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SCHREYER HONORS COLLEGE

DEPARTMENT OF SPANISH, ITALIAN, AND PORTUGUESE

DO COGNATES FACILITATE THE PROCESSING OF CODESWITCHED SENTENCES?

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SPRING 2016

A thesis
submitted in partial fulfillment
of the requirements
for baccalaureate degrees
in Industrial Engineering and Spanish
with honors in Spanish

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ABSTRACT

Codeswitching is a linguistic phenomenon in which a speaker seamlessly alternates between two different languages in a single discourse. Codeswitching has been perceived by some as a degeneration of language. However, studies have shown that codeswitching actually demonstrates an advanced command of both languages. As more research was performed, evidence of some switch cost was suggested; that is, there is a processing delay at the language switch point. Some studies have shown that there may be ways to mitigate these costs. It is thought that more frequent switches are easier for comprehenders to process.

The present study investigated whether cognate words could potentially mitigate these switch costs. Because cognates are words that are similar or identical in both languages, it is believed that cognates make both lexicons more readily available, enabling the brain to switch more rapidly between the two languages. Additionally, the perceived frequency of these words is higher than that of non-cognate words. These features may make processing the language easier and faster.

In this study I compared different types of sentences to determine whether readers were able to process codeswitched sentences more quickly by virtue of encountering a cognate verb directly before the switch. An eye-tracking device was used to measure the fixations of participants' eye as they read the sentences. I predicted that sentences with a cognate verb directly before the switch would be easier for the reader to process than those with a non-cognate verb before the switch.

The findings showed that cognate verbs did not have an effect on the processing of codeswitched sentences. In fact, results demonstrated that participants were actually able to read codeswitched sentences more quickly than non-codeswitched sentences, regardless of whether the predicate was preceded by a cognate or non-cognate. It was also interesting to find that there was no evidence of the cognate facilitation effect.

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ACKNOWLEDGEMENTS

Le doy mil gracias a Professor Giuli Dussias. You are one of the most dedicated people I have ever met and I'm so grateful to have had the privilege of working with you. I've seen first hand the long hours you put into making sure my experiment and the research of all your other students is on track. I have learned so much about Spanish, linguistics, and the research process over the past year. Your tireless work ethic is amazing. Thank you so much for investing your time in me as a student.

Special thanks go to Lauren Perrotti for teaching me how to use the eye tracker, extract data, and write scripts in R. Our video calls always left me feeling much better about the data analysis process and I could not have obtained these results without you!

Thank you to Anne Beatty-Martinez for sharing participants with me; it made participant recruitment and language proficiency analysis so much easier!

Thank you to my parents for pushing me and encouraging me throughout my entire academic career. I would not be who I am today without the value of hard work you have instilled in me. Your support in all of my endeavors means so much.

Thank you to Nigel Corea for steering me towards this research and for always encouraging me to do my best.

Thank you to my best friend and roommate, Erika Ann Arrojado, for figuring out the best way to word the tricky section about my experimental conditions. You're wonderful!

This research was funded through the Erikson Discovery Grant and the College of Liberal Arts Enrichment Award. I'm very grateful to have received these two generous grants.

Chapter 1

Introduction

Definition of Codeswitching

There is a broad range of speech alternation that can be classified as codeswitching. In its most basic definition, codeswitching is the ability for a bilingual speaker to seamlessly alternate between two different languages within a single discourse, sentence or constituent (Poplack 1982). Codeswitching is also an overarching term that accounts for both intra-sentential and inter-sentential codeswitching, both of which are explained below (see page 3). Not all linguists define codeswitching in the same way; in fact there are several definitions that I will discuss. For example, Toribio (2001) explained codeswitching as “the ability on the part of bilinguals to alternate between their linguistic codes in the same conversational event.” Put another way “codeswitching is an individual phenomenon wherein the speaker chooses when, why, and how to alternate between languages” (Bullock & Toribio, 2009, p. 6).

Codeswitching is not the only linguistic phenomenon that can occur when more than one language is present in a speech community. Another possible circumstance is diglossia, when various languages are compartmentalized into different aspects of society. In situations of diglossia, usually the two languages or language varieties are used for two completely different purposes. One example of diglossia can be found in Paraguay where the two official languages are modern-Spanish and the indigenous language Guaraní. Although both of these languages are taught in school, they are spoken in different contexts. Spanish is typically spoken in official and

institutional contexts while Guaraní is used in more informal contexts. Another example of diglossia is visible in most Arabic-speaking countries. In school children are taught the formal or “high” variety of the language called Modern Standard Arabic (MSA). This variety is used in literature and for formal occasions. Arabic speakers also learn a particular colloquial or “low” variety of the language from their region. This can be described as diglossia because the language community has two languages or varieties to choose from. Diglossia is different from codeswitching because the two languages are not inter-mixed together (Bullock & Toribio, 6).

There have been many misconceptions surrounding codeswitching and bilingualism. Codeswitching is perceived by some as a degeneration in language skills (Lance, 1975). One of the possible reasons for this misconception is in part due to the idea that codeswitching was thought of as reflecting semilingualism. This phenomenon is an underdeveloped form of bilingualism where the speaker does not know either of his languages “well enough to sustain the advanced cognitive processes which enable them to benefit from mainstream education” (Milroy & Muysken, 1995, pg. 3).

Another possible reason for the misconception may stem from the general public’s view of prescriptive and descriptive grammar. Prescriptive grammar is the mandated way that language “should be” used. When someone speaks in a manner that does not follow prescribed grammar, they are perceived as having “bad grammar.” Stigma is often attached to a speaker who uses incorrect or informal grammar or by simply speaking in a different dialect or accent that is not fully understood by the rest of the speakers in the area. Descriptive grammar, on the other hand, is the objective lens that linguists use to look at language; it is simply a description of how speakers are unconsciously using the language. Linguists use this description to study and classify language.

As a result of many more studies over the years, codeswitching is no longer accepted as a language deficit. Rather, the ability to codeswitch displays a strong grasp of both languages because we now know that codeswitching is rule governed. Furthermore, codeswitching can be viewed as an additional resource for speakers to express various social and rhetorical meanings (Gumperz, 1982a, 1982b).

Types of Codeswitching: Inter- and Intra-sentential

Linguists classify codeswitches into two categories: intra-sentential and inter-sentential. Intra-sentential codeswitching entails a language switch within the sentence, such as in example (1). Inter-sentential codeswitching occurs when the language switch occurs at clause boundaries, such as in example (2).

(1) **Mi padre está** *cooking in the kitchen.*

‘My father is’

(2) *¿Cómo está tu hermana?* I heard that she was ill.

‘How is your sister?’

Codeswitching research mainly focuses on the intra-sentential type. This type of codeswitching is more interesting to study because the speaker actually integrates the two languages together, carefully adhering to grammar rules in both languages (Backus, 1992). There are only certain places where codeswitching is allowed to take place within the same sentence, but an exact set of rules has not yet been determined. Below I will discuss work that has tried to capture what these rules or constraints are.

Constraints of Codeswitching

A bilingual conversation involving codeswitching may seem abrupt and random to a passerby. The listener may think that bilinguals can switch at any moment and at any point during speech. However, that is not the case. Various studies have shown that codeswitching is not random and cannot occur just anywhere in speech. In fact, there are several constraints that seem to describe where codeswitching is allowed to occur. There are core principles that govern whether or not a sentence would be naturally produced or accepted as a codeswitch. Researchers Bhatia and Ritchie (1996) explained that it is not a matter of determining *if* codeswitched language has constraints, but *what* those constraints are and how they can be applied to deeper understanding of human language. It is hard to predict at what point in a sentence the bilingual speaker will make the switch from one language to the other. This is because codeswitching has many social, psychological, and situational factors. What linguists do know is that for Spanish-English codeswitching, the following examples reflect bilinguals' intuitions about what are acceptable and unacceptable codeswitches: (Appel & Muysken, 1989, pg. 122):

Potential switch points:

(1) Between a head noun and a relative clause

(a) ...friends from Mexico *que tienen chamaquitas* (that have little children)

(2) Between a subject and a predicate in a copular construction

(a) My uncle Sam *es el más agabachado* (is the most Americanized)

(3) Subject and object pronouns must be in the same language as the main verb

(a) Unacceptable: *Yo* (I) went

(4) An auxiliary and a main verb, or a main verb and an infinitive must be in the same language

(a) Unacceptable: they want *a venir* (to come)

(5) It is difficult to switch inside a prepositional phrase

(a) in *la casa* (the house)

(6) It is impossible to switch between the article and the noun

(a) Unacceptable: I see the *casa* (house)

Linguists have tried to capture what is possible and impossible for codeswitching by proposing constraints divided into classes, each of which I explain in turn below. Defining a constraint that encompasses all constraints is extremely difficult and currently there is not one type of constraint that works perfectly in all cases.

A. Linear Constraints

Linear constraints are based on the idea that codeswitching usually occurs when there is linearity between the two languages. However, often times English and Spanish use different syntax to express the same meaning. For example, noun-adjective order is switched in the two languages as shown in (7) and certain grammatical pieces, such as “the personal *a*,” that exist in Spanish do not exist in English, and vice versa.

(7) (a) *Elena tiene un coche rojo.* S V O Adj

“Elena has a car-red.”

(b) Elena has a red car. S V Adj O

The central claim of linear constraints is that codeswitching would be less likely to occur in these contexts because the linear word order of the two languages does not match. The two linear constraints that I discuss below are the Equivalence Constraint and Free Morpheme Constraints.

1. The Equivalence Constraint

The Equivalence Constraint states, “Codes will tend to be switched at points where the surface structures of the languages map onto each other” (Poplack 1981). This constraint pertains to what can and cannot be done across words. Generally, if the word order requirements are maintained at surface level in both languages, then codeswitching is allowed to take place. For example, the equivalence constraint correctly predicts that the switch in (7) is not allowed because it breaks the rules of word order.

(7) *told *le*, *le* told, him *dije*, *dije* him

told to-him, to-him I-told, him I-told, I-told him

“(I) told him.”

(Poplack 1981:176)

Spanish expresses “le dije” with word order IO(Indirect Object) - S(subject)- V(verb), whereas English expresses the same concept as “I told him” with S-V-IO word order.

