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Intrasentential vs. Intersentential Code Switching in Early and Late Bilinguals

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INTRASENTENTIAL VS. INTERSENTENTIAL CODE SWITCHING IN EARLY AND LATE

BILINGUALS

by

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Abstract

INTRASENTENTIAL VS. INTERSENTENTIAL CODE SWITCHING IN EARLY AND LATE

BILINGUALS

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Master of Arts

Significant research has been done regarding the influence of age of acquisition
(i.e., the age at which one is exposed to a second language (L2)) on L2 learning (e.g.,
Johnson & Newport, 1989; Bialystock & Hakuta, 1999). Some researchers have shown
that bilinguals who have learned their second language early in life may differ in their
fluency from bilinguals who learned their second language later in life (White &
Genesee, 1996; Flege, 1999). Specifically, studies have suggested that bilinguals who
have not acquired their L2 by puberty will never acquire native-like proficiency
(Lenneberg, 1967); however, others claim that there is not one particular age after which
native-like language proficiency cannot be achieved (Birdsong and Molis, 1998; Flege;
1999).

However, little research has been done regarding the effect that age of acquisition
has on how bilinguals code switch and what rules govern this code-switching. Early
research by Poplack (1980) found that late (i.e., those who learned the L2 in adulthood),
less fluent bilinguals had different code switching tendencies than early (i.e., those who

learned L2 in childhood), more fluent bilinguals. Lipski (1985) suggested that early

bilinguals will engage in intrasentential switching while late bilinguals will rarely do so.

In the present study, 26 early and late Spanish-English bilingual speakers made

acceptability judgments on intra- and intersentential switches. Results indicate that there

is no statistical difference between early and late bilinguals when responding to whether a

mix was good or bad, and how good or bad a mix was. There were, however, trends in

the results which indicate that early bilinguals may respond faster to code switches than

late bilinguals, suggesting that early and late bilinguals may process language differently.

Further research is needed to confirm this finding.

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INTRODUCTION

Significant research has been done regarding the influence of age of acquisition (i.e., the age at which one is exposed to a second language (L2)) on L2 learning (e.g., Johnson & Newport, 1989; Bialystock & Hakuta, 1999). Studies have shown that the age of the bilingual at the time of acquisition may result in the most considerable differences in comprehension, production ability, accent differences, among other characteristics (Curtiss, 1989; Birdsong and Molis, 2001; Hirsh, et al, 2003). Specifically, some researchers have shown that bilinguals who have learned their second language early in life may differ in their fluency from bilinguals who learned their second language later in life (White & Genesee, 1996; Flege, 1999). Lenneberg (1967) suggested that bilinguals who have not acquired their L2 by puberty will never acquire native-like proficiency. However, other researchers claim that there is not one particular age after which native-like language proficiency cannot be achieved (Birdsong and Molis, 1998; Flege; 1999).

Similarly, code switching has long been a subject of linguistic study. It has been widely examined from a sociolinguistic perspective (Poplack, 1980; Lipski, 1985; Romaine, 1989; Gonzales-Velásquez, 1995; Zentella, 1997). Studies have shown that bilingual speakers may use code switching depending on their linguistic background, their role in a conversation, their age or race (Cheng and Butler, 1989), or their desire to assert solidarity or power (Wardhaugh, 2006). However, sociolinguistics has not yet been able to answer *how* code switching is processed. In contrast, some psycholinguists have endeavored to answer the questions surrounding

how code switching is processed (Heredia and Altarriba, 2001; Myers-Scotton, 1993; Dussias, 2003; Desmet and Declerq, 2006).

However, little research has been done regarding the effect that age of acquisition has on how bilinguals code switch and what rules govern this code-switching. Early research by Poplack (1980) found that late (i.e., those who learned the L2 in adulthood), less fluent bilinguals had different code switching tendencies than early (i.e., those who learned L2 in childhood), more fluent bilinguals. In addition, she found that less fluent bilinguals tended to switch intersententially, while fluent bilinguals tended to switch intrasententially. Lipski (1985) suggested that early bilinguals will engage in intrasentential switching while late bilinguals will rarely do so. Others have found that not only do adults and children engage in code switching in different manners, but the age at which they acquired the L2 affects the type and frequency of code switching (e.g., Jisa, 2000).

What is not known, however, is whether age of acquisition influences which code-switches are considered grammatically acceptable. Do early bilinguals accept intrasentential switches more readily than late bilinguals? Is there a particular age of acquisition at which bilinguals no longer accept intrasentential switches or does acceptability decrease as age of acquisition increases? Are certain types of code switches (e.g. switches with a transitive or intransitive verb) more acceptable than others? Determining the effects of age of acquisition in code switching may provide further information on how bilinguals process language.

THE PRESENT STUDY

The present study seeks to determine whether age of acquisition has an effect on code switching. Specifically, this study will examine intrasentential code switches (switches between the auxiliary and participle) and intersentential code switches (switches before the auxiliary and participle), and early and late bilingual responses to such code switches. The primary research question will be:

1. Does age of acquisition (early vs. late) affect the degree of acceptability in code switches in Spanish-English bilinguals?

The following point will also be examined:

a. Are intrasentential or intersentential code switches more likely to be accepted by early or late bilinguals?

Moreover, in order to discover whether early and late bilinguals process sentences differently, the following secondary research questions will be addressed:

b. Are transitive or intransitive verbs in a code switch more likely to be accepted by early or late bilinguals?

c. Are frequent verbs more likely to be accepted by early or late bilinguals in a code switch than less frequent verbs?

In order to discover the answers to these questions, a research study was designed to test participants' responses to two questions concerning intra- and intersentential switches: "Is this a good or a bad mix" and "How good or bad is this mix?" Results were analyzed by two different scores: good/bad responses to whether the mix is good or bad; participant ratings of how good or bad a mix is. Response times to the question of "is this a good or a bad mix" will also be recorded.

The answers to these questions may be applicable to two main areas of study: the critical period of language acquisition and bilingual language processing. The Critical Period Hypothesis (CPH) suggests that the crucial period for learning a language ends around the age of puberty (Lenneberg, 1967). This study may provide further evidence for or against the CPH. For example, if there are significant differences in the responses from the early and late bilingual participants, it may be further evidence of a critical period in bilingual language acquisition. However, if there are no major differences between early and late bilinguals, it may indicate one of two things: (1) that there is further evidence for a lack of a critical period in L2 acquisition; or (2) that the phenomenon of code switching does experience age effects like other aspects of language. The latter possibility may also suggest that there is a separate "Spanglish" grammar from which Spanish-English bilinguals, regardless of age of acquisition, retrieve their own set of language rules.

Results from the present study may imply further evidence for determining how bilinguals process languages. Using the Matrix Language Frame (MLF) model, and modular and interactive views of language processing, results will be analyzed to determine how bilinguals process language in code switching. The MLF explains code switching through the interaction of a speaker's Matrix Language and Embedded Language (Myers-Scotton, 1993). The modular view of language processing suggests that the languages of a bilingual are processed independently of each other (Kroll & Stewart, 1994). The interactive view of language processing suggests that the languages of a bilingual are processed together (van Heuven, et al., 1998). For example, increased processing times in intrasentential switching may

suggest that bilinguals organize their languages separately. Moreover, if there is a difference between early and late bilingual responses, it may indicate that they store their languages in different ways.

Chapter Two of this thesis contains a review of some of the relevant literature that has been influential in the study of code switching and age of acquisition. The remainder of this thesis will focus on the format and results of the present study. Chapter Three contains a description of the research methodology, including information on the participants, stimuli and experiments. Chapter Four describes the results of the experiment. Finally, Chapter Five summarizes the results and discusses the findings described in Chapter Four.

CHAPTER TWO

REVIEW OF LITERATURE

INTRODUCTION

Many studies on code switching focus on the production of code switching in bilingual speech rather than how the bilingual responds to perceiving (i.e., hearing or seeing) a code switch (Genesee et al., 1995; Jisa, 2000, Campos, 2005). The research that has focused on perception has examined what types of code switches are considered grammatical and how quickly bilinguals are able to decide whether or not switches are grammatical (Macnamara and Kushnir, 1971; Martinez et al., 1998).

Surprisingly, little research has been done that examines differences in how code switching is perceived by bilinguals with a different age of acquisition. The present study focuses on how acceptable early bilinguals versus late bilinguals perceive, rather than produce, certain types of intrasentential code switching (specifically between the Spanish auxiliary + English or Spanish participle by Spanish/English bilinguals). Based on the research of Dussias (2003), Lipski (1985), and Jisa (2000), this study hopes to determine whether or not age of acquisition influences the acceptability of intrasentential code switching.

This section will begin with a definition of the types of code switching. Section two will discuss bilinguals and differences between early and late bilinguals in code switching. Section three will briefly examine the sociolinguistic reasons for code switching. Section four will discuss psychological reasons to code switch and current research in psycholinguistics and code switching. The final section will

discuss the present study, which will endeavor to answer the following primary research questions:

1. Does age of acquisition (early vs. late) affect the degree of acceptability in code switches by Spanish-English bilinguals?

Moreover, the following point will also be examined:

      a. Are intra- or intersentential code switches more likely to be accepted by early or late bilinguals?

In order to determine whether or not early and late bilinguals also differ in the way they process sentences, the following secondary research question will be examined:

      b. Are transitive or intransitive verbs in a code switch more likely to be accepted by early or late bilinguals?

      c. Are frequent verbs more likely to be accepted by early or late bilinguals in a code switch than less frequent verbs?

WHAT IS CODE-SWITCHING?

Code switching has often been characterized by seemingly random changes from one language to another. It has had many names and definitions, from "Spanglish" or "Tex-Mex" to code switching, code mixing, or code changing (for the purpose of this paper, the term *code* refers to different languages, or different varieties or dialects of the same language(s); e.g. Mexican Spanish or Argentine Spanish are both codes of Spanish). Code switching may be defined as follows: the use of more than one language by two people engaged in a speech act (Poplack, 1980; Lipski, 1985; Gonzales-Velásquez, 1995; Myusken, 2000). It can occur between the

speakers involved in a conversation or within a speech turn of a single speaker. Code switching can appear on several language levels including syntactic, phonological and morphological levels.

Studies have shown that bilinguals, when discussing their own language abilities, will often confirm that they differ when speaking to monolinguals versus bilinguals. They may completely avoid using their L2 with monolinguals, while code switching when conversing with bilinguals (Grosjean, 2001). Most importantly, however, is that when bilingual speakers code switch they switch from language to language with ease and fluidity, following the syntactic and semantic rules of both languages (Muysken, 2000). Gonzales-Velásquez (1995) states that code switching is a linguistic option to bilingual speakers because they are proficient in both their native language and another. Code switching functions as part of their "verbal repertoire" just as much as their first and second languages do.

Types of switching

There are several terms referring to code switching, including *code mixing*; *code-changing*; and *tag-switching*, *situational* and *metaphorical code-switching*. As these terms often have various meanings attached to them, it is necessary to first define each type, as relates to this paper. *Code switching* is the general term for any kind of language switching, especially among bilingual Latinos (*quiero ir al* MALL NEXT TUESDAY 'I want to go to the mall next Tuesday') (Fromkin & Rodman, 1998). *Code mixing* is a brief insertion of a few words from one language into the other (*voy a comprar* PIZZA 'I'm going to buy pizza'). *Code changing* is defined as a long clause(s) inserted into one language before or after a segment of the other language

(Cheng & Butler, 1989) (Yesterday I went to school and learned about algebra and then suddenly *un chico empezó a cantar muy fuerte durante el clase y por fin todos fueron cantando* and then the teacher got mad but she couldn't get us to stop singing '…a boy started singing very loud during the class and finally everyone started singing…'). *Tag-switching* occurs when a speaker inserts a tag statement from one language into another language. Examples of this in English are taking phrases like *you know*, *I mean*, *no way*, etc, and then inserting them into a Spanish sentence, as seen in this example: *es difícil encontrar trabajo estes dias*, YOU KNOW? ('It's hard to find work these days, you know') (Romaine, 1989). *Situational code-switching* occurs when, due to a change in setting, conversational partners, or topic, a speaker chooses to speak in a different language than he was originally speaking (Wardhaugh, 2006). For example, a group of Japanese-English bilinguals engaged in a conversation in Japanese may switch to English when a monolingual English speaker approaches and joins the conversation. This concept also applies to shifting between registers within a language; e.g. a teenaged boy may speak Standard American English when conversing with a teacher, but switch to a lower register of slang English when his peers approach. *Metaphorical code-switching* is used to emphasize certain aspects of a statement or add meaning to relationships being expressed. This occurs when bilinguals switch languages to imply that they identify more with a group in a particular situation (Saville-Troike, 2003). However, in this paper, all switches regardless of the type will be referred to simply by the general term *code switching*, unless indicating the location of the switch (e.g. intrasentential switching, which will be discussed later on).

On the lexical level, code-switching usually occurs when there is no existing translation for a word or phrase (e.g. the Guatemalan slang term *a la gran chucha*, literally meaning 'to the big dog' has no direct translation to English, although the general meaning translates to *oh my*). At the semantic level, code-switching can occur within a phrase, sentence, or when an idea can be better explained in the other language. An example might be *cada semana olvida llevar su* PAYCHECK TO THE BANK ('every week he forgets to bring his paycheck to the bank'). Syntactic code-switching occurs when the rules of syntax of one language are applied to the other: *tengo muchos* HUNGERS (meaning 'I'm hungry') or *muchas* THANK YOUS (meaning 'many thank yous'), where the rules of syntax in Spanish are being applied to English (Cheng & Butler, 1989).

Intersentential vs. Intrasentential

Code switching may also differ in the location of the point at which the language switch occurs. The main distinction is usually seen between *intersentential* and *intrasentential* switching (Saville-Troike, 2003). *Intersentential* switching consists of language switches at phrasal, sentence, or discourse boundaries. For example, a speaker may finish his thought concerning how schools should increase their funding for music programs in Spanish, and then begin his subsequent thought regarding a college football game in English. "*Y yo pienso que todos los estudiantes deben aprender a tocar un instrumento* ('and I think that all the students should learn to play an instrument') SO, DID YOU SEE THE FOOTBALL GAME LAST NIGHT? BYU REALLY DID SOME DAMAGE TO POOR BOISE STATE…" This kind of switching requires

greater fluency in both languages than tag-switching, as each part of the utterance must agree with the rules of the corresponding language being spoken.

