

ISSUES IN BILINGUAL ACQUISITION:
A CASE STUDY

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Issues in Bilingual Acquisition: A Case Study

by

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Abstract

This thesis examines issues related to the relationship between the two languages comprised in a bilingual child's linguistic competence. The data investigated come from a longitudinal case study of an English-French bilingual child (2;00.04 to 4;02.25). The first topic under investigation relates to the reasons behind code switching as well as the constraints on the manifestations of this phenomenon. These constraints result in morpho-syntactic combinations that can or cannot occur in code-switched utterances. The data are also analyzed from the perspective of the acoustic manifestation of stress in each language. The results of this acoustic investigation suggest that the child has two separate stress systems and that she has mastered the main phonetic cues related to the manifestation of stress in each language. Overall, this study supports claims in the current literature that bilingual speakers do indeed have separate grammars in their linguistic competence.

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CHAPTER 1: Introduction

Important issues in language acquisition relate to bilingual children —those who learn two languages simultaneously, at times from birth. The study of bilingual learners can indeed shed light on the internal organization of the bilingual linguistic competence. Within this context, one research issue pertains to whether bilingual children have a unique grammatical system for both languages or two (partially or fully) autonomous grammars.

It has been suggested (e.g. Leopold, 1949; Swain, 1972; Volterra & Taeschner, 1978; Arnberg, 1987) that bilingual children go through a period during which they cannot distinguish between the two languages they are exposed to and, thus, have a unique grammatical system during this period. This hypothesis, labelled the ‘Unitary Language System’ hypothesis (henceforth ULS) by Genesee (1989), was built on the observation that bilingual children often mix items from both languages. This mixing phenomenon was hypothesized to manifest itself in situations where there was code switching and/or transfer between the two languages. In particular, code switching, or the “use [of] both of [the children’s] languages within a single unit of discourse” (Nicoladis & Genesee, 1997: 422; Nicoladis & Secco, 1998: 576), was thought to be a clear example of the child’s confusion between the languages. For further discussion of the ULS, see Lanza (1993) and Genesee, Nicoladis & Paradis (1995).

However, in a challenge to the ULS, it was also hypothesized that bilingual children instead, have two separate systems (e.g. DeHouwer, 1990; Goodz, 1994;

Genesee, Nicoladis & Paradis, 1995; Quay, 1995; LaBelle, 2000; Barlow, 2002). Recent work by Bosch & Sebastián-Gallés (2003) and Burns, Werker & McVie (2003) on speech perception demonstrate that even though bilingual children show a slight lag in reaction time as opposed to monolingual children when performing perception tasks, bilingual children are able to discriminate sounds similar to their monolingual counterparts. These results show that the bilingual children are able to classify their input in the same way as monolinguals. Also, in terms of rate of acquisition, Genesee (2003) claims that “although bilingual children are exposed to and must systematise two sets of language input, they appear to do so within the same general timeframe and approximately at the same ages as children learning only one language” (Genesee, 2003: 212). Consequently, it is currently accepted that bilingual children do not go through a stage similar to ULS but do, indeed, have two separate systems.

Since the dual system hypothesis has been introduced and accepted by a number of researchers, more evidence against the ULS has been highlighted. The instances of code switching and transfer that were once hypothesized to support the ULS, for example, have been re-evaluated to support the two-system hypothesis (Nicoladis & Genesee, 1997; Nicoladis & Secco, 1998). In this thesis, I will further contribute to this re-evaluation of the ULS, which will further test the dual system hypothesis.

In the subsequent sections, I examine the central issue introduced above — whether bilingual children are equipped with one grammatical system or two — from three perspectives: lexical, syntax and phonological. I accomplish this first by discussing the previous literature on the topic and then moving on to a previously-undocumented

longitudinal case study. The data from this study come from a bilingual, English-French learner. The details of this study, including further information about the participant as well as the methodology used for speech elicitation and data analysis, are discussed in depth in Chapter 2. The specific research topics I address in this thesis include an analysis of code switching, its manifestation, and specific constraints on its use. Another area I investigate concerns bilingual children's use of suprasegmental cues, more specifically, those related to the production of stress patterns.

The thesis is organized as follows. In Chapter 2, I introduce my case study. In Chapter 3, I present a survey of the background literature on the main issues to be addressed in the thesis. In the three subsequent chapters, I analyze the data based on the hypotheses discussed in Chapter 3. In Chapter 4, I examine the child's use of English, French and mixed utterances. I then analyze the child's use of code switching as well its role as a coping mechanism for an apparent lack of vocabulary in the lexicon of the non-dominant language. Chapter 5 concentrates on the Cooccurrence Constraints Hypothesis (CCH). I first provide evidence supporting this hypothesis and then discuss some of the syntactic configurations that possibly underlie the constraints on code switching. In Chapter 6, I first discuss LaBelle's (2000) analysis of stress patterns produced by a bilingual child. Building on this study, I conduct a follow-up investigation based on my case study. Finally, Chapter 7 draws together highlights from the preceding chapters. I take these as a starting point for a general discussion of my results and their implications for the field of acquisition.

CHAPTER 2: Bilingualism and Language Dominance: A Case Study

2.1 Background Information about the Participant

The participant involved in my case study is an English-French bilingual female child who is clearly English dominant and whom I have code-named Anne. The child's mother was raised in a bilingual English-French environment and is completely balanced in both languages. The father was raised speaking Arabic as his first language and learned French and English as second and third languages, respectively. He learned the latter two languages in school in Tunisia, his country of origin. At the age of 18, he moved to the province of Québec. Seven years later, at the age of 25, he settled in Newfoundland where he had been living for nine years at the beginning of my data collection.

The two languages learned by Anne during the data collection period, English and French, were (and are still) used interchangeably at home in interactions with the child, between the parents and with an older sibling. Arabic is never used. It is interesting to note that Anne's older brother *did not* (and still does not) display evidence of as strong of an English dominance as does Anne. Both children were raised in the same environment and were given roughly the same exposure to both languages. In spite of this, Anne's brother appears to be a fairly balanced bilingual while she clearly prefers English. The one difference in their upbringings that may explain this difference is that Anne's brother attended a daycare where both English and French were spoken. In contrast to this, Anne attended a daycare where only English was spoken. Her attendance in this monolingual

English daycare had two direct effects on her linguistic environment. First, she spent a significant amount of time being exposed to only English. Second, this exposure was in an environment where she was interacting with peers — young children like her.

According to Labov (1972), when young children interact with a peer group, they form an identity with this particular group and, thus, assimilate as much as possible to become like this group. I hypothesize that this is the case with Anne and the other children from the monolingual English daycare with whom she interacts daily. This combination of factors (amount of exposure; linguistic identification with peers) may be directly related to her English dominance (see also Pearson et al., 1997 the effects of linguistic input in bilingual development).

Anne's entry into this daycare corresponded with the beginning of my study; consequently, there are no pre-daycare data to draw comparisons with. However, a preliminary comparison conducted between earlier sessions, about four months after she began attending daycare, and later sessions, shows that she used more French in earlier sessions (as will be detailed in Chapter 4). This suggests a direct correlation between her attendance in English daycare and the decrease in her overall use of French.

From an impressionistic perspective, Anne's English proficiency in both pronunciation and vocabulary is parallel to that of a native speaker. Her spoken French is also similar to that of a native speaker with respect to pronunciation. However, although this cannot be verified with certainty, she appears to have more of a limited vocabulary than would a native French speaker of the same age and language background.¹

¹ All observations are based on personal impressions and observations.

Although Anne uses French less extensively than English, she exhibits a high level of comprehension in this language. For example, from a very early age, her maternal grandfather has spoken to her solely in French and, although she replies to him in English and has heard him speak English with others, she has never displayed difficulties with this mixed linguistic environment. Indeed, when spoken to in French, Anne exhibits full comprehension of what is said and at times will even explicitly translate into English (*Now it's a serpent and now it's a snake 2;09.28*). We can therefore hypothesize that she is acquiring French grammar but that her use of this language is recessive.²

From the above observations, I conclude that her dominant language is English and her non-dominant, French. My research will thus primarily focus on the effects of the dominant language on the non-dominant language, relative to the opposite effect. This will also help determining how her productive (dominant) and recessive (non-dominant) languages influence each other during the course of the time period covered by the study.

In this chapter, I discuss the all the information pertaining to my case study. In section 2.2, I discuss the method used for data collection. In section 2.3, I describe the procedure used for processing the data. Section 2.4 addresses the relevant ethical considerations. The final section, provides a brief description of the general method I used for data analysis.

² The term recessive will be used somewhat loosely in this thesis to refer to the apparent loss or explicit choice of not using the non-dominant language.

2.2 Methodology: Data Recording

Anne was recorded audio-visually for a total period of approximately two years and two months, between the ages of 2;00.04 and 4;02.25. The majority of the recordings were conducted between the ages of 2;00.04 to 3;00.05. From the beginning of the study until the age 2;04.18, the sessions were conducted weekly. However, from the age 2;05.10 to the end of the study, the recording sessions were conducted monthly. The sessions were recorded alternately with a French and an English interlocutor to observe Anne in each language environment. The sessions were conducted with native speakers of each language, who only spoke their first language with Anne. This approach was used in order to elicit as many productions as possible from that language. Before each French session, Anne was exposed to as much French as possible. This exposure was subtle so that Anne would not notice anything out of the ordinary and included such things as listening to the radio in French on her way to the recording session.

However, over the course of the recording sessions, Anne increasingly opted for English over French even when interacting with the French speaker. I assume that Anne realized that the French speaker did indeed understand and speak English and thus figured that if she used English, she still would be understood. Although the French interlocutor did acknowledge when Anne produced English, she did not, at any time, speak English with Anne. This was done in order to remain consistent throughout the sessions. Due to her overwhelming avoidance of French productions towards the end of

the first year of recording and her English language dominance, the later sessions from ages 3;00.26 to 4;02.25, were conducted solely with the English interlocutor.³

The recording sessions were approximately one hour in duration and consisted of informal, unguided speech elicited during everyday conversations, play, language games and story telling. The majority of the recordings were conducted in a soundproof room in the Speech Sciences and Language Acquisition Laboratory (SSLAL) at Memorial University of Newfoundland.

In addition to the required recording devices, this laboratory is equipped with books, toys, flash cards and other linguistically-stimulating materials that are used to encourage the child to speak and to make the experience as enjoyable as possible. Before each recording session, the child and the interlocutor would place a cartoon print blanket on the floor of the recording room as a “play area” on which most of the activities during that hour would take place. The blanket also provided a warm, playful atmosphere to make the child at ease. This blanket served a third purpose in that it provided a subtle delimitation of the camera’s view range. During the recording sessions, the interlocutor repeated each utterance Anne produced. This strategy prevented some of the ambiguity that can occur when examining the videos at a later date. It is important to note here that the French interlocutor did not repeat any English words Anne produced. However, the English interlocutor did repeat both the French and English utterances produced during the sessions. It was felt that if Anne realized that the French interlocutor understood, and spoke, English, Anne would not feel she had to use French to communicate and would

³ It is important to note here that the latter sessions conducted solely in English, are not analyzed in this thesis.

use English instead. However, it was also felt that since Anne knew that the English interlocutor understood as well as spoke French and due to her English dominance, there would be no impact on Anne's productions.

The recordings were performed with the use of a Sony Digital-8 DCR-TRV350 video camera and a Sony ECM-MS907 microphone. Care was taken to include Anne in all the activities during each session in order for her to feel at ease with the camera and the recording process. She was involved in basic tasks such as the insertion of the tape into the video camera as well as the placement of the microphone and the blanket. The recording sessions were stopped if Anne showed signs of being irritated or uninterested and no expectations of performance were placed upon her during these interactions. In actuality, Anne enjoyed the recording sessions. She often asked to be taken to the university to play in the room again and would get excited about seeing herself on camera.