Although the equivalence constraint does correctly predict the case above, it does not account for the full range of codeswitching scenarios. A counterexample is shown in below in (8). Although the word order is the same in both the Spanish and English formations, (8b) is not an acceptable codeswitch because it takes place between an auxiliary verb.

(8) (a.) The students *habían visto la película italiana*.

(b.) *The students had *visto la película italiana*.

“The students had seen the Italian movie.”

(Belazi, Rubin & Toribio, 1994)

2. The Free Morpheme Constraint

The Free Morpheme Constraint states, “A switch may occur at any point in the discourse at which it is possible to make a surface constituent cut and still retain a free morpheme” (Poplack 1981). This constraint pertains to what can and cannot be done inside of a word. A morpheme is a meaningful morphological unit of a language that cannot be further divided that can either be free or bound. Free morphemes are those that can stand alone and are found by themselves. Root words such as “comer,” the Spanish word meaning “to eat,” are examples of free morphemes. Bound morphemes are those that can never be found alone; they must always be affixed to a free morpheme. For example, “-iendo,” the present progressive verb form (“-ing” in English), is an affix that can be added to the verb “comer” to form a new verb tense of the word. To form new words, affixes are added to roots or free morphemes. For example:

- (9) (a.) Eat (root) + -ing (progressive form) → Eat-ing
 (b.) Com (root) + -iendo (progressive form) → com-iendo

According to the free morpheme constraint, codeswitching is not permitted between a free morpheme and a bound morpheme. Example (10) provides an example of a disallowed codeswitch. The sentence switches in the middle of the word, between a free morpheme, “eat,” and a bound morpheme, “-iendo.”

- (10) **estoy eat-iendo*

I-am eat-ing

(Poplack, 1980, pg. 586)

Poplack argues that items that have been phonologically integrated into the language are not codeswitches, but rather are borrowings (Sankoff & Poplack, 1981:5). Therefore, these types of words do not contradict the Free Morpheme Constraint.

(11) (a.) NP → DET N_{sp:n} Adj_{sp:adj}

(b.) el teipe rojo

“the red tape”

B. Hierarchical Constraints

The other category of constraints is referred to as hierarchical. These constraints target different types of words and have opposite predictions.

Before discussing the constraints, I will explain the two classes of words, open class and closed class words. Open class words contain words such as nouns and verbs, whose significance pertain to the real world we live in. Because of the constant changing of our world, with new inventions and new terms, more words can always be added to this class of words. (For example a new invention would receive a name, or a new technique such as “to Google” would be added as well.) Closed class words are words such as articles, conjunctions, determiners, prepositions, etc. They are the connecting pieces of sentences and only have grammatical significance. New words are not typically added to this class, as all of the words needed to describe these grammatical instances already exist.

The hierarchical constraints described below invoke the difference between open class and closed class words. As will be shown, these constraints sometimes make opposing

predictions. This is curious because the two different constraints discussed below are attempting to describe the same data set.

1. The Government Constraint

The Government Constraint states that codeswitched boundaries have an anti-government requirement. Government is defined in the following terms:

- (12) X governs Y if the first node dominating X also dominates Y, where X is a major category N (noun), V (verb), A (adjective), P (preposition) and no maximal boundary intervenes between X and Y.

Di Sciullo et al. (1986) then proposed the following as a condition on lexical insertion:

- (13) If X governs Y, ... X_q ... Y_q ...

Using the above definition of government, The Government Constraint is defined as:

- (a.) If L_q carrier has index q, then Y^{\max}_q .
- (b.) In a maximal projection Y^{\max} , the L_q carrier is the lexical element that asymmetrically c-commands the other lexical elements or terminal phase nodes dominated by Y^{\max} .

This suggests that the language of the head determines the syntax of its maximal projection and that the two categories must be in the same language if the government relation holds between

them (Di Sciullo et al. 1986). For example, this constraint would not allow a code-switch between a verb and its direct object.

However, there are many examples that suggest that the Government Constraint makes incorrect predictions. The Government Constraint predicts that a verb or preposition must be in the same language as its object. In example (14) we see that this does not hold true.

(14) This morning *mi hermano y yo fuimos a comprar* some milk.

‘This morning my brother and I went to buy some milk.’ (Di Sciullo et al. 1986)

In (14), the verb “comprar” is the governor because as a verb, it is one of the major governing categories defined in the definition of the Government Constraint. Therefore, the constraint dictates that the governee, the direct object of this verb, must be in the same language as the governor. According to the government constraint, example (14) would not be permissible since the direct object, “some milk,” is in English but follows a Spanish verb, “compar.” However, this example was taken from actual discourse, proving that bilinguals in reality do speak in a way that does not comply with the constraint.

2. The Functional Head Constraint

The Functional Head Constraint states, “The language feature of the complement f-selected by a functional head, like all other relevant features, must match the corresponding feature of that functional head” (Belazi et al. 1994).

Functional heads are words that have a grammatical role in the sentence (for example, some closed class words). Some examples of functional heads and their complements are: Verb

and Complementizer Phrase, Determiner and Noun Phrase, Quantifier and Noun Phrase, and Negation and Verb Phrase. For example, a complementizer (such as the word “that”) is a functional head because its grammatical role is to link together two clauses, one independent and one dependent.

The Functional Head Constraint predicts that there is no language switching between the functional head and its complement. According to this constraint, the language switch that occurs in (15a) would not be allowed because “*que*” is a functional head since it joins two clauses. In order to be acceptable according to this constraint, the clause that follows must be in the same language as the complementizer “*que*.” Example (15b) should be deemed acceptable by the Functional Head Constraint since the clause that follows the complementizer remains in the same language.

- (15) (a.) *Mi hermano dijo que* his friend...
 My brother said that his friend...’
- (b.) *Mi hermano dijo* that his friend...
 ‘My brother said that his friend...’

Like the constraints previously mentioned, predictions of the Functional Head Constraint do not work in all situations found in real world practice. Real bilinguals do codeswitch between the complementizer and direct object. One specific counterexample noted by Mahootian and Santorini (1996) is shown below:

- (16) I seen everything ’cause **no cogí na**’.
 ‘I saw everything because not took nothing.’

‘I saw everything because I didn’t take anything.’

This example taken from an actual Spanish-English bilingual would not be predicted by the Functional Head Constraint. In this case, “because” (‘cause) is a functional head joining two clauses; however, the language switch occurs afterward which means that the complement is not in the same language as the functional head. It can be noted that the Functional Head Constraint does allow switches between the verb and direct object since verbs are not functional heads.

From this section describing four different constraints, we can see that there have been many attempts capture when codeswitching is possible or impossible. None of these constraints works in every case. Clearly it is very difficult to propose a constraint that accounts for all of the data, so perhaps it is more fruitful to look at how different languages interact and use those findings to predict when codeswitching will occur.

Distinguishing Codeswitching from Borrowing

Codeswitching can often be confused with borrowing since both linguistic phenomena can involve using words in two different languages in the same discourse. This section attempts to distinguish the two.

Lexical borrowing is the process whereby words from a lending language become entrenched as conventional words in the receiving lexicon (Backus & Dorleijn, 2009). It is hard to differentiate “new” codeswitches from “established” loan words that have been around for a long time. Because of this, borrowing tends to not be accepted as codeswitching since borrowing can describe many different forms of language use. These borrowed words or grammar pieces are derived components from another source language and are integrated into the host language

if the speaker adapts the borrowed word both phonologically and morphologically. Often times the speaker does not even know that this word has been borrowed from another language because it has been adopted and used for a very long time. For example, in Venezuela the English word “tape” has been integrated into the Spanish language by creating a more Spanish form of the word, “*teipe*.” This new morphology and phonology of the word tries to mimic the English phonology of “tape.” The addition of the “e” on the end of the word is what creates a more Spanish phonology since Spanish words do not end with the [p] sound. These adjustments fully integrate it into the Spanish language so speakers are not codeswitching when they use this term in their dialogue.

Although not all linguists agree on the exact definition of codeswitching, it is widely accepted that borrowing is not constituted as codeswitching since the speaker is not actually switching between two different languages in which they are fluent. Inserting single words from another language and using words to fill in language gaps are considered borrowing as well and therefore are not accepted as codeswitching because of the reasons above.

Why Bilinguals Codeswitch

All language speakers have the tendency to style shift in their speech. This means that depending on the audience, location, or situation, the speaker may slightly alter their way of speaking. This phenomenon is present in both monolingual and bilingual speakers. However, bilinguals have the additional ability to language shift, that is codeswitch. One interesting point is that bilingual speakers are not instructed on how to codeswitch. Through an extensive knowledge of both languages, their minds seem to intuitively determine when an appropriate

codeswitch can take place. Codeswitchers of the same languages agree that some sentences are acceptable while others are not acceptable (Toribio, 2001). As the level of proficiency increased, so did the response agreements among the participants. Clearly, there is agreement on the acceptability of the codeswitches, especially among more advanced speakers.

Codeswitching is not a speech error; bilinguals only codeswitch with other bilinguals who speak with the same two languages that they do and they do not accidentally speak the wrong language to someone. Although it has been shown that some speech errors are made in L2 during the learning stages of L2 due to the influence of L1 (Poulisse, 1999), errors made by skilled bilinguals are not frequent (Kroll, Dussias, Bogulski & Valdés Kroff, 2012).

There are many reasons why a bilingual may codeswitch while speaking or writing; I will explore several of those reasons below. Forgotten words, language-specific phrases, interviews, and certain situations that are best expressed in the other language all play a role in when a bilingual chooses to codeswitch. Some bilinguals state that they codeswitch more often when they are tired because it is the “easy way out” to use whichever word comes to mind first. Other times, they choose a word in the other language because they could not think of that word in the language they were just speaking. This is referred to as the “most available word” phenomenon (Grosjean, 1982). Basically the speaker chooses a word to express the same thought, just in a different language. Sridhar and Sridhar (1980) equate this decision to picking between synonyms within the same language.

According to John Gumperz, codeswitching can be divided into two categories: situational and conversational. Situational codeswitching depends on changes in the interlocutor, context, and topic which stem from diglossic distribution of the varieties. Conversational, also referred to as metaphorical, codeswitching depends on changes in variety without external

prompting. For example, two villagers in a Norwegian Social Security office may use Standard Norwegian to discuss business and then switch into the local variety to discuss their family and personal lives (Blom & Gumperz, 1972).