Intrasentential switching involves a shift in language in the middle of a sentence, usually performed without pause, interruption or hesitation. An example of this is seen in the title of Poplack's (1980) study "Sometimes I'll start a sentence in English *y termino en español*" (italics added), ('sometimes I'll start a sentence in English and finish in Spanish'). This type of code switching requires the most fluency of all types of code switching because it requires speakers to switch to the rules of syntax of the other language mid-thought or sentence, and consequently may be avoided by all but the most fluent of bilingual speakers (Lipski, 1985). Intrasentential switching is a common phenomenon in Spanish-English bilingual speakers, and has become an identifying characteristic of Hispanic-American speech (Fought, 2003). Many linguists believe that a study of intrasentential code switching will "yield the greatest fruits in the way of characterizing the linguistic organization of the bilingual cognitive apparatus" (Lipski, 1985, p. 3). This study will focus primarily on intrasentential code switching in order to determine whether any differences exist between early and late bilinguals in how they process code switches.

BILINGUALS

Any treatment of code switching inevitably requires a discussion of the nature of bilingualism. The following section will define bilingualism, and discuss how the age of second language acquisition affects fluency and, in turn, how this affects code switching.

What is a bilingual?

When people think of a bilingual, they most often think simply of a person who fluently speaks two languages. Yet bilingual behavior is much more complex than simply speaking two languages. A bilingual person may be classified as a *natural bilingual* if he or she learned his second language as a child concurrent with his first language in his natural environment. Or a person may be considered a *secondary bilingual* if he or she learned his or her second language through school (Hoffman, 1991).

There are also many factors that play a role in bilingual fluency, including, motivation and attitude (Gardner, 1985; Clément et al., 1994), social setting (Siegel, 2003; Wardhaugh, 2006), age of acquisition (Lenneberg, 1967; Flege et al., 1999), learning strategies (Dekeyser, 2003) and language aptitude (Carroll, 1965, 1981). Age of acquisition has, however, been the most disputed factor, largely due to wide variety of results collected on research studies and the lack of indisputable evidence. Studies have shown that the age of the bilingual at the time of acquisition may result in the most considerable differences in comprehension, production ability, accent differences, among other characteristics (Curtiss, 1989; Birdsong and Molis, 2001; Hirsh, et al, 2003). An "early bilingual" (or child bilingual) may achieve native-like fluency in his or her second language, whereas a "late bilingual" (an adult bilingual, or one who learned his or her second language post-puberty) may never achieve native like proficiency (Clark, 2004).

Early vs. Late Bilinguals

Thus, an important consideration in bilingual fluency is the speaker's age at the time of second language acquisition. Some researchers have shown that bilinguals who have learned their second language early in life may differ in their fluency from bilinguals who learned their second language later in life (White & Genesee, 1996; Flege, 1999). This idea is reflected in the *Critical Period Hypothesis*, which states that the crucial period of complete language acquisition ends around the age of 12, and that if language is not learned before that time, native-like fluency will never entirely be attained (see Lenneberg, 1967; Curtiss 1989), and more recent researchers have suggested the cut-off period is even earlier (Flege et al., 1999; Baker & Trofimovich, 2001). In particular, Johnson and Newport (1989) found that when factors other than age are controlled for (such as motivation, amount of instruction, etc), age of acquisition was the only accurate aspect for predicting eventual second language proficiency. Using a grammaticality judgment task, they examined the "grammatical intuitions" of adult Chinese and Korean second language (L2) learners of English who had acquired English between the ages of 3 and 39. Their results show that the group with the youngest participants (3-7) performed similarly to the native controls, while the other participants showed a steady decline in performance based on age up through puberty. For participants who learned English from the age of 17 and up, the decline in performance disappeared. This suggests that although there is evidence for an age effect for pre-maturational learners, a late age of acquisition may result in a wide variety of ultimate attainment.

Similarly, in a replication of the Johnson and Newport (1989) study, Birdsong and Molis (1998) found that there was a strong age effect among their 32 participants,

but they surprisingly found that this effect occurred past puberty as well.   In other words, they found that the earlier a speaker learned the L2, the better, regardless of whether the language was learned before puberty or not. This was true for both early and late bilinguals, differing with the results found by Johnson and Newport (1989) in that there was no particular age wherein language acquisition became significantly better or worse. Further, other researchers (Bialystock and Hakuta, 1999; Flege; 1999) have shown age effects for both early and late bilinguals. Given the fact that age of acquisition has been found to be an influence in so many other areas of language acquisition, it would follow that it is also reflected in code switching. As previous research has not examined whether or not age of acquisition is a prominent factor in how code switching is processed, it will be the focus of this study.

REASONS FOR CODE SWITCHING

There are both social and psychological reasons a bilingual may code switch. Social reasons are obviously influenced by the people around the speaker, a desire to fit in, and need for solidarity, among other reasons (Wardhaugh, 2006). While sociolinguists examine the social environments and conscious motives for code switching, psycholinguists look at how code switching is processed. The psychological reasons for code switching are a complex and relatively new area of study in linguistics. The following section will first briefly discuss social reasons for switching. Psychological reasons for switching, as well as current research concerning psycholinguistics, bilinguals, and code switching and age of acquisition will then be addressed.

Social reasons

The area of sociolinguistics and code switching has been a widely researched topic in linguistics (see Poplack, 1980; Lipski, 1985; Romaine, 1989; Gonzales-Velásquez, 1995; Zentella, 1997). Therefore, code switching is usually thought of as a social phenomenon. Cheng and Butler (1989) list the following as some of the motives a speaker may have to code switch: "conversational topic, role of the speaker, setting of the interaction, familiarity of the two speakers, age, sex, race, ethnic, linguistic background, etc" (p. 295). When done consciously, switching languages may also allow a speaker to "assert power; declare solidarity; maintain a certain neutrality when both codes are used; express identity; and so on" (Wardhaugh, 2006, p.110). For example, if a group of bilingual Spanish-English speakers are conversing in both Spanish and English and a monolingual Spanish speaker enters the conversation, the group will most likely begin speaking only Spanish, in order to allow the monolingual to participate in the conversation, thereby expressing their solidarity with the monolingual. Or, if the bilingual group wishes to assert linguistic power over the monolingual, they might continue speaking only in Spanish to exclude him or her.

Unfortunately, code-switching is often wrongly misinterpreted as evidence of a lack of a linguistic ability of the speaker or deterioration of one or both languages. However, sociolinguistic research confirms that code-switching plays an important role in social functions, and does not necessarily indicate linguistic incompetence. According to Gonzales-Velasquez (1995)

Not only are some of the respondents…proficient in two languages, English

and Spanish, but they are also proficient in code-switching. Furthermore, they

exhibit an impressive knowledge of grammar in their switching behavior. The

respondents code-switch intersententially or intrasententially...In both types,

code-switching is done not haphazardly but, rather, according to a

grammatical structure. It is a variety of speaking that is appropriate in certain

domains or subdomains and within certain interlocutors (p. 427).

In a long term study in a Puerto Rican barrio of New York City, Zentella (1997)

found not only that code switching was a necessary part of a person's development

within the community and involves complex social and linguistic rules, but she also

discovered that "the acquisition of the hows and whys of 'Spanglish' [is] a

conversational strategy reflected in children's age, dominant language, and social

status, and [that] those same variables determined their mastery of the grammar of

'Spanglish'" (p.116). Zentella (1997) found that speakers would often begin in the

language they themselves were most comfortable in, but then would switch to the

language of any newcomer that joined the conversation. Children adhered to the

community norm by obeying a "follow the leader" approach to code switching: if an

adult or authority figure switched languages, the children would follow. Switches

also occurred to clarify a statement, to emphasize something that had been said, to

show politeness, or even to show one's prowess in both languages.

In addition, code-switching includes the notion of *communicative competence*,

which is the ability of a speaker to select and apply those expressions and phrases that

best reflect the social norms of the group with whom he or she is interacting; i.e., the

ability to say the right thing to the right person at the right time and right place.

Speakers who utilize code-switching may be viewed as intentionally switching codes

for purposes of effective communication. "Purposeful and appropriate code-

switching, therefore, can be viewed as an expression of communicative competence"

(Cheng & Butler, 1989, p. 296). Research by Alfonzetti (1998) in Italian-dialect

switching suggests that code switching can be explained in terms of conversational

analysis in communicative competence. Through an analysis of naturally occurring

bilingual speech, Alfonzetti argues that code switching is a communicative strategy

used specifically for the purposes of the speaker, and can be viewed as a cue for the

hearer to interpret given utterances a certain way.

These studies arguably explain many of the reasons why code switching

occurs. Speakers may use it to their advantage to express themselves or suggest a

certain status or feeling of power. Sociolinguistics is able to explain the when and

why bilinguals may use code switching in their speech. It does not, however, explain

how code switching is processed, nor has sociolinguistic research examined any

differences that may occur between early and late bilingual speakers. In order to

answer the question of *how*, research must be examined concerning how the bilingual

brain processes language in general; then answers to how an early or late bilingual

speaker code switches may be found.

CURRENT RESEARCH IN PSYCHOLINGUISTICS AND CODE SWITCHING

Unlike sociolinguists, psycholinguists have not dealt extensively with code

switching. It has been considered more of a sociolinguistic phenomenon, and

consequently the psychology of code switching has received only a fraction of attention. However, since psycholinguistics offers the ability to explain how and why bilingual speakers code switch, there has been increasing research in this area of study.

Why do bilinguals code switch?

As stated above, of the many reasons that bilinguals code switch, the most common belief is that speakers switch languages to compensate for a lack of fluency. While this may occasionally be the case, this belief excludes the possibility that the speaker can simply access a certain word or phrase faster from the language other than which he or she is currently speaking. This is seen in the tip-of-the-tongue phenomenon, in which people are unable to remember and produce a word or information that they know (Heredia & Altarriba, 2001). Thus, "code switching may be a problem of retrieval affected by...language use and word frequency" (Heredia & Altarriba, 2001, p.164).

Furthermore, "lack of fluency" excludes the possibility of explanation based on grammatical structure. For example, Spanish-English code switching does not allow for the phrase *el camión rojo* to be switched to *the truck rojo* or *el red camion*. This example would be impossible because in Spanish, the adjective generally follows the noun, and in English an adjective may never follow the head noun. Therefore this type of code switch is forbidden by the grammatical rules of code switching (Lipski, 1985).

Theories of language processing: MLF Model vs. Interactive vs. Modular

Roelofs (in Myers-Scotton, 2006, p.1) suggests that the main mystery surrounding bilingual language production is found not only in how a bilingual speaker keeps the two languages separate within his/her mind during monolingual conversation, but specifically how a speaker is able to integrate both languages in a conversation containing code mixing: in other words, psycholinguists are concerned with understanding how code switching is processed in the bilingual brain. Myers-Scotton's (1993) answer to this question was her Matrix Language Frame Model (MLF), which is a model designed to explain the structures in intrasentential switching. She claims that a bilingual speaker has a dominant language (Matrix Language or ML) and an Embedded Language (EL). The ML may or may not be the speaker's first language, especially for immigrants who speak predominantly their L2. When a speaker is code switching, the language that is functioning as the ML will set the grammar and morphosyntactic frame for the code switched sentences, e.g.: *No porque quiero perder* MY LANGUAGE SPANISH ('not because I want to lose my Spanish language'). This example shows how the grammatical morphemes all come from the ML (Spanish), even going beyond the Spanish and applying the ML to the other language (English). Occasionally there will be "language islands" (where one speech act, or statement, will be entirely in the ML, or entirely in the EL). This model also postulates that the speaker does not need to be fluent in the EL to engage in code switching, but may be more fluent in the ML. However, evidence from code switching indicates that speakers almost always choose the more grammatically dominant language (the ML) as a framework for the entire sentence or clause. This

implies that that the speakers must subdue the EL when engaging in code switching, and usually will not alternate the EL for ML, or vice versa (Myers-Scotton, 2006).

This model explains how a bilingual speaker processes language: the speaker does indeed have a syntactic structure that is being followed when code switching occurs (as seen in the example *No porque quiero perder* MY LANGUAGE SPANISH ('not because I want to lose my Spanish language')), and that structure could be explained through an examination of the individual structures of the two languages used in the switch. The MLF also offers proof that code switching is not indicative of language impairment: as noted previously, the speaker must be very proficient in the ML to code switch, because this language will provide the structure of the code switch. As Myers-Scotton insists: "[i]t doesn't make sense to argue that they switch *from* this language (the way switches typically go) because of fluency problems" (2006 p. 206).

Selective vs. non-selective views of code-switching

Another school of thought concerning bilingual language processing is centered on the following two hypotheses: *language selective* (modular) or *non-selective* (interactive) views. The first claims that languages of a bilingual are processed independent of each other and are separate (Kroll & Stewart, 1994). The second suggests that the lexical representations of each language interact with each other during word processing and are combined (van Heuven, et al., 1998). Investigations of these theories have focused on the lexical level of language processing, through research on the activation of word-level or syntactic information. In three experiments, Desmet and Declerq (2006) looked at whether syntactic information could primed from relative clause attachments. For example, in the

sentence "Someone shot the servant of the actress who was on the balcony" the relative clause could be adjoined with both "the servant" and "the actress" (Desmet and Declerq, 2006, p. 610). They found that Dutch-English bilinguals could be prompted to produce relative clause attachments from Dutch to English, even when completely separated from similar lexical items. Specifically, (looking at the example above) the relative clause could be joined with either "the servant" or "the actress" depending on which lexical item in Dutch was used to prime the clause. If the participants had just read a Dutch prime that contained a high level of connection between the clause and attachment, they were more likely to attach the relative clause in English to the first noun phrase. Their results show that syntactic information can be primed between the languages of bilinguals, which favored the interactive model (non-selective) of bilingual language processing.

However, research by Kroll and Stewart (1994) suggests that languages are organized separately, supporting the modular view. For their research, Dutch-English bilinguals participated in a picture-word naming activity, where it was found that there were increased translating rates when translating from the L2 to L1 or L1 to L2. This increased rate in translating time suggested that bilingual language processing may be in a modular format.

The results of these two studies demonstrate that linguists are still not sure whether or not the two languages of bilinguals are stored together or separately, nor whether there are processing differences between early and late bilinguals. The current study, which examines age effects on code-switching perception may help to answer these questions. For example, if a late bilingual takes a much longer time to

process the same code switched sentence as an early bilingual, it may indicate that

late bilinguals process language in the modular, or language selective method.

However, if the early bilinguals accept and process code switches faster, that may

show that they do not remain in their Matrix Language when code switching, but

instead switch to the Embedded Language, this may suggest that early bilinguals may

not have two separate language systems, as suggested by the MLF. If early and late

bilinguals differ in their language storing mechanisms, it would be reflected in the

kinds of code switches they found acceptable and their response times to code

switching grammaticality judgments. This idea of early vs. late bilingual code

switching and how language is stored will be addressed later in this paper.