2.3 Data Processing

The recorded data were exported to and formatted in a computer in the SSLAL. The video and audio content were transferred to the computer using a video editing program (iMovie). The data were then compressed into a video format in QuickTime. The data were compressed at a rate of 24 frames/sec, with a pixel delimitation of 320 x 240. The audio quality was kept at 16-bit sample size at a rate of 44.1 kHz. Back-ups of the recordings are stored in a safe location outside the university and the originals are kept in a locked cabinet in the SSLAL. Following formatting, the analysis proceeded

using the computer program *Phon* (Rose et al., in press), which enabled segmentation of the time intervals during which the child speaks, i.e. the recorded segments that are relevant for research. *Phon* also provided fields for data transcriptions, fields for identifying the utterance type (e.g. spontaneous versus repeated) as well as fields for taking additional observation notes. Using this program, the files were orthographically transcribed and any relevant notes were made.

2.4 Ethical Considerations

There were no direct risks associated with my research study, save for the child becoming uncomfortable with being recorded. As mentioned earlier, every precaution was taken to actively incorporate Anne into all interactions when she was present in the laboratory to make her at ease with the equipment being used and to make the event as stimulating and enjoyable for her as possible. Anne did not show any signs of discomfort while being recorded and, in fact, appeared to thoroughly enjoy her time in front of the camera. There were no direct benefits to the participant except for the fact that she benefited from a linguistically-stimulating environment, as well as the one-on-one contact with the interlocutors during the sessions.

Anne's parents were made aware of my research topic and signed a consent form, giving their permission for my use of the recordings. Anne's parents were able to stop the study at any time without consequence to them or to the child. I took care that they were comfortable with all aspects of the research plan and assured them that I was readily available to answer their questions, should any arise. To ensure confidentiality, I assured

them that access to the recordings will be limited to only my supervisor, the research assistants involved with the transcriptions and myself.⁴

2.5 Data Analysis

As mentioned above, the data were analyzed to detect occurrences of code switching and the phonetic properties of stress patterns. These analyses were conducted based on the language targeted in the recording session. Each of the recording sessions were classified according to date and interlocutor (French or English) and were then orthographically transcribed using *Phon* (Rose et al., in press). With this computer program, I was also able to conduct word-based searches in subsequent sessions which would aid in the analysis of Anne's code switching. *Phon* was also beneficial in that, using this program, I was able to export speech segments to *Praat* (<http://www.fon.hum.uva.nl/praat/>), a program which enabled the creation and analysis of the acoustic measurements needed for the examination of stress patterns. All of the data obtained from these analyses were compiled and organized in *Excel*. A more comprehensive discussion of the manner in which I examined the data and any relevant research findings are outlined in the subsequent chapters.

⁴ My research proposal has been approved by the Interdisciplinary Committee on Ethics in Human Research (ICEHR) at Memorial University of Newfoundland on April 21, 2005. The ICEHR reference number for this proposal is 2004/2005-050-AR.

CHAPTER 3: Literature Review

3.1 Introduction

Bilingual children are of particular interest in the area of language development. In early studies, bilingual children were commonly thought to be at a disadvantage with respect to their acquisition of multiple languages. The bilingual context of language acquisition was hypothesized to be detrimental to the children's general mental health and, in acute cases, to result in serious mental impediments such as schizophrenia (Diebold, 1968 as cited in Genesee, 2003: 206). In fact, as reported by Genesee (2003), many researchers (e.g. Arsenian, 1945; Darcy, 1953; Macnamara, 1966) suggested that bilingual children exhibited, as compared to monolinguals, a "lower verbal intelligence and/or ability" (Genesee, 2003: 206). However, thanks to more recent studies (e.g. DeCasper & Spence, 1986; Bosh & Sebastián-Gallés, 2003; Burns, Werker & McVie, 2003) traditional views have evolved. It is indeed commonly accepted in the more contemporary, scientific literature that "there is nothing in...[the] current understanding of monolingual acquisition that would lead one to believe that bilingual acquisition is inherently problematic or unnatural" (Genesee, 2003: 209). In fact, it is hypothesized that there are as many or even more children who grow up bilingual as monolingual around the world (Tucker, 1998 as cited in Genesee, 2003: 205), and no evidence suggests that these large populations of bilingual speakers display any kind of intellectual or linguistic deficit.

From a research perspective, a bilingual child's acquisition of two languages provides insight into important issues concerning the organization of bilingual linguistic competence. This organization can be observed by analysing transfer effects between languages and, in the area of speech and language pathology, aphasia-related phenomena.

Bilinguals who have language problems, as a result of acquired or developmental aphasia, provide insight into the dependence, independence, or interaction between the two languages. Studies of bilingual aphasia show that the patient can display equivalent disorders in both languages. This suggests that the languages are interconnected (Fabbro, 2001). However, one language can be recovered independently of the other, thus suggesting the opposite, namely that the languages are separate, or autonomous, in the bilingual speaker's linguistic competence. The overall evidence, however, suggests that there is a relationship between the two languages, at least at some level of cognitive organization (Fabbro, 2001).

In this chapter, I provide a brief summary of the relevant literature and hypotheses formulated within it to account for phenomena related to bilingual acquisition, in particular, in reference to the interaction between the two languages. In the first section, I present the findings for research involving language dominance and code switching. In section 3.3, I discuss a lexical acquisition process as proposed by LaBelle (2000). The topic of discussion in section 3.4 is code switching, more specifically the Cooccurrence Constraints Hypothesis (Hasselmo, 1972; Petersen, 1988; Lanza, 1993) which was proposed to distinguish between attested and apparently illicit word combinations in code switches. Section 3.5 discusses the results obtained from a study by LaBelle (2000) of the

stress productions of a bilingual, English-French, child. The final section concludes this chapter with a brief discussion.

3.2 Language Dominance and Code Switching

As mentioned in the introduction, there is, at least, some level of relationship between the languages spoken by a bilingual speaker. However, this relationship generally appears not to be a balanced one. Typically, a bilingual speaker appears to be stronger in one of his/her languages and is thus more fluent and more proficient in that language (Genesee, Nicoladis & Paradis, 1995; Nicoladis & Genesee, 1996). This language is called the dominant language and, the other, accordingly, the non-dominant language.

Language dominance is closely linked to code switching (also known as code mixing), or the “use [of] two languages within a single utterance or in a single conversation” (Nicoladis & Genesee, 1997: 422). Code switching can be divided into two types: intra-utterance and inter-utterance (Nicoladis & Genesee, 1996). The former, intra-utterance, is defined as when the children use both languages in the one utterance. A hypothetical example of this would be: *‘the chien’*. In this example, the child is producing the determiner, *‘the’* in English and the noun, *‘chien’* in French. The latter, inter-utterance, occurs when the inappropriate language is used with a given interlocutor. This type of code switching occurs when, for example, a bilingual English-French child directs an entire sentence in French to an English interlocutor.

In general, children code switch more in their non-dominant language than in

their dominant language (Nicoladis & Secco, 1998). The hypothesized reason for this is based on the children's lack of proficiency in their non-dominant language. This results in gaps in their vocabulary (Nicoladis & Genesee, 1996) or, more specifically, the translation equivalents that must exist between semantically related words in the two languages (e.g. English *cat* versus French *chat*) (Nicoladis & Secco, 1998). These gaps are typically filled with the corresponding word in the other language, a strategy which results in code switching. However, the child is predicted *not* to code switch if the translation equivalents are in their vocabulary. The acquisition of such translation equivalents is hypothesized to follow a particular pattern as proposed by LaBelle (2000). This proposal is discussed further in the next section.

3.3 Lexical Acquisition

LaBelle (2000) proposes that children follow a three-step pattern in acquiring translation equivalents. First, the bilingual child acquires a word in one of the languages. Second, the child acquires the translation equivalent in the other language and, for a given period of time, uses both words. Third, and finally, the word from the dominant language becomes the most commonly used. It is important to note that LaBelle (2000) does not propose any restrictions on neither the age nor the developmental stage of the child. A representative example of this pattern is shown in (1). In this hypothetical example, the child is an English-French bilingual who is English dominant.

(1) Three-Step Pattern for Acquiring Translation Equivalents



As illustrated in (1), the word ‘*chat*’, from the non-dominant language, is acquired first. Then, the English translation equivalent ‘*cat*’ is acquired and, from that moment on, both ‘*chat*’ and ‘*cat*’ can be used interchangeably. Finally, after this period of alternation between the two forms, the word in the dominant language is preferred over the translation equivalent in the non-dominant language. It is important to note here that LaBelle (2000) does not set restrictions on either the kind of bilingualism to which this pattern would apply or the developmental stages.

Thus far, the literature has suggested (Nicoladis & Genesee, 1996; Nicoladis & Secco, 1998) that code switching is a result of a deficiency in the non-dominant language. However, once the child learns the translation equivalent, following LaBelle’s hypothesized three-step pattern, it is predicted that he/she will not code switch. This general hypothesis, which addresses lexical issues, however does not provide an answer concerning the grammatical constraining of code switching, for example in syntactic constructions. One hypothesis proposed on this topic is discussed in the next section.

3.4 Cooccurrence Constraints Hypothesis

Various scholars (Hasselmo, 1972; Petersen, 1988; Lanza, 1993) have proposed that code switching is not a result of random combinations, but rather is constrained by the nature of certain grammatical categories that the child can or cannot combine in

syntactic constructions. To facilitate my description of this hypothesis, I have combined elements from each body of work (Hasselmo, 1972; Petersen, 1988; Lanza, 1993) which I merged into an all-encompassing hypothesis which I refer to as the Cooccurrence Constraints Hypothesis (henceforth CCH). The properties of the CCH have been taken directly from these works and highlight the commonalities between them.

According to the CCH, there are only three combinations of lexical (L) and grammatical (G) items of either the dominant (dom) and the non-dominant (nondom) language that can occur during code switching. There is a fourth combination, however, which is hypothesized not to occur. The combinations are illustrated in Figure (2) which consists of examples from a Dutch-English bilingual child, adapted from Petersen (1988: 482), as cited in Lanza (1993: 198).

(2) Combinations According to the CCH

Combinations	Meaning	Example
a) Gdom + Ldom	Dominant language grammatical and lexical items can occur together	<i>Her dolly</i>
b) Gdom + Lnondom	Dominant language grammatical items can occur with lexical items of the non-dominant language	<i>Her duke (her dolly)</i>
c) Gnondom + Lnondom	Non-dominant language grammatical and lexical items can occur together	Hendes dukke (her dolly)
d) * Gnondom + Ldom	Non-dominant language grammatical items can occur with lexical items of the dominant language	*Hendes dolly (her dolly)

As the table in (2) illustrates, a grammatical item from the dominant language can occur with a lexical item from either that same language or the non-dominant language.

However, a grammatical item from the non-dominant language can only occur with a lexical item of that same language. The combination of a grammatical item from the non-dominant language and a lexical item from the dominant language is hypothesized not to occur in child code switching.

Following from this hypothesis is the claim that an examination of which elements are code-switched should indicate which language is dominant. For example, if a bilingual English-French child combines English grammatical items with French lexical items, but does not combine French grammatical items with English lexical items, one can assume, based on the CCH, that the child is English dominant. Language dominance, however, does not manifest itself only in lexical or morpho-syntactic properties of a bilingual speaker's speech. Other linguistic properties can also be affected, including phonological ones. In the next section, I discuss a study that addresses the issue of language dominance from a prosodic perspective.

3.5 Stress

As alluded to above, the influence of each language on one another should also manifest itself in prosody, or more specifically, stress. LaBelle (2000) analyzed the stress patterns of an English-French bilingual child, in order to determine the relative influence of each of the languages' prosodic systems on the child's speech. Such influences can be detected from the differences in the stress systems of the two languages: English is a trochaic (strong weak) language while French is an iambic (weak strong) language.⁵

⁵ See Chapter 6 for a more in depth discussion of the stress systems of these languages.