Codeswitching should also be looked at through a sociolinguistic lens. From this perspective, language behavior and use are related to the speaker's social identity. Sociolinguistic factors are responsible for the high variation of codeswitching among bilinguals since speakers tend to speak differently and vary codeswitching techniques based on the situation and people with whom they are conversing. The grammar used by different speech communities varies from the differing social surroundings.

There are three types sociolinguistic factors that contribute to whether or not a codeswitch will occur in a language contact situation. The first type is independent of the speaker or the surrounding circumstances; these may include prestige (Labov, 1972; Trudgill, 1974), power relations, and the specific way of life (Gal, 1979) of the person or the community. The second type relates directly to the speakers with regard to their competency in both languages, their social networks and relationships, their attitudes and beliefs, and perception of themselves and others (Milroy & Gordon, 2003). The third kind is related to the actual conversations in which codeswitching occurs; codeswitching is a conversational resource and allows speakers to express themselves in ways that monolinguals cannot (Auer, 1998). All of these factors are interrelated and useful in trying to determine patterns of codeswitching.

Some researchers have found that codeswitching is often used for intimacy, humor, bonding, and lessening directness (Gardner-Chloros & Finnis, 2004). Some bilinguals may choose to switch languages in order to make something sound more polite. It is difficult to list all the reasons as to why bilinguals codeswitch. This is partly due to the fact that observation and

research alter linguistic behavior (e.g., how people codeswitch in their daily lives). The way research is conducted may affect patterns of codeswitching. For example, a researcher simply observing a group of speakers conversing during their coffee break may find codeswitching that is closer to the types of codeswitches that would normally be found in that area. These findings may differ from those that stem from research conducted through interviews because the social interaction may be perceived as more artificial.

The geographic location where the linguists conduct research may also affect the findings. Codeswitching mainly occurs in areas where language contact exists and where codeswitching is common among the people in the community (e.g. Puerto Rico). However, codeswitching in areas with immigrants speaking their native language amid the official national language is different from the codeswitching found in areas where there are two official languages. Other areas highly shun codeswitching, such as the Muslim, Turkish-speaking group in Thrace even though the majority of the population is fluent in both Turkish and Greek (Sella-Mazi, 2001). This purposeful avoidance of codeswitching is meant to protect the integrity of the Turkish language and to reduce the amount of linguistic and cultural influences. Codeswitching may also reveal different attitudes toward the culture of the other language that is used. For example, in both Mexico and Spain, English is widely known and is used often in the press to describe English or American concepts. However, Mexicans tend to have a resentful attitude toward the United States so when English is used in codeswitched texts, the tone is often ironic or resentful (McClure, 1998).

The minority and majority language speakers also can affect codeswitching. *We-code* is a term linguists use to describe the minority language and informal, in-group activities, whereas *they-code* describes the majority language and formal, out-group relations. *We-code* is used in

many contexts when the minority people discuss how the majority culture is affecting their minority culture. The minority group is often times from a different culture, and may feel like outsiders to the majority. It has been found that the minority group will sometimes codeswitch between their language and the majority language in order to try to fit in and become more a part of the majority culture (Rampton, 1995).

Clearly, there are a plethora of reasons for why bilinguals codeswitch. The ones mentioned above just brush the surface of the available research.

Chapter 2

Switch Costs and Bilingualism

Switch Costs

Evidence suggests that there is an associated “switch cost” that occurs when the brain switches between two different languages. That is, it takes longer for the brain to process and comprehend a sentence that contains a codeswitch. For example, bilinguals recognized words in one language more slowly when these words were immediately preceded by words of a different language (Grainger & Beauvillain, 1988; Grainger & O’Regan, 1992). This finding is referred to as the “basic language priming” effect. The slower response times suggest that switching languages has an effect on the word recognition process.

Switch costs have been shown to be affected by the switch directions of the languages. In a naming study by Meuter and Allport (1999), bilinguals named a series of digits alternating between their L1 (dominant) and L2 (weaker) languages. The numbers were displayed against a colored background that indicated for them to say the number in either L1 or L2. It was found that bilinguals were slower at naming the digit in the correct language on switched trials (when the response language changed from the language used in the previous trial) than on non-switched trials. Another interesting finding was that switch costs were greater when switching from L2, the weaker language, into L1, the dominant language than from L1 to L2. However, studies examining reading of language-switched versus non-switched words have less conclusive findings with respect to the asymmetry in switch costs. For example, Jackson,

Swainson, Mullin, Cunnington, & Jackson (2004) found that switch direction does not modulate the switch costs. Other studies have shown that when bilingual speakers are equally proficient in L1 and L2, the switch costs are symmetrical when switching from L1 to L2 and vice versa (e.g., Costa & Santesteban, 2004; Costa et al., 2006; Meuter & Allport, 1999).

The asymmetrical switch cost going from L2 to L1 when bilinguals truly have a dominant and weaker language can be explained in the following way. When L2 is being used, the brain must suppress the L1 task schema and inhibit L1 lemmas. The L1 must be more strongly suppressed than the L2 since it is the stronger language. Therefore, when the bilingual switches from L2 back to L1, it takes longer for the L1 task schema and lemmas to be reactivated (van Hell et al., 9). Simply put, it is more costly to switch into L1 since it takes more effort to suppress L1 during L2 processing (van Hell et al., 10).

Further studies have attempted to discover ways that reduce the effect of this switch cost and help bilinguals process codeswitched language more quickly and efficiently. For example, it was found that the comprehender can more easily recognize a switch when the phonetics of the codeswitched word and the base language differ from each other (Grosjean, 1995; Li, 1996). Another finding suggested that the mode of communication affected the recognition of the switch. It was easier for comprehenders to recognize a switch in listening situations rather than reading situations (Martinez, Sosa, Bates, & Hernandez, 1998; see also Chan, Chau, & Hoosain, 1983). There is some dispute over how much effect the expectancy of a codeswitch has on the recognition of switch. Some studies have shown that creating a natural context for the switch, which increased the expectancy of the codeswitch, eliminated the cost of the codeswitch completely (Amrhein, 1999; Chan et al., 1983). However, other studies have found that there is

still a processing cost even when the switch is perfectly predictable (Altarriba, Kroll, Sholl, & Rayner, 1996; Martinez et al., 1998; Meuter & Allport, 1999).

Another factor that seems to mitigate the switch cost of the bilingual is proficiency in the two languages. In one study, Moreno, Federmeier, & Kutas (2002) measured event-related potentials while Spanish-English bilinguals read English sentences that ended in expected English words, their Spanish translations (codeswitches), or English synonyms (lexical switches). It was found that the more proficient in Spanish the speaker was, the earlier the brain was able to detect the switch.

This study showed something else intriguing: the advanced speakers processed the codeswitched sentences more easily than the unexpected English synonym sentences. This suggests that the brain handles codeswitching in expected cases more as a lexical shift rather than as a different language. This implies that unexpected switches are more difficult to process, supporting suggestions from previous behavioral studies that the cost of switching may be diminished by factors affecting the unexpectedness of the switch.

Switch costs also have some dependency on the frequency of the words used in the switch. For example, Guzzardo, Valdés, and Dussias (2015) conducted a study that compared the costs of codeswitching after two Spanish auxiliary verbs: *estar* and *haber*. The findings showed that it was more costly for the reader to process the sentences that contained switches after *haber* than after *estar*. Since *estar* is a more commonly used auxiliary than *haber*, the argument is that more frequently used words near the codeswitch help to mitigate the costs of switching.

A study conducted by Fricke, Kroll, & Dussias (2015) found that even highly balanced, proficient codeswitchers experience a cost even when they retain full control over the choice to switch languages (Fricke, Kroll, & Dussias, 2015). The researchers concluded that proficient

bilinguals are able to perceive small phonetic cues in speech that are beneficial in predicting an upcoming language switch. These cues help the comprehender anticipate the switch which eases the processing of the language.

Advantages of Bilingualism

Although it appears that codeswitching comes with some costs, codeswitching should not be regarded as a deficit. In fact, there is evidence of certain advantages that are derived from being bilingual. These advantages include being able to identify the alternate image in reversible figures (Bialystok & Shapero, 2005) and ignoring irrelevant information in certain tests (Bialystok & Martin, 2004). Bialystok and colleagues hypothesized that since bilinguals have access to their two languages, they are constantly exercising and improving their executive skills through “selective attention to relevant aspects of a problem, inhibition of attention to misleading information and switching between competing alternatives” (Bialystok, Craik, Klein, & Viswanathan, 2004, pg. 291).

Another benefit is that bilingualism has a positive effect on mental health. Again, Bialystok and colleagues (Craik, Bialystok & Freedman, 2010) discovered that bilingualism could help prevent the onset of symptoms for Alzheimer’s disease. Their study consisted of collecting information of 102 bilinguals and 109 monolinguals who had all been diagnosed with Alzheimer’s. They noted the age at which the patients began to experience cognitive symptoms of the disease and the age of diagnosis. Occupation, education, fluency and several other factors were collected as well in order to control the experiment. The researchers found that bilingual patients did not show the onset of symptoms of the disease until an average of 5.1 years after the

monolingual patients and were diagnosed an average of 4.3 years later. Although bilingualism does not prevent the disease, it seems to significantly prolong a higher level of functioning once the disease takes root in the brain.

Furthermore, it has been shown that bilinguals are better at multitasking (Bialystok & Craik, 2010). In one research study, participants were tasked with driving while receiving various directives through headphones. The driving skills of all participants worsened once extra directions were given. However, the monolingual drivers' skills became even worse than those of their bilingual counterparts. This is evidence that bilinguals tend to be better at multitasking than monolinguals. The reasoning behind this is that bilingual brains are used to transitioning back and forth between languages so it is easier for them to concentrate on multiple tasks at one time.

