Kamas, E.N. & Reder, L.M. (1995). The role of familiarity in cognitive processing. In Lorch, R.F & O'Brien, E.J. *Sources of coherence in reading*. 177-202. New Jersey, USA: LEA.

Kelly, R. K. & Krishnan, L.A. (1995). "Fiction talk" in the ESP classroom. *English for Specific Purposes, 14*, 77–86.

Kersten, S. (2010). *The mental lexicon and vocabulary learning*. Germany: Narr Verlag.

Kolinsky, R., Pattamadilok, C. & Morais, J. (2012). The impact of orthographic knowledge on speech processing. *Ilha do Desterro, 63,* 161- 186. doi: 10.5007/2175-8026.2012n63p161

Kosinski, R.J. (2013). *A literature review on reaction time.* Retrieved from http://biae.clemson.edu/bpc/bp/lab/110/reaction.htm

Kliegl,R., Wei, P., Dambacher, M., Yan, M. & Zhou, X. (2011). Experimental effects and individual differences in linear mixed models: estimating the relationship between spatial object, and attraction effects in visual attention. *Frontiers in Psychology, 1,* p. 1-12. doi: 10.3389/fpsyg.2010.00238

Krashen, S. D. (2003). Free voluntary reading: still a very good idea. In Krashen, S.D. *Explorations in language acquisition and use*. USA: Heinemann, p. 15-29.

Krashen, S.D. (2009*). Principles and practice in Second Language Acquisition*. Internet ed. California: University of Southern California. Internet ed. California: University of Southern California.

Lao, C.Y. & Krashen,S.D. (2000). The impact of popular literature study on literacy development in EFL: more evidence for the power of reading. *System, 28*, 261-270.

Larson-Hall, J (2010). *A guide to doing statistics in Second Language Research using SPSS*. New York: Routledge, p.241-267

Learning Ally. https://www.learningally.org/ . March 3, 2014.

Linck,J.A, Osthus, P., Koeth, J.T. & Bunting,M.F (2013). Working memory and second language comprehension and production: A meta-analysis. *Psychon Bull Rev*. doi 10.3758/s13423-013-0565-2.

Linderholm,T. & van den Broek, P. (2002). The effects of reading purpose and working memory capacity on the processing of expository text. *Journal of Educational Psychology, 94,* p. 778-784.

Levelt, W.J.M. (1995). The ability to speak: from intentions to spoken words. *European Review, 3,* p.13-23.

Luce, P.A. & Pisoni, D.B. (1998). Recognizing spoken words: The Neighborhood Activation Model. *Ear & Hearing*, 19, 1-36.

Lund, R. J. (1991). Comparison of second language listening and reading comprehension. *The Modern Language Journal,75*, 1991, 196-204. Retrieved from http://www.jstor.org/

Magezi, D.A. (2015). Linear mixed-effects models for within-participant psychology experiments: an introductory tutorial and free, graphical user interface (LMMgui). *Frontiers in Psychology, 6,* p. 1-7. doi: 10.3389/fpsyg.2015.00002

McQueen, J. M. (2007). Eight questions about spoken-word recognition. In M. G. Gaskell (Ed.), *The Oxford handbook of psycholinguistics* , 37-53. Oxford: Oxford University Press.

Menezes, N. C. & Franklin, S. (2008). O Audiolivro: uma importante contribuição tecnológica para os deficientes visuais. *Revista Ponto de Acesso, 2,* 58-72. Retrieved from https://repositorio.ufba.br, March 3, 2014.

Montgomery, J. R.(2009). *Using audio books to improve reading and academic performance.* Retrieved from http://www.joelmonty.net/

Moody, K. (1989). Audio tapes and books perfect partners. *School Library Journal, 35,* 27-29. Retrieved from http://www.audiopub.org

Moussa-Inaty, J., Aires, P. & Sweller, J. (2011). Improving listening skills in English as a Foreign Language by reading rather than listening: A Cognitive Load perspective. *Applied Cognitive Psychology, 26*, 391–402.

Munson, B., & Solomon, N. P. (2004). The effect of phonological neighborhood density on vowel articulation. *Journal of Speech, Language, and Hearing Research*, 47, 1048–1058.

Nation, I.S.P. (2001). *Learning vocabulary in another language*. Cambridge University Press.

Newman, S.D. & Twieg, D. (2001). Differences in auditory processing of words and pseudowords: An fMRI study. *Human Brain Mapping* , 14, 39–47.

O'Malley, J.M. & Chamot, A. U. (1990). *Learning strategies in second language acquisition*. The United States of America: Cambridge University Press.

Osada, N (2004). Listening comprehension research: a brief review of the past thirty years. Dialogue, 3, 53-66. Retrieved from http://www.talk-waseda.net/dialogue/no03_2004/2004dialogue03_k4.pdf

Othman, J.&Vanathas, C. (2004). Topic familiarity and its influence on listening comprehension. *The English Teacher, 8*, 19-32.

Oxford, R. L. (2003). Language learning styles and strategies: an overview. *GALA*, Maryland. Retrieved from http://hyxy.nankai.edu.cn

Paivio, A. (2006). Dual coding theory and education. Draft chapter for the conference on "*Pathways to Literacy Achievement for High Poverty Children*," The University of Michigan School of Education, September 29-October 1.

Paran, A. (2008). The role of literature in instructed foreign language learning and teaching: An evidence-based survey. *Language Teaching, 41*, 465-496.

Pattamadilok, C., Knierim, I.N., Duncan, K.J.K. & Devlin, J.T. (2010). How does learning to read affect speech perception? *The Journal of Neuroscience*, 30(25), 8435– 8444.

Pavlenko, A (2009). Pavlenko, A (Eds.). Conceptual representation in the bilingual lexicon and second language vocabulary learning. In: *The bilingual mental lexicon*. Bristol: Multilingual Matters.

Peirce, J.W. (2007). PsychoPy—Psychophysics software in Python. _Journal of Neuroscience Methods,162,_ p. 8–13.

Petrova, A., Gaskell, M.G. & Ferrand, L. (2011). Orthographic consistency and word-frequency effects in auditory word recognition: New evidence from lexical decision and rime detection. *Frontiers in Psychology*, 2, 263. doi: 10.3389/fpsyg.2011.00263

RAND (2002). *Reading for understanding: Toward an R&D program in reading comprehension*. USA: RAND.

R Core Team (2014). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL http://www.Rproject.org/

Renandya, W.A. (2012). The role of input- and output-based practice in ELT. In *ELT in a changing world: innovative approaches to new challenges*. Newcastle: Cambridge Scholars Publishing. Retrieved from https://www.academia.edu/

Rost, M. (2001). Listening. In Carter, R.&Nunan, D (Eds).*The Cambridge guide to teach English to speakers of other languages*. 7-13. United Kingdom: Cambridge University Press.

Rubery, M. (2011). *Audiobooks, literature and sound studies*. New York: Routledge.

Salasoo, A. & Pisoni, D.B. (1985). Interaction of knowledge sources in spoken word identification. *Journal of Memory and Language, 24*, p. 210-231.

Santos, T.P.B. (2013). *Reading while listening*: o audiolivro como estratégia de aprendizagem em língua inglesa. Undergraduate thesis, Departamento de Letras e Artes, Universidade Estadual de Feira de Santana, Feira de Santana, BA.

Schmidt-Rinehart,B.C.(1994). The effects of topic familiarity on second language listening comprehension. *The Modern Language Journal, 78*, 179-189.

Schneider, W., Eschman, A. & Zuccolotto, A. (2002). E-Prime user's guide. Pittsburgh: Psychology Software Tools Inc.

Schütze, C.T. & Sprouse, J. (2013). Judgment data. In Podesva, R.J. & Sharma, D. Research methods in linguistics. New York: Cambridge University Press, p. 27 – 50.

Schwartz, A.I. & Kroll, J. F. (2006). Language processing in bilingual speakers. In Traxler, M.J.; Gernsbascher, M.A (Orgs) *Handbook of psycholinguistics.* 2nd Ed. Burlington, MA: Academic Press, p. 967 - 999.

Shanahan, D. (1997). Articulating the relationship between language, literature and culture: Toward a new agenda for foreign language teaching and research. *Modern Language Journal, 81*, 164–174.

Singleton, D. (2000). *Language and the lexicon: an introduction*. Oxford: Oxford University Press.

112

Sousa, L.B. & Gabriel, R (2012). Palavras no cérebro: o léxico mental. *Letrônica*, *5*, 3, 3-20.

