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ZAINE MARTINS NOGUEIRA

THE EFFECT OF ENGLISH- PORTUGUESE COGNATES IN A LANGUAGE DECISION TASK

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Trabalho de conclusão de curso apresentado ao curso de Letras-Inglês do Departamento de Estudos da Língua Inglesa, suas Literaturas e Tradução da Universidade Federal do Ceará, como requisito parcial à obtenção do título de licenciada em Letras-Inglês. Orientadora: Profa. Dra. Pâmela Freitas Pereira Toassi.

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ABSTRACT

The present study investigated the effect of cognate words in a language decision task containing cognates Portuguese-English and their respective controls. 133 words were presented to 5 participants through the software Psytoolkit (STOET, 2010, 2017), which provided information regarding accuracy and reaction time. The analysis of the results showed that the control words in English were responded faster than the other conditions (cognate words and control words in Portuguese). Accuracy was high for all the conditions.

Keywords: cognates; lexical access; bilingual lexicon.

RESUMO

O presente estudo investigou o efeito de palavras cognatas em uma tarefa de decisão lexical contendo cognatos Português-Inglês e seus respectivos controles. 133 palavras foram apresentadas para 5 participantes através do software Psytoolkit (STOET, 2010, 2017), o qual forneceu informações sobre acurácia e tempo de reação. A análise dos resultados mostrou que as palavras controle em inglês foram respondidas mais rapidamente do que as demais condições (cognatos e controles em português). A acurácia foi alta para todas as condições.

Palavras-chave: cognatos; acesso lexical; léxico bilíngue.

SUMMARY

1 INTRODUCTION

It is estimated that half of the world's population speaks more than one language, thus researchers have been studying the effect of these languages in the human brain. The brain of a bilingual person needs to have control to access the correct language according to the context, in order to avoid interference between the two languages.

The language hypothesis model presents the theory that tries to point out when language control is necessary and when both languages are accessed. According to this theory, our L1 is always activated in the brain, but the closer the context gets to a bilingual language, the more the L2 (second language) starts to be activated and therefore needs more control between languages to avoid interference.

Previous studies have shown that cognates, defined as words that have similar spelling and meaning in different languages, are processed more quickly in bilingual brains than in monolingual brains. That is, the more similar the word is in the two or more languages the more easily it will be accessed in the mental lexicon. Lexical access is the process responsible for the choice of words in our brain.

One of the main issues researched by many scientists is whether bilingual or multilingual people have a mental lexicon for each language spoken or just a lexicon in which it is not possible to separate the languages and their possible interference with each other. The majority of the evidence gathered by the literature favors the view of a shared lexicon among the languages.

In the present study it was investigated the effect of Portuguese - English cognates in a language decision task.

2 LITERATURE REVIEW

2.1 Cognates

Cognates are words that have an important role in the understanding of one or more languages, mainly in the present time when the bilingual phenomenon has reached an increasing number of people around the world. In order to understand what cognates are, we have the definition given by some researchers, for example the following concept by SZUBKO-SITAREK (2011, as cited in TOASSI, 2016) which says: “Cognates are words with similar forms and meanings and can be present between two or more languages”. Additionaly, the origin of cognates can be explained through language borrowing between different languages (SZUBKO-SITAREK, 2011 as cited in TOASSI, 2016). However, the origin and epistemology of cognates is not very important for Linguistics, in studies carried out in recent years, the main focus is on the effect that these similar words have in the brain of a bilingual person.

Regarding cognate words, a great amount of studies have been carried out in order to study the relationship of cognates as facilitating agents in understanding a second language (L2) and their relationship to the mother tongue (L1) in the fields of word recognition and production. This facilitation has been known as the cognate facilitation effect. According to (BILOUSHCHENKO, 2017) this is the concept of cognate facilitation effect: “A cognate facilitation effect indicates that the words of a bilingual’s two languages are not stored in separate ‘bins’ of long-term memory but are interconnected in a single mental lexicon.”