Code switching processing time

Producing a switch within a language has often been thought to incur a longer

processing time. Initial studies of code switching by Macnamara and Kushnir (1971)

found that bilinguals were slower to read code switched passages than monolingual

passages. They proposed that switching would take longer to process because it

would take more time to turn a language "off" or "on" as needed. Because both

language systems cannot be active at the same time, the processing of code switching

is slowed down (Heredia and Altarriba, 2001). Other research has found that

bilinguals were slower in recognizing words in one language when they were shown

words immediately beforehand in another language. This implies that switching

languages influences not only word recognition, but also the length of time it takes to

process language (Grainger & Beaufillain, 1988, Grainger & O'Regan, 1992**).**

However, certain factors such as the recognition of code switched words, semantic

context, phonetics, and "homophonic overlap" may help bilinguals speed up the process of code switching (Heredia and Altarriba, 2001; Grosjean, 1995). In contrast, switches using different types of verbs, such as transitive and intransitive, or high frequency and low frequency verbs, may cause the process of code switching to slow down. Other studies attempted to reduce or eliminate the ambiguity that may come with code switching (by creating natural code switching circumstances or by "blocking" the experiment's stimuli). They found that in so doing, the "cost" of code switching (the extra processing time) was nearly eliminated as well (Amrhein, 1999). Similar results were found in a study done by Moreno, et al (2002). An analysis of data from an electrophysiological study found that for some speakers in some contexts, the processing cost of code switching languages may be less than the processing cost of an "unexpected within-language item" (Moreno et al, 2002, p.1). Nevertheless, other studies have found that even code switches that were completely expected still incurred some form of processing cost (Altarriba et al., 1996).

The question that then arises is whether there a difference in processing cost that occurs between different types of code switches for early vs. late bilinguals. Dussias (2003) found that switches at an auxiliary + participle in Spanish-English code switches took significantly longer for participants to read than switches at the phrasal boundary. As these types of switches will be the focus of the author's research, they will be discussed in greater detail in a later section.

Perception vs. production and age of acquisition

The production of code switches by bilingual speakers has been widely studied (Chengappa, 1984; Genesee et al., 1995; Jisa, 2000, Campos, 2005).

Bilingual responses to and acceptability of code switching have also been examined (Macnamara and Kushnir, 1971; Grainger & Beaufillain, 1988, Grainger & O'Regan, 1992; Altarriba et al., 1996; Martinez et al., 1998; Dussias, 2003). However, little research has been done that compares how bilinguals with different ages of acquisition (early and late) respond to code switching. It is in this area of research with which the present study is concerned.

THE PRESENT STUDY: CODE SWITCHING AND AGE OF ACQUISITION

As evidenced in the section(s) above, significant research has been done concerning bilingual proficiency and age of acquisition. Early studies suggest that there is a difference in production of code switching between fluent and non-fluent bilinguals (Poplack, 1980; Lipski, 1985), but there has not been much investigation of the perception of code switching and age of acquisition.

In an early study done on code switching, Poplack (1980) discovered that bilinguals of varying abilities (both fluent and non-fluent) were found to produce code switches frequently, while still retaining grammaticality in both the L1 and L2. In addition she found that less fluent bilinguals tended to switch intersententially, while fluent bilinguals tended to switch intrasententially. Hale (1995) found that child bilinguals are more likely to code-switch because they have two terms for every concept they know, one in each language. In a long-term study of two French-English bilingual children, Jisa (2000) found that the age at which a child acquired the L2 affects the type and frequency of code switching. On the other hand, late bilinguals have different associations for concepts in each language, and seem to have

an increased ability to separate the two languages. According to Lipski (1985), all kinds of bilingual speakers, fluent or barely beginning to learn the language, engage in code switching, both intersentential as well as intrasentential. However, Lipski hypothesized that a speaker who has learned a second language after the critical period, even though he or she may speak the language fluently, will rarely engage in intrasentential switching. The speaker may switch languages intersententially in the course of conversation with other bilingual speakers, but will not switch languages mid-sentence.

Often a speaker who switches intrasententially is unaware of the fact that s/he has code-switched, and may be unable to correctly identify where the exact location of the shift occurred, or give explanation as to why s/he chose to switch at that moment. Given this, the question then arises of whether a bilingual speaker will differ in his/her perception of certain switches similar to how s/he produces them. Will a late learner find intrasentential switches less acceptable than an early learner might, as suggested by Lipski (1985)? Moreover, will an early and late bilingual perceive and process certain types of code switch differently?

In order to attempt to answer these questions, the current study, based loosely on a study done by Dussias (2003), was designed to examine intrasentential switching at the auxiliary + participle boundary in Spanish-English code switching. Dussias (2003) suggested that certain types of "syntactic junctures" are more likely to experience language switching, especially intrasentential switching, such as the Spanish auxiliary + verb location, for example, in the verb *estar* + participle. The reason for this may be that such boundaries would require the speaker to, for

example, divide the predicate adjective and preceding noun, rather than a verb from its adverb. Using the two Spanish verbs *haber* ('to have) and *estar* ('to be'), Dussias tracked participants' eye-movements in a reading experiment, as well as measured their response times to each sentence. She found that study participants took considerably more time to read and examine *haber* + English participle (*terroristas han* INJURED, 'terrorists have injured') switches than switches at a phrasal boundary (*terroristas* HAVE INJURED). However, *estar* + English participle switches (*ciudadanos estan* SUPPORTING, 'citizens are supporting') did not experience a significant increase in reading time.

  As previously mentioned, Dussias (2003) has researched the code switches between *estar* and *haber* + participle, but as of yet no research has been done concerning switches using the auxiliaries *ir* and *andar*. Although they have been demonstrated in Spanish-English code switching speech and literature, it may be interesting to determine which (if either) verb undergoes a higher degree of acceptability in terms of code switching. Dussias (2003) suggests that auxiliary verbs contain different degrees of grammaticalization, meaning that certain verbs may contain more of a grammatical meaning than a lexical one. A verb like *estar* is highly grammaticized, and therefore may be frequently used in auxiliary + participle code switches (Dussias, 2003, p.22). However, verbs like *ir* and *andar* are less grammaticized and therefore may be less likely in an auxiliary + participle code switch. Because of this, switches using *ir* and *andar* may be more likely to reveal possible differences in acceptability between early and late bilinguals.

Dussias (2003) also did not focus her research on other qualities of verbs, such as transitivity or frequency that may affect the acceptability of code switches. Her study also did not include whether or not age of acquisition was a factor in the acceptability of different types of switches. The following study hopes to add to research on code switching and age of acquisition by determining how acceptable certain switches are perceived to be by early and late learners. The research questions to be addressed are as follows:

1. Does age of acquisition (early vs. late) affect the degree of acceptability in code switches?

    a. Are intra- or intersentential switches more likely to be accepted by early or late bilinguals?

    b. Are transitive or intransitive verbs more likely to be accepted by early or late bilinguals?

    c. Are high frequency verbs more likely to be accepted by early or late bilinguals in a code switch than low frequency verbs?

CHAPTER THREE

METHODOLOGY

<u>**INTRODUCTION**</u>

The methodology for the research of the present study will be discussed in this

chapter. The research methodology for the present study was loosely based on

Dussias (2003) in which participants made grammaticality judgments on two different

Spanish verbs, *estar* and *haber.* In the Dussias (2003) study, an eye tracking device

was used and response times and eye movements were measured. The present study

modified the task by retaining the response time task but also added a new task,

wherein participants were asked to determine the degree of acceptability of the code

switch. The purpose of the modifications from Dussias (2003) to the present study

was first and foremost to determine whether age of acquisition (early vs. late) affects

the degree of acceptability (very good, good, ok, bad, very bad) in intrasentential

code switches. The modifications also allowed the author to examine what types of

code switches are influenced by age of acquisition, in particular, whether

intrasentential code switches take more time to process than intersentential code

switches; whether transitive or intransitive verbs are more likely to be accepted in a

code switch; and whether frequent verbs are more likely to be accepted in code

switches than infrequent verbs.

This section will begin with a description of the participants involved. The next

section will examine the stimuli used for the study, as well as explain why it was

chosen. The third section will describe the different instruments used to record the

data for the study, including the program *DMDX* and the online program *Qualtrics*.

The third section will also discuss the questionnaire, which was included in the

Qualtrics program. The final section will describe how the data were analyzed.

PARTICIPANTS

The original participants for this study were 28 native Spanish speakers, the

majority of whom were from Mexico. Two participants were disqualified for reasons

to be discussed below, putting the total number of counted participants to 26. The

participants ranged in age from 18 to 33. Twelve male and twelve female participants

were students at Brigham Young University at the time of the test and therefore

currently resided in Utah (where the study took place).   One of the male participants

was enrolled in Brigham Young University's Language Center. One male participant

had already completed his studies at BYU and was currently employed in the Provo,

Utah area.

Twelve of the participants were early bilinguals and 14 were late bilinguals.

Participants were determined to be early or late bilinguals based on their age at the

time they reported speaking English on a regular basis. For some participants "on a

daily basis" meant when they immigrated to the United States; for others this meant

when they began attending an English-only school and started speaking English in the

home. If the participant began speaking English on a regular basis (or moved to the

United States) before the age of 12, s/he was considered an early bilingual. If the

participant began speaking English on a regular basis after the age of 12, s/he was

considered a late bilingual. The age of 12 was chosen based on research by

Lenneberg (1967) and Curtiss (1989) which suggests that the crucial period of

language acquisition ends at puberty. However, no participating early learner started to learn English after the age of 11.

Of the early learners, 5 were males and 7 were females; of the late learners, 9 were males and 5 were females. Of the 26 participants, 21 were originally from Mexico and 4 were from another Spanish-speaking country, including two from Peru, one from the Dominican Republic, and one from Ecuador. One other participant grew up in a native Mexican Spanish-speaking community in California. One of the participants from Peru, and the participants from Ecuador, the Dominican Republic, and California were all early learners. The other participant from Peru was a late learner. Native speakers of Mexican Spanish were preferred because of the large number of native speakers found in the area of the study and a desire to test a unified dialect of Spanish among the speakers. Of the 5 non-Mexican native participants, 2 said that although their family was not from Mexico, they grew up around Mexican Spanish speakers in the community and at school.

In a questionnaire that will be discussed at greater length later in this section, participants were asked whether or not they code switched, and then how often (daily, weekly, or once in a while, meaning less often than weekly or daily). The majority of participants, 24 people, claimed to code switch at least once in a while. Only 2 participants claimed to never code switch. One participant indicated that he made particular effort not to code switch, and even corrected other bilingual speakers when they code switched around him.

Since all but one of the participants was enrolled in an English-speaking university, it was assumed that they were fluent in English, having scored at least a

630 on the TOEFL exam (where applicable). The exception to this is one late bilingual male who was enrolled in the English Language Center at Brigham Young University. He had only been in the US for 6 months, but had taken English classes for several years in Mexico prior to coming to the US. After the participant read the English instructions, the test administrator conducted a brief oral interview to determine whether or not he understood the activity. It was determined that he understood the activity and was fluent enough in English to proceed with the study.

Two participants were disqualified from this study. A 50 year old late male bilingual was disqualified because his age was above the desired age group. One late bilingual male was also disqualified because he had only been in the US for 2 months and did not seem to comprehend the English instructions well enough to make educated decisions about the switches.

Participants were recruited through emails and word of mouth. They were offered a candy bar for their participation. Most participants were found through a "hometown" search on Brigham Young University online student directory. Each participant was sent a personalized email briefly explaining the purpose of the study and then asking them to participate. Of the over one hundred emails sent out, only twenty actually replied and set an appointment with the author. The last nine were either friends of the author or friends of people who had already participated in the study. All participants agreed to the Informed Consent form approved by the Internal Review Board for the Use of Human subjects (see Appendix A for consent form).

Questionnaire

After agreeing to participate in the study, participants were asked to provide basic demographic information including age, gender, place of origin, native language, dominant language, age of English acquisition, language used most often on a daily basis, language used most often with friends and family, whether or not they code switched, and how often/with whom they code switched (see Appendix B for complete questionnaire). Additional information was collected about each person in personal interviews with the author.

Age of English acquisition. The earliest age of acquisition of any participant was 3 and the latest age of acquisition was 23. The average age of acquisition for the early learners was 6 (ranging in age of acquisition from 2-11) and the average age for late learners was 19 (ranging in age of acquisition from 15-26). Of the 26 participants, 12 stated that they learned English before the age of 15 and 14 learned English after the age of 15. There was only 1 participant who claimed to have learned English and Spanish simultaneously from birth. This person was included with the early English bilinguals. Of the early learners, 3 started learning English in their native country and then moved to the US as children. 4 participants had spent more than 10 years of their lives in the US. The total average length of time spent in the US for all participants was 6.3 years; 8.3 years for the early bilinguals (from 6 months to 17 years) and 3.7 years for the late bilinguals (from 7 months to 6 years).

All of the early learners either started learning English in school or at home in Mexico. Of the late learners, 12 moved to the US to learn English and go to college and 2 learned English while serving a religious mission for the Church of Jesus Christ of Latter-day Saints. Some of the late learners, 4 participants, also claimed to have

started learning English in school before moving to the United States, but they

admitted that at that time they only used English about 1 hour a day and only in a

school setting. This shows that although some of the late learners may have been

exposed to English at an early age, they did not begin to acquire the language until

they moved to the United States.

Table 3.1: English Age of Acquisition

Age Range (in years)	Early Bilinguals	Late Bilinguals
Age	18-33	19-27
Age of English acquisition	2-11	6-23
Length of time speaking English	9-22	.5-9
Length of time spent in US	5-17	.5-6
Averages (in years)	Early Bilinguals	Late Bilinguals
Age	23	24
Age of English acquisition	6	19
Length of time speaking English	14.5	5
Length of time spent in US	8.3	3.7

Language used and with whom? Eighteen (10 early learners and 8 late

learners) of the participants said that English was the language they used most often

on a daily basis while only 8 (2 early learners and 6 late learners) claimed Spanish.

One late learner said that he used both equally. 4 early and 3 late participants said

that they used English exclusively with their friends and families. The other 19

participants said that they used Spanish most often with family and English or both

languages with friends. Two participants (one early and one late learner) claimed to

use both languages equally with friends and family.

Table 3.2: Languages used and with whom (by number of participants)

Language used most often on a daily basis	Early Bilinguals	Late Bilinguals
Spanish	2	6
English	10	8
Both	--	0
Language used most with friends and family	Early Bilinguals	Late Bilinguals
Spanish	8	8
English	3	3
Both	1	1
*Two participants did not respond to this question		

and 1 late learner said they switched weekly; and 4 early learners and 4 late learners

said that they switched once in a while (meaning less than daily or weekly).

Table 3.3: How much do you code switch (by number of participants)

How much do you code switch?	Early Bilinguals	Late Bilinguals
Daily	5	5
Weekly	2	1
Once in a while	4	4
Never	2	1

With whom do you code switch? The most common answer to this question

was "with friends." One of the participants (an early learner) chose only family and 8

(5 early learners and 3 late learners) chose both family and friends. Two participants

(one early and one late) said they only code switch with co-workers. One late learner

said he code switched mostly with anyone who was a Spanish-English bilingual. The

early learners who code switched most often did so with friends and family and co-

workers. The late learners who code switched most often did so with friends and

family. In the early group, those who code switched least (only once in a while)

claimed to only do so with friends; in the late group, those who code switched least

did so with friends and family.