Bilingual advantages are not only apparent in adults, but also in children. Foy and Mann (2013) found evidence that bilingualism may confer advantages to children in situations of nonverbal auditory stimuli that require cognitive flexibility. Their study presented both monolingual and bilingual 5 year olds with two nonverbal auditory stimuli: a dog barking sound and a doorbell sound. The children were supposed to acknowledge the dog barking by pressing the spacebar, but ignore the doorbell sound by doing nothing. The researchers found that bilingual children performed the task better than the monolingual children. This study echoed previous work that has shown a bilingual advantage in nonverbal auditory tasks, but shown no difference in verbal auditory tasks. The study concluded that bilingualism aids in executive function task.

Chapter 3

Why Look at Cognates?

We have learned a great deal about bilingualism in this section. Although some people still view bilingualism and codeswitching as negative traits, science suggests that bilingualism offers many benefits to the speaker and their brain. The ability to think and speak in two languages offers more ways to express oneself and adapt to situations. Studies have also shown that there are some switch costs in comprehension involved when a bilingual switches from one language to another. Different schools of thought explain how these costs can be mitigated and what defines a more natural switch. Linguists tend to think that a natural switch is one that follows one of the constraints listed in this work. Psycholinguists believe that more frequent switches are more natural. Either way, there seems to be agreement that more natural switches are more easily processed and produce less of a cost.

It is possible that these switch costs can be mitigated through systems that follow constraints, the use of cues in the speech signal, or frequency of use (Appel & Muysken, 1989; Poplack, 1981; Fricke, Kroll, & Dussias, 2015; Guzzardo, Valdés, & Dussias, 2015). The present study will look at another language feature that may mitigate the cost of switching, the cognate status of words. Clyne (1967, 2003) observed that codeswitches appeared more often near trigger words, such as cognate words, than non-trigger words (e.g., non-cognate words). He defined trigger words as words with a similar form in a bilingual's two languages such as cognates, homographs, or proper nouns. He explained that when these words are produced, the language-not-in-use becomes more readily available and is therefore more likely to be produced. However,

these data were simply observational and were not strictly controlled for, so confounding variables may have been present.

The planned study has two goals: first, to look at how switch costs can be mitigated during a codeswitch, and second, to look into the comprehension of the codeswitched sentences. The goal of the planned experiment is to test whether cognates can facilitate the processing of codeswitches language. Cognates are words that have similar or identical orthography, phonology, and semantics in two different languages. For example “artist” and “*artista*” are similar cognates, while “piano” and “*piano*” are identical in English and Spanish, respectively. Various studies (e.g Lemhöfer & Dijkstra, 2004) have shown that bilinguals process cognate words differently than non-cognate words (e.g., non-cognates: “*mesa*” is the Spanish word meaning “table”). Specifically, it has been shown that cognates are produced and recognized faster than non-cognate words. This difference in processing is called the “cognate facilitation effect” (Costa et al., 2000; Dijkstra et al., 1999; Schelletter 2002, etc.). These studies have shown that this effect is present in both languages of the bilingual, but it is more noticeable in the non-dominant language. One explanation for the phenomenon of the “cognate facilitation effect” is that bilinguals perceive cognate words as being used more frequently; therefore the words are more accessible in both lexicons. A study by Marina Sherkina-Lieber (2004) asked bilinguals and monolinguals to rate the frequency of use of various cognate and non-cognate words (Sherkina-Lieber, 2004). It was found that bilinguals rated the frequency of cognate words significantly higher than the monolinguals did, but that both groups named the frequency of non-cognate words the same. This shows that bilinguals perceive the frequency of cognate words to be higher than the actual frequency of use since they hear and use these words in both languages.

The perceived higher frequency of use makes these words more accessible to the bilingual and therefore more easily processed.

In summary, cognates have a special status in the bilingual lexicon; because they are shared between two languages, they are thought to enhance the parallel activation of both linguistic systems. This characteristic of cognates may help bilinguals facilitate the processing of codeswitching when they are on the receiving end of the discourse. Codeswitching research has focused almost exclusively on production, with markedly less work being conducted on the comprehension of codeswitched sentences. This gap is significant given that codeswitching is not a production phenomenon alone: All codeswitched structures produced by a bilingual must, in turn, be processed by a comprehender. Bilinguals encounter codeswitched writing in daily emails and texts of which they are on the receiving end of the written message. In production, codeswitching is often motivated by a word or phrase in the other language that better conveys pragmatic intentions (Myers-Scotton, 2006). For bilingual listeners or readers, however, codeswitches can be unexpected and thus potentially costly to process. Indeed, a few studies investigating codeswitching from the perspective of the comprehender suggest that recognizing and integrating a linguistic code different from the one most recently encountered entails a processing cost. The central question in the planned work is whether the presence of cognates can facilitate the processing of different types of codeswitches. Because cognates can potentially surface anywhere in a sentence, one might predict that if cognates trigger the production of a codeswitch, they might also make it easier for listeners to facilitate their comprehension.

Chapter 4

The Present Study

The aim of this study is to test whether the presence of a cognate can help to mitigate the switch costs involved in processing a codeswitched sentence. I hope to find that cognates do indeed help to facilitate the processing of the sentences which contain a cognate verb directly before the switch point of the sentence. I expect to find that bilinguals are able to read and process the sentences containing cognates more quickly than when they read a similar sentence containing a non-cognate at the switch point. This study could help show whether cognates trigger codeswitching among bilinguals.

In order to test our hypotheses, I will ask Spanish-English bilinguals to read several sentences. The sentences will be paired so that half will contain a cognate verb and the matching sentence will contain a non-cognate synonym instead. By using an eye-tracking device, I will determine the fixation on each word and the reading time of the sentences. I hope to find that the sentences containing a cognate verb will have faster reading times than their non-cognate counterparts.

Chapter 5

Methodology

Participants

A total of 16 participants were recruited for this study, all between 18 and 26 years of age with the mean being [M = 20.67]. The participants were divided into two groups: the first group consisted of Spanish-English bilinguals with L1 Spanish and L2 English. These participants are noted codeswitchers; that is, they reported codeswitching in their daily lives and in a variety of contexts. These participants all proved to be codeswitchers in a previous study. They participated in a game context that naturally elicited spontaneous codeswitches.

Four different language tests/questionnaires were performed on the participants to determine their proficiency in each language. A brief description along with an example question from each test follows. The full version of each test can be found in Appendix B.

1. Language History Questionnaire (LHQ)

This is a self-rating questionnaire on which the participants rank their Spanish and English proficiency in both reading and writing production as well as speaking and listening comprehension. Skills are ranked on a 1 to 10 scale with 1 being “very low” and 10 being “perfect.” They also answer open-ended questions regarding their language preference, typical everyday use, and their acquisition history. The participants’ average rating of their Spanish proficiency out of 10 (M = 8.84, SD = 1.03) was slightly lower than their English proficiency rating (M = 9.29, SD = 0.77). The difference in these

means was not significant ($p = 0.24$). Participants also ranked the frequency of codeswitching in their daily life from “Never” (1) to “Always” (5). The mean of the group was 3.8 ($SD = 0.98$), which falls in the “Occasionally” to “Frequently” range.

2. *Diploma de Español como lengua Extranjera (Diploma of Spanish as a Foreign Language) (DELE)*

The DELE is a standardized test that is administered by the Spanish Ministry of Education, Culture, and Sport (<http://diplomas.cervantes.es/en>). The test measures Spanish language competency by examining cloze reading, vocabulary selection, and grammar. The test is scored out of 50 points; correct answers receive 1 point and incorrect answers receive 0 points. The mean score of the participants was 33.92 out of 50 ($SD = 5.38$).

Sample: INSTRUCCIONES: elige el significado de la palabra en negrita.

21. Tengo la impresión de que los libros que yo tenía de pequeña están disperso por la casa de mis padres.

- a. Ordenados
- b. Perdidos
- c. Esparcidos

3. Michigan English Language Institute College English Test (MELICET)

Similar to the DELE, the MELICET measures English language competency through examining cloze reading, vocabulary selection, grammar, and reading comprehension.

The test is scored out of 50 points; correct answers receive 1 point and incorrect answers receive 0 points. The mean score of the participants was 41.43 out of 50 ($SD = 7.73$).

A t-test was run to determine the significance of the means of the DELE and the MELICET tests. There was a significant difference between the two means ($p= 0.006$), demonstrating that the participants on average had a higher grammatical command of English than Spanish.

Sample: INSTRUCTIONS: Choose the word or phrase that best completes the conversation.

1. “What time will we arrive in San Francisco?”
“I’m not sure, because I don’t know _____ from here.”
 - a. it is how far
 - b. how far is it
 - c. how far it is
 - d. how is it far

4. Verbal Fluency Test (VF)

The Verbal Fluency Test measures the fluency of a subject through their vocabulary in four basic categories in both Spanish and English. Participants were given 30 seconds per category (e.g. animals, fruit, colors, articles of clothing, vegetables, body parts) to name as many items in English in the respective category. After this was completed, participants repeated the task, this time naming items in Spanish for each category (e.g. animales, frutas, colores, ropa, vegetales, partes del cuerpo). Each correct response receives one point, and all of the points are summed to get the total VF score for each language. On average, participants were able to name more exemplars in English ($M = 55.73$, $SD = 20.92$) than in Spanish ($M = 44.27$, $SD = 16.76$), demonstrating that the group had more verbal fluency in English. The difference in the averages was statistically significant ($p = 0.0018$), confirming the higher English fluency of the group.

Materials

The stimuli are comprised of 40 sentence groups. Each sentence group presents one sentence in four different conditions (an example of each condition is provided in Table 1):

Condition 1: cognate/codeswitch

Condition 2: non-cognate/codeswitch

Condition 3: cognate/no switch

Condition 4: non-cognate/no switch.

Table 1: Example of conditions for one sentence group

Condition 1	Cognate/Codeswitch	El abogado confirmó the release of the prisoners.
Condition 2	Non-Cognate/Codeswitch	El abogado aseguró the release of the prisoners.
Condition 3	Cognate/No switch	El abogado confirmó la liberación de los presos.
Condition 4	Non-Cognate/No switch	El abogado aseguró la liberación de los presos.

Four separate files were then created for four different stimuli sets. Each file followed a Latin Square design and contained one sentence from each sentence group, cycling through the different sentence conditions but maintaining a total of ten instances of each sentence condition. This was done to ensure that participants were exposed to each of the conditions, but that none saw the same sentences within an experimental item. This pattern is illustrated in Table 2. All of the codeswitched sentences began in Spanish and switched into English directly after the verb. Each sentence was controlled for number of words, frequency of verbs used, and length of the verb.