According to Poort and Rodd (2017), cognates are processed faster than words that only exist in one language, thus demonstrating that because they are similar, the cognate facilitation effect acts on the bilingual brain, facilitating the understanding of a second language.

This effect happens because their rapid production, translation and recognition are related to their representations or forms at the levels: phonological, orthographic and morphological, for example, which are activated in both languages, as mentioned by SZUBKO-SITAREK (2011). This means that the more similar the word the faster it will be recognized in a lexical decision task.

Therefore, through these initial concepts of cognates, it can be discussed in the next topics how cognates act on the mental lexicon and how experimental studies applying the lexical decision task have shown positive results to the cognate facilitation effect. The evidence presented by these studies can help elucidate the processes that underlie the use of two or more

languages. In the next section, concepts and processes about the mental lexicon will be discussed.

2.2 Mental Lexicon and Lexical Access

Understanding the concept of mental lexicon is indispensable when we discuss the effects of cognates on the bilingual brain, because it is through this definition that we can analyze how the recognition and production of a word happens in an experiment.

According to Kroll and De Groot, (2009) "The mental lexicon is the database containing all words in the mind of the language user." Toassi (2016) claims that "The mental lexicon also stores a great amount of information for each word in all language aspects: syntax, semantics, phonology." That is, it is able not only to perform a word decoding but also to understand a word at more complex levels of language.

Lexical access, which for Toassi (2016) means "the search for a word, or for the match of a word and its correspondent meaning" can occur in an effective and automatic way most of the time, however many variables can interfere in this process, (eg: the proficiency of the speaker, similarity between languages among others).

There is no consensus among researchers on how the mental lexicon works, whether bilingual people have different lexicons for each language or whether there is only one lexicon with which the two languages (or more) are interconnected. As stated Toassi (2016):

> "Lexical access has since long intrigued researchers, mainly regarding the organization and processing of bilinguals – there seems to be no consensus regarding the organization and processing of the mental lexicon for L1 and L2. Li (2009) claims that the issue of representation of the mental lexicon for bilinguals has been highly controversial, since there is no answer to the existence of a single lexicon or a shared lexical storage."

There are many hypotheses and models with different perspectives in order to clarify how lexical access occurs. Some authors believe that there are separate lexicons for each language within the human brain and that they do not integrate, on the other hand, other researchers believe that a single mental lexicon is responsible for recognizing a word and accessing it in the brain and lastly, there is also the possibility of separated but interconnected lexicons to access the languages spoken by a bilingual or multilingual (TOASSI, 2016).

Thus, it is essential to understand the discussions about the mental lexicon so that it is possible to comprehend some of the processes involved in the decision making process involved in the experiment carried out in the present study. In the next section, some studies involving cognates and lexical access will be presented.

2.3 Experimental studies with cognate words

Several studies have been carried out in the area of Second Language Acquisition (SLA) with cognate as their stimuli. Toassi (2016) carried out a study with 56 participants speaking German, Portuguese and English. The research had three objectives, the first was to analyze how cognates would facilitate the understanding of English as a target language, the second was to investigate the relationship between cognates in English, Portuguese and German and their lexical processes and finally the last was to analyze whether there are differences in the semantic priming effect of the three languages. There were three experiments in the study: 1) experiment with eye tracking to analyze the understanding of sentences that contained cognates in English, German and Portuguese. 2) A language production experiment that consisted of presenting pictures that contained cognates in the three languages for participants to narrate a story, and 3) a picture naming task with a cross-language priming paradigm. The results of study 1 showed that triple cognates facilitated the understanding of sentences. These results also showed that there was evidence for non-selective lexical access, as well as a shared storage for the three languages in an integrative way.