Table 3.4: With whom do you code switch? (By number of participants)

With whom do you code switch?	Early Bilinguals	Late Bilinguals
Friends	4	3
Family	1	0
Co-workers	1	1
Both friends and family	4	5
Everyone	1	1

STIMULI

The number of and sentence structure for the stimuli for this study were based

on the stimuli from Dussias (2005), but the current study used the Spanish verbs *ir*

and *andar* rather than *estar* and *haber*. In particular, the stimuli consisted of 119

mixed Spanish-English sentences, 40 of which focused on the verb ir, 39 on *andar*,

and 40 were control sentences (one sentence focusing on *andar* was inadvertently

eliminated when inputting the sentence onto the DMDX program, and therefore was

also eliminated from the Qualtrics program).

Half of both the *ir* and *andar* sentences, or 20 from each set, contained the

switch before the auxiliary verb and 20 contained the switch after the auxiliary, as

seen in sentences (1) through (4). The sentences were designed to be of similar

grammatical structure and all contained between eight and ten words.

Ir

(1) Before: *El criminal temía que los abogados were discovering the truth*

(2) After: *El criminal temía que los abogados iban discovering the truth*

'The criminal was afraid that the lawyers were discovering the truth'

<u>Andar</u>

(3) Before: *Ella admite que su amiga was chatting with the criminals*

(4) After: *Ella admite que su amiga andaba chatting with the criminals*

'She admits that her friend was chatting with the criminals'

The control sentences were designed to be as poorly structured switches as possible, with the switch often occurring in places that would either be very unusual for a fluent speaker i.e., when a Spanish article (*la)* modifies an English noun (*girl*)), or were obviously grammatically incorrect (i.e., when a feminine article (*la*) is used with a masculine noun (*hombre))*, such as sentences (5) and (6).

(5) *La girl supones que his padres were removing los pictures*

'The girl supposes that her parents were removing the pictures'

 (6) *El operador saben que la hombre iba dialing the numbers*

'The operator says that the man was dialing the numbers'

The purpose of the control sentences was to guarantee that the participants were performing as expected and to distribute obviously ungrammatical sentences throughout the more grammatical ones.

INSTRUMENT

This study consisted of two parts: a timed section on the program DMDX and a Likert-type survey on an online program (Qualtrics), both of which required that participants perform practice questions to acquaint themselves with the format of the study before beginning (both programs will be further discussed bellow). Two programs were used because the study designer was unable to find one single program that was able to measure response times as well as record an answer to a

Likert type question. Study participants were warned that, due to the repetition of so many similar looking sentences, they might become bored with the activity and therefore they were asked to try to pay special attention to each sentence throughout the study. They were also told that they could take a break at any time after the initial timed test. Participants were asked to judge each sentence independently of the others and were requested to judge the "goodness" or "badness" of each *mix* within the sentence, rather than simply assume a sentence was bad because it contained a mix.

After reading and hearing the instructions, participants began the timed portion of the study first, to ensure that their first reaction would be recorded on the timed portion. They were then given a brief break and given the Likert-scale portion of the study. The typical length of time to complete both parts of the study was 45 minutes.

Pilot Experiment

A brief pilot experiment was conducted using the Qualtrics program to test the effectiveness of the instructions, determine which, if any, types of stimuli sentences were hard to understand, and to ascertain the amount of time that would be needed for a participant to complete the online portion of the test (since the DMDX program was already timed and used the same stimuli, it was decided that it did not need to be tested). All three of the participants who volunteered to take the pilot test were current students at Brigham Young University. Two of them were native speakers of Spanish and one was a fairly fluent Spanish-English bilingual. They were encouraged to provide any suggestions or problems that may have had with the study.

All of their suggestions dealt with spelling errors or requested further clarification on the instruction sheet and therefore none of the stimulus items were changed for the final study. None of the pilot study volunteers participated in the actual study.

DMDX Program

DMDX is a program that, among other things, measures response times. It was used in this study to measure how long it took each participant to decide whether a mix was good or bad. The sentences were set to appear every 5000 milliseconds, which, after testing the speed on several native Spanish speakers, seemed to be an appropriate length of time to read and comprehend each sentence. This section of the study was timed in order to determine whether the early or the late bilinguals responded more quickly to these acceptability judgments. The same laptop was used by all participants in order to eliminate any errors that may have occurred because of minor computer timing differences. After doing the practice questions, the participant read each sentence and then indicated that the mix was "good" or "bad" by pressing the right "shift" key if it was a good mix and the left "shift" key if it was a bad mix. In order to ensure that the participants did not forget which shift key meant good and which meant bad, stickers were attached to the shift keys and the also on the proper sides of the screen. Participants were encouraged to choose their answer based on their first instinct about each mix. The sentences were also automatically randomized for this section. It took each participant just over 12 minutes to complete this part of the study.

Qualtrics Program

Qualtrics is an online program that provides several different templates from which a designer could build a research study (see www.qualtrics.com). For the purpose of the current study, a Likert type template was used. Because of the nature of the program, the sentences could not be automatically randomized. Instead, a program was used to randomize the data before inputting it onto the website, making the sentences random, but in the same order for each participant. This did not cause a problem in the results since the participants had all seen the data already in the DMDX program.

After reading slightly modified instructions from the timed portion of the study, answering two practice questions and filling out a brief questionnaire about themselves (described below), the participants again answered whether each of the 119 stimuli sentences contained a good or bad mix, and in addition answered the question: "*How* good or bad is this mix?" by using a 5 point Likert scale. The participants were able to choose from 5 options: very good; good; ok; bad; very bad. A sample question is shown in figure (1).

Figure 1: Qualtrics Question #27

"Nosotros vemos que la máquina iba punching holes in the shoe"

	Good	Bad	Not sure
Is this sentence a good or a bad mix?	☐	☐	☐

"Nosotros vemos que la máquina iba punching holes in the shoe"

	Very good	Good	Ok	Bad	Very bad
How good or bad is this mix?	☐	☐	☐	☐	☐

Because of the nature of the program, all sentences were listed twice, or one time per

question. All questions required an answer before the participant could go on to the

next page.

Once again, the participants were asked to choose their first instinct on each

question. They were also reminded that they should read through each question

quickly, in order to complete the survey in a timely manner. The average time to

complete the Qualtrics program was 25 minutes.

Instructions

Before beginning the study, participants were given a brief oral overview

about the purpose of the study. They were only informed that the study looked at

"Spanish-English language mixing" and that they would be asked to read a series of

sentences and then decide whether each one was a "good" or "bad". They were then

asked to read the instructions, which explained what code switching was and how to

differentiate between a "good mixture" and a "bad mixture." Examples of both good

and bad types of code switching were given in order to familiarize the participants

with the concept of code switching, as seen in sentences (7) through (9) (see

Appendix C for complete instructions). The instructions were as follows:

> This study involves looking at the phenomenon of code switching in Spanish-English bilingual speakers. Code switching occurs when a bilingual speaker uses two languages within one conversation, sentence, phrase, or even one word at a time. It is a natural language process and completely acceptable in bilingual speech. Some mixes of the two languages seem good and others seem bad.
>
> For this study you will be asked to answer some brief biographical questions about your language background. Then you will read about 100 different sentences that are a mix of Spanish and English. You will first be asked whether or not the mix sounds good or bad to you, and then how good of bad

it seems. A good mix is a sentence that you might hear in daily conversation when speaking with bilingual Spanish-English speakers. For example:

A la chica le gusta comprar root beer para sus hermanos.

You would probably choose "good" for sentences with a good mix likes this. But for sentences with a bad mix of the two languages like:

This is the car that estabamos estacionados detras

You would probably choose "bad" for sentences with a bad mix like this. There will be a practice question following these instructions.

When answering each question, please respond with your first instinct about the sentence. Think to yourself "would I, or would I not hear or say a sentence like this in everyday conversation?"

Thank you for your participation in this study. Good luck!

DATA ANALYSIS

From the two experiments the participants performed, three types of scores were generated: answers to the question of whether the code switch was acceptable or not acceptable (hereafter good/bad responses), their response times to these judgments (hereafter response times), and their ratings of the appropriateness of these switches on the 5-point Likert scale (hereafter ratings).

In order to answer the first two questions of this research study, for each of the types of scores, a separate data analysis was performed. For each of these types, these scores were further divided into the four types of sentences examined in this study: switches before the auxiliary verb, sentences using *ir*, sentences using *andar* and control sentences (where the switches were in grammatically inappropriate places). Scores were averaged over these 4 sentences types for each participant. In addition, participants were divided into two groups (as described above): early and late bilinguals. For each of the analyses the average scores (good/bad judgments,

response times, and ratings) of each of the two groups were compared to each other to determine whether statistical significance was achieved

In particular, for the good/bad judgments, a chi-square analysis was performed. For the ratings and the response times, a series of two way ANOVAs (sentence type x age of learner) was performed and post hoc Tukey tests were used to determine significance across the four sentence types.

For the third question, whether the two groups differed in accepting switches for transitive versus intransitive verbs, sentences were divided into 48 transitive and 30 intransitive sentences, after which a separate analysis was performed. Transitive sentences were defined as sentences wherein the participial verb was accompanied by a direct object. Intransitive sentences were defined as sentences wherein the participial verb was not accompanied by a direct object. The scores for each of these sentences were averaged for each participant. In addition, participants were divided into two groups (as described above): early and late bilinguals. For each of the analyses we compared the average scores of each of the two groups to each other to determine whether statistical significance was achieved.

For the fourth questions, whether the two groups differed in accepting switches for high versus less frequent verbs, sentences were divided into 50 frequent and 28 infrequent verb sentences. In order to determine whether verbs were frequent or infrequent, they were searched for in the British National Corpus (see http://view.byu.edu/). Verbs were considered frequent verbs if they appeared more than 25 million times in every 100 million words. Verbs were considered infrequent verbs if they appeared less than 25 million times in every 100 million words. The

scores for each of these were then averaged for each participant. Participants were also divided into two groups: early and late bilinguals. For each of the analyses we again compared the average scores of each of the two groups to each other to determine whether statistical significance was achieved.

CHAPTER FOUR

RESULTS

The purpose of this study was to examine whether or not age of acquisition

(early vs. late) affects the degree of acceptability as well as processing time in

intrasentential code switches. Specifically, the study focused on switches between

the Spanish verbs *ir* and *andar* and an English participle. The results from the

experiment described in Chapter Three will be reviewed in 4 sections below, as

relates to the following research questions:

1. Does age of acquisition (early vs. late) affect the degree of acceptability in

   code switches?

   a. Are intrasentential or intersentential code switches more likely to be

   accepted by early or late bilinguals?

   b. Are transitive or intransitive verbs in a code switch more likely to be

   accepted by early or late bilinguals?

   c. Are frequent verbs more likely to be accepted by early or late

   bilinguals in a code switch than less frequent verbs?

The results described in this chapter were computed using several different

statistical analyses (which are discussed at the end of Chapter Three). Some of these

analyses focus solely on the judgment made by participants as to whether a switch

was a "good" or "bad" switch. The second analysis examined participant's ratings of

how "good" or bad" a switch was determined to be (on a scale from 1 ("very good")

to 5 ("very bad"), while the final analysis addressed response times.   This chapter

will proceed as follows: results for Question 1 will be addressed by a description of

the good/bad responses, then participant ratings, and finally response times.

Questions 2-4 will follow the same pattern.

Question 1: Does age of acquisition (early vs. late) affect the degree of acceptability in code switches?

The main focus of this study was determining whether age of acquisition affected how acceptable a code switch was. The author's hypothesis was that the early bilinguals would be more accepting of code switches than the late bilinguals. To examine this question, the responses of the early and late bilinguals to code switches were analyzed by comparing their good/bad responses, ratings, and response times to the four types of sentences discussed above.

Good/bad Response Scores

Participants responded to the question of "is this a good or bad mix?" twice, once on the DMDX program and again on the Qualtrics program. The responses from the DMDX program were chosen for the calculations because they were the response from the first time participants had seen the sentences and were therefore determined to be a more accurate measure of participant's first instinct.

Figure 4.1 below depicts the average percentage of participants that chose the option "good" for each type of switch. As evidenced by the data, the responses given by both early and late bilinguals were very similar on every type of switch, although it appears that the late bilinguals find switches in *andar* sentences more acceptable than do the early bilinguals, while the reverse is true for switches before the verb + participle constructions.

Figure 4.1: Percentage of Participants that chose "Good" on Question 1
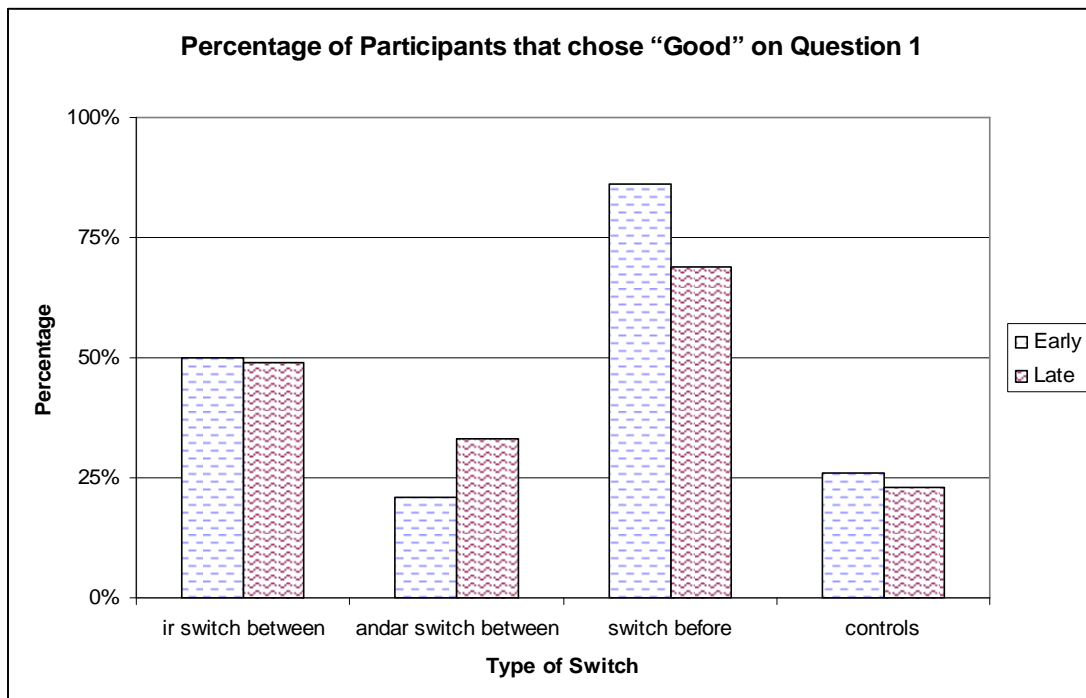
The good/bad response scores for the two groups of bilinguals for the four sentence
types were submitted to a chi-square analyses. This analysis demonstrated that there
was no significant difference between the early and late bilinguals for any of the
sentence types (χ^2= .043, p>.05). However, all participants appeared to have a slight
preference for switches between *ir* and a participle as opposed to *andar* and a
participle, although it was not a statistically significant difference. Moreover, all
participants seemed to favor switches before the verb + participle construction than
switches in between.