Table 2: Illustration of how conditions were distributed

	File 1	File 2	File 3	File 4
Sentence Group 1	Condition 1	Condition 2	Condition 3	Condition 4
Sentence Group 2	Condition 2	Condition 3	Condition 4	Condition 1
Sentence Group 3	Condition 3	Condition 4	Condition 1	Condition 2
Sentence Group 4	Condition 4	Condition 1	Condition 2	Condition 3
Sentence Group 5	Condition 1	Condition 2	Condition 3	Condition 4
...
Sentence Group 40	Condition 4	Condition 1	Condition 2	Condition 3

Each file contained a total of 82 sentences: 2 practice sentences, 40 fillers, and 40 experimental stimuli (10 per condition). As in the experimental items, half of the filler sentences were codeswitched and half were unilingual. These sentences were not controlled for cognates versus non-cognates. Additionally, there were 2 practice sentences that contained a codeswitch after a cognate verb. All four files used the same practice and filler sentences, but different experimental stimuli. Every sentence also had a corresponding comprehension question that was asked in English if the sentence ended in English and asked in Spanish if the sentence remained in Spanish. The answers to the questions were split equally between “yes” and “no.” Table 3 below shows the English and Spanish versions of the question for the same sentence group that was used above.

Table 3: Example of questions for a given sentence group

Conditions 1 and 2	Did the lawyer confirm the release of the prisoners?
Conditions 3 and 4	¿El abogado confirmó la liberación de los presos?

Procedure and Equipment

An Eyelink 1000 eye tracker (SR Research, 2008) was used to collect and record data in a sound-attenuated booth. A chin rest supported the participant's head to ensure that their head remained still for the duration of the reading tasks. Calibration of the eye tracker took place before the experiment began, after the first two practice sentences, and during the experiment as needed (e.g. if the participant's gaze moved away from the critical region of the sentence). Each participant was tested using one of the four experiment files that contained a set of 82 sentences, each followed by a "yes or no" comprehension question. The participant used a button box to indicate their response to each question. They indicated "yes" by pressing the green button with their left thumb and "no" by pressing the red button with their right thumb. Participants were not informed whether or not they chose the correct response. The experiment began with 2 practice sentences and questions, after which the eye tracker was recalibrated. Then the participant was presented with the set of 80 sentences that were pseudo-randomized. These was a mixture of 40 fillers and 40 stimuli. The entire experimental procedure lasted about 20 minutes, and participants were paid \$20 for their time.

Chapter 6

Results

In this section results will be divided according to the research questions exposed earlier. For all analyses, a t-test comparing the means was run for each of the four reading measures

(Liversedge, et al., 1998):

1. Gaze Duration – the sum of all fixations made in a region until the point of fixation leaves the region either to the left or to the right
2. Right-bounded Duration – the sum of all fixations in a region moving toward the right
3. Regression Path Duration – the sum of all fixations from the first fixation in a region up to but excluding the first fixation to the right of this region
4. Total Duration - the sum of all the fixations in a given region, including fixations made when re-reading the region

Participants averaged about 92% accuracy in answering the comprehension questions.

1. Does the presence of a cognate verb facilitate the processing of a codeswitch?

In order to answer this question, a comparison was conducted between the predicate in Condition 1 (cognate and codeswitch/ **confirmó the release of the prisoners**) and the predicate in Condition 2 (non-cognate and codeswitch/ **aseguró the release of the prisoners**). No statistically significant differences were found when the codeswitched predicate was preceded by a cognate vs. non-cognate for any of the four reading measures (Gaze duration: $M_1 = 1218.04$ msec, $M_2 = 1152.42$ msec, $p = 0.37$; Right bounded duration: $M_1 = 1450.35$ msec, $M_2 = 1499.90$ msec, $p = 0.54$;

Regression path duration: $M_1 = 1892.59$ msec, $M_2 = 1968.72$ msec, $p = 0.47$; Total duration: $M_1 = 1450.35$ msec, $M_2 = 1499.90$ msec, $p = 0.54$). Data suggests that a cognate verb does not help the reader to process a codeswitched sentence any faster than a similar sentence with a non-cognate verb.

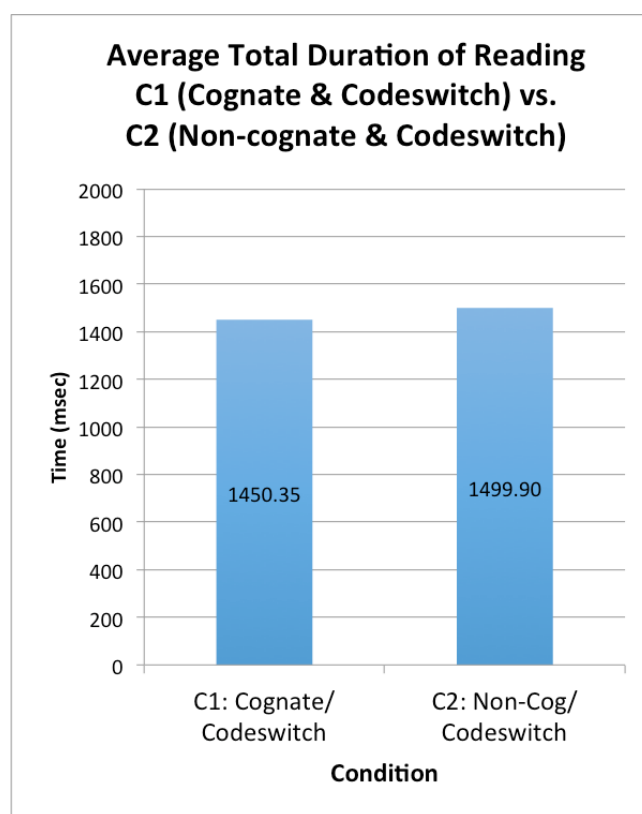


Figure 1: Comparison of C1 and C2

2. Is codeswitching costly?

To answer this question, codeswitched conditions (Condition 1: cognate & codeswitch; Condition 2: non-cognate & codeswitch) were compared against non-codeswitched conditions (Condition 3: cognate & no switch; Condition 4: non-cognate & no switch). Statistically significant differences were found in all four reading measures (Gaze duration: $M_{12} = 1185.23$ msec, $M_{34} = 1388.65$ msec, $p < 0.001$; Right bounded duration: $M_{12} = 1475.13$ msec, $M_{34} =$

1804.88 msec, $p < 0.001$; Regression path duration: $M_{12} = 1930.65$ msec, $M_{34} = 2306.85$ msec, $p < 0.001$; Total duration: $M_{12} = 1475.13$ msec, $M_{34} = 1804.88$ msec, $p < 0.001$). On average, participants read the codeswitched sentences faster than the non-codeswitched sentences. As seen in Figure 3 below, the means are quite different, with the codeswitched sentences having a much shorter total duration.

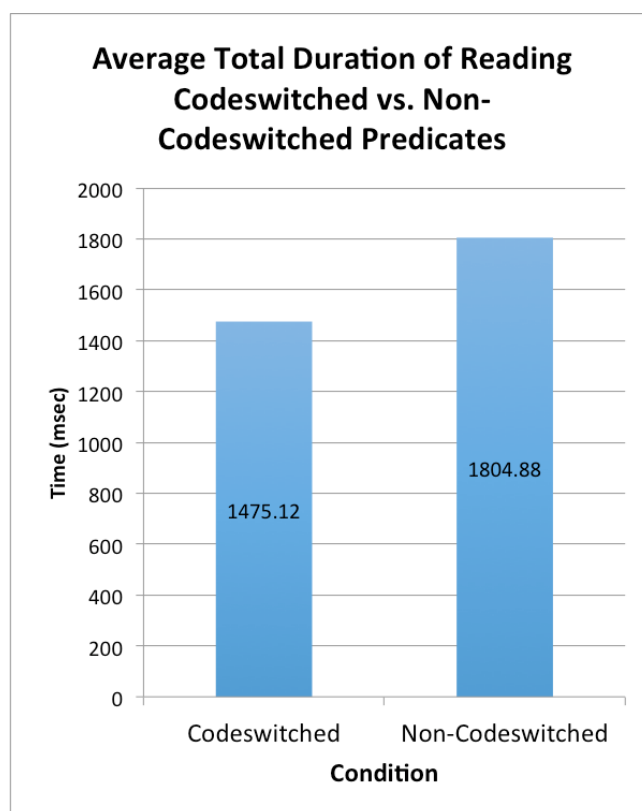


Figure 2: Comparison of Codeswitched and Non-codeswitched sentences

3. Are cognate verbs read faster than non-cognate verbs?

In order to answer this question, cognate conditions (Condition 1: cognate & codeswitch; Condition 3: cognate & no switch) were compared against non-cognate conditions (Condition 2: non-cognate & codeswitch; Condition 4: non-cognate & no switch). There were no statistically significant differences found in any of the four reading measures (Gaze duration: $M_{13} = 1342.82$

msec, $M_{24} = 1231.07$ msec, $p = 0.79$; Right bounded duration: $M_{13} = 1623.67$ msec, $M_{24} = 1656.34$ msec, $p = 0.73$; Regression path duration: $M_{13} = 2077.28$ msec, $M_{24} = 2160.22$ msec, $p = 0.99$; Total duration: $M_{13} = 1623.67$ msec, $M_{24} = 1656.34$ msec, $p = 0.77$). This suggests that cognate verbs are not read any faster than non-cognate verbs.