To determine which stress pattern, trochaic or iambic, was being most influential in the child's speech, LaBelle analyzed the fundamental frequencies (F0) of the final syllables of declarative utterances. According to LaBelle, a rising F0 curve on the last syllable should indicate an iambic stress pattern. In contrast to this, a falling F0 curve should be indicative of a trochaic pattern.

The results from LaBelle's study indicate that the participant used mostly trochaic stress patterns, consistent with influence from the English language. Based on these results, LaBelle hypothesized that the child's use of this particular stress pattern is a result of an "innate predisposition to use the trochaic pattern as supplied by the default parameter value [+trochaic]" provided by Universal Grammar (LaBelle, 2000: 483). Thus, according to this hypothesis, as a result of Universal Grammar, the child is predisposed to use the trochaic stress pattern even when speaking an iambic language, such as French. LaBelle takes this predisposition as the main factor driving the dominance of English stress patterns in the speech of his participant.

3.6 Discussion

The hypotheses presented in this chapter are all relevant to the study of language acquisition taking place in a bilingual setting. In the subsequent chapters of this thesis, I discuss, in depth, each of the hypotheses outlined here as well as their application to my own data. My data and results will provide support to most of these hypotheses. However, in cases where my results differ, I will present an alternative point of view in an attempt to disentangle the controversy raised by the discrepancies observed.

CHAPTER 4: The Origins of Code Switching

4.1 Introduction

As discussed in the previous chapters, it was initially suggested that bilingual children passed through a period during which they could not distinguish between their languages and thus had one, unitary system (e.g. Leopold, 1949; Swain, 1972; Volterra & Taeschner, 1978; Arnberg, 1987). However, in light of current research, it is now generally accepted that these children do, indeed, have two separate systems (e.g. DeHouwer, 1990; Goodz, 1994; Genesee, Nicoladis & Paradis, 1995; Quay, 1995; LaBelle, 2000; Barlow, 2002). Consequently, without the ULS to explain why bilingual children mix elements of both languages, the focus moved to other explanations such as language dominance.

Language dominance is not uncommon in bilingual children. This is because the children are often not equally fluent in both languages. In the majority of cases, the children are indeed more proficient in one language and this language is deemed the dominant language (Genesee, Nicoladis & Paradis, 1995; Nicoladis & Genesee, 1996). Typically, dominance is positively correlated to the amount of exposure to a language: the more exposure to a language, the more likely the child is to be dominant in that language (Nicoladis & Genesee, 1996). For example, if a bilingual child is exposed to a greater amount of input from English than Spanish, he/she will most likely be English dominant. Language dominance is very influential with respect to code switching, the topic of this chapter, and transfer, to be discussed in Chapter 6.

In this chapter, I attempt to shed new light on code switching. In section 4.2, I provide a brief description of code switching. In the following section, I present my general findings with respect to Anne's code switching. In section 4.4, I discuss the origins of code switching and in the subsequent section, present the findings of my analysis. In section 4.6, I attempt to determine whether child code switching is influenced by context and in the following section, I examine the word acquisition process as proposed by LaBelle (2000). The final section provides a discussion of the relevant findings.

4.2 Code Switching

Code switching, as mentioned above, has been defined as when bilingual children “use both their languages within a single unit of discourse” (Nicoladis & Genesee, 1997: 422; Nicoladis & Secco, 1998: 576). Relevant literature (Nicoladis & Genesee, 1996) presents two distinct types of code switching: inter-utterance and intra-utterance. However, as a result of Anne's language dominance, which caused a steady decrease in the amount of spoken French recorded, the majority of code switches in my corpus are of the inter-utterance type (such as using English with the French interlocutor). Perhaps, in this context, the definition of code switching as given by Petersen (1988: 479) is more applicable: “the term code switching is used to refer to any abrupt and momentary shifting from one code to another, within a speech context”.

As mentioned in section 4.1, language dominance influences code switching in many ways. Studies show that children code switch more in their non-dominant language

to compensate for a lack of vocabulary in that language (Nicoladis & Genesee, 1996) or, in other words, the lack of a translation equivalent (Nicoladis & Secco, 1998).

Accordingly, bilingual children are predicted to code switch more in contexts where they predominantly use their non-dominant language (Genesee, Nicoladis & Paradis, 1995; Nicoladis & Secco, 1998). Consequently, with respect to my study, we would expect Anne to code switch more when speaking French and also, to code switch more with the French interlocutor.

To verify this, I extracted all the instances of code switching during this time period. Because the recordings alternated languages and were alternating within a relatively short period of time, this comparison provided a significant number of observations, to which we turn now.

4.3 General Characteristics of Anne's Speech

In this section, I discuss the general patterns found in Anne's speech through an examination of the characteristics of the English, French and mixed utterances attested throughout the recording sessions. It is important to note, however, that due to the overwhelming number of English utterances (because of Anne's dominance in this language), I was more specifically concerned with the French and mixed utterances. For the purpose of all analyses, I identified a mixed utterance as one that contains at least one word from each language (for example: *he just saute* 2;04.4). I will begin my discussion with my analysis of mixed utterances.

However, before we tackle the specifics of the matter, it should be noted that the mixed utterances in my corpus can be divided into two groups. The first group consists of English multi-word utterances with a French word inserted (for example: *last time I ate a lot of bonbon and after I gonna be sick* 2;09.28). Interestingly, French multi-word utterances with English words inserted do not occur in this corpus (for example: **regarde le petit dog*). I hypothesize that utterances of this type do not occur as a direct result of Anne's English dominance. However, the second group of mixed utterances consists of examples which contain only two words, one from each language (for example: *where chien* 2;02.03). Such mixed utterances, which are, on the face of it, difficult to classify because of the equal weight of each language, will be discussed in depth in a later section.

Focusing now on the relative prevalence of code switching in each language, it is important to note that Anne code switched much more with the French interlocutor. Indeed, out of the 105 utterances where code switching was attested, 74 cases (70.5%) are found in the French sessions and the remaining 31 (29.5%) are found in the English sessions. This supports the generalization that children code switch more with a speaker of their non-dominant language (Genesee, Nicoladis & Paradis, 1995; Nicoladis & Secco, 1998). In addition, Anne used more French with the French interlocutor than with the English interlocutor and vice versa. This is to be expected due to the influence of the language used by the interlocutor in the session. However, it is important to note that the proportion of French utterances with the French interlocutor gradually decreased over time, as will be illustrated in a subsequent section.

Interestingly, as Anne's production of French utterances decreased, her production of mixed utterances increased. This suggests that she was still accessing resources from her French language even though her use of this language was decreasing. However, note here that this occurred only in the sessions with the French interlocutor, not with the English one.

It is also interesting to note that, overall, there were a greater number of utterances produced with the English interlocutor than with the French interlocutor.⁶ Since each session was approximately an hour in duration, time cannot account for the difference in the number of utterances produced. Hence, I attribute this difference to Anne's comfort level with each interlocutor. Anne was more familiar with the English interlocutor than with the French interlocutor whom she did not know prior to the beginning of the data recording sessions. This, in addition to her English dominance, presumably contributed to this trend (see Genesee, Boivin & Nicoladis (1996) for a comparison of a child's interactions and comfort level with a parent and with a stranger).

These general findings are outlined in (3) below, where I compare the relative frequency of the French, English and mixed utterances produced in sessions with the French interlocutor with those produced with the English interlocutor. This frequency was calculated by dividing the amount of each type of utterance by the total number of utterances produced in that session. The English and French sessions are presented in alternation to facilitate comparisons between the two.

⁶ The only exception to this is the first English recording session during which Anne produced fewer utterances (145) than were produced in the first French session (220). I attribute this to the simple fact that the English sessions was the first recording session of the entire corpus.

(3) Anne's Production of English, French and Mixed Utterances⁷

	English	Mixed	French
E-2;00.25	141/145 = 97.2%	0/145 = 0%	4/145 = 2.8%
F-2;00.27	209/220 = 95.0%	0/220 = 0%	11/220 = 5.0%
E-2;01.10	496/507 = 97.8%	9/507 = 1.8%	2/507 = 0.4%
F-2;01.03	115/181 = 63.5%	5/181 = 2.8%	63/181 = 34.8%
E-2;02.17	356/367 = 97.0%	5/367 = 1.4%	6/367 = 1.6%
F-2;02.03	145/209 = 69.4%	12/209 = 5.7%	52/209 = 24.9%
E-2;03.22	457/459 = 99.6%	0/459 = 0%	2/459 = 0.4%
F-2;02.24	111/146 = 76.0%	8/146 = 5.5%	27/146 = 18.5%
E-2;05.10	568/573 = 99.1%	4/573 = 0.7%	1/573 = 0.2%
F-2;04.04	191/219 = 87.2%	9/219 = 4.1%	19/219 = 8.7%
E-2;06.18	386/397 = 97.2%	4/397 = 1.0%	7/397 = 1.8%
F-2;04.18	286/323 = 88.5%	16/323 = 5.0%	23/323 = 7.1%
E-2;08.16	415/415 = 100%	0/415 = 0%	0/415 = 0%
F-2;06.22	331/358 = 92.5%	17/358 = 4.7	10/358 = 2.8%
E-2;09.10	268/269 = 99.6%	1/269 = 0.3%	0/269 = 0%
F-2;09.00	97/101 = 96.0%	2/101 = 2.0%	3/101 = 3.0%
E-3;00.05	466/470 = 99.1%	3/470 = 0.6%	1/470 = 0.2%
F-2;09.28	156/160 = 97.5%	4/160 = 2.5%	0/160 = 0%

In the first session with the French interlocutor, Anne produced a small number of French utterances, 11, which I attribute to the fact that Anne, who was barely familiar with the recording setting, was not very familiar with the French interlocutor. Indeed, during the next French session, she produced 63 French utterances (i.e. approximately one third of the utterances during that session), the most French utterances with the French interlocutor out of all the sessions in my corpus, and 5 mixed utterances. This augmentation in her French productions could be indicative of an increase in Anne's familiarity and comfort level with the French interlocutor as well as with the recording

⁷ French sessions are marked with "F" while English sessions are marked with "E".

situation. As well, it is interesting to note that in each of the first two sessions (both the initial English and French sessions), Anne does not produce any mixed utterances.

It is also important to note that during the first French session, Anne produced her first complex French utterance of my data corpus: *bébé cheval* (2;00.27).⁸ No multiword French utterances were produced while with the English interlocutor at any time during the data gathering period.⁹ This is important because it illustrates Anne's sensitivity to the different languages used by the interlocutors and reinforces the argument for the bilingual child's ability to distinguish between the two languages (Nicoladis & Genesee, 1997). Another argument supporting this interpretation comes from the fact that Anne generally produced fewer French utterances and a smaller number of mixed utterances with the English interlocutor.¹⁰ This small number of mixed utterances in the English sessions also supports the claim that bilingual children code switch more in their non-dominant language (Nicoladis & Secco, 1998).