The experimental study by Barcelos (2016) sought to analyze the influence of an L1 (Portuguese) and L2 (English) on an L3 (French) on the lexical access of trilingual speakers. The experiment had 26 Portuguese, English and French speaking trilingual participants who had to perform lexical decision tasks composed of 1) stimuli in French, which were cognate in Portuguese and English or both, 2) interlingual homographs in the same way as the cognates. The results of the research showed that there was non-selective lexical access, However, there was no facilitating effect of cognates between the three languages, nor was it possible to observe this facilitation in reaction times (RTs). Showing that the experiments and their results are debatable and are not always able to affirm the expected hypotheses.

There are also experiments in the field of bilingual lexicon and oral production. Rodrigues (2018) carried out a study which focused on a picture naming task to investigate lexical access and oral production in bilingual Portuguese-Spanish and Portuguese-English speakers. The task was carried out with 26 bilingual participants who made the nominations of the pictures divided into 60 nominations in L1 and 60 nominations in L2, totalizing 120 nominations. The central objective, which is important for the discussion of the present study, was to analyze the production of speech, as well as lexical access in participants of the first group composed of Portuguese-Spanish speakers and the second group with Portuguese-

English speakers. The observation of reaction times during the naming of images was carried out to identify the effects of linguistic similarity in the mental lexicon and whether or not there is an exchange between the languages of the participants. The results showed that the bilinguals responded faster and obtained more correct answers when the cognate words were present, showing the occurrence of the cognate effect. However, it was not possible to state that there was a linguistic similarity between the three languages in the experiment.

Otwinowska (2017) carried out an experiment to translate cognates and false cognates in order to analyze the factors that determine knowledge about an L2. He conducted an experiment with participants who had Polish as L1 and English as L2. The study involved 150 participants aged between 20 and 25, with 99 females from the University of Warsaw, Poland. Participants were presented with a list of 105 words in English, with 35 Polish-English cognate words, 35 Polish-English false cognates and 35 non-cognate control English words. Participants were given a list of 105 words and had to write their respective translations and had to indicate the confidence level they had when translating each word on a scale of 1 - 4 (1 - I'm guessing; 2 - I think it might be so; 3 - I'm quite sure; 4 - I know for sure). The confidence scale was used to analyze the possible word guessing effect during the experiment. The results showed that the translation of cognates was better than false cognates in relation to the non-cognate control words. Furthermore, it also showed that the phenomenon of cross-linguistic formal similarity affects L2 word learnability, making it possible to observe a mechanism in which these words are acquired by bilingual speakers.

3 METHODOLOGY

The present study aimed at the development of an experiment in the software PsyToolkit (STOET, 2010, 2017), in which it was possible to collect reaction time data of five (5) participants who performed a language decision task. The task contained Portuguese-English cognates and their respective control words.

In addition, Google Forms was also used as a tool to gather data regarding participants' profile and to present participants to the Consent Form (CAAE: 33969320.8.0000.5054). The present study was divided into four stages:

1st: The first part of the experimental session of the present study consisted in the presentation of the Consent Form to participants through Google Forms. After reading it and clarifying doubts, if they agreed to it, they could follow to the next part.

2nd: The second part of the experimental session consisted in participants filling in a questionnaire, also on Google Forms. This questionnaire contained 22 multiple choice or short answer questions aimed at gathering data regarding participants' profile, including contact information and their language history background.

3rd: The third part of the experimental session contained a link for participants to access the language decision task on Psytoolkit. In this experiment, participants saw words in the center on the computer and had to decide as fast as accurately as possible if the presented word belonged to English or Portuguese. Before starting actual data collection, participants had a practice session in order to get familiar with the procedures of the task. In this practice session, 10 words were presented. After that, participants performed the same procedure for data collection, in which 133 words were presented, one at a time.

In order to certify participants' knowledge of English, a vocabulary test was performed, through a link informed by the researcher (http://www.itt-leipzig.de/static/vltenglish_01r/index.html). In this test participants had to match 150 words to their definitions. The test consists of five levels, starting with the 1000 most frequent English words and ending with the 5000 most frequent English words. The test has to be done in a maximal time of 30 minutes. The result is made available immediately after its conclusion. The participant had to save this result as a pdf file or make a print of the computer screen and send it to the researcher.