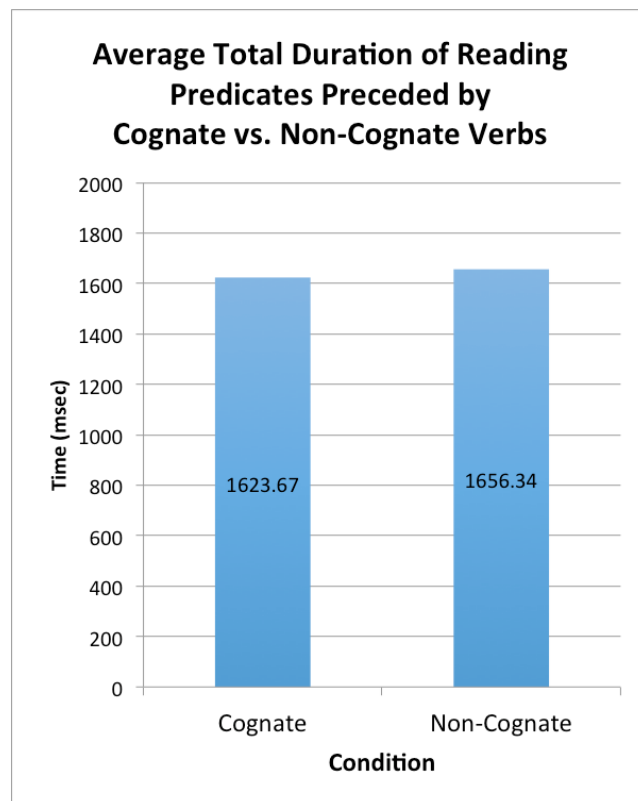


Figure 3: Comparison of Cognates and Non-cognates

Chapter 7

Discussion/Conclusion

This study examined three main questions:

1. Can cognate verbs help facilitate the processing of codeswitched sentences?
2. Are codeswitched sentences more costly to read than non-codeswitched sentences?
3. Are cognate verbs read faster than non-cognate verbs?

I investigated these questions by comparing eye tracking data reading measures across four conditions. Condition 1 and Condition 2 were of central importance to this study because they were directly related to the main research question. The results showed that reading a codeswitching is not modulated by the presence of a cognate verb directly before the switch. Additionally, no evidence of the cognate facilitation effect was found.

1. Does the presence of a cognate verb facilitate the processing of a codeswitch?

Condition 1 (cognate-codeswitch) was compared with Condition 2 (noncognate-codeswitch) to answer this question. As stated in the Results section, no significant differences were found in any of the four reading measures. This result suggests that shows sentences are read equally as fast whether they are and when they are not preceded by a cognate. This means that cognate verbs do not modulate the processing of codeswitches. Why might this be the case? One possibility is the participants that were recruited for this study were proficient codeswitchers and were accustomed to reading code-switching sentences; as a result, there was no effort for the comprehension mechanisms to process codeswitched language. Added to this, the stimulus material involved switches at sites that have been reported in past studies to be frequent loci of codeswitching (i.e., switches between the verb and its predicate). It is possible that past studies

have reported switch costs because the switches that bilinguals were asked to process were unnatural, but that the switches in this study did not result in a slowdown in processing because they mirrored naturally-occurring switches.

2. Are codeswitched sentences more costly to read than non-codeswitched sentences?

Conditions 1 and 2 (switched sentences) were compared against Conditions 3 and 4 (unilingual sentences). As stated in the Results section, all four reading measures showed a statistical significance, suggesting that participants read codeswitched sentences more quickly than non-codeswitched sentences. Although this seems to suggest that codeswitching is not costly, the question cannot be fully answered since there is a confound: it may be that the participants read Spanish slower than English. As described in Chapter 5, two of the three proficiency tests (Grammar: $M_{\text{Eng.}} = 41.43$, $M_{\text{Span.}} = 33.93$, $p = 0.006$; Verbal Fluency: $M_{\text{Eng.}} = 55.73$, $M_{\text{Span.}} = 44.27$, $p = 0.0018$) showed that on average the participants were more English dominant. This suggests that they are faster in general at reading English compared to reading Spanish. If so, it might be that once the participant reaches the codeswitch, he or she is able to finish reading the sentence more quickly than if it had been in Spanish.

Although codeswitching often happens in the auditory domain in conversations between two in-group bilinguals, it is appearing more in written forms such as texts, emails, and newspaper articles. These forms of communication, while not as impromptu as spoken conversation, are produced more quickly and are less edited than a formal writing, such as a newspaper article or a speech. I argue that a possible reason for the findings is that the participants in this study were all frequent codeswitchers, and possibly have experience with

written codeswitches. These encounters of codeswitched text may make reading a codeswitched sentence in a study less unexpected for a reader.

3. Are cognate verbs read faster than non-cognate verbs?

No evidence of the cognate facilitation effect was found. This result is very similar to that found in Van Assche, Duyck, & Brysbaert (2013). In that study, verbs were presented in isolation (not in a sentence) and then in-context (in a sentence) during a second experiment. Results showed that participants were able to read cognate verbs faster in isolation, but once the verbs were in context, no cognate facilitation effect occurred. In my study, the lack of modulation might be due to the high levels of morphology found in Spanish verbs. This large amount of information might overshadow any potential Cognate Facilitation.

The findings show that frequent codeswitchers do not seem to be negatively impacted by a codeswitch in the sentence. The overall finding of this experiment is that codeswitched sentences are read more quickly than non-codeswitched sentences, regardless of the cognate status of the preceding verb. It seems that when bilinguals are reading codeswitched sentences with as much ease as or greater ease than when reading unilingual sentences, cognate verbs do not provide an additional boost.

It is noteworthy that in the Language History Questionnaire, some of the participants indicated that they codeswitch “very infrequently” even though their production in a previous task (not reported in this thesis) showed otherwise. This self-report hints back at the stigma that is often associated with codeswitching, as discussed in Chapter 1.

Future Direction

Future directions should seek participants who are not reported codeswitchers. By running this study with a different group of bilingual participants, I predict that they would find it more challenging to read codeswitched sentences than for the frequent codeswitchers. It would be interesting to see if there is a significance in cognate status, specifically if cognates help non-codeswitchers to facilitate the codeswitched sentences since both languages would be activated in their brain. It may also be interesting to test Spanish L2 learners who are not necessarily highly proficient nor codeswitch, but who have a good command of Spanish to see if the cognate is beneficial to them in processing codeswitched sentences.

It would also be intriguing to test participants on sentences that codeswitch from English into Spanish. Although these types of codeswitches are not as common, it may provide interesting results. Perhaps in these cases, the codeswitched sentences would not be read more quickly than the non-codeswitched sentences, or maybe a cognate facilitation effect would be beneficial for the processing. Additionally, a condition with sentences fully in English would be beneficial to have to get a baseline on the participant's English reading proficiency.

Appendix A

Materials

The materials shown below include the sentences that I used for this study. The first column displays Condition 1, while the second column displays Condition 4. This table the two verbs that were used for each sentence group and the codeswitch that occurred. Please note that

conditions 2 and 3 are not shown below but can be obtained by simply switching the verbs used in each sentence group. Please refer to Table 1 for an example.

Table 4: Stimuli of each sentence group number

Group	Condition 1 (cognate & codeswitch)	Condition 4 (non-cognate & no switch)
1	La enfermera administraba the medicine whenever it was needed.	La enfermera proporcionaba la medicina cuando era necesario.
2	El ejército desmanteló the missile before it could explode.	El ejército desmontó el misil antes de que pudiera explotar.
3	El ladrón confesó the truth during the interrogation.	El ladrón dijo la verdad durante el interrogatorio.
4	El abogado confirmó the release of the prisoners.	El abogado aseguró la liberación de los presos.
5	El vendedor confirmó the purchase with the buyer.	El vendedor acordó la mercancía con el comprador.
6	The hair dresser confirmó the news about her divorce.	La peluquera compartió la noticia sobre su divorcio.
7	The couple planeó the tour with the travel agency.	La pareja compró el tour con la agencia de viajes.
8	El juez consultó his notes to double check what happened.	El juez leyó sus notas para repasar lo que había sucedido.
9	El trabajador depositó his money in the bank.	El trabajador puso el dinero en el banco.
10	El periodista reveló the corruption within the finance company.	El periodista destapó la corrupción en de la compañía de finanzas.
11	Los exploradores descubrieron the treasure on the island.	Los exploradores escondieron el tesoro en la isla.
12	El hombre descubrió his vehicle in an abandoned parking lot.	El hombre encontró su vehículo en un estacionamiento abandonado.
13	El policía descubrió the evidence in a safe.	El policía dejó la evidencia en una caja fuerte.
14	El cartero descubrió the letter in the back seat of his car.	El cartero olvidó la carta en el asiento trasero de su coche.
15	El neurólogo descubrió the mistake in the diagnosis.	El neurólogo encontró el error en el diagnóstico.
16	El hombre descubrió the diamonds in a cave.	El hombre perdió los diamantes en una cueva.

17	El médico descubrió the illness without costly tests.	El médico curó la enfermedad sin pruebas costosas.
18	La guerra destruyó the relations between the two countries.	La guerra empeoró las relaciones entre los dos países.
19	El líder del proyecto dividió the tasks between the committee members.	El líder del proyecto repartió las tareas entre los miembros del comité.
20	La recepcionista afirmó her integrity when she has interrogated.	La recepcionista recalcó su integridad durante el interrogatorio.
21	El abogado preparó his arguments before the trial.	El abogado repasó sus argumentos antes del juicio.
22	Los pescadores estimaron the size of the crabs.	Los pescadores apuntaron el tamaño de los cangrejos.
23	El juez examinó the receipts in the box.	El juez escondió los recibos en la caja.
24	El estudiante explicó the equations to his friends.	El estudiante mostró las ecuaciones a sus amigos.
25	El viajero exploró the jungle by plane.	El viajero recorrió la selva por avión.
26	El comprador negoció the price with the merchants.	El comprador acordó el precio con los comerciantes
27	El aficionado de fútbol obtuvo four tickets to the World Cup.	El aficionado de fútbol consiguió cuatro billetes para la Copa Mundial.
28	La cantante practicó the song in her dressing room.	La cantante escribió la canción en el vestuario.
29	La novia prefirió a cake instead of cookies.	La novia quiso una torta en cambio de galletitas.
30	El camarero preparó the drink in a glass.	El camarero mezcló el trago en un vaso.
31	El panadero preparó the bread last night.	El panadero horneó el pan anoche.
32	El alcalde presentó the budget for the new library.	El alcalde compartió el presupuesto para construir una nueva biblioteca.
33	La editora publicó the survey on the newspaper last week.	La editora colocó la encuesta en el periódico la semana pasada.
34	Los soldados recibieron the messages from their families.	Los soldados oyeron los mensajes de sus familias.
35	La secretaria recibió the box at her desk.	La secretaria dejó la caja en su escritorio.