After a peak during the second French session, conducted at age 2;01.03, the French utterances produced in the French sessions began to decrease, as illustrated in (4). This decrease occurred in a rather gradual fashion throughout the majority of the French sessions. This trend is not reflected in the amount of French spoken with the English interlocutor, however, which fluctuates with no clear pattern although it is consistently low. The one exception to this decrease occurs during the session conducted at age 2;04.04, where the number of French productions makes a noticeable drop and then

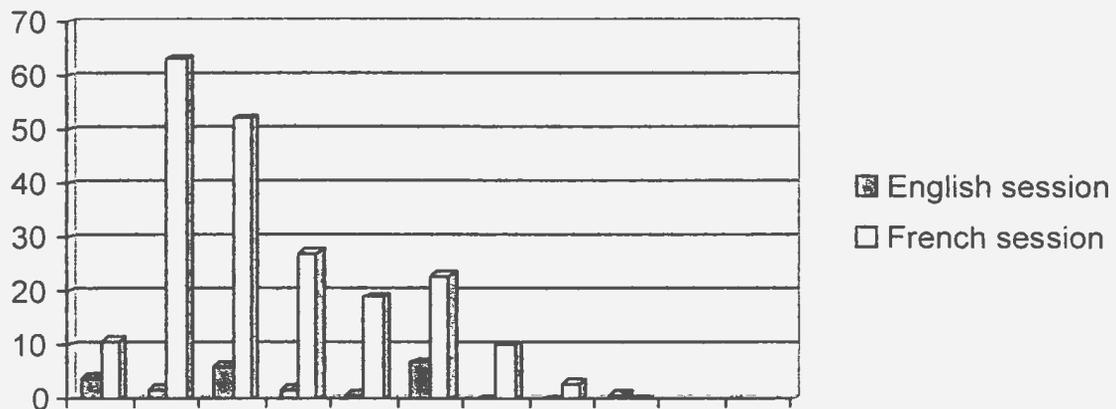
⁸ I classify a complex French utterance as one that consists of two (or more) French words.

⁹ However, it is important to note that Anne does produce complex utterances in English and French from this point throughout the corpus.

¹⁰ This only exception to this comes from the second English session.

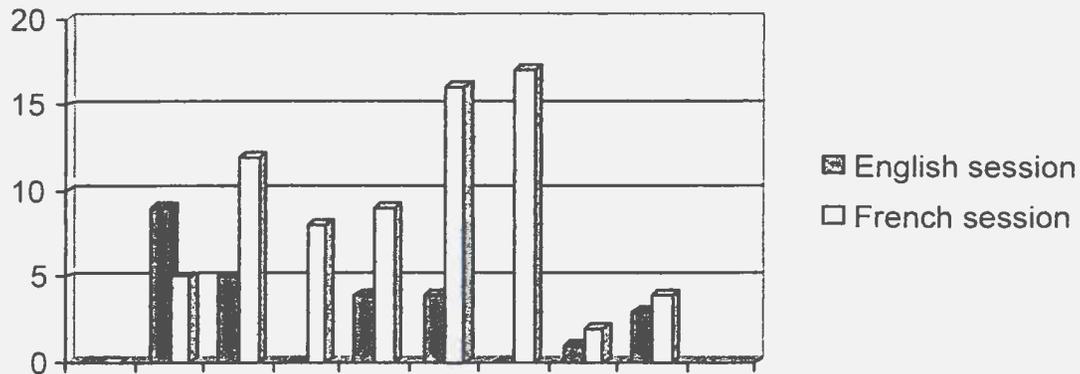
increases again in the next session. By the age of 2;08.16, Anne has stopped producing both French and mixed utterances with the English speaker. This is in sharp contrast to the previous English session, at age 2;06.18, which contained the most French utterances produced in an English session.

(4) Number of French Utterances Produced by Anne across Sessions



As mentioned previously, Anne's use of French utterances decreases over the course of the study. During the same time period, however, her use of mixed utterances in the French sessions fluctuates but with a general increase, except towards the end of the data gathering period. Anne's mixed utterance productions are illustrated in (5).

(5) Number of Mixed Utterances Produced by Anne across Sessions



I hypothesize that a possible phasing out of French in favour of English could be causing the increase in the number of mixed utterances observed. Because Anne was choosing English over French as her default language, she was inserting more and more English words in her French utterances. This hypothesis does not seem to apply to the fluctuations in the number of mixed utterances produced during the English sessions for which no trend could be established. Indeed, the only pattern found within the data set is a general one: except for the second English session, Anne consistently code switches more in her non-dominant language, French, than in her dominant language, English.

Anne's use of mixed utterances, otherwise known as code switching, can be explained by two hypotheses proposed in the literature. The first focuses on *why* code switching occurs and, the second, describes *how* it manifests itself, i.e. in what ways it is constrained. I address these issues in turn in the next two sections.

4.4 *The Origins of Code Switching*

According to various scholars (e.g. Genesee, Nicoladis & Paradis, 1995; Nicoladis & Genesee, 1996; Nicoladis & Secco, 1998), code switching can be seen as a coping mechanism to make up for a deficiency in the non-dominant language. This deficiency is understood as a lack of vocabulary (Nicoladis & Genesee, 1996) or, in other words, a lack of translation equivalents in the non-dominant language for words mastered in the dominant language (Nicoladis & Secco, 1998). Thus, gaps in the child's vocabulary in one language are filled with the corresponding word in the other language. This hypothesis provides an explanation for why bilingual children code switch more in their non-dominant language, in which they have a more limited vocabulary, than in their dominant language, in which they have a more extensive vocabulary. According to this hypothesis, if the translation equivalent *exists* in the child's vocabulary, the child is predicted not to code switch. For example, if Anne is speaking French and does not know the French word *chat*, 'cat', but does know the word *cat*, she will use the English word in the French utterance because it is available in her vocabulary.

This hypothesis also predicts that Anne will follow a trend proposed by LaBelle (2000). As mentioned in Chapter 2, this hypothesis states that children follow a three-step pattern in acquiring translation equivalents. First, the bilingual child acquires a word in one of the languages. Second, the child acquires the translation equivalent and, for a time, uses both words. Third, and finally, the word from the dominant language becomes the most commonly used. This is illustrated in (6).

(6) Three-Step Pattern for Acquiring Translation Equivalents



As shown in (6), hypothetically, the child learns the French word *chat* first. Then, when the child learns the translation equivalent for that word, *cat*, there is a period of time during which both of the words are used. Following this, the word from the dominant language, in this case the English *cat*, is preferred.

While the methodology I employed does not enable an exhaustive assessment of the child's productive vocabulary—something which can only be achieved through high-density daily recordings of the child's productions—an exhaustive compilation of the recorded database provided a list of the English and French words used during the recording sessions as well as all recorded cases of translation equivalents (e.g. the use of both *cat* and *chat*), against which the limited vocabulary hypothesis could be tested. The results from this analysis, and observations related to the three-step process illustrated in (6), are detailed in the subsequent sections.

4.5 Constraints on Code Switching

To apply these hypotheses to my own research, I extracted and noted every instance of code switching in my corpus for both the French and the English recording sessions. An utterance was considered to be code-switched if it consisted of at least one word from the other language (for example: *look, he got soulier 2;02.24*). Using *Phon*, I

searched the previous recording sessions for the translation equivalent of the code-switched word. I hypothesized that if the translation equivalent was *not* found in the previous sessions, this would support the hypothesis that children code switch because of a lack of translation equivalent.

Of the 31 examples of code switching under analysis, 16 (51.6%) were examples of English multiword utterances with a French word inserted. The remaining 15 (48.4%) utterances were examples of two words, one in each language, such as *where chien* (2;02.03). The latter utterances required a further step in order to determine the directionality of code switching. This task was performed based on two considerations: Anne's use of articles, or lack thereof, and qualitative comparisons between the two types of code-switched utterances.

The first argument focuses on Anne's use or non-use of articles. In French, a noun is typically preceded by an article (e.g. *le chien, une poupée*). However, in English, this is not the case; nouns can occur without an article: *dog, doll*, etc. Accordingly, in my corpus, Anne's productions of French nouns are generally preceded by either a proto-determiner or a fully-fledged determiner while her English nouns typically are not. These observations are significant in that Anne *does not* produce any type of determiner in the 15 code-switched utterances under consideration here. This is illustrated in the following examples: *where bébé* (2;02.24) and *where mauve*¹¹ (2;06.22). These utterances are thus perfectly comparable to English examples from my data such as: *where puppy* (2;02.03) and *where plate* (2;05.10). In both cases, Anne does not use any type of determiner, nor is

¹¹ In this particular example, Anne was referring to an object that was purple. This is because *le/la mauve* is a way to refer to 'the purple one'. Thus, she is using the colour adjective as a noun.

there any evidence of a proto-determiner. I hypothesize that if the utterance were produced with an underlying French syntax, then there would be evidence of the presence of some sort of determiner.

Second, this argument is also supported through a comparison of these 15 examples with other examples of multi-word productions. To illustrate this, compare *where bébé* (2;02.24) and *where other lapin* (2;02.03). These examples show that when another word is inserted, in this case ‘*other*’, the word is always in English. There are no such examples in my corpus in which the inserted word is in French. Thus, this provides further evidence that examples such as *where bébé* (2;02.24) are English utterances with a code-switched French word inserted in them. This conclusion is also compatible with Anne’s English dominance and apparent avoidance of French whenever possible. Assuming this directionality of the code-switched utterances, I present the general findings in the section below.

4.5.1 Results

6/31 (19.4%) of the times Anne code switched, the translation equivalent was not found in previous recording sessions. Thus, these examples are suggestive of a gap in her vocabulary which yielded a lack of translation equivalent. However, these cases could also be simply related to a lack of relevant data captured during the recording sessions. This latter possibility is indeed supported by the fact that the majority of times Anne code switched, 25/31 (80.6%), a translation equivalent was found in previous sessions. This being said, these findings cannot be used either to refute or confirm the hypothesis

illustrated in (6). Indeed, fluctuations between competing forms from either language are predicted by LaBelle's hypothesis. One can conclude from this that the hypothesis, as currently stated, is too powerful.

Indeed, the period of alternation between translation equivalents allowed by the hypothesis is neither defined nor discussed in much detail in LaBelle (2000). One question that does arise concerns the factors, if any, which influence and condition the child's use of a particular word as opposed to its translation equivalent, since both are available in their vocabulary at this point. According to LaBelle's hypothesis, after the period of alternation, the child should use only one word and hence, there should not be any more code switching for that given word. However, we know that bilingual adults do code switch even though they have translation equivalents available in their vocabulary. Their reasons for code switching can range from being stylistic, driven by the need to convey a particular nuance, or influenced by the particular linguistic context. I hypothesize that, similar to bilingual adults, the linguistic context is an influencing factor for bilingual children, in this case Anne's, use of words.

4.6 Constrained by Context?

To examine if Anne's code switching is influenced by the context, the code-switched utterances have to be analyzed with respect to the surrounding utterances. For example, in the utterance: *last time I eat a lot of bonbon and after I gonna be sick* (2;09.28), was the production of the code-switched word, *bonbon*, influenced by its use

earlier in the session? Or, was the use of this French word completely spontaneous (i.e. not influenced by a previous production)?

To determine this, I re-analyzed each recording session, in particular, the ten minutes immediately preceding each code switch. If the interlocutor used the code-switched word before it was produced by the child, it can be deduced that context did play a role regarding which words were code switched. The code-switched word was deemed 'repeated' if the word was used, by the interlocutor, any time during the ten minutes immediately preceding the code-switched utterance.

Out of the total 31 code-switched utterances examined, 19 (61.3%) were classified as being repeated by the child. The other 12 (38.7%), were spontaneously produced by the child —meaning that the word was not previously produced by the interlocutor. All of the code-switched utterances produced with the English interlocutor (n=8) were spontaneous. However, there were only 4 (17.4%) spontaneous code-switched utterances in the sessions with the French interlocutor. The remaining 19 (82.6%) of the utterances were repeated. These results are to be expected because Anne would have been exposed to more French in the sessions with the French interlocutor and therefore, would repeat more French words. I hypothesize that the results for repeated code-switched words in the French sessions are so high because, during these sessions, Anne was not speaking much French and thus, several of the words she produced were merely repeated from what had already been said.

These results are significant because they suggest that context does indeed influence code switching. Thus, we can draw the conclusion that code switching in child

language, similar to code switching by adults, is influenced by the context of the interaction. In this case, Anne was exposed to more French in the French sessions and thus repeated more French words. However, it is interesting to note that there were more spontaneous code-switched utterances in the English sessions than in the French. On the one hand, we would expect to find more spontaneously produced French words in the French sessions due to the influence of the French interlocutor. However, on the other hand, Anne was not exposed to any French in the English sessions and therefore, all of the code-switched utterances produced would be spontaneous.