3.1 Participants

The present study was carried out with five participants, being 4 female and 1 male. All of them were or had been an undergraduate student at the Federal University of Ceara, one was an Economic Sciences student, one was a Psychology student, one was an Oceanography student, one was an Agronomy student, and one was an Accounting Sciences student.

Participants' age ranged from 22 to 24 years old. Four of them had their undergraduate course incomplete and one of them had completed it.

All of them spoke Portuguese as their native language and studied English as a second language. 50% studied English for more than two Years, 33,3% studied for until one year and 16,7% studied for up to six months.

83,3% of the participants reported having learned English through language course. 50% of them estimated their level of English as 3, on a scale that ranged from 0 to 10.

3.2 The corpus

In order to carry out the language decision task of the present study it was necessary to make a selection process of the cognate and control words that would be used. For the English words, the Corpus of Contemporary American English – COCA (DAVIES, 2008) was used. For the Portuguese words, the Léxico do Português Brasileiro – LexPorBR was used. Both were essential to provide information regarding word frequency and to look for control words which matched the cognates in number of letters, frequency and grammatical class (all of the selected words were nouns).

In order to collect reaction time data and observe which word condition was processed faster, the words were divided into the following four conditions:

- ✓ ci (cognate in English),
- ✓ cti (control in English),
- ✓ cp (cognate in Portuguese),
- ✓ ctp (control in Portuguese).

Table 1 shows the 133 words presented to participants in the experiment, which were divided into 2 blocks.

Table 1

Stimuli of the language decision task

cp	**ci**	**ctp**	**cti**
acadêmico	academic	amanhã	amendment
acesso	accident	anseio	answer
acidente	acess	bolsa	baker
alarme	activities	caderno	bonds
apartamento	actor	caminho	childhood
atividades	alarm	carteira	corner
ator	apartment	cliente	countryside
autor	author	clima	cuffs
blusa	calendar	compromisso	effort
calendário	confusion	corpo	employtment
confusão	drug	corregedoria	holidays

droga	effects	correria	issue
efeitos	electricity	criança	lips
eletricidade	exam	desempenho	listen
exame	fruit	dúvida	meetings
fruta	galaxy	esperança	month
galáxia	insect	estilo	pathway
inseto	instruction	finalidade	purposes
instrução	melon	fluxo	reading
melão	memory	índole	screen
memória	minute	início	season
minuto	music	liberdade	shrubs
música	palace	linha	skills
palácio	panic	lousa	stars
pânico	plant	medo	steering
planta	protector	palavras	stone
protetor	region	pessoa	streaming
região	revision	pressa	thighs
revisão	series	primo	throughout
série	television	receio	underground
televisão	tractor	registro	woods
trator	union	sabedoria	worm
união	universe	volante	writings
universo			

Source: Own authorship

Table 2 presents the stimuli used in the training session.

Table 2

Stimuli presented in the training session

vida
religion
compreensão

lâmpada
lake
moon
music
precisão
juventude
air

Source: Own authorship

It can be seen in Table 2 the words that were used as the stimuli to the training session of the experiment. These words were also divided according to the experimental conditions preciously mentioned and with the number of letters.

3.3 The experiment

The experiment consisted of the presentation of 133 words including the four conditions previously mentioned – ci, cti, cp, ctp. In addition, 10 words were presented to participants in the training session.

The procedure occurred as the following. When participants access the link of the experiment, they were directed to the task on PsyToolKit (STOET, 2010, 2017), in which they saw a greeting image, which contained the first instruction of the experiment.