36	El pintor refinó his technique after attending a class.	El pintor mejoró su técnica después de asistir a una clase.
37	El periodista reportó the accident on the highway.	El periodista vio el accidente en la autopista.
38	El marido seleccionó a ring for his wife.	El marido escogió un anillo para su esposa.
39	El guía descubrió the path in the forest.	El guía vio el camino en el bosque.
40	El panadero simplificó the recipe for the dough.	El panadero cambió la receta de la masa.

Appendix B

Proficiency Tests

Language History Questionnaire

Marian, Blumenfeld, & Kaushanskaya (2007).
Northwestern Bilingualism & Psycholinguistics Research Laboratory
Traducción por Rojas & Iglesias (2008)
Temple University Bilingual Language Laboratory

Cuestionario de Experiencia y Competencia Lingüística

Apellido(s)		Nombre(s)		Fecha	
Edad		Fecha de Nacimiento		Masculino <input type="checkbox"/>	Feminino <input type="checkbox"/>

(1) Por favor indique todos los idiomas que conozca **en orden de dominio**:

1	2	3	4	5
---	---	---	---	---

(2) Por favor indique todos los idiomas que conozca **en orden de adquisición** (su idioma materno primero):

1	2	3	4	5
---	---	---	---	---

(3) Por favor indique que porcentaje del tiempo UD *actualmente* y *en promedio* está expuesto a cada idioma.

(Los porcentajes deben de sumar a 100%):

Indique idioma:					
Indique porcentaje:					

(4) ¿Al escoger leer un texto disponible en todos sus idiomas, en que porcentaje de los casos escogería leerlo en cada idioma? Asuma que el texto original fue escrito en un idioma que UD no conoce.

(Los porcentajes deben de sumar a 100%):

Indique idioma:					
Indique porcentaje:					

(5) ¿Al escoger que idioma usar para hablar con una persona igualmente fluida a UD en todos sus idiomas, que porcentaje del tiempo escogería UD hablar en cada idioma? Por favor indique el porcentaje del tiempo total.

(Los porcentajes deben de sumar a 100%):

Indique idioma:					
Indique porcentaje:					

(6) Por favor indique las culturas con las cuales UD se identifica. En una escala del cero al diez, por favor valore hasta qué punto UD se identifica con cada cultura. (Ejemplos de culturas posibles incluyen Estado Unidense, China, Judío-Ortodoxo, etc.):

Indique cultura:					
	(pulsar aquí)	(pulsar aquí)	(pulsar aquí)	(pulsar aquí)	(pulsar aquí)

(7) ¿Cuántos años de educación tiene UD? _____

Por favor indique su nivel más alto de educación (o la aproximación Estado Unidense equivalente a un título obtenido en otro país):

Menos que escuela secund
Escuela secundaria/prep:

Algo de Universidad
Universidad

Maestría
Ph.D./M.D./J.D.

Entrenamiento Profesion Algo de Escuela Otro:
Graduado

(8) Fecha de inmigración a los Estados Unidos, si aplicable

Si UD ha inmigrado a otro país, por favor indique el nombre del país y la fecha de inmigración aquí abajo.

(9) ¿UD ha tenido un problema de visión , impedimento de audición , incapacidad de lenguaje , o incapacidad de aprendizaje ? (Indique todo lo aplicable). Si es el caso, por favor explique (incluyendo cualquier corrección/es necesaria/s):

Idioma:

Este es mi idioma (por favor seleccione del menú extraído).
Todas las preguntas que siguen se refieren a su conocimiento de _____ .

(1) Edad cuándo UD...:

<i>empezó a adquirir:</i>	<i>llegó a ser fluido en:</i>	<i>empezó a leer en:</i>	<i>llegó a leer fluidamente en:</i>

(2) Por favor indique el número de años y meses que UD pasó en cada ambiente lingüístico:

	Años	Meses
Un país donde es hablado		
Una familia donde es hablado		
Una escuela y/o ambiente de trabajo donde es hablado		

(3) En una escala del cero al diez, por favor seleccione su *nivel de **competencia*** al hablar, comprender, y leer de los menús extraídos:

Hablar	(pulsar aquí para escala)	Comprender lenguaje hablado	(pulsar aquí para escala)	Leer	(pulsar aquí para escala)
--------	---------------------------	-----------------------------	---------------------------	------	---------------------------

(4) En una escala del cero al diez, por favor seleccione cuanto los siguientes factores contribuyeron a su aprendizaje de _____:

Conviviendo con amistad	(pulsar aquí para escala)	Cintas de lenguaje/auto instrucc	(pulsar aquí para escala)
Conviviendo con familia	(pulsar aquí para escala)	Viendo televisión	(pulsar aquí para escala)
Leyendo	(pulsar aquí para escala)	Escuchando la radio	(pulsar aquí para escala)

(5) Por favor valore hasta qué punto UD actualmente está expuesto a _____ en los contextos siguientes:

Conviviendo con amistad	(pulsar aquí para escala)	Escuchando la radio/música	(pulsar aquí para escala)
Conviviendo con familia	(pulsar aquí para escala)	Viendo televisión	(pulsar aquí para escala)
Leyendo	(pulsar aquí para escala)	Cintas de lenguaje/auto instrucc	(pulsar aquí para escala)

(6) ¿Según a su percepción, cuanto acento extranjero tiene UD en _____ ?

(pulsar aquí para escala)

(7) Por favor valore que tan frecuentemente los demás lo identifican a UD como un hablante no nativo basado en su acento en _____ :

(pulsar aquí para escala)

Idioma:

Este es mi idioma (por favor seleccione del menú extraído).

Todas las preguntas que siguen se refieren a su conocimiento de _____ .

(1) Edad cuándo UD:

<i>empezó a adquirir:</i>	<i>llegó a ser fluido en:</i>	<i>empezó a leer en:</i>	<i>llegó a leer fluidamente en:</i>

(2) Por favor indique el número de años y meses que UD pasó en cada ambiente lingüístico:

	Años	Meses
Un país donde _____ es hablado		
Una familia donde _____ es hablado		
Una escuela y/o ambiente de trabajo donde _____ es hablado		

(3) En una escala del cero al diez, por favor seleccione su *nivel de competencia* al hablar, comprender, y leer _____ de los menús extraídos:

Hablar	(pulsar aquí para escala)	Comprender lenguaje hablado	(pulsar aquí para escala)	Leer	(pulsar aquí para escala)
--------	---------------------------	-----------------------------	---------------------------	------	---------------------------

(4) En una escala del cero al diez, por favor seleccione cuanto los siguientes factores contribuyeron a su aprendizaje de _____ :

Conviviendo con amistad	(pulsar aquí para escala)	Cintas de lenguaje/auto instrucc	(pulsar aquí para escala)
Conviviendo con familia	(pulsar aquí para escala)	Viendo televisión	(pulsar aquí para escala)
Leyendo	(pulsar aquí para escala)	Escuchando la radio	(pulsar aquí para escala)

(5) Por favor valore hasta qué punto UD actualmente está expuesto a _____ en los contextos siguientes:

Conviviendo con amistad	(pulsar aquí para escala)	Escuchando la radio/música	(pulsar aquí para escala)
Conviviendo con familia	(pulsar aquí para escala)	Viendo televisión	(pulsar aquí para escala)
Leyendo	(pulsar aquí para escala)	Cintas de lenguaje/auto instrucc	(pulsar aquí para escala)

(6) ¿Según a su percepción, cuánto acento extranjero tiene UD en _____ ?

(pulsar aquí para escala)

(7) Por favor valore que tan frecuentemente los demás lo identifican a UD como un hablante no nativo basado en su acento en _____ :

(pulsar aquí para escala)

DELE**Participante:****SECCION 1: Texto****INSTRUCCIONES:**

Complete el siguiente texto eligiendo para cada uno de los huecos una de las tres opciones que se le ofrecen.

NIÑOS SALUDABLES

Los padres siempre se están preguntando cómo conseguir que sus hijos sean unos niños talentosos y sanos y las soluciones pueden estar más cerca de lo que creemos. Ni tónicos, ni vitaminas, ni cursos de lectura veloz pueden conseguir tantos resultados en los niños 1 la práctica constante de hábitos saludables, Un sueño reparador, una alimentación sabia, 2 a una actividad física constante y el control del estrés son claves a la hora de potenciar habilidades naturales de los más pequeños.

3 contrario de los que se creía, el sueño está lejos de ser una fase de hibernación mental. 4 que se descansa es la musculatura, pero en el cerebro se inician procesos fisiológicos fundamentales 5 el adecuado funcionamiento del niño, indispensables en la prevención de 6 enfermedad. El sueño es como el supermercado de noche, al momento del 7 no se apagan las luces, 8 que se encienden muchas más para limpiar las instalaciones y reponer los productos.

No solo 9 vital para el niño dormir las horas recomendadas, también que lo 10 a la hora del crepúsculo, pues en ese momento se 11 la disminución gradual de su actividad y la cantidad de estímulos que acuden a su cerebro desciende.

En la comida están los nutrientes básicos, 12 cumplen importantes funciones estructurales. 13 nacimiento en adelante, el niño obtendrá de ahí la materia prima para formar su cerebro y organismo. Si se 14 un niño talentoso, lo primeo es aplicar en 15 mismo las normas de alimentación saludable.

Las frutas, por ejemplo, deben consumirse más 16 tres veces al día, no hay que permitir que el yogur, otro gran alimento, les 17 protagonismo en la dieta de los chicos.

A pesar de los conocimientos, padres con las mejores intenciones se han topado con la barrera del gusto. Pero la preferencia por la comida sana también se puede educar, acostumbrándolos desde pequeños y explicando el 18 siempre.

El cuerpo humano está diseñado para moverse. Pero, en la actualidad, el sedentarismo ha limitado el crecimiento intelectual y emocional. Para evitarlo es crucial que los niños 19 una actividad física constante, en forma sistemática. Lo preferible es la práctica de un deporte, por ejemplo, el tenis de mesa, que le 20 mucho al niño en términos de coordinación y estrategia.

[Adaptado de *El Mercurio*, Chile]

SECCION 2: Vocabulario

INSTRUCCIONES: elige el significado de la palabra en negrita.