I turn now to the second part of this analysis, which focuses on the word acquisition process as proposed by LaBelle (2000).

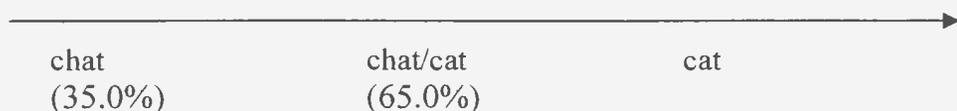
4.7 The Three-Step Word Acquisition Process

As mentioned previously, it is unfortunate that the period of alternation between the translation equivalents during the word acquisition process proposed by LaBelle (2000) is not more detailed. For example, the length of time during which Anne, or any bilingual child, will alternate between the two words is not specified in his model of acquisition. Thus, if Anne completely ceases to use a French word shortly after learning the English equivalent, I can assume that the period of alternation is small. However, if Anne uses both forms (*cat* and *chat*, for example) for a considerable amount of time, the period of alternation is much larger. Because this period is not detailed, no basis for comparison is available which leaves the question as to whether both situations (short or long periods of alternation) can be considered equivalent.

To examine this hypothesis, I followed a two-step process. First, I isolated all of the examples of French words in my corpus. It is important to note that the French words under analysis are only those for which it is the first time the word was produced. It is also important to note that each French word was only analyzed once. Second, using *Phon*, I searched the previous and subsequent recording sessions for the translation equivalent for each individual French word. According to LaBelle's hypothesis, it should be the case that when Anne uses the English equivalent for a French word for the first time, this occurrence should be followed by a period of alternation between the French and the English word, followed by the use of the English word only.

For 21 (35.0%) of the 60 French words under analysis, the English translation was not found in earlier recording sessions. These examples are in accordance with LaBelle's proposal that the word in one language will be used before the translation equivalent is acquired in the other language. For the remaining 39 (65.0%) examples, the translation equivalent was found in previous recording sessions. However, as alluded to above, these results do not necessarily undermine LaBelle's hypothesis. These examples could be representative of the period of alternation between the translation equivalents. Perhaps, in this case, the period of time during which only one word was used occurred before the current study began and thus, the recording sessions captured the second stage of this hypothesis. Recall LaBelle's continuum from section 3.4 repeated here, in (7), for convenience but, at this time, with my results added for clarification purposes:

(7) Three-Step Pattern for Acquiring Translation Equivalents: My Results



The results for Anne's use of translation equivalents show the building of her bilingual lexicon at various points along the continuum. The first results, those for which the translation equivalent was not found in previous sessions, illustrate the beginning of the continuum during which only one word, in this case the word from the non-dominant language, is used. The second results, those for which the translation equivalent was found, point to the middle of the continuum.

Still according to LaBelle's hypothesis, the French word should not be found after the period of alternation. Interestingly, the French word was *not* found in subsequent sessions for exactly half ($n=30$) of the data. However, the French word *was* still found in later sessions for the other half ($n=30$) of the data. This, again, points to two positions on the continuum. The 30 examples for which the French word was still found in later sessions show that these particular examples are still in a period of alternation. However, the remaining 30 examples for which the French word was not found in later sessions are compatible with the end of the continuum. They suggest that Anne is past the point of alternation for these words and has settled on the word from the dominant language.

It is important to note, however, that there are four exceptions to this analysis. The exceptions are French words which only occurred once and whose English equivalent never occurred. These words are: pêche '*peach*' (2;01.10), squelette '*skeleton*'

(2;02.03), guitare '*guitar*' (2;06.22), and vaisselle '*dishes*' (2;02.24). These examples are so limited in number that they cannot influence the overall results of the study.

My results also show that all words do not follow the acquisition process at the same time. It is plausible to think that factors such as the respective times of exposure to a word versus to its translation equivalent, as well as lexical frequency may play a role in this respect. For example, the shorter the time between the exposure to the French word and then to the English, the more quickly the child would move into the period of alternation. Also, if the child uses the words '*chat*' and '*cat*' at a high frequency, then, perhaps, the duration of the period of alternation is shortened for these words. Unfortunately, due to the small size of my corpus, I am unable to test either of these possibilities and thus, the topic is left for further study.

4.8 Discussion

Overall, Anne's use of French during the recording sessions decreased over time. I hypothesize that this is because of her growing English dominance linked with her near refusal to speak French. However, it is interesting to note that as Anne's French productions decreased, her use of mixed utterances increased. I hypothesize that this is a direct result of her avoidance of French, which led her to use the English equivalent for words previously used in French.

The hypothesis outlined above is based on LaBelle's (2000) word acquisition process which proposes that the children follow a three-step pattern during word acquisition. First, the child uses the word in one of his/her languages. Second, the child

uses the word in both languages for a period of time, and last, the child uses the word from the dominant language. My data does provide support for this hypothesis if various points on the continuum are considered. My data also supports the hypothesis that code switching is a result of a lack of vocabulary (Nicoladis & Genesee, 1996) or a lack of translation equivalents (Nicoladis & Secco, 1998). However, an important question still looms: how is code switching constrained by the grammar? This question is addressed in the following chapter.

CHAPTER 5: Constraining Code Switching

5.1 Introduction

As mentioned in Chapter 1, bilingual children were once hypothesized to go through a period during which they were unable to distinguish between their languages (e.g. Leopold, 1949; Swain, 1972; Volterra & Taeschner, 1978; Arnberg, 1987). In brief, it was hypothesized that “if children use two languages within a single utterance, or a single conversation [hence, code switch], they must not be able to differentiate their two languages, and have instead combined the two languages into a unitary language system (ULS)” (Nicoladis & Genesee, 1997). However, recent studies show that code switching is a not a result of the bilingual child’s inability to distinguish between the languages and that, indeed, these children *are* able to distinguish between their languages at a very young age (e.g. Meisel, 1990; Genesee, Nicoladis & Paradis, 1995; Nicoladis & Genesee, 1996; Bosch & Sebastián-Gallés, 2003; Burns, Werker & McVie, 2003).

In line with the latter, it has been demonstrated that code switching follows a set of systematic, language-specific constraints (Hasselmo, 1972; Petersen, 1988; Lanza, 1993). This discovery provides evidence against the unitary hypothesis because “in order to uphold the unitary system (ULS) hypothesis, one would need to establish that, all things being equal, bilingual children use elements from both languages indiscriminately in all contexts of use” (Genesee, 2003: 213). However, as I will discuss in this chapter, code switching can be characterized as a set of restrictions concurring which items can and cannot occur together in mixed utterances. Hence, contrary to previous belief, the

phenomenon of code switching is now seen as discriminatory and, as such, cannot provide evidence for a unitary system.

This chapter is organized as follows. In section 5.2, I introduce the hypothesis of code switching as a set of combinations. In the next section, I present the methodology for my analysis and in section 5.4, the results obtained from this analysis. Section 5.5 illustrates some shortcomings of the previous hypothesis. Building on these, in section 5.6, I introduce a supplementary hypothesis in an attempt to further characterize code switching from a grammatical perspective. The final section, offers a brief summary and discussion.

5.2 Cooccurrence Constraints

According to one scholar, “code switching is not haphazard but exhibits certain regularities” (Hasselmo, 1972: 261). These regularities were first analyzed by Hasselmo (1972) who examined data from an English-Finnish speaker. Follow up studies include Petersen (1988) and Lanza (1993) who studied bilingual Danish-English and Norwegian-English children, respectively. Each of these studies revealed that code switching could be characterized by a set of constraints on specific items that the bilingual child can or cannot combine together in their speech productions. Petersen (1988) labelled this hypothesis the ‘dominant-language hypothesis’.

For convenience sake, I reiterate Figure (8) from Chapter 3 which outlines which combinations can and cannot occur (from Petersen 1988:482, as cited in Lanza, 1993:198). These combinations are examples from an English-dominant, Dutch-English

bilingual child. They illustrate a general proposal which I label the Cooccurrence Constraints Hypothesis (CCH). I have named the hypothesis such to incorporate Petersen's (1988) 'language-dominance hypothesis' and Lanza's 'cooccurrence constraints' (Lanza, 1993: 198).

(8) Combinations According to the CCH

Combinations	Meaning	Example
a) Gdom + Ldom	Dominant language grammatical and lexical items can occur together	<i>Her dolly</i>
b) Gdom + Lnondom	Dominant language grammatical items can occur with lexical items of the non-dominant language	<i>Her duke (her dolly)</i>
c) Gnondom + Lnondom	Non-dominant language grammatical and lexical items can occur together	Hendes dukke (her dolly)
d) * Gnondom + Ldom	Non-dominant language grammatical items can occur with lexical items of the dominant language	*Hendes dolly (her dolly)

As these examples illustrate, there are three possible combinations of lexical and grammatical items that can occur in the child's code-switched utterances. The fourth combination (in (8d)), a grammatical item from the non-dominant language and a lexical item from the dominant language, is predicted not to occur. It is important to note that a grammatical item from the non-dominant language is hypothesized to *only* occur with a lexical item of that same language. According to the hypothesis, an examination of which elements are code switched can thus indicate which language is dominant.

This provides a clear, testable hypothesis on constraints affecting code switching that I have applied to my own data. I predict that, according to the CCH, Anne's code switching will consist of combinations (8a) through (8c) but not (8d). If this hypothesis is correct, Anne, being English dominant, should use, in code-switched utterances, both grammatical and lexical items in English but only lexical items in French.

5.3 Methodology for the Current Study

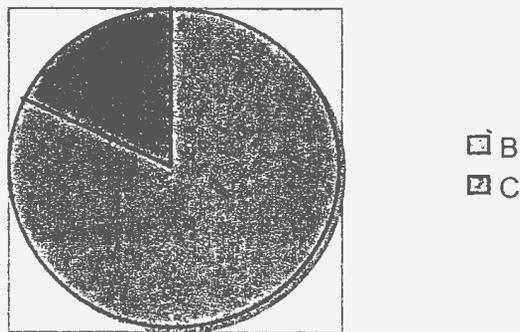
For the purpose of this analysis, an utterance was labelled as mixed if it contained at least one word from the other language (for example: *no, not garçon* 2;02.17). However, English utterances that included a French proper noun were not included in this category nor were utterances with "special" nouns. Special nouns were excluded from the analysis because, although words such as *Grand-papa* or *Nanny* are not proper nouns, Anne uses them as if they were. Anne has been introduced to these people using these specific names and consequently, uses them when addressing these particular people, even among English speakers. For example, even when other relatives used the English form *Poppa*, Anne still used the French form *Grand-papa*. As well, it is interesting to note that while her maternal grandmother is referred to using the English form, *Nanny*, her maternal grandfather is *Grand-papa*. For these reasons, I have classified such special nouns in the same category as proper nouns. Proper nouns were also excluded from this analysis based on similar work by Genesee, Nicoladis and Paradis (1995) who excluded proper nouns because they were hypothesized to "belong to both languages" (Genesee, Nicoladis & Paradis, 1995: 619).

Code-switched combinations that did not correspond to either of the four proposed combinations were also excluded (n=67). This included combinations of two lexical items; *doggie saute* or *going École* (2;01.03) and examples which included a proper noun. These examples indicate that such combinations can be used freely in code-switched utterances, no matter the language ordering they display (here, French-English or English-French).

5.4 Results

Of the four combinations, (8a) was excluded from the calculations due to Anne's overwhelming English dominance which lead to a large number of more complex English utterances. Consequently, the vast majority of the remaining code-switched combinations considered were examples of combination (8b), Gdom + Lnondom: 32 out of a total 39 (82.1%). The remaining 7 (17.9%) code-switched utterances were examples of Gnondom + Lnondom (combination (8c)). This is illustrated in (9) below.