Stein N. L., & Glenn, C. G. (1975). *An analysis of story comprehension in elementary school children: a test of a schema*. Retrieved from ERIC digital database ERIC Number: ED121474 http://files.eric.ed.gov/fulltext/ED121474.pdf June 8, 2015.

Sticht, T.G. & James, J.H. Listening and reading. (1984). In *Handbook of reading research* (1st ed., pp.293-317). New York: Longman

Szmalec, A., Brysbaert, M. & Duyck, W. (2012). Working memory and (second) language processing. In Altarriba, J. & Isurin, L. *Memory, language and bilingualism: Theoretical and applied approaches*. Cambridge University Press. doi: 10.1017/CBO9781139035279.004.

Shuttleworth, M. (2009). Within Subject Design. Retrieved from https://explorable.com/within-subject-design

Tanenhaus, M.K., Flanigan, H.P & Seidenberg, M.S. (1980). Orthographic and phonological activation in auditory and visual word recognition. *Memory & Cognition*, 8(6), 513-520.

Taft M., Castles, A., Davis, C.,Lazendic, G. & Nguyen-Hoan, M. (2008).Automatic activation of orthography in spoken word recognition: Pseudohomograph priming. *Journal of Memory and Language* 58, 366–379.

Takac, V.P. (2008). *Vocabulary learning strategies and foreign language acquisition*. Great Britain: Multilingual Matters LTD.

Tomitch, L.M.B.(1996). Individual differences in text organization perception and working memory capacity. *Revista da ANPOLL, 2,* 71-93.

Vaden, K.I., Halpin, H.R. & Hickok, G.S. (2009). Irvine Phonotactic Online Dictionary, Version 2.0. [Data file]. Retrieved from http://www.iphod.com.

Vandergrift, L. (2007). Recent developments in second and foreign language listening comprehension research. *Language Teaching, 40*, 191–210. Retrieved from http://journals.cambridge.org

Vandergrift, L. & Goh, C. (2012). Teaching and Learning Second Language Listening: Metacognition in Action. New York: Routledge.

VanPatten, B. & Benati, A.G. (2010). *Key terms in second language acquisition*. London: Continuum International Publishing Group.

Vitevich, M.S. (2007). The spread of the phonological neighborhood influences spoken word recognition. *Memory & Cognition*, 35(1),166–175.

Warren, R. M. (1970).Perceptual restoration of missing speech sounds. *Science, 167,* 392–393.

Weber, A. & Cutler, A. (2004). Lexical competition in non-native spoken-word recognition. Journal *of Memory and Language, 50,* 1–25. doi:10.1016/S0749-596X(03)00105-0

Weber, A. & Scharenborg, O. (2012). Models of spoken-word recognition. *WIREs Cogn Sci, 3*, 387–40. doi: 10.1002/wcs.1178

Winter, B. (2013). Linear models and linear mixed effects models in R with linguistic applications. arXiv:1308.5499. [http://arxiv.org/pdf/1308.5499.pdf]

Woodall, B. (2010). Simultaneous listening and reading in ESL: helping second language learners read (and enjoy reading) more efficiently. *TESOL Journal 1.2* . Retrieved from http://slureading.pbworks.com/

Zeeland, H.V. & Schmitt, N. (2012). Lexical coverage in L1 and L2 listening comprehension: the same or different from reading comprehension?. *Applied Linguistics,* p. 1-24. doi:10.1093/applin/ams074

APPENDIX A
Excerpts of the Stories

The Last Underwater City

We humans have no hope left.

As I sit here looking at the water around me, I realize we should have let ourselves die off twenty years ago when the earth flooded. But being the resilient, stubborn species that we are – we slugged on, finding a new way to live.

This mile long underwater metropolis is what passes for living conditions now in this new age. Of course, I was only eighteen when the earth flooded and we were forced to find a way to live underwater instead of on land…but I remember.

The feel of grass beneath my feet. The feel of a breeze touching my neck. There are none of those things here. The officials of the city would have us believe that the sun with its harmful rays was the cause of us seeking shelter underwater, and that here, in our half sphere of comfort and barely breathable air – we were safe.

We had been taught in school that the sun was a life-giving force…that without its warmth the earth would have frozen several times over. I hear less and less mentions of the old days…eventually, will they pretend that we always lived underwater? Will they teach our youth that this is normal? They discourage those of us that remember from telling the children that conditions were not always like this. But I have a nephew…and I make sure that he knows – that he remembers my stories.

I don't like being confined down here. As a captain, I long to feel more proactive about our city's decisions. But I don't. I feel trapped in this little bubble that is tethered so irrefutably to the ocean floor.

I sense that while our ancestors were great explorers, this section of ocean will be the last place we ever migrate to – no one wants to leave. No one even cares anymore. Let the warriors and the fishermen venture out, along with the

occasional inspired explorer or scientist. That was what passed for conventional thinking nowadays.

Everyone else was completely and obliviously happy to go about their normal lives never questioning, hardly even thinking about what might be out there. I'm glad that I won't be around to see what challenges overpopulation brings.

I hear the siren sounding calling me to the training deck. I wonder what they could possibly want, those who govern us. However, they are in charge and I am expected to fulfill my duty, regardless of my personal opinion about them.

I rise from my sitting place stiffly, shuffling around my quarters for a moment to make them look presentable in case anyone should check. Most don't know that I sit alone, sulking, staring out the window at the sun which is too far away. They expect that I have friends – that I am even still close with the members of my family that have made it with me through everything.

But I am not. I do not believe in the old adage of tragedy drawing loved ones closer. In my case, it just forced me to push them away. I visit when it is called for, but no more than that.

I sit, and I remember. I read books that made it with me. There are very few of them, and if anyone higher up knew that I had them, they would probably be taken away from me for others to "study".

That did not fool me. I knew they would be burned. Whereas I seemed to treasure everything from my past, the new president and his cronies seemed hell bent on wiping it all out. With that thought in my mind, I covered my books with the upmost care before leaving the room.

It only took me about a brisk five minute walk to get to the training room, where I saw others had already assembled. Again, I pondered what would be the cause for calling all of us here. Yes, we had our pitiful little military, but most of them also held other jobs within the sphere – and next to none of them had actually had any combat experience.

The president, his advisor, and two governors were gathered in a corner talking feverishly. The rest of us stood there soundlessly, waiting to be addressed.

When they did finally turn to us, their faces were grim. The advisor nodded at the president in what I assume was supposed to be encouraging – but came out more as just a jerking movement. If the situation had not felt so serious, I might have laughed to myself at the awkward moment.

"Men: the forefront of any defense." the president began slowly. "We need you now."

I took great notice that he said "you" and not something that included himself, also.

"We have detected a potential threat to our newfound way of life."

Whispers broke out among the room. After all, had we not been that we were safe here? There were no other survivors, and even if there had been, they would not be coming to attack their own kind.

No, this was something else – something much more dangerous. I for one, was curious to know what it was and why the president was holding back from us. The president cleared his throat, trying to regain the room's attention.

 "We are not sure who they are, only that they are…shark-like in nature and appearance, aside from some human characteristics. We have seen them before, but it appears that they have not been aware of us until recently. It is unlikely that some type of alliance can be reached, as they hunt for the same sustenance that we ourselves need."

Several things became apparent to me very quickly. The president had not told us everything that he knew up until this point, and he – and whatever scientist were in his pocket – had technology for that far outreached what they advertised having.

"sir?" I asked, trying to sound as polite as possible. " how do we know that these…sharkmen have similar needs to our own? How long have we been watching them?"

The president took his time before answering. He took a long, hard look at me. After his burning gaze failed to make me cower, he finally lowered his own eyes.

"We have been observing them for quite some time. They appear to have developed a taste for human flesh." Several people in the room groaned with disgust. They were not equipped to deal with such things. I, however, was.

The Invisible Scientist

"There you go, Marvin."

Peter Wellingsworth busied himself taking care of his lab rat and cleaning up the rest of his workspace. The adviser would have a fit if Peter left the lab in such a mess. He hated cleaning up, however, because it felt like every morning he had to start over on his work. If he could leave it out, he could pick up right where he left off – instead of having to get back in the swing of things. He sighed.

"I guess that's just how it has to be, huh?" The rat squeaked at him and then went back to snuffling in the food peter had given him; it was sad that his closest companion these days was the rat that served as his testing subject.