Ratings

While the analysis described above demonstrates that there were no
differences between the early and late bilinguals and their responses to whether or not

a switch was "good" or "bad", it is possible that there may be differences in the degree to which the two groups of bilinguals perceive a switch as being "good" or "bad." Thus, participants also responded to the question of "how good or bad is this mix?" on the Qualtrics program by marking one of the following 5 response choices (Very good, Good, OK, Bad, Very Bad). The average response to this question was 3 (OK) for both early and late bilinguals. In order to determine the statistical significance of the results, a two-way (type x age) ANOVA was performed on the data with participant's ratings as the dependent variable. Results indicated that, again, age of acquisition was not a significant factor in determining whether participants thought a switch was good or bad (F=.085, p=.771). (Results for sentence type differences will be discussed below.)

Response Times

Another measurement with which early and late bilinguals could differ in their responses to code switches is in the amount of time it takes them to either accept or reject a particular response time. To determine whether the two groups differed in their response times in determining whether a code switch was good or bad, response times were recorded through the DMDX program to the question of "is this a good or a bad mix?" Results from this analysis demonstrated that the average response time for early bilinguals was 2759.62 milliseconds and the average for late bilinguals was 2905.869 milliseconds, suggesting that the early bilinguals were faster than the late bilinguals at responded to a code switch. On average, switches using *ir* had the shortest response time, while the control sentences experienced the longest response time. Figure 4.2 below depicts the average response times for each type of switch.

Figure 4.2: Total Average Response Times
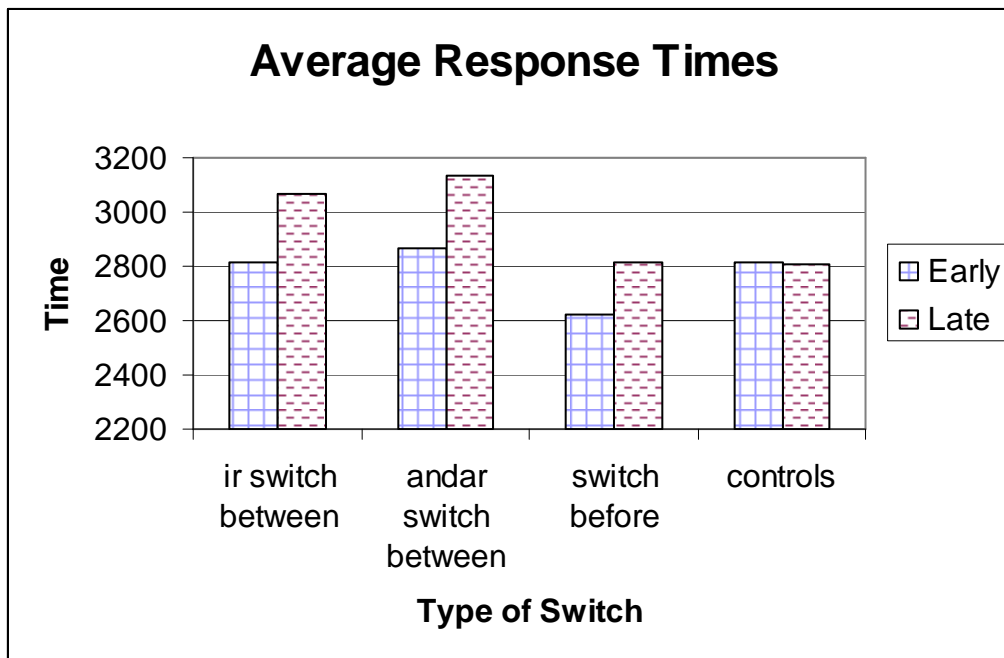
There was no statistically significant difference in the time it took an early or late bilingual to process each sentence. A two-way (type x age) ANOVA was run on the data with participant's response times as the dependent variable. Results indicated that age was not significant (F=.906, p=.343). (Results for sentence type differences will be discussed below.)

In summary, the answer to question one of this study was "no": age of acquisition was not a factor in the acceptability of code switches for both early and late bilinguals. However, although not statistically significant, there was a slight preference for switches between *ir* and a participle as opposed to *andar* and a participle for both early and late bilinguals. There was very little difference between the early and late responses for the controls. The next question directly addressed

whether differences between these two types of sentences were in fact statistically significant.

Question 2: Are intrasentential or intersentential switches more likely to be accepted by early and late bilinguals?

This question was designed to determine whether early and late bilinguals process sentences differently. The first type of sentences examined were those that included intra- or intersentential code switches. These two types were chosen in order to support or refute previous research by Dussias (2003), who found that bilinguals responded faster to intersentential switches than intrasentential switches, and Lipski (1985) who found that late bilinguals are less likely to engage in intrasentential switching than early bilinguals. In order to examine this question, good/bad responses, ratings, and response times were regrouped into the two sentence types: sentences with the switch between the auxiliary verb and participle (intrasentential) and sentences with the switch before the auxiliary verb and participle (intersentential). Two other types of sentences will also be examined below.

Good/bad Response

Examinations of the data as shown in Figure 4.3 below suggest that both early and late bilinguals preferred intersentential switches (switches between ir or andar and a participle) to intrasentential switches. Figure 4.3 below depicts the average responses by early and late bilinguals to this question.

Figure 4.3: Good/Bad Response to Question 2
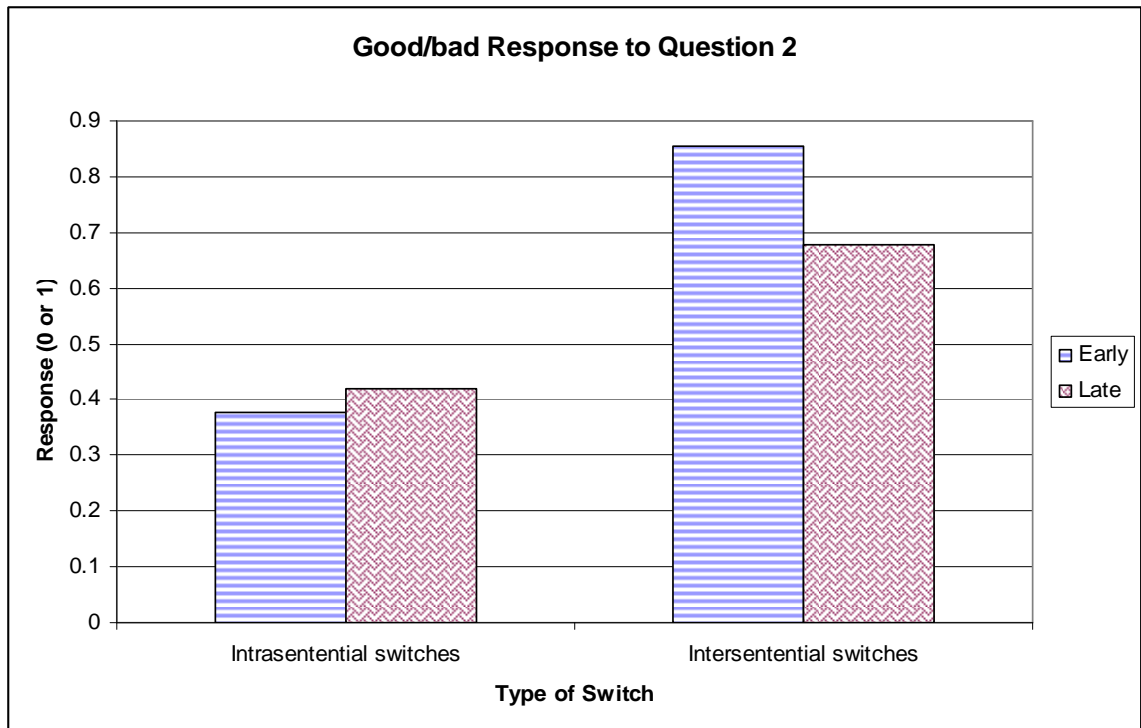
The good/bad response scores for the two types of code switches were submitted to a

chi-square analysis. This analysis indicated that there was a significant difference

between intra- and intersentential switches (χ^2= .043, p>.05). However, results again

indicated that age of acquisition was not a significant factor in determining whether

an intra or intersentential switch was good or bad.

Ratings

While the results discussed above suggest that there was a statistical

difference between good/bad responses for intersentential and intrasentential switches

for all participants, early and late bilinguals did not have their own preferences. This

is further established in participant responses to the rating questions. The average

ratings for each group is shown in Table 4.1.

Table 4.1: Average Ratings for Intrasentential and Intersentential Switches

Average Response	Early	Late
Intrasentential	2.3	2.3
Intersentential	2.8	2.8

Post-hoc Tukey tests revealed that sentences with intrasentential switches

(using *ir* and *andar*) were processed fastest, followed by intersentential switches, and

finally the controls. These results are depicted in Table 4.2.

Table 4.2: Processing Time for each sentence type

Sentence Type	Processing Time (in ms)
Switch with *ir*	45.6429
Switch with *andar*	57.7143
Switch before	86.1071
Controls	147.0001

To determine the statistical significance of the results, a 2 way (type x age)

ANOVA was run on the data with participant's response times as the dependent

variable. Results indicated that the variable type (sentence type) was significant

($F=44.211$, $p<.0001$), meaning that there was a statistically significant difference in

the choices participants made between an intrasentential switch and an intersentential

switch.

Response Times

For the third analysis for question 2, the aim was to determine whether bilinguals in general responded more quickly to intra- than inter-sentential switches, as well as whether early bilinguals responded more quickly to both types of switches than did late bilinguals. To answer this question, response times were recorded through the DMDX program to the question of "is this a good or a bad mix?" The average response times for both early and late bilinguals are depicted in Figure 4.4. As depicted, the late bilinguals responded more slowly to both types of switches.

Figure 4.4: Response Times for Intrasentential and Intersentential switches
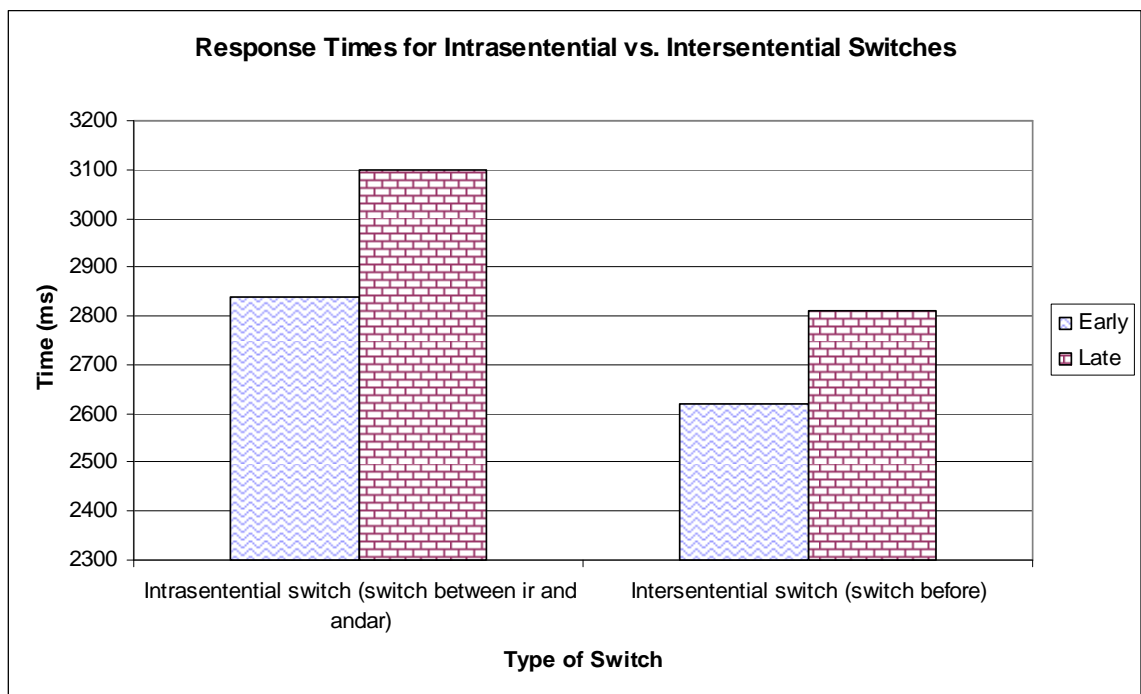
A two-way (type x age) ANOVA was run on the data with participant's response times as the dependent variable. Results indicated that type was significant (F=162.640, p<.0001), meaning that there was a statistically significant difference in the time it took both early and late bilinguals to process each sentence. However, there was no significant difference between how quickly early bilinguals responded to either type of switch than late bilinguals.

In summary, early and late bilinguals took longer to respond to intrasentential switches than intersentential switches. Surprisingly, age of acquisition was not a factor in any of the results.

Question 3: Are code switches with transitive or intransitive verbs more acceptable and which takes more time to process for early and late bilinguals?

The second sentence type examined was whether there was a difference between switches with transitive and intransitive verbs. The differences between these two types of sentences was examined because differing responses could indicate that early and late bilinguals process sentences differently. In order to examine this question, sentences were again regrouped into two types: sentences with an auxiliary and transitive participial verb, and sentences with an auxiliary and intransitive participial verb. Good/bad responses, ratings, and response times were again analyzed.

Good/bad Response

The most important trend of the results of this question was that early bilinguals were more likely to accept both transitive and intransitive switches than late bilinguals were. Transitive verbs were also slightly more preferred than intransitive verbs. The average responses to this question for both early and late bilinguals are listed in Table 4.3 (1=good, 0=bad).

Table 4.3: Average Responses to Question 3

Average Response	Early	Late
Transitive	0.65	0.57
Intransitive	0.58	0.52

The chi-square analysis of the responses to this question ("Is it a good or a bad mix?") were shown to be non-significant (χ^2= .0001904, p>.05) both for a difference between transitive and intransitive verbs and between early and late bilinguals' responses. In other words, neither sentence type, nor age were statistically significant.

Ratings

Although no statistical difference was found for the good/bad responses, ratings for switches involving transitive versus intransitive verbs were also compared The average rating for switches involving a transitive verb for both early and late bilinguals was 2.6. The average rating for switches involving an intransitive verb for early bilinguals was 2.4 and the average for late bilinguals was 2.5, depicted in Table 4.4.