(9) Anne's Combinations B and C



All of the 39 code-switched utterances supported the results from Hasselmo (1972), Petersen (1988) and Lanza (1993). Examples of combinations (8a) through (8c) were found but no examples of combination (8d) were attested. Representative examples from my corpus are presented in (10).

(10) Anne's Code Switching According to the CCH

Combinations	Meaning	Example
a) Gdom + Ldom	Dominant language grammatical and lexical items can occur together	My pyjamas (2;00.25)
b) Gdom + Lnondom	Dominant language grammatical items can occur with lexical items of the non-dominant language	With a couteau (2;05.10)
c) Gnondom + Lnondom	Non-dominant language grammatical and lexical items can occur together	un autre chien (2;01.03)
d) *Gnondom + Ldom	Dominant language grammatical items can occur with lexical items of the non-dominant language	* Le dog

Although only a small set of examples of code switching in my corpus could be used, these data nonetheless enable us to empirically support the CCH. However, the majority of the code-switched utterances in my data set consist of two lexical items, a combination which is not addressed in the hypothesis. As well, this hypothesis does not account for why combination (8d) cannot occur. These two shortcomings are discussed in the following sections.

5.5 *Beyond the Cooccurrence Constraints Hypothesis*

As mentioned above, one shortcoming of the CCH is that it does not account for examples of code switching that involve two lexical items, but only those that are a combination of a grammatical and a lexical item. Herein lies a problem: how to account for code-switched examples such as '*baby poisson*' or '*garcon hiding*' (2:01.10) which constitute the majority of code-switched utterances in my data set. Because examples such as these occur frequently, it is safe to assume that there are no restrictions or constraints on utterances of this type.

Another shortcoming of this hypothesis is that while the CCH describes *how* code switching manifests itself in a child's speech, providing a set of combinations that can and cannot occur, neither Hasselmo (1972), Petersen (1988) nor Lanza (1993) have offered any explanation as to why the fourth combination, *Gnondom + Ldom, cannot occur. In the next section, I hypothesize why this combination cannot occur while the other three can.

5.6 *A Syntactic Asymmetry*

In this section, I propose an explanation for the restrictions discussed above which relies on aspects on syntactic structure. To facilitate the discussion, I will use the following examples: *the dog*, *the chien*, *le chien* and **le dog*.

I hypothesize that the reason why **le dog* cannot occur is because the languages, the dominant and non-dominant ones, interact in a hierarchical fashion and that this relationship is mirrored in syntactic structure. I hypothesize that code switching is

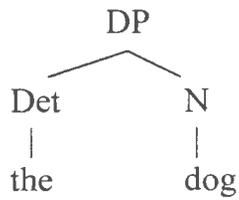
directly constrained by the language of the governing heads in syntactic constructions. Stated informally, I propose that heads from the dominant language can grammatically govern dependent elements from both languages; however, heads from the non-dominant language can only govern dependent elements from the non-dominant language. Thus, the syntactic heads from the dominant language are free in the sense that they can select components from either the dominant or non-dominant language. Heads from the non-dominant language, however, are grammatically constrained in the sense that while they can select a complement from the non-dominant language, they cannot select a complement from the dominant language. This hypothesis is formally stated in (11).

(11) Syntactic Constraint on Code Switches:

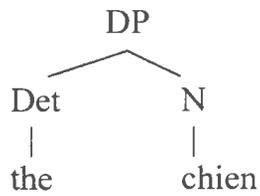
Functional heads from the non-dominant language cannot select lexical items from the dominant language as complements.

Thus, the reason for which the fourth combination, for example: **le dog*, cannot occur is because the head of the phrase, *le*, is in the non-dominant language and therefore, cannot have a dependent in the dominant language, such as *dog*. This is illustrated in the following examples.

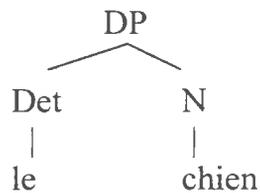
(12) Grammatical Item (Dominant) + Lexical Item (Dominant)



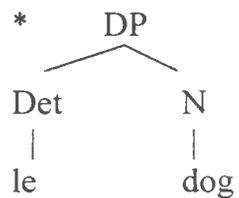
(13) Grammatical Item (Dominant) + Lexical Item (Non-dominant)



(14) Grammatical Item (Non-dominant) + Lexical Item (Non-dominant)



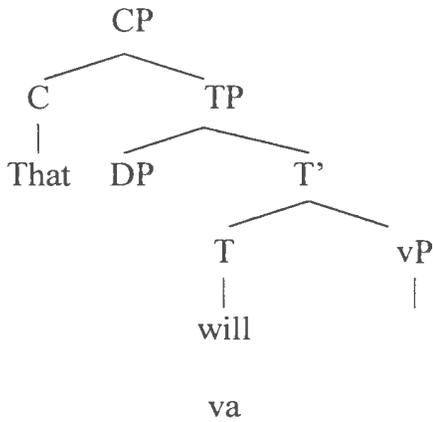
(15) Grammatical Item (Non-dominant) + Lexical Item (Dominant)



It is important to note that the vast majority of utterances in my data set consist of examples of two-word utterances rather than larger, more complex, multiword utterances.

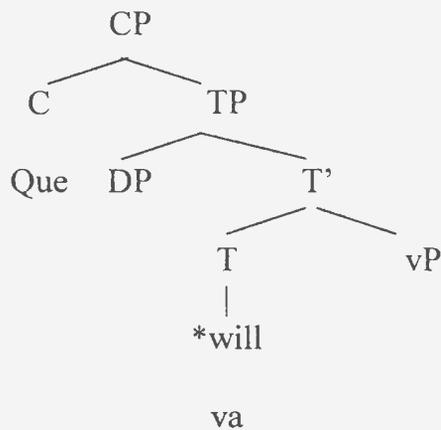
However, the CCH does suggest that the constraints and restrictions on code switching should apply to the multiword utterances as it does to the smaller examples. For example, if English is the dominant language, as it is in my study, we would expect the following:

(16) The Application of the CCH in Multiword Utterances: English Utterance



As illustrated in (16), when the utterance is in English, both the English and the French verb, ‘*will*’ and ‘*va*’ respectively, are possible. However, when the utterance is in the non-dominant language, French, only the French verb occurs. This is illustrated in (17).

(17) The Application of the CCH in Multiword Utterances: French Utterances



As shown in (17), similar to the two-word utterances, a grammatical element in the non-dominant language, in this case French, can only occur with a lexical element also from the non-dominant language. However, this begs the question as to why the non-dominant language is so restrictive that it only allows one combination while the dominant language allows the two. We would expect the child to have a stronger sensitivity of the dominant language's rules. Perhaps, however, it is because the children have a greater fluency in the dominant language that they are able to insert a grammatical item from either language. Perhaps their limited mastery of the non-dominant language only permits grammatical items of that language to be combined with lexical items from that same language.

It is also important to note here that this analysis is based on languages with comparable syntactic structures. The extent to which this hypothesis would hold for other bilingual environments and contexts remains to be tested (see Paradis, Nicoladis and Genesee (2000) for a study of switching in children who are moderately dominant).

However, this hypothesis has the merit to provide clear and testable relations based on the dominance relationships that exist between the languages spoken by bilingual speakers.

5.7 Discussion

According to the CCH, code switching is a result of specific combinations which can, or cannot, occur in a child's code-switched speech. However, there is one combination that the CCH forbids: a grammatical item from the non-dominant language with a lexical item from the dominant language.

Although neither Hasselmo (1972), Petersen (1988) nor Lanza (1993) address the issue of why this combination cannot occur, in an attempt to understand the grammatical motivations for the CCH, I took an excursus into the syntactic configurations involved in the code-switched productions. Results from this analysis suggest that the hierarchy of languages in a bilingual's system is reflected in the way that these languages can be used within a syntactic construction. In brief, a head category from the dominant language can select, as its complement, a lexical item from any of the languages. In contrast to this, a head category from the non-dominant language apparently cannot select a complement from the dominant language. I hypothesize from this that there exists grammatical restrictions on lexical access that are tied to the internal organization of both grammars in the linguistic competence of a bilingual speaker. I, however, leave the issue of how this should be formally encoded in theoretical models of the bilingual linguistic competence for future research.

It could be hypothesized that Anne did not produce grammatical morphemes in French simply because she did not know any due to her recessive French grammar and her overwhelming English dominance. However, my data set consists of 15 utterances in which Anne does, in fact, correctly use French grammatical morphemes. For example: *un bébé* 02;02.24, *une tasse* 02;04.18 and *le petit cochon* 02;06.22.¹² This shows that Anne does indeed know grammatical morphemes in French, thus she is not restricted in this respect, and thus must be restricted by the CCH.

In the next chapter, I turn the focus to an examination of the relationships between both languages being learned by Anne from the perspective of the acquisition of the languages' stress systems.

¹² For a full list of examples, see Appendix A.

CHAPTER 6: The Manifestation of Stress in a Bilingual Learner's Speech

6.1 Introduction

Building on the discussion offered in the previous chapters, I will, in this chapter, discuss the Unitary Language System Hypothesis (ULS) as well as issues such as transfer, or the interaction between the languages of the bilingual speaker. As was illustrated in Chapters 4 and 5, code switching, which was once taken as evidence for the ULS, has been reinterpreted as evidence for the two-system hypothesis. Similarly, transfer was also once thought to be evidence for the mono-system hypothesis. However, in the following paragraph, I will focus on its role as evidence for the dual system hypothesis.

The interaction between a bilingual child's grammatical systems manifests itself in various forms of transfer phenomena. Evidence of transfer between the languages is found on various levels: code switching (lexical and syntactic), as discussed in Chapters 4 and 5, and sound substitutions (phonological). Concerning the latter, Barlow (2002) recently examined sound substitutions in bilingual Spanish-English children who were Spanish dominant. In the corpus she studied, substitutions typically found in Spanish also occurred in some English utterances even though the pattern is not typical to English. Representative examples of the sound substitutions found in Spanish are shown in (18).

(18) Phonological Substitutions in Spanish (Barlow, 2002:62-63):

<i>llaves</i>	[jaβes]	→	[laβe]	“keys”
<i>amarillo</i>	[amarijo]	→	[malilo]	“yellow”
<i>vestido</i>	[bɛstiðo]	→	[betilo]	“dress”

These substitutions, for example target [r] and [ð] rendered as [l], also occurred when the children were speaking English, as illustrated in (19).

(19) Phonological Substitutions in English (Barlow, 2002:67):

“green”	[gɹin]	→	[glin]
“feather”	[fɛðə]	→	[fɛlə]
“crayons”	[kɹɛɪjənz]	→	[leɪnənz]

Patterns such as these show that the two systems, in this case Spanish and English, interact, which results in phonological transfer. Transfer typically occurs from the dominant language to the non-dominant one, in contrast to the opposite effect (Barlow, 2002; see also Nicoladis, 2006 for a survey of articles on this topic). This is illustrated in (18) and (19), in which the substitutions attested in Spanish-dominant learners, and which are typically found in the acquisition of Spanish, also occurred in the English productions, even though they are not normally found in data on the monolingual acquisition of that language. Thus, English, the non-dominant language, was influenced by Spanish, the dominant language.

Another area in which transfer can manifest itself is prosody or, more specifically, stress. Transfer effects between the two languages' stress systems could manifest

themselves at the level of the position where stress is realized within the word or in the phonetic realization of stress. In this chapter, I will investigate both issues based on an acoustic study of the realization of stress in Anne's English and French word productions.

The chapter is organized as follows. In section 6.2, I present a general overview of stress which is followed by a discussion of the differences between the English and French stress systems in section 6.2.1. In section 6.3, I discuss the findings of LaBelle's (2000) study of an English-French bilingual learner which provides a starting point for the current one. In section 6.3.1, I discuss some concerns with the approach LaBelle utilized in his investigation. Building on this criticism, I introduce my research methodology in section 6.4. Results are reported in sections 6.5 and 6.6. Section 6.7 offers a discussion of the results and their implications. This discussion is followed by concluding remarks in section 6.8.