He spent so much time working that any friends he had through college had probably lost hope of seeing him outside this lab, and all of the idiots that he worked with were jerks. He couldn't see how they had gotten hired in the first place. He suspected their wealthy parents offered money to the department. No way had they gotten here with their mediocre work.

"Hey *Peter*."

Speak of the devil and the devil shall appear, Peter thought.

Corey Smith was one of the prime candidates of what scientists should not be. He enjoyed breaks more than work, and was so lazy that Peter genuinely thought some of the test animals got more accomplished than he did.

"Corey." Peter responded stiffly.

He hated when Corey was around, because it usually ended in Corey messing up something of his – whether it be his personal belongings or work.

"so, did I hear you talking to your rat again?" Corey said. "You really should get out more".

He looked around.

"it looks like you're starting to live here man".

He set his hand on top of a pile of papers haphazardly, which, of course, send them tumbling to the floor.

"oh shoot, I'm sorry. I guess you won't be getting out of here quite soon, after all." Corey gave a half-hearted, apologetic smile before sauntering out the door.

Peter was fuming as he tried to put the papers back in their correct order.

"That guy is such an ass…" he muttered to himself while he cleaned.

His eyes paused on two pages that were out of place in sequential order, but had wound up together.

They were his notes on a formula for the physical property of invisibility. Many hard hours had gone into calculating and recalculating what he was certain would work. Thus far, none of his formulas had worked – and it was this project that made Peter the laughing stock of the office.

The adviser of the department had mentioned that if Peter did not produce results soon, his project would be canned and he would be shuffled off to department mandated projects from paying clients.

Peter did not know what made him able to keep trying for this long – but he wasn't looking forward to getting rid of all his research and starting over on something else.

He cleared the papers away to be resorted tomorrow, when something else on the pages caught his attention.

Two chemicals that he would have never thought of putting together. Seeing them side by side gave Peter an epiphany about how to readjust his formula.

He quickly scooped them up and placed them on the lab table, adjusting his glasses as he looked over both sheets again.

Of course! How could he have not thought of this before?

He smirked as he thought, *Thanks Corey*.

Marvin paced back and forth in his cage, watching Peter work with his beady eyes. Peter talked to him as he went, voicing an opinion out loud about a certain chemical or measurement – and occasionally telling Marvin how they will soon venture into a new realm of science. Peter lost all track of time as he worked, and he couldn't bring himself to care.

After many hours, Peter finally thought that it was ready.

"Time to try". He told himself quietly.

He didn't know what he would do if it didn't work this time. He'd been working so hard and for so long, that he had let himself get discouraged. This was the first time in weeks that he had actually felt enthusiasm.

He took a small dropper and pulled an even smaller amount of the clear solution out of the vial. He noticed his hand shaking slightly as he lowered the dropper over Marvin's food bowl, mixing it with the small amount of morsels that were left. Marvin hurried over, eager to check out the new food source.

Within minutes, the mouse had devoured the rest of the food. Peter scribbled a few notes as he watched.

He watched the clock carefully as time crept by.

Nothing was happening.

His shoulders slumped forward in defeat. He had been so sure that it would work this time.

He got to his aching feet and popped his neck. It had all been a pipe dream, anyway.

He was so exhausted he couldn't bring himself to clear up the mess he made while working through the night.

He took one last look around the room.

"Good night Mar-" he started to say, but was startled to find the white rodent was no longer in his cage!

Peter started to feel excitement building within him, but he told himself not to let his emotions run away with him, the door was shut to the lab, so it would be more prudent to search the room and see if Marvin had escaped. Peter came closer to the cage and his excitement doubled. The latch was completely secure on the cage.

In a fit of inspiration, Peter poured a bit more food into the rat's dish. He waited and watched.

To his delight, he saw some of the food moving around the bowl, while other small chunks entirely disappeared. Marvin hadn't escaped. He was invisible!

Peter felt like jumping up and down and screaming for joy. He wanted to run down the hall, shouting at his colleagues that they had all been wrong – completely wrong about him and his work.

He was no kook, he was a genius!

He waited for a few minutes more, observing Marvin's cage. After about twenty more minutes, the white rat was back in his regular form, and appeared to have suffered no damage. He observed Peter with the same disinterested eyes that he always had – and appeared perfectly normal.

The Wormhole Effect

The woman stood, stirring her coffee.

It had escaped her notice that she was being watched and monitored by an unseen force. The awareness knew that the day was rapidly coming when something would have to be done about the woman, a different – and undeniably intelligent being – named Madeline. She had progressed much further than the universe had originally foreseen she would in her theory of wormholes.

She could not be allowed to proceed in the direction which she was headed. The only true questions were in what way she would need to be dealt with – and how quickly.

It would depend on how rapidly her research continued. The universe watched, waiting for the right moment.

"You can't be serious about this, Madeline. If it doesn't go through, you'll not only have wasted nearly three years of your life, you'll also be the laughing stock of the scientific community. Is that what you want?"

Madeline tried not to consider her best friend's concerns as anything more than jitters about venturing into the unknown. After all, she herself still had doubts and moments of nervousness.

"I'm sure, Adam. I wish you would just leave me alone about it."

"I am just trying to look out for you. I don't want you throwing your career away unnecessarily. I mean, worm holes? Really? This isn't a science fiction movie." He took his hand and ran it through his hair, a tell-tale sign he was getting really nervous about the whole ordeal.

"My name is on that work too. We both have to be entirely certain before we even consider going to the board with this." he said.

Madeline took a moment to think about what Adam was saying. It saddened her that he did not think she was capable of finishing what she had started. A few years ago when she had approached him about being a partner in her research, he had seemed curious – if not entirely enthusiastic. However, as time passed, he had become more and more reluctant to continue with their work, citing reasons and theories that debunked theirs entirely.

But she had decided on her thesis, she wanted to pick something that no one had ever seen before: something so earth-shattering that hers would become a household name. Her professors thought the idea was crazy – but adventurous – and had decided if she really wanted to pursue this theory, then they would allow it.

Her belief was that every black hole was in actuality a wormhole that led to another dimension. She did not fool herself into thinking her colleagues actually

agreed with her on this belief, but none were rude enough to say her work was impossible – except for Adam.

He had been her confidante even before this project had begun. They had known each other since they had entered the college as freshman several years ago. What had started as a very productive study partnership had developed into much more for Madeline. She started noticing the delicate high cheekbones that were prominently displayed in Adam's face. The sky blue eyes that could laugh and smile when he was happy, and turn cloudy and dark whenever he was upset. What she loved most was his passion for his studies; he was an amazing student and it excited her to work with him.

However, Adam had either not noticed or chose to ignore the change in her feelings, for he never pursued her in any way. It had stung deeply any time she had seen him with another woman, and they had slowly drifted apart for a while. That is, until Madeline had approached him with her thesis and asked him to help her develop it in addition to his own. She promised him full credit for their findings – if they discovered anything at all.

And she hated that now he felt they should back away from the whole thing.

"I know it's not a movie, I just think it is a very plausible thesis. I'm sorry you don't feel the same."

She turned away from him so that he could not see the tears that were beginning to well up in her eyes. Nothing ever seemed to go right with Adam anymore.

"I didn't mean to upset you."he told her, automatically sensing her distress.

Why was it that he could so easily read her emotions when she was upset or frustrated – but he could not notice the blatant emotions she coveted for him?

"I'm sorry for hurting your feelings. I think you are an amazing scientist, and that your work has always been impeccable. I'm just worried you're stretching too far this time."

"I would not be doing this if I didn't think the research was ready. Do you really think that I would approach the board if I wasn't entirely prepared? I would not put my name in jeopardy like that – much less both of ours. Besides, I still have a little over a week to fine-tune everything."

Adam was pacing now as they talked, no longer able to contain his nervousness.

"You've just hit so many snags and problems with this. We both have. The math just doesn't support it."

"*Didn't*, you mean. I told you, I tweaked the formula, and I know that it is right."

He looked at her skeptically.

"You need more time to focus on this. If you're right about it like you think you are, you should give yourself more time to double-check your work. The thing isn't even due for months yet! Why are you rushing it?"

"If you had found something that you thought would change the entire human race, wouldn't you want to get the information out there as soon as you possibly could?" she challenged him.

"Not until I was absolutely sure about it – and had thoroughly consulted my partner about it…"he said.

"I'm not discussing this with you, anymore."

She got up from where she had been leaning against the counter in the kitchen of her small apartment. "I think you should go. As I said, I have some fine-tuning to do for the presentation. You know the time of the board meeting, I hope you're there with me. If not – I'll understand."