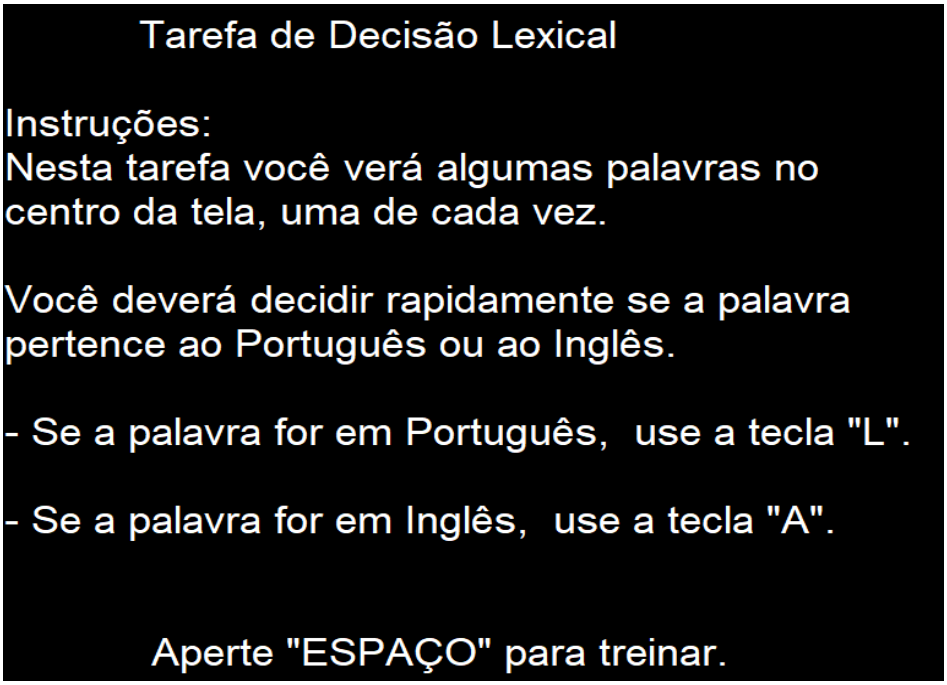

Image 1: Welcome screen.

Source: Own authorship

It can be seen in Image 1 that the instruction provided to participants for the language decision task is that they should press the key “L” when they saw a word in Portuguese and the key A when the word presented was in English.

In the following image we present the fixation cross which was presented in the initial screen, in a speed of 500 milliseconds, before each stimuli.

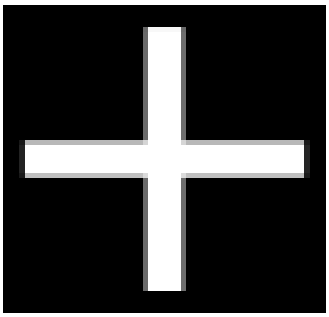

Image 2: Fixation cross.

Source: Own authorship

In the following image it can be observed how the stimuli were presented on screen. It is important to mention that They were presented in the center of the screen and in a random order for each of the participants

Image 3: Example stimuli.

Source: Own authorship

It i also worth mentioning that the stimuli were divided into 2 blocks, the first one containing 66 words and the second one 67 words. Between those two blocks participants had a break to be able to relax a little. When they returned they saw the instructions again.