21. Tengo la impresión de que los libros que yo tenía de pequeña están **dispersos** por la casa de mis padres.

elige uno

22. Estábamos en plena reunión y, **de buenas a primeras**, la directora empezó con el tema de la subida de impuestos.

elige uno

23. Es un club muy exclusivo. Tiene una **contraseña** para poder entrar en determinados días.

elige uno

24. Esa decisión es **inapelable**; ahora que, si tú quieres, puedes hablar con Juan a ver qué te dice.

elige uno

25. Es necesario **restituir** el honor de esa persona porque, si no, no querrá asistir a una reunión con todos los demás representantes.

elige uno

26. Llegamos al aeropuerto a las tres y a **duras penas** cogimos el avión, no sin antes hablar por teléfono con una de nuestras familias.

elige uno

27. Decidieron tener una conversación previa a la firma del tratado para **limar asperezas**.

elige uno

28. En medio de los exámenes el hijo de Marta tuvo un **bajonazo**: por eso sigue preparándose para ellos.

elige uno

29. La situación familiar hizo que mi abuelo **tomara cartas en el asunto** en aquella época.

elige uno

30. Con ese aspecto de **pasmado**, es el mejor escritor de su generación.

elige uno

SECCION 3: Gramática

INSTRUCCIONES: Elige la opción correcta para cada una de las siguientes oraciones.

31. En la compañía se está decidiendo estos días si _____ nuevos horarios para los trabajadores.

elige uno

32. María no era de la opinión de que _____ todos a casa de Juan, pero al final fuimos.

elige uno

33. En las vacaciones en Brasil gasté mucho dinero, más _____ pensaba: es que era todo tan bonito...

elige uno

34. A Luisa le dio _____ decir que tenía sueño y se fue a casa.

elige uno

35. No tenemos _____ idea de qué habrá podido pasar en la última jornada de Bolsa porque hemos estado de vacaciones.

elige uno

36. Yo creo que a Carlos no le gustó nada que _____ en su casa sin avisar.

elige uno

37. No estoy dispuesta a irme sin que _____ la verdad.

elige uno

38. No sé si a Clara _____ han devuelto ya las maletas que perdió en el aeropuerto.

elige uno

39. ¿Dónde han estado los chicos toda la tarde, que no los he visto?

- No sé, _____ porque mañana tienen un examen importante.

elige uno

40. ¿Vas a asistir a la inauguración de la nueva sede?

- Si tengo tiempo, _____ hoy.

elige uno

41. Yo _____ tú, hablaría con ella, es lo mejor para aclarar la situación.

- elige uno
42. Ella le dijo que, si de verdad la _____, se lo demostrara.
elige uno
43. El hecho _____ lo eliminaron de la lista de candidatos todavía no está claro.
elige uno
44. _____ que se traslade a vivir a esta casa estará encantado con el paisaje alrededor.
elige uno
45. Nadie conseguirá aprobar ese examen _____ se prepare a conciencia: es muy duro.
elige uno
46. _____ salir de casa, se dio cuenta de que había dejado las llaves dentro.
elige uno
47. _____ haber sabido que ibais a venir, habríamos preparado más comida.
elige uno
48. Había mucha gente que quería acudir al estreno de la película, _____
decidiéramos ir otro día a verla.
elige uno
49. Cuando llegamos a la oficina _____ 15 personas esperando para hablar con
nosotros.
elige uno
50. Nuestros hijos ya son mayores. _____ arreglan muy bien en casa solos.
elige uno

Participant:**SECTION 1: Grammar**

INSTRUCTIONS: Choose the word or phrase that best completes the conversation.

1. "What time will we arrive in San Francisco?"
"I'm not sure, because I don't know _____ from here."

choose one

2. "Did George enter the photography contest?"
"No, but if he had, I think he _____."

choose one

3. "What's the matter?"
"I feel _____ out."

choose one

4. "May I bring you a cup of tea?"
"I prefer coffee _____ tea."

choose one

5. "Have you ever gone to Tahiti?"
"No, but I have _____ for a long time."

choose one

6. "Will you come to my party on Saturday?"
"_____ I'd like to, I can't."

choose one

7. "Don't forget to pay the rent tomorrow!"
"Please remind _____ in the morning."

choose one

8. "Susan plays the piano very well."
"_____ that, she's an excellent singer."

choose one

9. "Which chair should I take?"
"The _____ over there."

choose one

10. "Mark isn't very smart, is he?"
"Actually, he's smarter than he _____ to be."

choose one

11. "What do you think of American football?"
"I think it's _____ sport."

choose one

12. "What shall we do about this problem?"
"John suggests _____ a meeting."

choose one

13. "Where did you get those curtains?"
"My wife made them _____ an old tablecloth."

choose one

14. "Do you like sugar in your coffee?"
"Yes, _____ better."

choose one

15. "Why did John refuse to pay for his dinner?"
"Because _____ two hours by the time he was served."

choose one

16. "When is the meeting going to begin?"
"_____ Fred comes, we can get started."

choose one

17. "Does John have a lot of accidents at work?"
"Yes. He isn't _____ he should be."

choose one

18. "Did David enter the writing contest?"

"Yes, he thinks he has _____."

choose one

19. "Does Barbara have a difficult job?"

"Yes. She is responsible _____ many important decisions."

choose one

20. "You gave me the wrong amount of money."

"How _____? I gave you what you asked for."

choose one

21. "Will Bill's report be ready by Friday?"

"No, I don't think he _____ it by then."

choose one

22. "When will this paint be dry?"

"Not long. This is very _____ paint."

choose one

23. "Does Sue like circuses?"

"Yes, the clowns always make _____."

choose one

24. "Did you do well on the history test?"

"No. I studied all night _____ failed."

choose one

25. "How do those shoes fit?"

"My feet are too big _____ them."

choose one

26. "Do Mary's children help with the housework?"

"Yes, if she asks _____."

choose one

27. "Where's the box I asked for?"
"Over there, _____ on the table."

choose one

28. "Let's plan a picnic for Saturday."
"_____ it rains?"

choose one

29. "Is Lynn going to buy a new suit?"
"Yes, she's looking for a suit like _____."

choose one

30. "That movie isn't very good."
"Just wait. The best part _____."

choose one

SECTION 2: Cloze

INSTRUCTIONS: Read the passage, then select the word which best fills the blank in both grammar and meaning.

Color is such a constant part of our environment that we tend to ignore its messages. Many people with perfect vision suffer 31 a sort of cultural color blindness. But 32 unnoticed color influences feelings as well. 33 of experiments with both infants and 34 indicate that blue light tends to 35 activity and produce a state of restfulness. 36 more tense a person is, the 37 blue will act as a tranquilizer. Red, 38 the contrary, excites the nervous system, 39 that if this page were printed 40 red paper, electrodes attached to your skin 41 show a definite increase in muscle 42 , restlessness, and eye movements compared with 43 reactions to the white page. Studies 44 found that patients in hospital rooms 45 red or other bright colors require 46 attention from nurses than patients in 47 painted in more subdued colors. Furthermore, 48 has been found that school children 49 more alert and learn faster in 50 painted rooms. However, this is unfortunately accompanied by an increase in restlessness and noisiness.

[Adapted from MELICET test]

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ACADEMIC VITA
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EDUCATION

Bachelor of Science in Industrial Engineering

Bachelor of Science in Spanish

Schreyer Honors College

The Pennsylvania State University, University Park, PA
May

2016

GPA: **3.67/4.0** May 2016

INTERNATIONAL EXPERIENCE

Spanish Language & Culture Study Abroad Program, CIEE, Seville,

Spain Summer 2014

Summer

2014

- Acclimated to foreign culture and lifestyle living with host family
- Increased global perspective and understanding of diverse cultures
- Strengthened Spanish language comprehension and communication skills

ENGINEERING EXPERIENCE

Lean Manufacturing Intern, GE Energy Management, Salem, VA

Summer 2015

- Created standard work instructions for 4 machines and processes
- Designed and deployed over 50 5S shadow boxes for plant floor and card room
- Implemented Kan Ban system for over 50 formed parts

Engineering Compliance Intern, GE Transportation, Erie,

PA Summer

2013

Summer 2013

- Streamlined safety plan and related documents for LNG locomotive test site
- Implemented communication boards promoting safety on floor in 5 labs
- Generated Flashing Blue Light alarm system standard work for labs and floor

RESEARCH EXPERIENCE

Bilingual Codeswitching Lab

2015-2016

Pennsylvania State University, University Park, PA

Spring 2013

- Researched the effects of cognates on codeswitching under the direction of Dr. Giuli Dussias

- Facilitated eye tracking experiment with human subjects
- Extracted and analyzed data for honors thesis

Electrochemistry Laboratory Undergraduate Research Assistant
Pennsylvania State University, University Park, PA

Spring 2013

Spring 2013

- Compiled UNIX scripts and executed high performance computing simulations under direction of Dr. Michael Janik
- Utilized Materials Studio to model 5 organic molecules and related behavior
- Analyzed data and calculations to determine reaction path of glycerol

LEADERSHIP

Success Strategies Lead, PSU Women in Engineering Program Orientation 2015

- Planned and facilitated 3-hour workshop to 180 first-year engineering women
- Shared resources and best practices for academic, physical, and mental success

Co-President, On My Honor Campus Girl Scouts
 Fall 2015

Spring 2014 -
 Spring/Fall 2014

- Planned and hosted 2-3 badge events per semester for groups of 10-70 local Girl Scouts
- Facilitated general meetings and relayed communication between troop leaders and Girl Scouts Heart of Pennsylvania Council staff

Mentor, PSU Women in Engineering Program Orientation 2014- 15

- Provided leadership and mentorship for 7 first-year undergraduate students
- Communicated frequently with mentees throughout summer and academic year

Rover, Penn State Women in Engineering Program Orientation 2013-14

- Communicated with and provided mentorship for 7 first-year undergraduate students
- Assisted in set-up, tear down, and seamless operation of WEP orientation

INVOLVEMENT

Member, Penn State Ballroom Dance Team 2014-16

Member, Rules & Regulations THON Committee 2014-15

Recipient, Girl Scouts of America Gold Award 2012

2012

GRANTS

Erikson Discovery Grant

College of Liberal Arts Enrichment Grant

Schreyer Travel Grant