He looked as though he wanted to say more to her, but Madeline was sick and tired of hearing how little faith he had in her ideas. She appreciated his opinion, but did not want his pessimism messing up everything that she had worked for so diligently.

She walked to the door and opened it, making it clear the conversation was over.

APPENDIX B
Stimuli of the Spoken Word Recognition Tasks

The Last Underwater City

Trial Sentences

Frequency of recurrence* – filler word	Sentence	Phonological Neighbors	Answer options
15 have	We don't have many secrets to keep.	23	Have, hack, half
5 room	There is great furniture in the room.	38	Room, rumour, rude

*number of times that the word appears in the excerpt

Experimental Sentences

NOUNS				
Word	SFreq	Target sentence Syllables before and after the target	Phonological Neighbors	Answer Options
whispers	5.49	She heard all of those whispers then hugged her daughter. 5b-5a	5	Whispers Whiskers Whistlers
shelter	11.67	People sometimes need shelter in difficult times. 5b-5a	5	Shelter Belter Welter
duty	50.96	Mothers know that their duty is to raise their kids	2	Duty Beauty

		5b-5a		Juicy
corner	52.53	Find guidelines in the corner of the second screen. 5b-5a	13	Corner Corker Quarter
warriors	6.59	In battle wounded warriors don't perform very well. 5b-5a	4	Warriors Warders Warmers
bubble	8	The creation of bubbles is reduced in beer. 5b-5a	17	Bubbles Doubles Rubles

VERBS				
Word	**SFreq**	**Target sentence Syllables before and after the target**	**Phonological Neighbors**	**Answer Options**
Sulking	1.18	It's not very wise to keep sulking for a long period of time. 7b-7a	2	Sulking Sucking Shaking
treasure	19.06	Hard work makes our citizens treasure their free time throughout their lives. 7b-7a	5	Treasure Pleasure Threatened
fulfill	3.9	Young people really like to fulfill their dreams trying out new things. 7b-7a	2	Fulfill Refill

				Trifle
drawing	16.02	Show your mom affection by drawing a beautiful picture for her. 7b-7a	2	Drawing Drowning Drying

ADJECTIVES				
Word	**SFreq**	**Target sentence Syllables before and after the target**	**Phonological Neighbors**	**Answer Options**
stubborn	10.86	Anxiety may be a stubborn impulse that destroys lives. 6b-6a	0	Stubborn Stumble Stabbing
Jerking	2.27	People who suffer from jerking limbs may feel overwhelmed. 6b-6a	7	Jerking Joking Jacking
harmful	1.29	The press will say pot is harmful if smoked in great amount. 6b-6a	1	Harmful Horrible Helpful
gathered	9.63	It takes more than a few gathered wires to build machines. 6b-6a	3	Gathered Bothered Gardener

Filler Sentences

Frequency of recurrence – filler word	Sentence	Phonological Neighbors	Answer options
8 president	She became president the next day.	1	President, proponent, preeminent
4 underwater	Sand in underwater inclines and hurt coral reefs	0	Underwater, overwater, unwater
4 took	each country took immediate action to reduce emissions	24	Took, look, hook
4 feel	You can really feel the history	55	Feel, fill, fell
3 things	There are many things to keep in mind	11	Things, thinks, dings
3 something	I would like to say something about the problem	1	Something, summing, anything
3 several	Test your knowledge about several different topics	1	Several, overall, general
3 remember	It is always important to remember your obligations.	3	Remember, pretender, offender
3 everything	Talented players explained everything about the game.	0	Everything, anything, something

3 make	There is a solution that can make college more accessible	50	Make, wake, cake
3 earth	Satellites are in polar orbit above the earth.	28	Earth, dirt, earn
2 trying	She was trying to get pregnant.	8	Trying, drying, frying
2 thinking	Wishful thinking is usually an outgrowth of a fear	4	Thinking, sinking, thanking
2 training	The training got m ore effective than before	8	Training, trading, trailing
2 sphere	They step out of their natural sphere	8	Sphere, steer, spear
2 seemed	They found products that seemed too weird to be true	16	Seemed, seized, schemed
2 scientist	A top scientist worries that the virus has mutated.	2	Scientist, science, sportiest
2 normal	Cooperation is a normal part of the life in society	4	Normal, formal, norm
2 moment	People changed the rules of the game every moment.	1	Moment, opponent, woman
2 little	It ends a little under two years.	6	Little, literal, tittle
2 live	She accepted to live in	29	Live, lip, leave

	complete darkness		
2 human	They discovered a new species of primitive human.	6	Human, humid, humus
2 flooded	They were being flooded with evidence about the crime	3	Flooded, blooded, toddler
2 forced	The guy was forced to clarify all the rule	14	Forced, forest, fourths
2 conditions	Weather conditions can affect the traffic today.	4	Conditions, conclusions, commission
2 city	It's very easy to go to the city by bus.	18	City, seat, sitter
2 believe	People believe controversial statements about health care	6	Believe, relieve, achieve
2 calling	The organization is calling for the directors with urge.	16	Calling, crawling, cowling

The Invisible Scientist

Trial Sentences

Frequency of recurrence – filler word	Sentence	Phonological Neighbors	Answer options
7 time	Parents should spend more time with their children	36	Time, tie, type
5 back	They need money to go back to their country.	66	Back, pack, black

Experimental Sentences

NOUNS				
Word	SFreq	Target sentence Syllables before and after the target	Phonological Neighbors	Answer Options
defeat	11.37	This was the final defeat to our many trials. 5b-5a	3	Defeat Deceit delete
research	33.1	It's clear that poor research leads to challenges. 5b-5a	2	Research Rehearse Recourse
delight	5.65	Most doctors take great delight in	4	Delight

				Daylight
		helping patients 5b-5a		Delay
damage	33.06	Bad eating habits damage your health and body. 5b-5a	5	Damage Damning Dammit

VERBS				
Word	**SFreq**	**Target sentence Syllables before and after the target**	**Phonological Neighbors**	**Answer Options**
scribbled	0.51	Earlier an old writer I met scribbled some verses in my notebook 7b-7a	2	Scribbled Scrabbled Struggled
hurried	1.22	The agents stopped their tasks and hurried to provide support for that man. 7b-7a	8	Hurried Hurled worried
enjoyed	18.16	None of the singers really enjoyed staying in that lifeless town. 7b-7a	5	Enjoyed Injured Employed
building	99.57	Workers from our sector were building a new system with three codes. 7b-7a	8	Building Billing Bidding

ADJECTIVES				
Word	**SFreq**	**Target sentence Syllables before and after the target**	**Phonological Neighbors**	**Answer Options**
wealthy	7.37	Twenty countries have grown wealthy and ten others have failed. 6b-6a	3	Wealthy Healthy Stealthy
startled	2.45	The crowd was facing with startled eyes the player's movements. 6b-6a	3	Startled Started Star ed
lazy	11.59	The rules will not change the lazy routine of our houses. 6b-6a	14	Lazy Lays Laser
eager	6.86	Faith keeps him alive and eager to carry on his wish . 6b- 6a	11	Eager Either Eater
aching	2.06	Migraines are bad because aching heads can't think properly. 6b-6a	15	Aching Aiding Aging
able	159.9	Teachers said that she's able enough to solve the quiz.	10	Able Sable