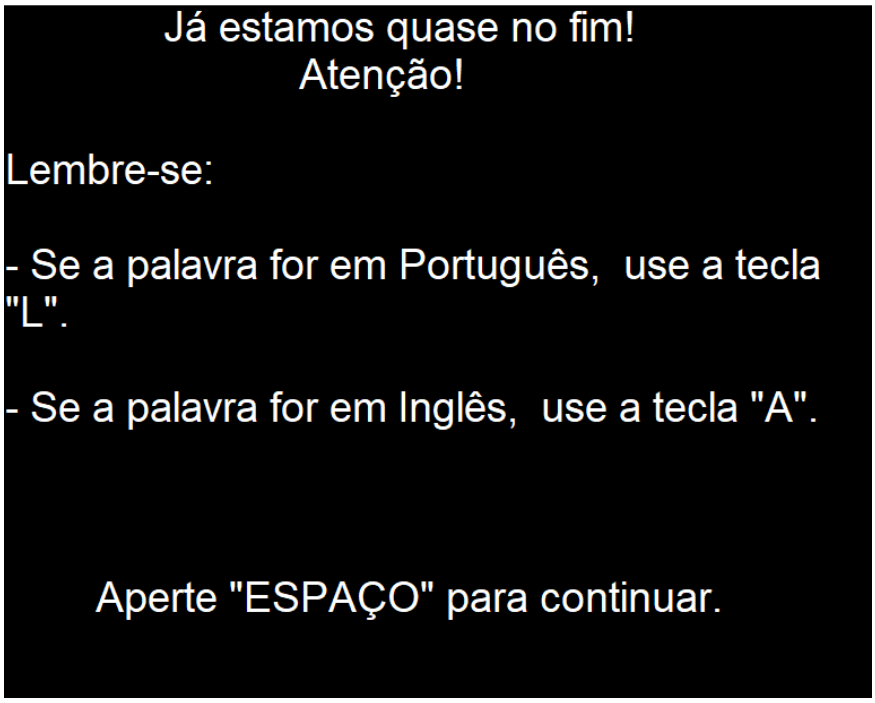

Image 4: Instructions for block 2.

Source: Own authorship

A final thanking image was presented at the end of the experiment.

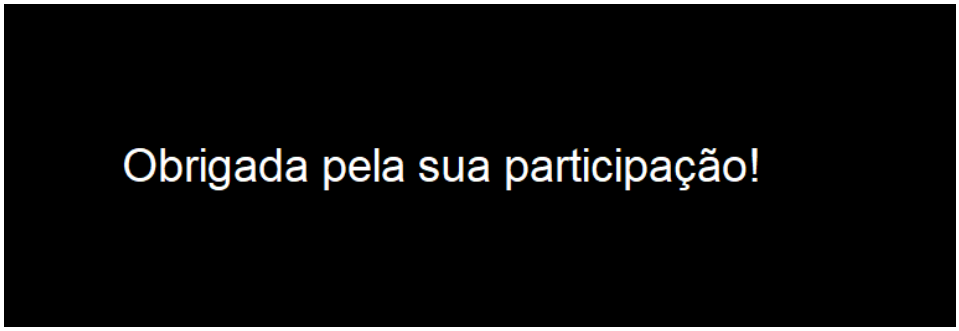

Image 5: Final image.

Source: Own authorship

After that, participants performed the vocabulary test. This test lasted up to 30 minutes, which were controlled by the website. The test belongs to the Institute of Test Research and Test Development of the University of Leipzig, in Germany, which provides vocabulary tests in different languages.

Image 6: Vocabulary tests.

Source: https://itt-leipzig.de/about-the-vocabulary-tests-2/?lang=en

In the receptive vocabulary test, participants had to look at the description of a word and choose the one that best fit its meaning.