Table 4.4: Average Rating for Question 3

Average Rating (1-5)	Early	Late
Transitive	2.6	2.6
Intransitive	2.4	2.5

In other words, the averages for these two types of sentences for both early and late bilinguals differed very little from each other. Unsurprisingly, a two-way (sentence type x age) ANOVA run on the data with participant's rating as the dependent variable indicated that neither the variable type-- sentence type (F=.021, p=.885), nor age (F=.547, p=.463) was significant.

Response Times

The responses to this part of the question provided interesting trends in the results. Although not statistically significant, results showed that there is a difference in response times between early and late bilinguals: the early bilinguals have seemingly faster response times than the late bilinguals for both transitive and intransitive verbs. The average response times for early and late bilinguals are depicted in Figure 4.5.

Figure 4.5: Response Times for Transitive vs. Intransitive Switches
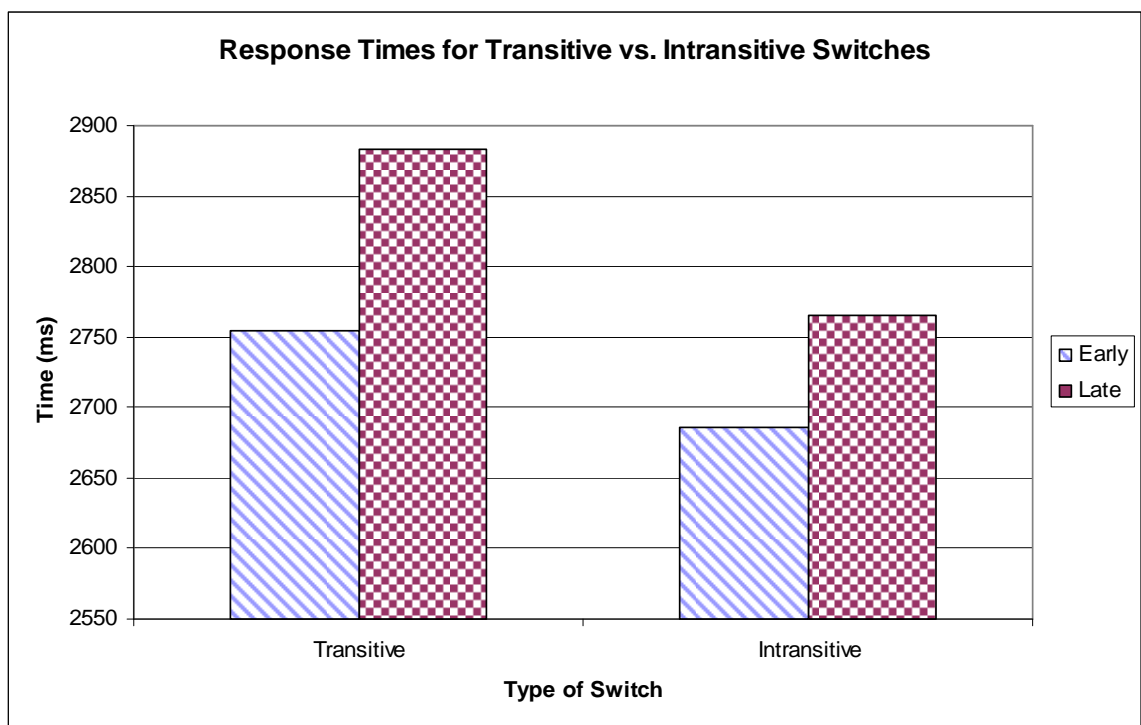
To determine whether these differences were statistically significant, a two-way (type x age) ANOVA was run on the data with participant's response times as the dependent variable. Once again, results indicated that the variable type (verb type) was insignificant ($F=2.015$, $p=.162$) as was the variable age ($F=1.592$, $p=.213$). In other words, there was a no statistically significant difference in the choices

participants made between a transitive switch and an intransitive switch for either early or late bilinguals.

In summary, there was no difference in ratings or response times for early and late bilinguals in switches using transitive and intransitive verbs. Age of acquisition was not a factor in any of the responses.

Question 4: Are code switches with high frequency or low frequency verbs more acceptable and which takes more time to process for early and late bilinguals?

The third type of sentence examined was whether there was a difference between switches with verbs of high frequency and verbs of low frequency. These differences were again examined to determine whether or not early and late bilinguals process language differently. Sentences were again regrouped into two switch types: sentences with an auxiliary with a high frequency verb as the participle, and sentences with an auxiliary with a low frequency verb as the participle. Responses were recorded and analyzed for good/bad responses, ratings, and response times.

Good/bad Response

Although responses to this question did not yield statistically significant results, there is a trend in the data: early bilinguals seemed slightly more likely to accept both high frequency and low frequency verbs than late bilinguals. However, both groups were very similar in their overall view of high frequency and low frequency verbs. The average responses for both early and late bilinguals to switches involving high versus low frequency verbs are listed in Table 4.5 (1=good, 0=bad).

Table 4.5: Average Responses to Question 4

Average Response	Early	Late
High frequency	0.62	0.55
Low frequency	0.63	0.56

The good/bad responses to this question ("Is it a good or a bad mix?") were submitted to a chi-square analysis. This analysis was again shown to be non-significant (χ^2= .00001437, p>.05).

Ratings

In addition, a similar analysis was performed on the ratings of switches for high versus low frequency verbs. The average rating for switches including a high frequency verb for both early and late bilinguals was 2.5. The average rating for switches including a low frequency verb for both early and late bilinguals was 2.6, depicted by Table 4.6.

Table 4.6: Average Rating for Question 4

Average Rating (1-5)	Early	Late
High frequency	2.52	2.54
Low frequency	2.58	2.56

To determine whether these averages were statistically different, a two-way (sentence type x age) ANOVA was run on the data with participant's rating as the dependent variable. Results indicated that both the variable type (sentence type) and age were insignificant (F=.000, p=.996) and (F=.039, p=.844), respectively.

Response Times

Finally, the average response times for high versus low frequency verbs were calculated. The average response time for switches with high frequency verbs for early bilinguals was 2712.74 milliseconds, while the average for late bilinguals was 2824.82 milliseconds. The average response time for switches with low frequency verbs for early bilinguals was 2754.98 and the average for late bilinguals was 2861.89, depicted by Figure 4.6

Figure 4.6: Response Times for High Frequency vs. Low Frequency Switches
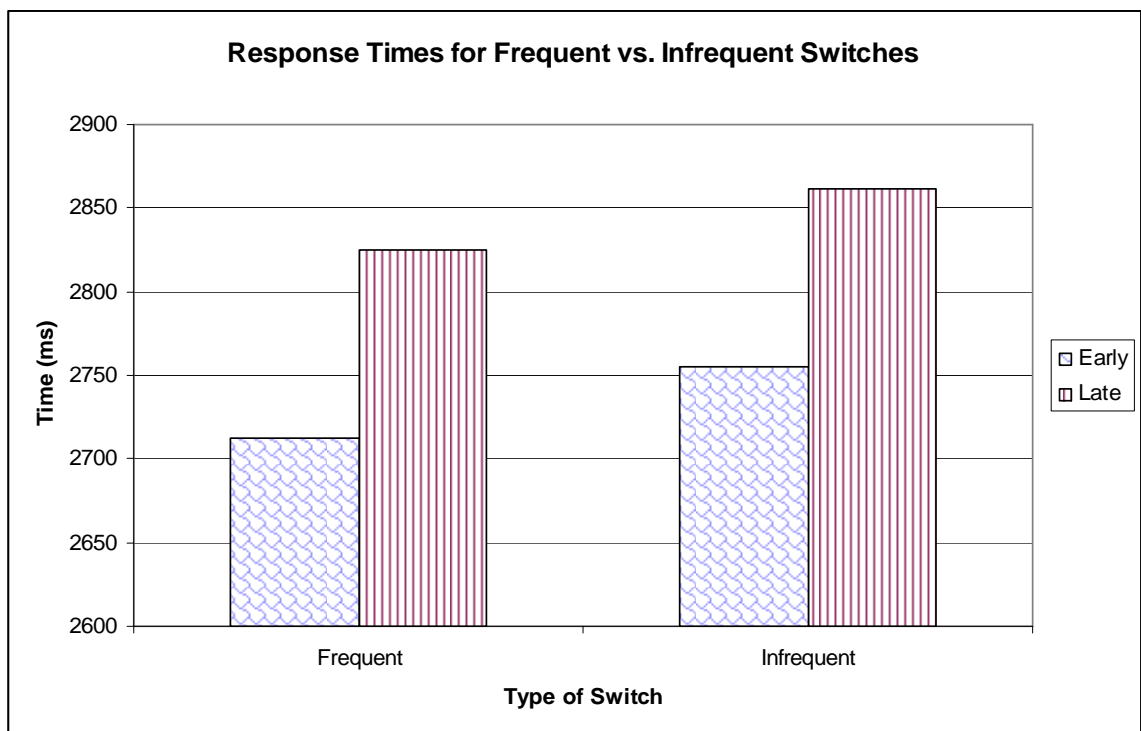
To determine whether differences in response times for high versus low frequency verbs reached significant difference, a two-way (type x age) ANOVA was run on the data with participant's rating as the dependent variable. Results indicated that both the variable type (sentence type) and age were insignificant (F=2.146, p=.149) and (F=.282, p=.598) respectively.

In summary, there was no difference in ratings or response times for early and late bilinguals in switches using high frequency and low frequency verbs. Age of acquisition was not a factor in any of the responses.

Conclusion

The results of the current study demonstrate that switches between the auxiliary *ir* and a participle take longer to read than switches between *andar* and a participle. Switches that occur before the auxiliary (intersentential switches) take the least processing time of all, while the control sentences took the longest. Surprisingly, age of acquisition was not found to be a factor in any of the analyses, although early bilinguals tended to responded faster than late bilinguals for all types of sentences, and also seemed to accept more switches overall. The type of verb found in the participle (transitive, intransitive, frequent or infrequent) was also found to be insignificant. Further discussion of the implication of these findings will continue in Chapter 5.

CHAPTER FIVE

CONCLUSION

The results described in Chapter Four provided three main findings, each of which will be discussed in greater detail later in this chapter, in answer to the following research question:

1. Does age of acquisition (early vs. late) affect the degree of acceptability in code switches?

Answers to the following questions were also found:

a. Are intrasentential or intersentential code switches more likely to be accepted by early or late bilinguals?

b. Are transitive or intransitive verbs in a code switch more likely to be accepted by early or late bilinguals?

c. Are frequent verbs more likely to be accepted by early or late bilinguals in a code switch than less frequent verbs?

The primary research question was answered by a study involving a grammaticality judgment task and measurement of response times. The principal finding in this study was that age of acquisition does not affect the degree of acceptability in intrasentential code switching.

The secondary finding in this study was that intrasentential code switches do take more time to process than intersentential code switches, but there was no effect of age of acquisition in their acceptability or processing time. The final finding in this study was that there is no preference for verb type in a code switch, regardless of

whether it was transitive, intransitive, frequent or infrequent. Age of acquisition also has no effect on the acceptability of a code switch using different types of verbs.

This chapter will proceed with a discussion of the particular results for each finding in turn. Implications for bilingual language processing will then be addressed, followed by limitations of the study and finally, suggestions for further research.

DISCUSSION OF RESULTS

Finding #1: Age of acquisition does not affect acceptability of code switches.

This finding directly contradicts that of Lipski (1985), who found that, at least in production, late bilinguals will rarely engage in intrasentential code switching. The results from the current study may differ from Lipski's results because this study deals with perception of code switches rather than production. Nevertheless, it was surprising that in this study, late bilinguals appeared to be almost as likely to accept intrasentential switches as early bilinguals were. Interestingly, late bilinguals were more accepting of switches with the verb *andar*.

Although the results indicate that age of acquisition does not affect the acceptability of code switches, trends in the data may suggest otherwise. For example, early bilinguals were consistently faster at responding to each question. They also had a higher (though statistically insignificant) rate of acceptability than late bilinguals for intrasentential switches with the verb *ir*, intersentential switches, controls, switches with a transitive or intransitive verb, and switches with a high or low frequency verbs. There was a higher rate of acceptance by late bilinguals than

early bilinguals only for intrasentential switches with the verb *andar*. One explanation for this finding could be that, since early bilinguals have been speaking English longer than late bilinguals, they have also probably been code switching for longer, solidifying what kinds of verbs are preferred in code switches and causing their response times to be more automatic than those of the late bilinguals. For early bilinguals the verb *andar* may have too strong of a lexical meaning (Dussias, 2003) to be acceptable in many combinations of code switches. It is possible that these trends in responses may become significant results with more study subjects.

Finding #2: Intersentential switches take longer to process than intrasentential switches.

This finding is in direct contradiction to results found by Dussias (2003) in a similar study. This result is supported by the statistically significant difference in response times that were observed when the auxiliary verb was in Spanish and the participle was in English (intrasentential switches) as opposed to switches where the auxiliary verb and participle were both in English (intersentential switches). Interestingly, all participants experienced a longer response time for intersentential switches than for intrasentential switches (average of 51.6786 ms for intrasentential switches and 86.12 for intersentential switches). A partial reason for this may be that speakers are more flexible with switches at an auxiliary juncture when the present progressive is being used (Dussias, 2003). Furthermore, Sankoff and Poplack (1981) found that auxiliary boundaries in code switches have a very high propensity for code switching.

Or perhaps the answer is found in Poplack's (1980) suggestion that only less fluent bilinguals switch intersententially: it could be that the bilinguals tested in this study were too fluent to accept intersentential switches, and instead preferred intrasentential switches. This theory could be explored further by examining the differences in acceptability patterns of less-fluent late bilinguals and early bilinguals.

The age effect on intra- and intersentential switches was not statistically significant. The average response times for these switches were as follows: the average time for intrasentential switches for early bilinguals was 2839.66 ms and the average for late bilinguals was 3098.653 ms; the average response for intersentential switches for early bilinguals was 2621.26 ms and the average for late bilinguals was 2811.204. However, the trend seemed to be a faster response time for early bilinguals than for late bilinguals. This trend may become significant with a larger testing group, and eventually show that there is evidence for age of acquisition effects. If there are age effects, especially in response times, it may signify that early and late bilinguals process language differently; if one group has a much lower response time than the other, it may indicate that their languages are stored separately, and if the response times are very low, it may be that their languages are stored together.

Finding #3: Verb type has no effect on acceptability or processing time in code switches for early and late bilinguals.

Although all participants appeared to have a preference for intrasentential switches (where the switch occurred between the auxiliary and participle) over intersentential switches (where the switch appears before the auxiliary verb), there appeared to be no statistically significant preference for any particular type of

participial verb, be it a transitive, intransitive, high frequency or low frequency verb. Participants did not vary in their yes/no response or on the rating scale.