		6b-6a		Table

Filler Sentences

Frequency of recurrence – filler word	Sentence	Phonological Neighbors	Answer Options
7 himself	He does not let himself be int imidated by silence	1	himself, herself, itself
6 thought	People thought these amazing inventions were fake	20	thought, taught, fought
6 food	That restaurant food has more fat than others.	27	food, fool, fooled
5 lab	The lab also generates samples in scales	37	lab, lib, lob
5 cage	A new lamb was taken into the cage for the wolf	28	cage, cave, gage
4 around	You should compete against players from around the	9	around, arouse, arraign

	world.		
3 working	Working moms are more educated and more prevalent	13	working, lurking, wording
3 papers	Many scientific papers are never cited again.	15	papers, payers, pagers
3 department	the Education Department pays debt collectors	1	department, departure, detouring
2 wrong	When we knew this was wrong, it was too late.	28	wrong, wrung, rung
2 together	This is a perfect example of working together	1	together, another, bothered
2 waited	we've waited so long to begin the course	18	waited, hated, mated
2 starting	I want to make starting on small possible	6	starting, staring, starring
2 project	It raises	5	project,

	many good points about the project		protect, prospect
2 seeing	You are also seeing fewer results	29	seeing, ceiling, skiing
2 order	Birth order af fects kids' personalities	9	order, other, border
2 hated	Her mother absolutely hated the internet	15	hated, heated, rated
2 forward	You are to go forward in le aps and bounds	2	forward, toward, award
2 excitement	Teachers expressed their excitement at the news.	1	excitement, incitement, statement
2 escaped	The jobs report escaped the margin of error	3	escaped, stated, exited
2 dropper	A water dropper was used to place droplets	7	Dropper, draper, proper
2 devil	They were commonly	8	Devil, bevel, level

	known as devil worshipers		
2 course	She already knows the course you are interested in	34	Course, costs, curse
2 cleaning	Some nice cleaning tools appeared on my desk.	5	Cleaning, clinging, cloning
2 because	It is simple to use because of its intuitive interface	4	Because, cause, become
2 appeared	Police officers appeared to overestimate the threat	3	Appeared, peered, speared
2 adviser	You should check with an adviser at your institution	6	Adviser, visa, visage
2 again	The population in our city is growing again.	2	Again, regain, attain

The Wormhole Effect
Trial Sentences

Frequency of recurrence – filler word	Sentence	Phonological Neighbors	Answer options
4 want	We want people who can solve challenging problems	19	Want, went, wand
1 moments	Every day should hold moments of joy	1	Moment, morning, moaning

Experimental Sentences

NOUNS				
Word	SFreq	Target sentence Syllables before and after the target	Phonological Neighbors	Answer Options
ordeal	2.37	Her treatment was an ordeal for everyone there. 5b-5a	1	Ordeal Order Older
jitters	1.29	I heard that people's jitters were due to gossip. 5b-5a	6	Jitters Hitters Bitters
findings	2.69	Indeed many great findings came from your efforts. 5b-5a	1	Findings Bindings Minding
distress	7.27	You shouldn't allow distress to stop you from	2	Distress Distrusts Stress

		trying. 5b-5a		
concerns	10.22	We used to share our concerns on the old technique. 5b-5a	2	Concerns Concerts Converts
freshman	7.35	Leaders welcomed the freshman and showed him the dorms. 5b-5a	2	Freshman Freshen Fishman

VERBS				
Word	**SFreq**	**Target sentence Syllables before and after the target**	**Phonological Neighbors**	**Answer Options**
wasted	16.75	It's too late to say he had wasted his precious hours for nothing 7b-7a	7	Wasted Waited Weighted
throwing	29.18	These people were furiously throwing their stuff at the lecturers. 7b-7a	3	Throwing Rowing Growing
rushing	6.02	During the contest they were rushing to answer all the questions. 7b-7a	7	Rushing Gushing crushing
messing	13.04	The new data set is just messing with what was already planned. 7b-7a	7	Messing Message Meshing

140

| leaning | 4.25 | Critical debates have been leaning towards practical methods. 7b-7a | 14 | Leaning Lining Learning |
| hurting | 19.1 | Wearing heels is probably hurting these women's feet legs and backs. 7b-7a | 7 | Hurting Herding Hurling |

ADJECTIVES				
Word	SFreq	Target sentence Syllables before and after the target	Phonological Neighbors	Answer Options
headed	30.78	All three main ideas were headed by great biologists. 6b-6a	8	Headed Heeded herded
blatant	1.14	The children know well that blatant offenses aren't allowed. 6b-6a	1	Blatant Latent Bating

Filler Sentences

Frequency of recurrence – filler word	Sentence	Phonological neighbors	Answer options
3 thesis	The graduate student could break down her thesis into smaller goals	2	Thesis, rhesus, theatre
3 upset	Change and	4	Upset,

	globalization have upset many people.		unset, sunset
3 board	Any of the board members may call for a vote	47	Board, border, bold
2 universe	The universe is really, really big.	0	Universe, university, verse
2 theory	Different theories have come in and out of vogue	2	Theories, theatre, three
2 sorry	He is sorry to have published the card	11	Sorry, soggy, sorrow
2 partner	There is no such thing as a perfect partner.	1	Partner, carpet, porter
2 notice	A notice of action is issued and must be sent to her	5	Notice, nothing, notes
2 movie	I think you know why movie attendance is down	7	Movie, moody, move
2 feelings	There are no words to describe these feelings	8	Feelings, fillings, failings
2 emotions	Reflecting on your emotions could help you	4	Emotions, emissions,

			erosion
2 eyes	Put on your glasses and give your eyes a rest	47	Eyes, ice, rice
2 fine	My father is fine because there was no accident	46	Fine, find, tine
2 decided	The case is being decided by the District Court	1	Decided, derided, derived
2 belief	I've been thinking a lot about faith and belief	15	Belief, relief, beseech
2 amazing	It is amazing how our paths cross in different countries.	1	Amazing, aphasic, amusing
3 years	Challenging years serve as a test for companies.	16	Years, ears, gears
3 woman	The woman is not looking for danger	6	Women, wooden, woolen
4 right	We still have to fight for the right to exist	61	Right, write, white
2 change	You have to make decisions and change your habits	9	Change, chain, range
1 worm	It's horrible when	21	Worm,

	you find a worm in your apple		warm, whirl
1 wish	I wish they all could solve their problems in this way	38	Wish, which, wick
1 understand	Some political parties don't understand each other	1	Understa nd, understo od, understa nding
1 sky	shots of the night sky are something else	14	Sky, sly, spy
1 smile	Don't force yourself to smile when you are sad	8	Smile, style, small
1 reasons	There are more than good reasons to take the test	8	Reasons, seasons, regions
1 rude	This would be viewed as something rude.	47	Rude, nude, rube
1 questions	They tried to respond accurately all the questions	3	Questions , quests, creations

APPENDIX C
Comprehension Tasks

Tarefa de Compreensão da História

The Last Underwater City

Marque apenas uma alternativa correta para cada questão.

1. O que os humanos fizeram quando a Terra inundou no universo de *The Last Underwater City* ?

a) Os humanos destruíram outras criaturas que viviam numa metrópole antiga embaixo d'água.
b) Os humanos encontraram uma nova forma de viver numa metrópole embaixo d'água.
c) Os humanos reconstruíram uma metrópole que usava recursos submarinos.

2. O que os oficiais da cidade diziam com relação ao sol?

a) Que seus raios eram a principal fonte de energia que alimentava as metrópoles.
b) Que seus raios causaram desequilíbrios ambientais que resultaram na inundação.
c) Que seus raios eram prejudiciais e por isso eles moravam embaixo d'água.

3. As crianças da nova geração

a) eram encorajadas a adorar o sol como força vital e lembrar da Terra do passado.
b) eram desencorajadas a adorar o sol e encorajadas a lembrar da Terra do passado.

c) eram desencorajadas a pensar em outra realidade, inclusive o passado da Terra.

4. O narrador da história é um capitão

a) que detesta morar embaixo d'água, mas queria participar mais das decisões da cidade.
b) que gosta de morar embaixo d'água, mas não quer participar das decisões da cidade.
c) que cumpre seus deveres e conta histórias da antiga geração nas escolas da cidade.

5. Com relação à nova geração da cidade, o capitão afirma

a) que as pessoas são relativamente felizes e que investem no crescimento da cidade por meio de pesquisas .
b) que apesar de felizes as pessoas não questionam a realidade e não exploram o mundo externo.
c) que as pessoas estão mais inquietas que os ancestrais e priorizam o desbravar do mundo submarino.

6. O que o capitão faz quando a sirene toca?

a) Atende prontamente ao chamado, pois já sabe o plano dos governantes.
b) Imagina o porquê do chamado e sai para organizar o pessoal do quartel.
c) Organiza o pessoal do quartel e pensa no grande amor que sente pela família.

7. O que o novo presidente costumava fazer com os livros antigos e memórias do passado?

a) Certificava-se que os livros fossem retirados de circulação e que as memórias do passado fossem esquecidas.

b) Certificava-se que os livros fossem queimados e as memórias do passado fossem reescritas.

c) Permitia com moderação a circulação de ideias antigas como os conhecimentos científicos e militares.

8. A reunião convocada no quartel

a) revelou sobre a invasão eminente da cidade por outros sobreviventes da grande inundação.

b) revelou que a cidade estava sendo ameaçada por tubarões gigantes que precisavam ser caçados.

c) revelou que a cidade estava sendo ameaçada por tubarões com aspectos humanos.