6.2 General Overview of Stress Systems

The locus of stress is generally the syllable. A stressed syllable is typically characterized as being more prominent than the surrounding syllables (Mertens, 1991; Ladefoged, 1993; 2001; Pollock, Brammer & Hageman, 1993; Laver, 1994; Hayes, 1995; Kehoe, Stoel-Gammon & Buder, 1995). However, how can one define this relative prominence? According to Laver (1994: 450), "other things being equal, one syllable is more prominent than another to the extent that its constituent segments display higher pitch, greater loudness, longer duration or greater articulatory excursion from the neutral disposition of the vocal tract" (see also Fry, 1955; 1958; Bolinger, 1958; Morton &

Jassem 1965; Nakatani & Aston, 1978; Mertens, 1991; Ladefoged, 1993; Hayes, 1995; Kehoe, Stoel-Gammon & Buder, 1995; Gussenhoven & Jacobs, 1998; Borden, Harris & Raphael, 2003; Caldecott, in press). Thus, stress is dependent on three acoustic cues: pitch, duration and intensity. These cues are discussed in more detail in the following paragraphs.

Pitch is a result of the “frequency (or rate) of vibration of the vocal folds... [and] its acoustic correlate is fundamental frequency” (Laver, 1994: 450). Fundamental frequency, henceforth F0, is directly correlated to stress in that a stressed syllable is often marked by a high F0 (e.g. Lea, 1977; Ladefoged, 1993; Pollock, Brammer & Hageman, 1993; Borden, Harris & Raphael, 2003).

The second cue, duration, is defined as “simply, the amount of time taken up by a speech event” (Laver, 1994: 431). Stressed syllables are typically longer than unstressed syllables. However, it is important to note that not every long syllable is a stressed syllable (Ladefoged, 1993). For example, the word ‘radio’ has three long vowels but only the first receives an “extra push of air from the lungs”, identifying it as stressed (Ladefoged, 1993: 113).

The final cue, intensity, “is proportional to the average size, or amplitude, of the variations in air pressure ” (Ladefoged, 2001: 165). “The perceptual feature relating to the physical concept of intensity” is loudness (Laver, 1994: 501). In English, stressed syllables are typically louder, and thus more intense, compared to unstressed syllables (Pollock, Brammer & Hageman; 1993).

It has been hypothesized that children, similar to adults, make use of these three cues to identify and mark stress in utterances (Pollock, Brammer & Hageman, 1993). However, the point at which children make use of these cues is unclear. Two hypotheses have been proposed in this regard in the literature. Firstly, it has been suggested that children start producing stress with a preference for trochaic patterns (e.g. Allen & Hawkins, 1980; Archibald, 1995; LaBelle, 2000).¹³ According to this 'trochaic bias' hypothesis, Universal Grammar (henceforth UG) provides "an underlying trochaic template" (LaBelle, 2000: 482). Thus, children initially use a default parameter value and produce a trochaic stress pattern even when the target pattern is iambic (LaBelle, 2000: 483). Secondly, it has been hypothesized children do not have a trochaic parameter or any parameter setting whatsoever (e.g. Leopold, 1947; Klein, 1984; Hochberg, 1988; Pollock, Brammer & Hageman, 1993). This is called the 'neutral start' hypothesis and suggests that children "are unbiased towards any particular stress pattern" (Pollock, Brammer & Hageman, 1993: 185). Thus the children "begin the learning process with no stress preferences" (Hochberg, 1988: 275). The evidence for this hypothesis comes from data from children producing even, or level, stress in early speech. This type of stress production is indicative of no particular preferred pattern. In relation to this, it has also been hypothesized that the "stress habits of the community assert themselves quickly and decisively" (Leopold, 1947: 24 as cited in Hochberg, 1988: 275). This means that a child learning French, for example, should start using an iambic stress pattern in early productions.

¹³ See the next section for a definition of trochaic patterns.

To investigate these hypotheses in the context of phonological bilingual development, I have analyzed Anne's speech with an approach that expands on that proposed by LaBelle (2000), who performs an acoustic investigation of stress patterns produced by a bilingual, English-French child.

In the next section, I describe and compare the stress patterns of these languages, which will provide us with a basis for data interpretation.

6.2.1 French Versus English Stress Systems

Simply stated, French is an iambic language whereas English is a trochaic language. Languages which have iambic patterns, such as French, are referred to as having a "weak strong" stress pattern (LaBelle, 2000: 479). No alternating stress patterns are found, however, in this language; only the final syllable of phrases receives stress (e.g. Charette, 1991). Compatible with this is the observation that French is a "quantity-insensitive" language (Paradis, Petitclerc & Genesee, 1997: 443). Thus, syllable weight, i.e. the difference between a light or heavy syllable, is not a determining factor in the assignment of stress (Gussenhoven & Jacobs, 1998; LaBelle, 2000). In terms of the phonetic realization of stress in French, it must also be noted that stressed versus unstressed syllables display uneven durations: stressed syllables in French typically display longer durations than unstressed syllables. They can indeed be, at least, twice as long as unstressed syllables (Kamiyama, 2002). As well, Mertens (1991) notes that for French, duration is the best cue for indicating stress. Duration thus, is an important cue in the characterization of French stress.

Trochaic languages, on the other hand, have a “strong weak” stress pattern (LaBelle, 2000: 479). This means that generally, in a disyllabic form, the first syllable is strong and the second is weak. These stressed syllables are normally heavy or long syllables. Note on this regard that English is a quantity-sensitive language and, therefore, the weight of the syllable plays a role in the assignment of stress (Gussenhoven & Jacobs, 1998; LaBelle, 2000).

Early research on English stress patterns reveals that “stressed vowels in English had a higher F0 72% of the time, higher amplitude 90% of the time, and longer duration 70% of the time when compared to unstressed vowels across words” (Lieberman, 1959 as cited in Caldecott, in press). Thus, as illustrated by these findings, F0 and duration have relatively the same influence on stressed segments in English; whereas the clearest defining factor for stressed and unstressed syllables in English relates to amplitude. Hence, this latter acoustic cue is the one in which we expect to see the greatest evidence for English stress patterns. As we will see, this hypothesis is supported by the results of the current study,

6.3 LaBelle's (2000) Study of an English-French Bilingual Learner

LaBelle (2000) hypothesized that “a bilingual child’s very early patterns of language use should incorporate measures that are sensitive to prosodic phenomena if their goal is to document differentiated trajectories of acquisition” (LaBelle, 2000: 474). Thus, if the children are differentiating between their languages, there should be evidence of some prosodic features sensitive to each language, for example the use of a particular

stress pattern. In this context, a bilingual English-French child is expected to use a trochaic pattern while speaking English and an iambic pattern while speaking French. However, the lack of a particular stress pattern, for example, iambic, would indicate that the child is under the influence of a general trochaic system. As opposed to this, if the child is differentiating between the two languages, with no evidence of a trochaic system in the French productions, we would expect an iambic stress pattern in the French productions.

As alluded to above in section 6.2, the detection of stress patterns, iambic or trochaic, can be achieved through acoustic measurements of the three cues that are potentially relevant to stress (pitch, duration and intensity), more specifically through differences in the manifestation of each of these three cues between unstressed and stressed syllables. According to LaBelle, a rise in F0 between the penultimate and the final syllable would be indicative of an iambic stress pattern. In contrast to this, a lowering of F0 between non-final and final syllables would indicate a trochaic pattern. Because duration is an important cue in French, as noted in section 6.2.1, an increase in duration should show evidence of the iambic stress system. Similarly, because intensity is an important cue in English, an increase in this cue would indicate evidence of a trochaic stress pattern. Thus, to determine the type of influence, either iambic or trochaic, LaBelle measured each of the three cues for single word utterances in both languages. However, as is discussed later, he did not report results based on duration or intensity data.

Strict criteria were used by LaBelle for choosing the tokens for analysis. The approach he used is similar to that used by Kehoe, Stoel-Gammon & Buder (1995). In

both of these studies, only declarative utterances were included in the analysis. This is because interrogative and imperative utterances typically have a rising intonational contour which could lend to biased results, especially with regard to F0. LaBelle hypothesized that “phrase-final syllables with high F0 [would indicate that] ... the child is using iambic stress patterns” (LaBelle, 2000: 476). Thus, the natural rising intonation of both interrogative and imperative utterances could produce a misleading pattern suggesting iambic stress. Indeed, rising intonation could cause a final unstressed syllable to have to a greater F0 than a non-final, stressed syllable (Kehoe, Stoel-Gammon & Buder, 1995).

Using the measurements obtained from the declarative utterances, an “impressionistic judgment was made regarding each token’s stress pattern” (LaBelle, 2000: 476). The stress pattern was classified as having either iambic stress, trochaic stress or even stress (i.e. if the child equally stressed both syllables, thus not showing evidence of either stress pattern). According to LaBelle, this method of judgment was in accordance with results from “the strict F0 method of assigning stress 94% of the time” (LaBelle 2000: 476).

LaBelle’s results suggest that his participant’s productions are generally under a trochaic influence, even when uttering French productions. LaBelle proposes that this illustrates that there is “an underlying trochaic template [which] is supplied by Universal Grammar” (LaBelle, 2000: 482). Thus, these results provide evidence for the hypothesis that children are provided with a particular template and disfavor the neutral-start hypothesis.

However, various questions and concerns arise from LaBelle's methodology and, consequently, the resulting conclusions. These issues relate to three areas: first, the cues that were analyzed; second, the method of judgment of the stress pattern's influence; and third, the phonological domain evaluated to determine stress patterns. These three issues are further discussed in the following section.

6.3.1 Discussion of LaBelle's (2000) Study

As mentioned in section 6.2, the three cues (pitch, duration and intensity) are very important in identifying and analyzing stress. Although LaBelle claims to have measured each token for pitch, duration and amplitude (LaBelle, 2000: 476), results of the duration and amplitude measurements were neither discussed nor reported on in his research. However, since we know that French uses duration as a main cue, LaBelle's findings, based on F0, raise significant doubts on the validity of his results, at least with regard to the assessment of the French productions. As well, LaBelle considered rising F0 contours to be indicative of an iambic stress pattern and, accordingly, a falling F0 contour to indicate a trochaic influence. Here again, his measurement method needs to be discussed, especially since declarative sentences in French may often have even or lower intonation on the final (stressed) syllable, depending on factors such as sentential focus and the type of phrase or sentence following the stressed syllable (p.c., Y. Rose, March 2006).

The second area of concern is about the method of judgment. LaBelle made "an impressionistic judgment regarding each token's stress pattern; [...which provided] the classification used for the final analysis" (LaBelle, 2000: 476). However, various studies

(e.g. Goffman, 1985; Pollock, Brammer & Hageman, 1993) have shown that children have not yet fully mastered the cues for stress assignment and thus, can be “providing the listeners (judges) with inconsistent or unreliable cues” (Pollock, Brammer & Hageman, 1993: 185). Thus, impressionistic judges, and hence judgements, may be misled by some of the children’s misuse of stress cues and an incorrect judgment may be made. In such cases, it is plausible to think that impressionistic judgements may not yield the most reliable results.

Concerns also arise with respect to the phonological domain within which the stress patterns were evaluated. LaBelle only performed acoustic analyses on the final syllable of each token. However, stress is an intrinsically relative notion and, therefore, a stressed syllable can only be considered as prominent when it is compared to adjacent syllables (Mertens, 1991; Ladefoged, 1993; 2001; Pollock, Brammer & Hageman, 1993; Laver, 1994; Kehoe, Stoel-Gammon & Buder, 1995). Indeed, “a body of careful experimental work has established that no one physical correlate can serve as a direct reflection of linguistic stress levels” (Hayes, 1995: 5). For example, to determine the intonational curve, which would determine whether the syllable has a falling or rising F₀, one would have to draw a comparison between at least two syllables.