One reason that verb type may have had no effect on the acceptability of switches may be that participants were less concerned with the type of verb included in the switch, and more concerned with type of switch being used, i.e., whether the switch was intra- or intersentential rather than an intransitive or high frequency verb. Therefore, it may be that if a switch included a transitive verb but was intersentential, it would more acceptable but take them longer to process than if the switch was intrasentential with a transitive verb.

Participants did, however display trends that, with a larger group of study subjects, may become significant. Early bilinguals appeared to be more accepting of all types of switches (transitive, intransitive, high frequency and low frequency) than the late bilinguals. Early bilinguals also responded faster to all four types of switches in questions 3 and 4. Research by Grosjean (1995) suggests that certain factors such as the recognition of code switched words, semantic context, phonetics, and "homophonic overlap" may help bilinguals *speed up* the process of code switching. Naturally, it would follow that if the process of code switching can be sped up by certain factors, it could also be *slowed down* by other factors, such as verb type. Further research with a larger study group may prove that the trends in the results of this study are statistically significant, revealing that verb type does actually influence the acceptability of certain code switches. Further research may also provide evidence for an age effect, as seen in the trends in responses of early bilinguals.

The fact that early bilinguals accept a wider variety of switches with a faster response time is a very interesting finding. There could be several different reasons for this. First, early bilinguals may actually have their two languages stored together. This would explain why they are more accepting of switches than late bilinguals: if the early bilinguals just have one system they may be unable to discern between a grammatical switch and an ungrammatical switch because the grammars from their two languages have mingled together. A second option is that early bilinguals have a separate "Spanglish" language center, wherein they have taken parts of both Spanish and English grammar and mixed them together. This would also explain why they are more accepting of switches than late bilinguals: their "Spanglish" grammar is much more accepting of code switches than the English and Spanish grammars are on their own. Further research is needed in order to determine which, if either, of these hypotheses is correct.

IMPLICATIONS

The results for this study indicate that there is no age effect in bilingual code switching. Furthermore, it is suggested that both early and late bilinguals process language in a similar manner. This section will proceed with a discussion of the implications of this study on the Critical Period Hypothesis, followed by a discussion of the findings of this study on bilingual language processing.

Critical Period Hypothesis

The Critical Period Hypothesis suggests that the crucial period of complete language acquisition ends around the age of 12, and that if language is not learned

before that time, native-like fluency will never entirely be attained (see Lenneberg, 1967; Curtiss 1989). However, as code switching is something that most native monolingual speakers do not experience, it cannot be considered an issue of fluency. In order to determine whether there are age effects in code switching, it must be analyzed simply in terms of code switching itself, rather than fluency. Instead of investigating whether code switching is done "natively," researchers must simply look for any differences between how early and late bilinguals produce and respond to switches. In other words, a bilingual who learned an L2 at the age of 7 might produce and respond differently to a code switching task than a bilingual who learned an L2 at the age of 22.

As mentioned in Chapter Two, there has been a wide variety of findings regarding the age effect (see Johnson and Newport, 1989; Birdsong and Molis, 1998; Bialystock and Hakuta, 1999). However, the results of this study indicate that, at least in code switching, the age effect is minimal. In all three scores analyzed, age of acquisition was not a factor. This may indicate one of the following: (1) that the critical period for language acquisition does not entirely explain ultimate second language acquisition; or (2) that code switching is a linguistic process that occurs separately from the rest of language; (3) that there actually are age effects in code switching, as seen in the trends in this study's results, but a larger study group is needed to substantiate these claims. If code switching is viewed as a linguistic characteristic that only the most fluent bilinguals experience, then there should be differences in how early bilinguals, (who may be more fluent than late bilinguals) as compared to late bilinguals, code switch.

According to Liski (1985), bilinguals of all ages and level of fluency engage in code switching, but only early bilinguals will participate in intrasentential code switching. Hale (1995) found early bilinguals more likely to code switch in general, because they have a term in each language for everything they know, while late bilinguals have different associations for concepts in each language, and therefore have an increased ability to separate the languages. However, results from this study did not support any such findings. If these were truly the case, results from this study should have reflected some sort of significant differences between early and late bilinguals.

One possible conclusion that may be drawn from the results of this study is that code switching does not experience the same type of age effects that other aspects of language do because code switching occurs independently of other bilingual processes, and is therefore immune to the usual age effects. This could be explained by hypothesizing that that both early and late bilinguals share a similar type of bilingual grammar wherein there are certain rules that are acceptable. Spanish-English code switching may be processed in a separate "Spanglish" language area wherein both early and late bilinguals follow the same basic rules and therefore respond similarly to code switching tasks. Further research is needed in order to determine the accuracy of this hypothesis.

If there are age effects in code switching, it would explain why the early bilinguals responded more quickly to and were more accepting of different switches. As mentioned above, this may indicate that early bilinguals have combined both languages into one system, or that they have a unique "Spanglish" language system,

wherein code switching is completely acceptable. Further research is needed to determine whether or not there are age effects in code switching.

Bilingual Language Processing

There are two primary views of bilingual language processing: the *language selective* (modular), which is further supported by the Matrix Language Frame (MLF) model, or the *non-selective* (interactive) view. The first claims that languages of a bilingual are processed independent of each other (Kroll & Stewart, 1994). The second suggests that the lexical and syntactic representations of each language interact with each other at least on the word processing level (van Heuven, et al., 1998). The results of this study seem to support the language selective, or modular model. Evidence for this was found in results from both the control groups and intra and intersentential switches. The controls will be discussed first, followed by the intra and intersentential switches.

The controls were a group of sentences designed to be grammatically incorrect and were used as distracters throughout the study. Examples of controls sentences are as follows:

1. The profeta dijo que the gente iban storing food

   'The prophet said that the people were storing food'

2. Sus padres dijeron que las niños were diving in the lake

   'His parents said that the children were diving in the lake'

3. La scientists cree que el departament were gastando money

   'The scientists believe that the departments were spending money'

Some of the controls were designed with the Spanish first, while others began with English. Some contained obvious grammatical errors ("la scientists") while others were more subtle ("las niños"). However, the unifying factor throughout all of the control sentences was that they all contained several switches between Spanish English. Participants were asked the same questions for the controls ("is it a good or bad mix," "how good or bad is the mix?") as well as timed. Interestingly, participants experienced the longest processing time for sentences from the control group.

The reason for this may be found in the MLF and modular language processing models, where the two languages are processed and stored independent of the other. Myers-Scotton's (1993) MLF model explained intrasentential switching by stating that a bilingual engaged in code switching will have an active Matrix Language (ML), which will set the grammar and morphosyntactic frame for the code switched sentences, and a subdued Embedded Language (EL).

If bilinguals incur a longer processing time switching from language to language several times, this may be further evidence that the languages are stored separately. Sentences from the other two groups, intrasentential or intersentential switches (where the sentences started in Spanish and ended in English) only required the participants to switch languages once. Controls, however, required that the participant switch back and forth about five times for each sentence. The fact then, that it took participants a significantly longer time to process these sentences is no surprise; it simply confirms the theory that bilinguals organize their languages separately. Research by Macnamara and Kushnir (1971) suggested that bilinguals were slower to process code switched passages because the two languages had to be

turned "off" or "on" as needed, also suggesting that a bilinguals languages are stored separately.

On a deeper level, the same is true of the intra- and intersentential switches. Although both of these types of switches required that the participant switch languages only once, they both incurred an increased processing time. Myers-Scotton (2006) suggests that intrasentential switches are especially indicative of two grammars, because it is in this type of switch that a bilingual's two grammars are directly in contact. This means that in intrasentential switching, the clause is divided by the L1 and L2 and therefore forces the bilingual's EL (or ML, depending on the switch) to come to the surface. In this study, both intra- and intersentential switches require a switch from the bilingual's ML to EL (or vice versa), as both types occur within one sentence (although the intrasentential switches divide a clause). This procedure of intra- and intersentential code switching incurs a longer processing time, further affirming the idea that the two languages are stored separately.

Furthermore, evidence from this study seems to indicate that early and late bilinguals store their languages in the same manner. Although early bilinguals did process the sentences slightly faster than late bilinguals, it was not statistically significant. Early bilinguals also accepted switches more often than late bilinguals, with the exception of switches using *andar*, which were preferred by late bilinguals. However, these results were also not statistically significant. These results suggest that both early and late bilinguals may organize their languages the same way and have a similar "grammar" for accepting intersentential switches. As mentioned in the section above, this may be due to a "Spanglish" grammar that all Spanish-English

bilinguals share, regardless of their age of acquisition. If this is the case, experience in the language, rather than age, may be the determining factor in how fast or slow the language is processed. Further research is needed to determine the accuracy of this hypothesis.

LIMITATIONS

The limitations of this study mostly deal with the size of the group tested. The main problem with this study is found in that there were only 26 total participants included in the data analysis. Twelve of the participants were early bilinguals and 14 were late bilinguals. Although there were trends in the data (such as early bilinguals responding slightly faster than late bilinguals), it was not statistically significant. With more participants included, more statistically significant results may have been found. However, the low F value of the results (F=.291 for response times and age; F=.088 for ratings and age) indicated that this limitation was not detrimental to the study.

Another limitation of this study was the natural tendency of some bilingual speakers to disapprove of code switching. It was impossible to know whether participants had a negative or positive attitude towards code switching and if this would influence their grammaticality judgments and response times. Participants were asked, however, to put aside any biases they might have towards code switching and simply answer the questions honestly. Moreover, since responses were timed and measured participants' first instinctive reactions to the sentences, it can be assumed that the responses recorded were the honest opinions of the participants.

SUGGESTIONS FOR FURTHER RESEARCH

There are many directions in which this research may be continued. First, a replication of this study using a much larger testing pool may yield more significant differences in results from the current study, providing further information on age effects in language acquisition and bilingual language processing. It would also be interesting if the stimuli from this study were given to participants in an oral rather than written format. Perhaps an even more fascinating study would be to prompt participants to produce the different types of code switches on their own, rather than record their perceptions of given switches.

Another possible area of study is in simultaneous bilinguals and code switching. As there was only one simultaneous bilingual in this study, it is impossible to draw any conclusions about the way they organize language. However, research by Sebastian-Galles et al. (2005), suggests that simultaneous bilinguals do not attain the same level of proficiency as early bilinguals. It would be interesting to examine whether differences also arise between simultaneous and early bilinguals in code switching. A study similar to the present study, wherein participant's responses to acceptability judgments on certain types of code switches were recorded and timed, may provide evidence of how simultaneous and early bilinguals process and organize language. This type of study may also shed light on the hypothesis of bilinguals having a "Spanglish" grammar, wherein code switching is acceptable.

CONCLUSION

In conclusion, it was found that age of acquisition is not a factor in bilingual code switches. Moreover, the type of verb used within the switch was insignificant for both early and late bilinguals. In contrast with the findings of Dussias (2003), intersentential switches experienced a longer response time than intrasentential switches. However, trends in the research suggest that statistically significant differences in verb type and age of acquisition may occur with a larger study group.

The findings of this study may have implications for both the theory of the critical period and bilingual language processing. Although it has been suggested that code switching may be immune to the age effect, further research is needed in order to confirm such findings. Results indicate that both early and late bilinguals organize their languages separately. Furthermore, it has been suggested that bilinguals may actually have a separate "Spanglish" grammar, causing both early and late bilinguals to respond in a similar manner to code switching acceptability tasks. Further research is needed in order to substantiate such a hypothesis.

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Appendix A

Informed Consent Form

You are invited to participate in a research project entitled "Code-Switching in Spanish-English Bilinguals." The purpose of this research is to understand how bilinguals accept or reject different kinds of language change.

This activity will take approximately 15 minutes to complete. You will be asked to read sentences in Spanish and in English and make decisions about them. You will be measured on your accuracy for each question. Your results will by analyzed only by the researcher and your name will not be used in discussions of the data.

There is minimal risk associated with this activity. If you feel uncomfortable at any time during the testing session, please feel free to take a break. Your participation in this experiment is voluntary and you may withdraw from the activity at any time.

Your performance on this activity will be kept strictly confidential and any publication or presentation on the results of this study will only refer to participants by number or as an entire group.

If you have any questions regarding the research activity, results, or other questions, feel free to contact the researchers, Kelly Zirker (315-879-1372) at kahz@byu.net, Wendy Baker (801 422-4714) at wb42@email.byu.edu or Dr. Renea Beckstrand, IRB Chair, (801-422-3873) at renea_beckstrand@byu.edu.

I have read and understand the above statements, and I voluntarily agree to participate in this research activity (Please choose one):

Yes____   No____

Appendix B

Questionnaire

1. Age _____

2. Gender _____

3. Place of Origin (City, Country) _____

4. Native Language _____

5. Dominant Language _____

6. Age at which you first learned English _____

7. Length of time speaking English on a regular basis _____

8. Length of time spend in the United States _____

9. Language used most often on a daily basis _____

10. Language used most often with friends/family _____

11. Do you ever code switch? _____

12. If yes, how often? (daily, weekly, once in a while, etc.)
_____

13. With whom do you usually code switch? (friends, family, others?)
_____

Appendix C

Instructions for Experiment

This study involves looking at the phenomenon of code switching in Spanish-English bilinguals speakers. Code switching occurs when a bilingual speaker uses two languages within one conversation, sentence, phrase, or even one word at a time. It is a natural language process and completely acceptable in bilingual speech. Some mixes of the two languages seem good and others seem bad.

For this study you will be asked to answer some brief biographical questions about your language background. Then you will read about 100 different sentences that are a mix of Spanish and English. You will first be asked whether or not the mix sounds good or bad to you, and then how good or bad it seems. <u>A good mix is a sentence that you might hear in daily conversation when speaking with bilingual Spanish-English speakers</u>. For example:

A la chica le gusta comprar root beer para sus hermanos

You would probably choose "good" for sentences with a good mix like this. But for sentences with a bad mix of the two languages like:

This is the car that estabamos estacionados detras

You would probably choose "bad" for sentences with a bad mix like this. There will be a practice question following these instructions.

When answering each question, please respond with your first instinct about the sentence. Think you yourself "would I, or would I not hear or say a sentence like this in everyday conversation?"

Thank you for your participation in this study. Good luck!