9. A ameaça que os cercava foi observada

a) por várias décadas pelos cientistas e concluiu-se que matavam por diversão.

b) por um tempo e concluiu-se que eram violentos e impiedosos.

c) por um tempo e concluiu-se que se alimentavam de seres humanos.

10. Quando ouviram sobre os inimigos,

a) os soldados ficaram apreensivos, e o capitão com medo de perder a família.

b) os soldados ficaram enojados, mas o capitão sentia-se preparado para lidar com a situação.

c) os soldados ficaram aterrorizados, e o capitão pensou em desistir da missão.

Tarefa de Compreensão da História
The Invisible Scientist

Marque apenas uma alternativa correta para cada questão.

1. Por que o Peter não gostava de limpar o laboratório em que trabalhava?

    a) Porque os outros colegas de trabalho bagunçavam tudo novamente no dia seguinte, e isso o irritava.
    b) Porque no dia seguinte ele mesmo teria que bagunçar tudo novamente para continuar o trabalho.
    c) Porque o supervisor era perfeccionista e sempre reclamava da maneira como ele arrumava as coisas.

2. O Marvin era

    a) um colega chato do Peter.
    b) o supervisor nervoso do Peter.
    c) a cobaia dos experimentos do Peter.

3. Qual a opinião do Peter com relação aos colegas de trabalho?

    a) Não conseguia nem imaginar como eles foram contratados para as pesquisas, pois eram tolos e estúpidos.
    b) Sabia que eles não eram talentosos e brilhantes, por isso ele precisava fazer uma pesquisa de qualidade.
    c) Sabia que eram ricos e populares, mas passava tempo demais trabalhando para fazer amizade com eles.

4. O que Corey costumava fazer que mais deixava Peter irritado?

    a) Falava besteiras e mostrava-se preguiçoso durante o trabalho.
    b) Bagunçava as coisas dele, incluindo materiais de trabalho.
    c) Chamava Peter de fracassado, pois ele não saía do laboratório.

5. A proposta de criar uma fórmula da invisibilidade

a) era vista pelos colegas de laboratório como uma proposta inovadora, porém inviável e impossível.
b) ainda recebia apoio do supervisor, apesar de não ter credibilidade com os colegas de laboratório.
c) tinha uma fórmula extremamente cara, e que poderia não produzir o resultado esperado no tempo previsto.

6. O que ajudou o Peter a reajustar a fórmula da invisibilidade?

a) A interferência inesperada de Corey.
b) A pressão do supervisor.
c) O pagamento dos clientes do departamento.

7. Como Peter testou a fórmula da invisibilidade?
a) Colocando uma dose na comida de Corey.
b) Colocando uma dose na comida de Marvin.
c) Colocando uma dose na água do supervisor.

8. O processo de ingestão da fórmula seguiu as seguintes etapas:

a) Desaparecimento instantâneo, reaparecimento incompleto, reaparecimento completo depois de 20 minutos.
b) Não desaparecimento inicial, desaparecimento incompleto e desaparecimento definitivo.
c) Não desaparecimento inicial, desaparecimento completo e reaparecimento completo.

9. Como Peter se sentiu ao saber que a fórmula funcionava?

a) Assustado, pois os colegas sentiriam inveja dele e tentariam derrubá-lo.

b) Entusiasmado, mal podia conter a alegria, pois se considerava inteligente.
c) Entusiasmado, mas com receio de mostrar a fórmula para os colegas.

10. A ingestão da fórmula
a) provocou pequenos danos, porém reversíveis
b) não provocou nenhum dano aparente
c) provocou danos severos e irreversíveis

Tarefa de Compreensão da História
The Wormhole Effect

1. Por que a consciência do universo queria fazer alguma coisa a Madeline?

a) Porque ela descobriu a origem do universo com a teoria dos buracos de minhoca.
b) Porque ela previu o fim do universo com a teoria dos buracos de minhoca.
c) Porque ela avançou na teoria sobre os buracos de minhoca.

2. Qual a posição de Adam com relação ao trabalho de Madeline?

a) Ele não a apoia, apesar de ser seu colega de pesquisa.
b) Ele a apoia, afinal além de colegas de pesquisa eles são amigos.
c) Ele permanece indiferente, pois o trabalho foi ideia dela.

3. Qual a reação de Adam quando Madeline o convidou para ser seu colega de pesquisa?

a) Ele pensou em desistir e citava outras teorias contrárias.
b) Ele aceitou entusiasmado, mas com o tempo perdeu o ânimo.

c) Ele pensou entusiasmado na carreira dele, pois a ideia faria sucesso.

4. Os que os professores achavam da ideia de Madeline?

a) Concordavam e deram total apoio.
b) Achavam a ideia impossível, fazendo-a mudar de tema.
c) Achavam a ideia insana, mas deram apoio mesmo assim.

5. Para Madeline, os buracos de minhoca

a) eram buracos negros que levavam à outras dimensões
b) estavam na mesma dimensão dos buracos negros
c) eram dimensões externas influenciadas por buracos negros

6. O amor de Madeline por Adam

a) era correspondido, pois além de amigos eles eram colegas de pesquisa.
b) não era correspondido, por mais que eles fossem amigos e colegas de pesquisa.
c) era correspondido, mas depois não deu certo, pois ele saia com outras mulheres.

7. Por qual motivo eles começaram a discutir?

a) Madeline e ele estavam numa crise de relacionamento.
b) Adam não concordava mais com as ideias de Madeline.
c) Porque ela sugeriu defender a tese diante do comitê sozinha.

8. Com relação à tese,

a) Madeline tinha pressa em defendê-la, mas Adam acreditava que ela estava sendo precipitada demais.

b) Adam tinha pressa em defendê-la, mas não queria apresentar com Madeline por conta dos desentendimentos.

c) Adam pensava que a tese poderia mudar o mundo, e não queria que Madeline a defendesse sem corrigir direito.

9. A discussão entre eles

a) provocou de vez o término do relacionamento.

b) fez com que Madeline desistisse de defender a tese para o comitê.

c) fez com que eles se distanciassem, pois ele não deu credibilidade ao trabalho.

10. Com relação aos conselhos de Adam,

a) Madeline não queria mais ouvi-los, estava cansada e desapontada.

b) Madeline queria ouvi-los, mas não demonstrava pois era teimosa.

c) Madeline não os seguiu fielmente, mas anotou as dicas que ele deu.

APPENDIX D
Delayed Free Word Recall Task
Tarefa de Memória (*Free Recall Task*)

1 - Escreva nos espaços o máximo de palavras **em inglês** que você conseguir lembrar das histórias trabalhadas na semana passada.

The Last Underwater City

The Invisible Scientist

The Wormhole Effect

APPENDIX E
Language Learning Profile Questionnaire

UNIVERSIDADE FEDERAL DE SANTA CATARINA
CENTRO DE COMUNICAÇÃO E EXPRESSÃO
DEPARTAMENTO DE LÍNGUA E LITERATURA ESTRANGEIRAS
PROGRAMA DE PÓS-GRADUAÇÃO EM INGLÊS

Este questionário é parte do estudo sobre a leitura e a compreensão oral de histórias em língua inglesa que eu, Tayane de Paula Bastos Santos, estou conduzindo, sob a orientação da professora Dra. Roberta Pires de Oliveira. Agradeço desde já sua participação.

Questionário sobre a aprendizagem de inglês como língua estrangeira

---

I – Dados pessoais

*Preencha essa etapa em letra de forma

Nome:_____

Sexo: ( ) M ( ) F Profissão:_____Idade:_____

Local de nascimento (cidade, estado):_____

E-mail:_____

Escolaridade:

( ) Ensino Fundamental incompleto ( ) Ensino Fundamental Completo ( ) Ensino Médio incompleto
( ) Ensino Médio completo ( ) Superior incompleto ( ) Superior completo ( ) Pós-graduação

---

II - Contato com a língua inglesa

1) Há quanto tempo você iniciou o curso regular de inglês?
( ) menos de 6 meses atrás
( ) 6 meses a 1 ano atrás
( ) mais de 1 ano. Quanto tempo?_____

2) Você já esteve em algum país de língua inglesa?
( ) sim
( ) não

3) Se sim, por quanto tempo?
( ) menos de 2 meses
( ) até 6 meses
( ) de 6 meses a 2 anos
( ) mais de 2 anos

* é possível marcar mais de uma opção na questão 4.