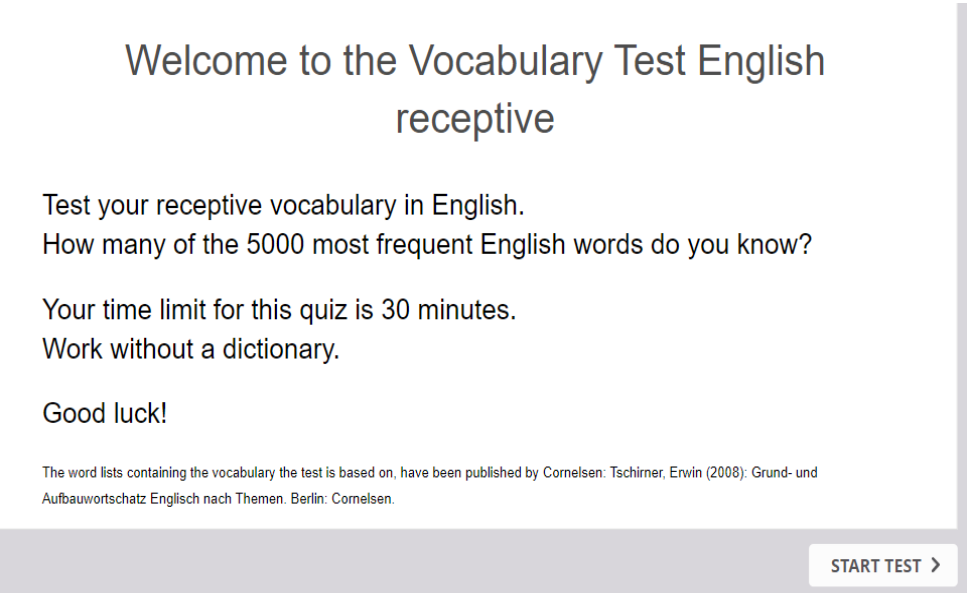

Image 7: Welcome screen of the vocabulary test.

Source: https://itt-leipzig.de/about-the-vocabulary-tests-2/?lang=en

4 RESULTS

Table 1 shows the descriptive statistics of data collected considering the three experimental conditions for the group of participants: ci (cognate in english), cti (Control in english) cp (Cognate in portuguese), and cti (control in english). The results were analyzed through the measure of reaction time (RT).

Table 3
Descriptive statistics of RT

Condition	**ci**	**cp**	**cti**	**ctp**
Mean	773,7	739,6	695,08	729,89
SD	281,62	229,38	248,48	212,38
Median	694	677,5	644	685
Minimum	429	451	365	451
Maximum	1952	1971	2558	2174
Range	1523	1520	2193	1723

Source: Own authorship

Regarding the conditions, Table 3 shows that the results of the mean RT was lower for the cti (control in English) condition. In addition to that, the values of minimum and median seem to follow the same pattern. The maximum and range value showed the opposite, being higher values for the cti condition than those mentioned before.

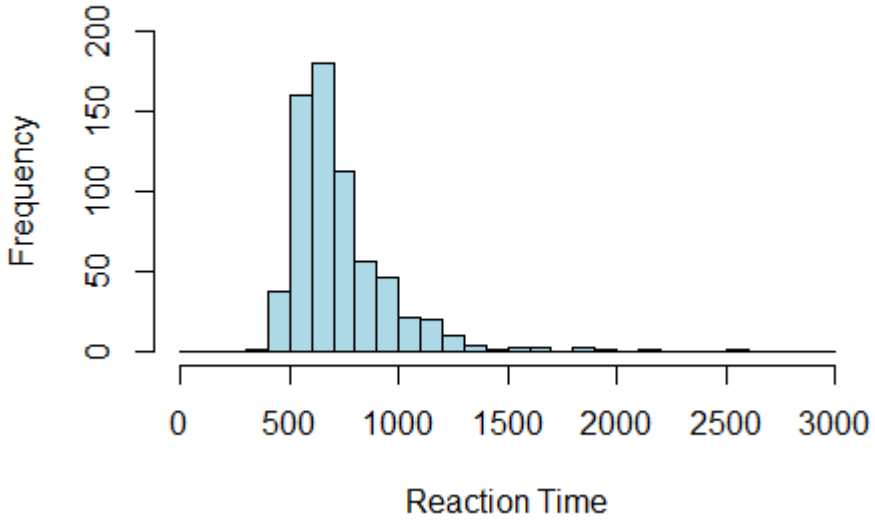

Figure 1: Histogram of Reaction time

Source: Own authorship

Figure 1 shows a histogram of RT. The histogram is a bar graph used to represent continuous variable data, allowing you to get an idea of how these data are distributed, i.e. their behavior. The histogram presented in Figure 1 shows that most answers ranged from 500 to 1000ms.