Appendix D

Stimuli

"El criminal temía que los abogados were discovering the truth"
"El criminal temía que los abogados iban discovering the truth"
"Su madre veía que nosotros were driving around"
"Su madre veía que nosotros íbamos driving around"
"La mujer vio que los visitantes were arriving at the house**"**
"La mujer vio que los visitantes iban arriving at the house**"**
"Las ingenieras saben que el jefe was questioning the worker"
"Las ingenieras saben que el jefe iba questioning the worker"
"La mujer cree que el disco was spinning around"
"La mujer cree que el disco iba spinning around"
"Nosotros vemos que la máquina was punching holes in the shoe"
"Nosotros vemos que la máquina iba punching holes in the shoe"
"La profesora explica que la máquina was grabbing the thread"
"La profesora explica que la máquina iba grabbing the thread"
"Yo admito a los niños que mi tio was distracted"
"Yo admito a los niños que mi tio iba distracted"
"Su hermana supone que los amigos were going for a walk"
"Su hermana supone que los amigos iban going for a walk"
"Juan piensa que el pintor was looking for the paint"
"Juan piensa que el pintor iba looking for the paint"
"El operador sabe que el hombre was dialing the numbers"
"El operador sabe que el hombre iba dialing the numbers"
"La muchacha veía que los estudiantes were crossing the street"
"La muchacha veía que los estudiantes iban crossing the street"
"La científica cree que el departamento was spending money"
"La científica cree que el departamento iba spending money"
"Los profesores saben que los estudiantes were preparing for the exam"
"Los profesores saben que los estudiantes iban preparing for the exam"
"El comandante dice que los soldados were betraying their country"
"El comandante dice que los soldados iban betraying their country"
"La pilota vio que el muchacho was breaking the windows"
"La pilota vio que el muchacho iba breaking the windows"
"El tío creía que su sobrino was changing his clothes"/;
"El tío creía que su sobrino iba changing his clothes"/;
"El director piensa que el empleado was talking too fast"
"El director piensa que el empleado iba talking too fast"
"El profeta dijo que la gente were storing food"
"El profeta dijo que la gente iba storing food"
"La chica supone que sus padres were removing the pictures"
"La chica supone que sus padres iban removing the pictures"
* "María veía a la nina que was playing during recess"
"María veía a la nina que andaba playing during recess"

"El jardinero vio que el niño was pulling flowers"
"El jardinero vio que el niño andaba pulling flowers"
"La muchacha dice que su hermana was talking at the party"
"La muchacha dice que su hermana andaba talking at the party"
"El equipo sabe que el jugador was looking for his ball"
"El equipo sabe que el jugador andaba looking for his ball"
"Ramón es el que was accompanying the president"
"Ramón es el que andaba accompanying the president"
"El juez cree que los jóvenes were playing cards"
"El juez cree que los jóvenes andaban playing cards"
"El estudiante anunció que la profesora was starting class"
"El estudiante anunció que la profesora andaba starting class"
"La dueña sabe que el estudiante was fighting with everyone"
"La dueña sabe que el estudiante andaba fighting with everyone"
"El jefe sabía lo que you were doing in the truck"
"El jefe sabía lo que andabas doing in the truck"
"Tú sabes lo que el hombre was doing over here"
"Tú sabes lo que el hombre andaba doing over here"
"Ella admite que su amiga was chatting with the criminals"
"Ella admite que su amiga andaba chatting with the criminals"
"La policía dice que la chica was yelling stupid things"
"La policía dice que la chica andaba yelling stupid things"
"El director dice que la actriz was looking for the camera"
"El director dice que la actriz andaba looking for the camera"
"Él recuerda que su primo was teaching him to dance"
 "Él recuerda que su primo andaba teaching him to dance"
"Alberto dice que la mujer was putting plants in the garden"
 "Alberto dice que la mujer andaba putting plants in the garden"
 "Él piensa que su hermano was singing over there"
 "Él piensa que su hermano andaba singing over there"
 "Las chicas admiten que they were flirting to find a boyfriend"
 "Las chicas admiten que andaban flirting to find a boyfriend"
 "El general creía que el espía was conspiring against the nation"
 "El general creía que el espía andaba conspiring against the nation"
 "La madre sabía que we were looking for the store"
 "La madre sabía que andábamos looking for the store"
 "Sus padres dijeron que los niños were diving in the lake"
 "The criminales temía que los abogados were discovering el truth"
 "El criminales temía que los abogados were descubriendo the truth"
 "His madre saw que nosotros were driving la vuelta"
 "Su madre veían que we íbamos driving around"
 "La men vio that los visitantes were arriving at la house"
"The mujer veían que los visitantes iba arriving a the casa"
"La engineers saben que el boss was examinando the trabajador"
"The ingenieras saben que the jefe iba questioning the worker"
"La women cree that el disco was spinning la vuelta"

"La mujer believes que the disco iban spinning around"
"We vemos que las machine was punching holes en el shoe"
"Nosotros vemos que the máquina was picando holes in the shoe"
"La profesor explica que la máquina was grabbing the hilo"
"The profesoras explain que la máquina iba grabbing el thread"
"I admita los niños que mi uncle was distract"
"Yo admito a the niños that my tio iba distracted"
"Her hermana supongo que los amiga were going for a walk"
"Su hermana supone que the amigos iba dando a walk"
"Juan piensan that the pintor was looking for the pintura"
"Juan piensa que el painter iba buscando for the paint"
"El operator sabe que el hombres was dialing los numbers"
"El operador saben que la hombre iba dialing the numbers"
"La muchachas veía que los estudiantes were crossing las street"
"The muchacha see que los estudiantes iban crossing the street"
"La científica creen that el departament was spending dinero"
"La scientists cree que el departament were gastando money"
"Los profesores sabe que la estudiantes were preparing para the exam"
"The profesores saben que los students iban preparing for the examen"
"El comandante dicen that los soldados was betraying su country"
"El commander dice that the soldados iba betraying their country"
"La pilota see que el muchachos was quebrando los window"
"The pilotas vio que el muchacho iban breaking the vidrios"
"El tío thought que su sobrino was changing su ropas"
"The tío creía that su sobrino iban changing his clothes"
"El directores piensa que el empleados was talking too rapido"
"El director piensan que the empleado were hablando tan fast"
"El profetas dijeron que las gente were storing comidas"
"The profeta dijo que the gente iban storing food"
"La girl supones que his padres were removing los pictures"
"The chicas supone that sus padres were alejandos the pictures"

Appendix E

Transitive Stiumuli

"El criminal temía que los abogados were discovering the truth"
"El criminal temía que los abogados iban discovering the truth"
"Las ingenieras saben que el jefe was questioning the worker"
"Las ingenieras saben que el jefe iba questioning the worker"
"Nosotros vemos que la máquina was punching holes in the shoe"
"Nosotros vemos que la máquina iba punching holes in the shoe"
"La profesora explica que la máquina was grabbing the thread"
"La profesora explica que la máquina iba grabbing the thread"
"Juan piensa que el pintor was looking for the paint"
"Juan piensa que el pintor iba looking for the paint"
"El operador sabe que el hombre was dialing the numbers"
"El operador sabe que el hombre iba dialing the numbers"
"La muchacha veía que los estudiantes were crossing the street"
"La muchacha veía que los estudiantes iban crossing the street"
"La científica cree que el departamento was spending money"
"La científica cree que el departamento iba spending money"
"Los profesores saben que los estudiantes were preparing for the exam"
"Los profesores saben que los estudiantes iban preparing for the exam"
"El comandante dice que los soldados were betraying their country"
"El comandante dice que los soldados iban betraying their country"
"La pilota vio que el muchacho was breaking the windows"
"La pilota vio que el muchacho iba breaking the windows"
"El tío creía que su sobrino was changing his clothes"
"El tío creía que su sobrino iba changing his clothes"
"El profeta dijo que la gente were storing food"
"El profeta dijo que la gente iba storing food"
"La chica supone que sus padres were removing the pictures"
"La chica supone que sus padres iban removing the pictures"
"El jardinero vio que el niño was pulling flowers"
"El jardinero vio que el niño andaba pulling flowers"
"El equipo sabe que el jugador was looking for his ball"
"El equipo sabe que el jugador andaba looking for his ball"
"Ramón es el que was accompanying the president"
"Ramón es el que andaba accompanying the president"
"El estudiante anunció que la profesora was starting class"
"El estudiante anunció que la profesora andaba starting class"
"La dueña sabe que el estudiante was fighting with everyone"
"La dueña sabe que el estudiante andaba fighting with everyone"
"El director dice que la actriz was looking for the camera"
"El director dice que la actriz andaba looking for the camera"
"Él recuerda que su primo was teaching him to dance"
"Él recuerda que su primo andaba teaching him to dance"

"Alberto dice que la mujer was putting plants in the garden"
"Alberto dice que la mujer andaba putting plants in the garden"
"El general creía que el espía was conspiring against the nation"
"El general creía que el espía andaba conspiring against the nation"
"La madre sabía que we were looking for the store"
 "La madre sabía que andábamos looking for the store"

Appendix F

Intransitive Stimuli

"Su madre veía que nosotros were driving around"
"Su madre veía que nosotros íbamos driving around"
"La mujer vio que los visitantes were arriving at the house"
"La mujer vio que los visitantes iban arriving at the house"
"La mujer cree que el disco was spinning around"
"La mujer cree que el disco iba spinning around"
"Yo admito a los niños que mi tio was distracted"
"Yo admito a los niños que mi tio iba distracted"
"Su hermana supone que los amigos were going for a walk"
"Su hermana supone que los amigos iban going for a walk"
"El director piensa que el empleado was talking too fast"
"El director piensa que el empleado iba talking too fast"
"María veía a la nina que was playing during recess"
"María veía a la nina que andaba playing during recess"
"La muchacha dice que su hermana was talking at the party"
"La muchacha dice que su hermana andaba talking at the party"
"El juez cree que los jóvenes were playing cards"
"El juez cree que los jóvenes andaban playing cards"
"El jefe sabía lo que you were doing in the truck"
"El jefe sabía lo que andabas doing in the truck"
"Tú sabes lo que el hombre was doing over here"
"Tú sabes lo que el hombre andaba doing over here"
"Ella admite que su amiga was chatting with the criminals"
"Ella admite que su amiga andaba chatting with the criminals"
"La policía dice que la chica was yelling stupid things"
"La policía dice que la chica andaba yelling stupid things"
"Él piensa que su hermano was singing over there"
"Él piensa que su hermano andaba singing over there"
"Las chicas admiten que they were flirting to find a boyfriend"
"Las chicas admiten que andaban flirting to find a boyfriend"

Appendix G

High Frequency Stimuli

"Su madre veía que nosotros were driving around"/;
"Su madre veía que nosotros íbamos driving around"/;
"La mujer vio que los visitantes were arriving at the house**"/;**
"La mujer vio que los visitantes iban arriving at the house**"/;**
"Las ingenieras saben que el jefe was questioning the worker"/;
"Las ingenieras saben que el jefe iba questioning the worker"/;
"Yo admito a los niños que mi tio was distracted "/;
"Yo admito a los niños que mi tio iba distracted "/;
"Su hermana supone que los amigos were going for a walk"/;
"Su hermana supone que los amigos iban going for a walk"/;
"Juan piensa que el pintor was looking for the paint"/;
"Juan piensa que el pintor iba looking for the paint"/;
"El operador sabe que el hombre was dialing the numbers"/;
"El operador sabe que el hombre iba dialing the numbers "/;
"La científica cree que el departamento was spending money"/;
"La científica cree que el departamento iba spending money"/;
"Los profesores saben que los estudiantes were preparing for the exam"/;
"Los profesores saben que los estudiantes iban preparing for the exam"/;
"La pilota vio que el muchacho was breaking the windows"/;
"La pilota vio que el muchacho iba breaking the windows"/;
"El tío creía que su sobrino was changing his clothes"/;
"El tío creía que su sobrino iba changing his clothes"/;
"El director piensa que el empleado was talking too fast"/;
"El director piensa que el empleado iba talking too fast"/;
"María veía a la nina que was playing during recess"/;
"María veía a la nina que andaba playing during recess"/;
"El jardinero vio que el niño was pulling flowers"/;
"El jardinero vio que el niño andaba pulling flowers"/;
"La muchacha dice que su hermana was talking at the party"/;
"La muchacha dice que su hermana andaba talking at the party"/;
"El equipo sabe que el jugador was looking for his ball"/;
"El equipo sabe que el jugador andaba looking for his ball"/;
"El juez cree que los jóvenes were playing cards"/;
"El juez cree que los jóvenes andaban playing cards"/;
"El estudiante anunció que la profesora was starting class"/;
"El estudiante anunció que la profesora andaba starting class"/;
"La dueña sabe que el estudiante was fighting with everyone"/;
"La dueña sabe que el estudiante andaba fighting with everyone"/;
"El jefe sabía lo que you were doing in the truck"/;
"El jefe sabía lo que andabas doing in the truck"/;
"Tú sabes lo que el hombre was doing over here"/;
"Tú sabes lo que el hombre andaba doing over here"/;

"La policía dice que la chica was yelling stupid things"/;
"La policía dice que la chica andaba yelling stupid things"/;
"El director dice que la actriz was looking for the camera"/;
"El director dice que la actriz andaba looking for the camera"/;
"Él recuerda que su primo was teaching him to dance"/;
"Él recuerda que su primo andaba teaching him to dance"/;
"Alberto dice que la mujer was putting plants in the garden"/;
"Alberto dice que la mujer andaba putting plants in the garden"/;
"Él piensa que su hermano was singing over there"/;
"Él piensa que su hermano andaba singing over there"/;
"La madre sabía que we were looking for the store"/;
"La madre sabía que andábamos looking for the store"/;

Appendix H

Low Frequency Stimuli

"El criminal temía que los abogados were discovering the truth"
"El criminal temía que los abogados iban discovering the truth"
"La mujer vio que los visitantes were arriving at the house"
"La mujer vio que los visitantes iban arriving at the house"
"Las ingenieras saben que el jefe was questioning the worker"
"Las ingenieras saben que el jefe iba questioning the worker"
"La mujer cree que el disco was spinning around"
"La mujer cree que el disco iba spinning around"
"Nosotros vemos que la máquina was punching holes in the shoe"
"Nosotros vemos que la máquina iba punching holes in the shoe"
"La profesora explica que la máquina was grabbing the thread"
"La profesora explica que la máquina iba grabbing the thread"
"El operador sabe que el hombre was dialing the numbers"
"El operador sabe que el hombre iba dialing the numbers"
"La muchacha veía que los estudiantes were crossing the street"
"La muchacha veía que los estudiantes iban crossing the street"
"El comandante dice que los soldados were betraying their country"
"El comandante dice que los soldados iban betraying their country"
"El profeta dijo que la gente were storing food"
"El profeta dijo que la gente iba storing food"
"La chica supone que sus padres were removing the pictures"
"La chica supone que sus padres iban removing the pictures"
"Ramón es el que was accompanying the president"
"Ramón es el que andaba accompanying the president"
"Ella admite que su amiga was chatting with the criminals"
"Ella admite que su amiga andaba chatting with the criminals"
"La policía dice que la chica was yelling stupid things"
"La policía dice que la chica andaba yelling stupid things"
"Las chicas admiten que they were flirting to find a boyfriend"
"Las chicas admiten que andaban flirting to find a boyfriend"
"El general creía que el espía was conspiring against the nation"
"El general creía que el espía andaba conspiring against the nation"