4) Antes de iniciar o curso regular de inglês, como você tinha contato com o idioma?

( ) através de filmes, músicas, jogos de vídeo game, internet, TV, rádio
( ) através de conversa com pessoa fluente em inglês ou falante nativo de inglês
( ) através de familiares e amigos bilíngues
( ) através da escola
( ) não tinha contato com o idioma

Continua

III - Motivações

é possível marcar mais de uma opção na questão 5

5) Por que você está aprendendo inglês?
( ) para viajar
( ) por motivo profissional
( ) para aperfeiçoamento nos estudos
( ) por motivo de lazer
( ) outros, nesse caso, por favor, especifique:_____

6) Você dedica quanto do seu tempo para o estudo do inglês extraclasse?
( ) nenhum
( ) até 1h por semana
( ) até 2h por semana
( ) mais de 2h por semana

IV – Estilo de aprendizagem – suas preferências sensoriais

7) Escolha apenas uma opção de 1 a 7. Quanto mais você se identificar com um estilo de aprendizagem, maior será o número escolhido. Quanto menos você se identificar, menor o número a ser escolhido.

A- Visual: gosta de ler e obter informação de estímulos visuais como imagens, slides, anotações, esquemas, textos escritos, resumos, etc.
( ) 1   ( ) 2   ( ) 3   ( ) 4   ( ) 5   ( ) 6   ( ) 7

B - Auditivo: gosta de ouvir conversações, aulas e comandos. Gosta de interagir bastante na sala de aula, especialmente quando precisa interpretar um personagem e conversar com os colegas . Pode sentir maior dificuldade com exercícios escritos.
( ) 1   ( ) 2   ( ) 3   ( ) 4   ( ) 5   ( ) 6   ( ) 7

C - Sinestésico/Tátil : gosta de trabalhar com movimentos, gosta de manipular objetos como colagens, flashcards. Tem dificuldade em ficar sentado na sala de aula por muito tempo, preferindo intervalos frequentes, andar pela sala e atividades que envolvam movimento corporal.
( ) 1   ( ) 2   ( ) 3   ( ) 4   ( ) 5   ( ) 6   ( ) 7

V – Estratégias de aprendizagem: o que você faz para aprender inglês

8) Escolha apenas uma opção de 1 a 7. Quanto mais você se identificar com uma estratégia, maior será o número escolhido. Quanto menos você se identificar, menor o número a ser escolhido.

A - Assistir filmes e vídeos com áudio e legendas em inglês
( ) 1   ( ) 2   ( ) 3   ( ) 4   ( ) 5   ( ) 6   ( ) 7

B - Ouvir músicas acompanhando a letra
( ) 1   ( ) 2   ( ) 3   ( ) 4   ( ) 5   ( ) 6   ( ) 7

C - Estudar gramática
( ) 1   ( ) 2   ( ) 3   ( ) 4   ( ) 5   ( ) 6   ( ) 7

D - Traduzir textos em geral, tanto do inglês para o português quanto do português para o inglês
( ) 1   ( ) 2   ( ) 3   ( ) 4   ( ) 5   ( ) 6   ( ) 7

E – Interagir por escrito em inglês em redes sociais, jogos e/ou grupos online com falantes nativos e outros aprendizes
( ) 1   ( ) 2   ( ) 3   ( ) 4   ( ) 5   ( ) 6   ( ) 7

F - Escrever textos em inglês
( ) 1   ( ) 2   ( ) 3   ( ) 4   ( ) 5   ( ) 6   ( ) 7

G -Fazer leituras silenciosas acompanhadas de exercícios de interpretação, tradução ou prática de vocabulário
( ) 1   ( ) 2   ( ) 3   ( ) 4   ( ) 5   ( ) 6   ( ) 7

H - Fazer leituras acompanhadas da narração de falantes nativos ou professores de inglês
( ) 1   ( ) 2   ( ) 3   ( ) 4   ( ) 5   ( ) 6   ( ) 7

I - Fazer leituras em voz alta
( ) 1   ( ) 2   ( ) 3   ( ) 4   ( ) 5   ( ) 6   ( ) 7

J – Repetir o discurso dos falantes nativos
( ) 1   ( ) 2   ( ) 3   ( ) 4   ( ) 5   ( ) 6   ( ) 7

K - Usar materiais de apoio como livros didáticos, dicionários, revistas, blogs e listas de exercícios
( ) 1   ( ) 2   ( ) 3   ( ) 4   ( ) 5   ( ) 6   ( ) 7

L - Falar inglês com nativos e outros aprendizes, pessoalmente ou por Skype, Livemocha, etc.
( ) 1   ( ) 2   ( ) 3   ( ) 4   ( ) 5   ( ) 6   ( ) 7

M - Pedir para professores, amigos e/ou falantes nativos corrigirem os seus erros
( ) 1   ( ) 2   ( ) 3   ( ) 4   ( ) 5   ( ) 6   ( ) 7

N - Frequentar um curso de idiomas
( ) 1   ( ) 2   ( ) 3   ( ) 4   ( ) 5   ( ) 6   ( ) 7

O - Participar ativamente das aulas no curso de idioma, fazendo perguntas e esclarecendo dúvidas.
( ) 1   ( ) 2   ( ) 3   ( ) 4   ( ) 5   ( ) 6   ( ) 7

P - Fazer anotações e resumos durante os estudos
( ) 1   ( ) 2   ( ) 3   ( ) 4   ( ) 5   ( ) 6   ( ) 7

Q - Frequentar aulas de conversação
( ) 1   ( ) 2   ( ) 3   ( ) 4   ( ) 5   ( ) 6   ( ) 7

R - Estudar com o auxílio de materiais e mídias ilustradas, como os flashcards e games.
( ) 1   ( ) 2   ( ) 3   ( ) 4   ( ) 5   ( ) 6   ( ) 7

S - outras, especifique: _____

VI – Contato com narrativas

9) Você já tinha lido livros, histórias, ou contos completos em inglês?
( ) sim
( ) não

10) Se sim, quantos?
( ) 1 a 5
( ) 6 a 10
( ) mais de 10

11) (opcional) Se sim, quais os seus favoritos?
_____
_____
_____

Continua

V – Habilidades linguísticas

*Escolha apenas uma opção de resposta para as questões abaixo.

.

12) Qual habilidade linguísticas abaixo você considera ter maior domínio em inglês?
( ) leitura
( ) compreensão oral
( ) falar
( ) escrever

13) Qual habilidade linguística você considera que precisa se esforçar mais para aprender?
( ) leitura
( ) compreensão oral
( ) falar
( ) escrever

14) Qual variedade do inglês falado você tem maior familiaridade?
( ) Inglês americano
( ) Inglês britânico
( ) Inglês australiano
( ) Inglês canadense
( ) Inglês da Irlanda
( ) Inglês da África do Sul
( ) Inglês da Nova Zelândia
( ) Outra: _____

15) De modo geral, como você avalia o seu conhecimento em inglês?
 ( ) regular
( ) bom
( ) ótimo

16) No momento você está estudando alguma língua estrangeira além do inglês?
( ) sim. Qual língua? _____
( ) não

Fim

APPENDIX F
Retrospective Questionnaire

UNIVERSIDADE FEDERAL DE SANTA CATARINA
CENTRO DE COMUNICAÇÃO E EXPRESSÃO
PROGRAMA DE PÓS-GRADUAÇÃO EM INGLÊS
Este questionário é a parte final do estudo sobre a leitura e a compreensão oral de histórias em língua inglesa que eu, Tayane de Paula Bastos Santos, estou conduzindo, sob a orientação da professora Dra. Roberta Pires de Oliveira. Obrigada pela sua participação.

Nome:_____ Data: _____/____/____

Questionário sobre as tarefas realizadas

* Marque apenas uma opção de resposta em cada questão abaixo.

1 - Qual a sua opinião com relação ao treinamento?

( ) ruim   ( ) indiferente   ( ) bom   ( ) regular   ( ) ótimo

2 - Das três histórias trabalhadas, qual você mais gostou?

( ) The Invisible Scientist   ( ) The Last Underwater City   ( ) The Wormhole Effect

Justifique. Considere por exemplo o tema, a dificuldade do texto, qualidade da narração, etc.
_____
_____
_____

3 - Das três histórias trabalhadas, qual você gostou menos?

( ) The Invisible Scientist   ( ) The Last Underwater City   ( ) The Wormhole Effect

Continua

Justifique. Considere por exemplo o tema, a dificuldade do texto, qualidade da narração, etc.