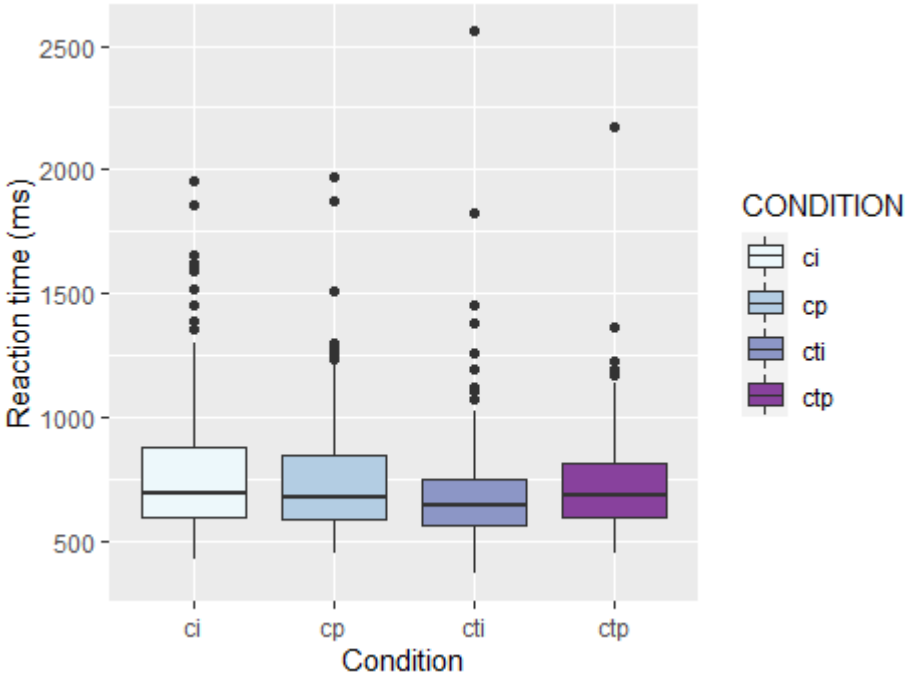

Figure 2: Boxplot of Reaction time vs Condition

Source: Own authorship

Figure 2 shows a boxplot of RT versus condition. The bloxpot aims to provide information about the characteristics of data relating to location and dispersion, In the bloxpot 4 regions are presented which: 1st quartile, 2nd, 3rd and 4th quartile. The 2nd and 3rd quartile are represented inside the box; the line in the middle of the box is the median. The several dots presented above the boxplot are the outliers.

According to the boxplot presented in Figure 2 it can be seen that the cti condition was indeed the one with the shorter RT. A possible explanation for this result would be that participants expected to perform a task in English, therefore, their English language was more activated than the mother tongue, causing a facilitation in processing, reflected in a shorter RT.

Regarding the answers of participants for the language the words belonged, they had a high accuracy in all the conditions. The analysis of the results showed that participants answered correctly for the control condition 99,39% of the time. More specifically, in only 2 trials out of 330 participants chose the incorrect language for the control words.

Participants' accuracy was also very high when the answers for cognate words were analyzed. For the condition ci, accuracy was 95, 73% (157 correct, 7 incorrect) and for the condition cp it was 97,06% (165 correct, 5 incorrect).

5 CONCLUSION

The participants had shorter reaction times with the control words in English, possibly due to an expectation for the experiment to be in the English language. When the words were cognates English-Portuguese and controls in Portuguese there was a conflict in the language decision process and therefore a longer reaction time.

The results of this experiment are in agreement with the ones of Gadelha (2021), in which participants performed a similar task with interlingual homographs between English and Portuguese and were also faster for the English control words than for the Portuguese control words.

This experiment also showed that the cognate facilitation effect is not evident in a word recognition task as the one applied in the present study. In short, it can be said that it is necessary to conduct this experiment with a larger number of participants in order to strengthen this discussion.

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