_____
_____
_____

4 - Dos três modos utilizados no treinamento, qual você prefere mais?

( ) ler somente   ( ) ler e ouvir   ( ) ouvir somente

Por qual motivo?

_____
_____
_____

5 – Com relação às tarefas relacionados às histórias que você teve contato durante o treinamento, selecione em qual você acha que teve um desempenho melhor.

a)Tarefa de compreensão do texto (as questões sobre o conteúdo dos textos):
( ) The Invisible Scientist
( ) The Last Underwater City
( ) The Wormhole Effect

b)Tarefa de reconhecimento do vocabulário (no computador):
( ) The Invisible Scientist
( ) The Last Underwater City
( ) The Wormhole Effect

c)Recordação das palavras (a tarefa de hoje):
( ) The Invisible Scientist
( ) The Last Underwater City
( ) The Wormhole Effect

6 – (Opcional) Gostaria de dizer algo mais? Deixe aqui seus comentários e sugestões.

_____ **Fim**
_____

APPENDIX G
Consent Form

TERMO DE CONSENTIMENTO LIVRE E ESCLARECIDO

Convido-vos a participar do projeto de pesquisa intitulado **Ler e ouvir no reconhecimento da palavra falada e na memória lexical: um estudo com aprendizes brasileiros de inglês como língua estrangeira** (*Listening While Reading on Spoken-Word Recognition and Lexical Memory: a Study with Brazilian Learners of English*). Você foi selecionado(a) por ser aluno(a) do nível básico de Inglês como Língua Estrangeira e estar matriculado(a) no curso de Letras Língua Inglesa da Universidade Federal de Santa Catarina e/ou curso de inglês do Extra-Curricular. Este estudo está sendo conduzido pela mestranda Tayane de Paula Bastos Santos e orientado pela professora doutora Roberta Pires de Oliveira.

Objetivos e Justificativa

O objetivo dessa pesquisa é investigar as relações entre a entrada bimodal de estímulos e a aprendizagem de inglês como língua estrangeira. Estudos sugerem que esse tipo de entrada parece ser benéfica para o desenvolvimento da proficiência leitora e auditiva, e possivelmente facilita a compreensão textual. Contudo, mais pesquisas são necessárias para quantificar e descrever a que nível os possíveis efeitos dependem da leitura e compreensão oral ou de outros conhecimentos linguísticos dos aprendizes.

Benefícios e Riscos

Essa pesquisa pode trazer contribuições para a área de aprendizagem de línguas estrangeiras no Brasil, ao investigar se a leitura e a compreensão oral podem afetar a memória lexical e a percepção da palavra falada. Pode ainda contribuir para ampliar a percepção dos aprendizes sobre o

que pode ser feito para ajudá-los a ouvir e ler de forma mais eficiente em outra língua.

Por se tratar de uma situação de teste, você pode se sentir ansioso(a) ou apresentar estresse momentâneo. Contudo, as sessões serão feitas individualmente e serão confidenciais. A pesquisadora também se certificará de que você esteja o mais confortável possível durante a coleta de dados.

Procedimentos

A pesquisa está dividida em duas sessões: (1) na primeira será solicitado que você responda um breve questionário, realize três tarefas de leitura e compreensão oral e três testes de compreensão textual, totalizando sete atividades. Haverá uma pausa entre as atividades. (2) Na segunda sessão será solicitado que você realize um teste de memória e responda um breve questionário. A segunda sessão ocorrerá uma semana após a participação na primeira sessão. Todos os detalhes serão explicados antes dos testes, que acontecerão em local e horário marcados previamente e serão aplicados pela própria pesquisadora.

Todas as instruções e enunciados dos testes serão em língua portuguesa e os conteúdos em inglês. Ao fim da pesquisa, a pesquisadora irá mostrar as conclusões tiradas a partir dos resultados das atividades e dará sugestões que possam ajudar os seus estudos futuramente. Você também terá direito a um certificado de participação de pesquisa. Além disso, caso seja de seu interesse, a pesquisadora poderá enviar uma cópia eletrônica da dissertação resultante da pesquisa após a mesma ser aprovada.

Confidencialidade

Os resultados serão publicados, porém, nenhuma informação pessoal sua constará nos resultados, mantendo-se assim sua confidencialidade. Apenas a pesquisadora e a orientadora terão acesso aos dados coletados antes dos mesmos serem preparados para publicação.

A participação ou não participação nessa pesquisa não afetará sua relação com a UFSC e essa escolha deve ser feita livremente por você.

Além disso, você pode desistir da pesquisa a qualquer momento por qualquer motivo. Quaisquer dúvidas podem ser tiradas com a pesquisadora através do e-mail **tayanepbs@yahoo.com.br** e do telefone **(48) 9674-5513** ou com a orientadora através do e-mail **ropiolive@gmail.com** e telefone **(48) 9822-7688.**

Esse documento deverá ser assinado em duas vias, ficando uma com você e outra com a pesquisadora. Assinando o Consentimento Pós-Informação abaixo, você estará consentindo com o uso dos dados coletados para a pesquisa. Muito obrigada.

_____   _____

Tayane de Paula Bastos Santos   Roberta Pires de Oliveira

Pesquisadora   Orientadora

Consentimento Pós-Informação

Eu, _____ (nome completo), fui esclarecido sobre a pesquisa "Ler e ouvir no reconhecimento da palavra falada e na memória lexical: um estudo com aprendizes brasileiros de inglês como língua estrangeira" e concordo que meus dados sejam utilizados para a realização da mesma.

Florianópolis, _____ de _____ de 2015.

Assinatura: _____.

RG: _____.

A pesquisadora Tayane de Paula Bastos Santos declara cumprir as exigências do item IV.3 da resolução 466/12, que regulamenta as pesquisas envolvendo seres humanos.

Comitê de ética: CEP-HEMOSC. Rua Barão de Batovi, 360, Centro de Florianópolis. CEP 88.015-530. Telefones: (48) 3251 9826 e 3251-9752. E-mail: cep@fns.hemosc.org.br

APPENDIX H
Summaries of the Stories in Portuguese

The Last Underwater City

A Terra não é mais a mesma e os habitantes dela vivem em um mundo diferente do mundo que conhecemos.

Personagens: o capitão, o presidente, etc.

The Invisible Scientist

Um jovem cientista está trabalhando em um projeto inovador: a fórmula da invisibilidade.

Personagens: Peter Wellingsworth, Corey, Marvin, o supervisor, etc.

The Wormhole Effect

Uma pesquisadora do PhD (doutorado) e o seu colega de pesquisa estão estudando sobre os buracos de minhoca.

Personagens: Madeline, Adam, os professores, etc.

APPENDIX I
Screenshots of the SWR tasks on PsychoPy
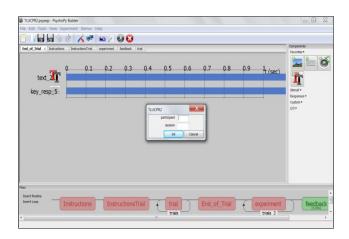
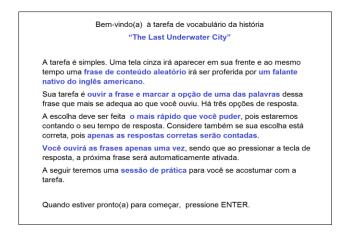*Figure 11*. First screen.

Figure 12. Second screen with general instructions.

Figure 13. Third screen with response instructions.

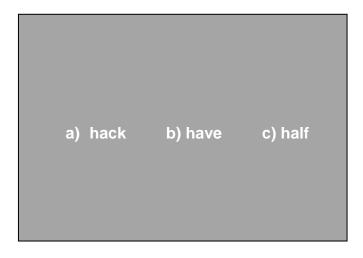*Figure 14*. Example of audio stimuli playing.

Figure 15. Example of trial response options. It enters automatically after the stimulus ends.

Figure 16. Warning message after trial.
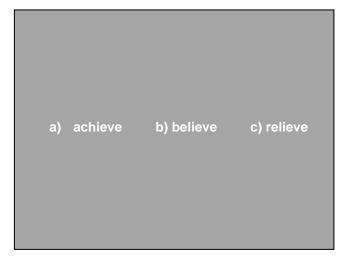
Figure 17. Example of audio stimuli playing.

Figure 18. Example of response for experimental stimuli (filler).

Figure 19. End of task and thanking screen.