These points, unfortunately, cast shadows of doubt on the results obtained from LaBelle’s study. Consequently, it is possible that his conclusions should be taken with caution. Taking this as a starting point, I performed acoustic analyses of Anne’s stress patterns in both French and English words. The methodology I used is outlined in the next section.

6.4 Methodology of the Current Study

In an attempt to provide a careful methodological basis to my study, I modified LaBelle's (2000) approach in three areas. It is important to note, however, that, similar to Labelle (2000), I only analyzed declarative utterances for the same reasons presented in that study as well as because of their high frequency in my corpus.¹⁴ First, I have not only measured the three cues, F0, duration and intensity, but I have also reported the results of these measurements. This is important because, as mentioned above, English and French stress patterns are typically realized through different manifestations of these cues. Thus, in order to examine their relative influence, it is imperative to compare the interactions between them in the child's productions. Second, because of limitations due to the smaller size of my corpus, I did not have enough examples to compare a wide range of syllable structures. I thus primarily based my measurements and comparisons on vowels. Third, I measured both the final vowel and the penultimate one and then compared the measurements obtained from both vowel positions. This method was used because, as mentioned above, stress is a measure of relative prominence and must be judged in relation to segments in the surrounding environment. The approach I used is, in fact, comparable to that used by Kehoe, Stoel-Gammon & Buder (1995) who assessed the "total duration, F0, contour, and [...] amplitude contour of each stressed and unstressed syllable" in disyllabic words (Kehoe, Stoel-Gammon & Buder, 1995: 342).

¹⁴ It would have been interesting to examine interrogative utterances themselves but, unfortunately, there were not enough of this type of utterance produced in the French sessions thus, such a study would be inconclusive at best. I leave this for further research with a larger corpus.

The measurements I obtained for each acoustic cue for both the penultimate and ultimate vowels were compared and the differences in values between the vowels were systematically compiled. This was done by subtracting a measurement (e.g. F0) obtained from the final vowel from the corresponding value obtained from the penultimate vowel. These differences could be either negative or positive depending on the values obtained for each of the vowels. For example, a negative value would result if the penultimate vowel had a higher F0, was longer (duration) or had more amplitude than the final vowel. Conversely, the result would be positive if the final vowel a higher F0, duration or amplitude.

The guidelines used to make the judgements based on these measurements, which are based on the descriptions of French and English stress provided in section 6.2.1, are outlined in (20).

(20) Conclusions from Differences Between Penultimate and Final Syllables

	Negative value	Positive value
F0	iambic stress	trochaic stress
Intensity	trochaic stress	iambic stress
Duration	trochaic stress	iambic stress

The acoustic measurements were obtained using the computer programs *Phon* (Rose et al., in press) and *Praat* (<http://www.fon.hum.uva.nl/praat/>). Using *Phon*, I extracted the relevant tokens (declarative utterances) in both French and English. The data were classified according to both the language spoken by the child and the language spoken during the recording session. First, this helped in determining whether Anne was

using the correct stress pattern for the language of the word produced (i.e. trochaic stress pattern when speaking English), and if the language generally used at the time of recording, was having an effect on the stress pattern Anne was producing. Second, the sessions were separated in this fashion in order to control possible influences from the session's main language. However, no noticeable differences between sessions were found¹⁵. Then, using the program *Praat*, I obtained waveforms and spectrograms of each token. An illustration of this is provided in (21).

(21) Waveform and Spectrogram for 'cookie' (02;02.23)



As illustrated in (21), *Praat* provides clear waveforms and spectrograms which are beneficial for this type of analysis. In this program, there are various visual aids to help with identifying the peak values used in this analysis. Two of these such aids are

¹⁵ The utterances analyzed are included in Appendix B and are classified by the main language in that session.

illustrated in the spectrogram given above. The white line illustrates the intensity curve while the dark, dotted line represents pitch modulations. Using these visual aids, I measured the F0 and the intensity peaks as well as the duration for both the penultimate and the ultimate vowels. The measurements were then compiled in a spreadsheet and the deltas (differences between penultimate and final syllables) were calculated. The results of this analysis are presented in the next section.

6.5 Results: French Utterances

In this section, I provide the results of my analysis. Recall that according to the theoretical statements made in section 6.2, if the results are in favour of the trochaic template, we should expect to see Anne using a trochaic stress pattern in both English and French productions. However, if Anne does not show a bias towards the trochaic stress pattern (i.e. if she uses an iambic pattern with French and a trochaic pattern with English) the results provide support for the neutral-start hypothesis. As we will see, the results do, in fact, support the neutral-start hypothesis.

The findings will be presented in two separate sections, one for each language spoken by the child. Because Anne uttered French productions in English sessions and vice versa, the results are also divided according to the session's main language. In other words, the results for the French productions are based on French words only, which can originate from either French or English session; the same applies for the English productions. Within each of the sections below, I will present the specific findings for

each of the three cues: F0, intensity and duration. I begin with Anne’s French productions, addressing F0 first, in the next section.

6.5.1 Results from French Productions: F0

If we consider F0 only, the data would suggest that Anne produces more utterances with an iambic stress pattern during the English sessions than during the French sessions. These results are outlined in the summary table in (22).

(22) Results for F0 in French Productions

	Falling/Iambic	Rising/Trochaic	Average (F0 difference)
English sessions	7/11 (63.6%)	4/11 (36.4%)	-22.6 Hz
French sessions	11/25 (44.0%)	14/25 (56.0%)	6.8 Hz
Total	21/36 (58.3%)	15/36 (36.1%)	-2.2 Hz

As we can see from this table, results based on F0 indicate that Anne’s French words were produced with a trochaic stress pattern in 56.0% of the cases during French sessions. In contrast to this, an iambic pattern emerged in 63.6% of utterances produced during the English sessions. This is opposite to what we would expect given that English is a trochaic language and French is iambic. Taking F0 as our sole cue, these results thus suggest that the language spoken in the session did not have a predictable effect on the stress pattern Anne produced, since she used a predominantly trochaic pattern with the French interlocutor (when we would expect an iambic influence) and vice versa.

Interestingly, as illustrated in the ‘total’ results line, which combine the data from both the English and the French sessions, the majority of the French productions are produced with an iambic stress pattern, that is, 21 out of 36 total utterances (58.3%). Although Anne produces her stress patterns with a counter-intuitive trend when analysing each session individually, the general trend for all the French productions in both sessions combined is the use of an iambic stress pattern.

In an attempt to provide a general characterization of the stress patterns produced, I tabulated the average of the deltas for both the English sessions and the French sessions individually, as well as collectively. As illustrated in (20), the value of the deltas, either positive or negative, would indicate the general influence of a particular stress pattern. With respect to F0, a negative value would be indicative of an iambic stress pattern, and a positive, of a trochaic stress pattern. As illustrated in (22), the average for the English sessions was negative, thus supporting the claim that there was, from an F0-only perspective, an iambic influence. Conversely, the average for the French sessions was positive, which indicates a trochaic influence. The overall average is slightly negative, which is mildly suggestive of an iambic influence.

These results contradict LaBelle’s findings, because they do not show a predominantly trochaic influence. In actuality, when Anne speaks French, I have found overall evidence of an iambic influence. Recall that the results presented above are based on the F0 cue only and that, according to Hayes (1995), multiple cues are needed to analyze stress. For this reason, I also examined intensity and duration as well as F0. The results for intensity and duration are discussed in the following two sections.

6.5.2 Results for French Productions: Intensity

Turning now to the results based on the measurement of intensity, we also observe the counter-intuitive trend discussed above for F0. The English sessions provide evidence of an iambic influence while the French sessions show a slight trochaic effect. However, the trochaic influence in the French sessions is not as pronounced as it is with respect to F0 as illustrated in (22). Indeed, if intensity were to be the sole cue considered, Anne would have had a roughly equivalent number of trochaic and iambic patterns in the French sessions, 13 versus 12 respectively. These results are illustrated in (23).

(23) Results for Intensity in French Productions

	Ultimate/Iambic	Penultimate/Trochaic	Average (difference in intensity)
English sessions	7/11 (63.6%)	4/11 (36.4%)	1.9 dB
French sessions	12/25 (48.0%)	13/25 (52.0%)	0.3 dB
Total	19/36 (52.8%)	17/36 (47.2%)	-0.4 dB

Overall, the results for intensity do not indicate a significant difference between the amount of iambic stress patterns produced compared to the amount of trochaic patterns. Accordingly, the small deltas are indicative of the relative equivalence of the measurements. Without contradicting it, these results do not provide support for the trochaic bias hypothesis. This is to be expected, however, because intensity is not a salient cue for French, as mentioned in section 6.2.1, and thus should not play a significant role in French productions. Instead, if Anne has control on the phonetic

correlates of French stress, we would expect to see the influence of an iambic stress pattern in the measurements obtained for duration. These results are discussed in the following section.

6.5.3 Results for French Productions: Duration

With respect to the French tokens produced, this cue is particularly significant because duration is the most distinctive acoustic correlate in French, as mentioned in section 6.2.1. Thus, it is in these results that we should see the influence of iambic stress most clearly. Compatible with this expectation, as illustrated in (24), Anne produces the vast majority of her utterances with a longer ultimate vowel, hence, with an iambic influence.

(24) Results for Duration in French Productions

	Ultimate/Iambic	Penultimate/Trochaic	Average (difference in duration)
English sessions	9/11 (81.8%)	2/11 (18.2%)	28 ms
French sessions	19/25 (76.0%)	6/25 (24.0%)	54 ms
Total	28/36 (77.8%)	8/36 (22.2%)	46 ms

Overall, Anne uses an iambic stress pattern the vast majority (77.8%) of the time when speaking French. It is important to note here that even when speaking French with the English interlocutor, Anne uses an iambic stress pattern. These results thus clearly suggest that the language that corresponds to the word uttered by the child, in this case

French, is more influential than the language generally spoken in the recording session, here, English.

These results also provide evidence against the trochaic bias hypothesis. They show that Anne produces a clearly predominantly iambic influence while speaking French, something which squarely contradicts LaBelle's (2000) findings. (Recall that LaBelle's conclusions are based on F0 measurements only.)

As duration is a significant acoustic correlate of stress in French, intensity is significant in English. Given that Anne has mastered the main acoustic correlate in French, her non-dominant language, one would expect her to have mastered the acoustic correlates of English, her dominant language, as well.

6.6 Results: English Utterances

Similar to her French productions, Anne's English productions were also measured with respect to pitch, intensity and duration. Contrary to early expectations, it was difficult to find two-syllable, declarative utterances in her English productions. This was because most of her English utterances were longer than two syllables. Despite this, keeping with the method used for extracting the French data, I could identify 20 utterances from the English sessions and 21 utterances from the French sessions, for a total of 41 utterances, a number which compares well with the 36 French utterances discussed in the previous sections.

6.6.1 Results for English Productions: F0

If F0 were the only correlate considered, English words produced in both the English and the French sessions would have to be considered as having an iambic influence. This is a counter-intuitive observation because Anne is speaking English, a trochaic language, and at times, with an English interlocutor. Thus, we would generally expect a trochaic influence. Instead, we find influence of an iambic stress pattern; 75.0% of the time in the English sessions and 67.0% in the French sessions. The results are illustrated in (25).

(25) Results for F0 in English Productions

	Falling/Iambic	Rising/Trochaic	Average (F0 difference)
English sessions	15/20 (75.0%)	5/20 (25.0%)	-44.5 Hz
French sessions	14/21 (67.0%)	7/21 (33.0%)	-29.5 Hz
Total	29/41 (71.0%)	12/41 (29.0%)	-36.8 Hz

The averages tabulated show very large negative numbers for both the English and French sessions as well as for both types of sessions collectively. This suggests that there is a very significant iambic influence.

Again, these results appear to contradict those by LaBelle (2000) concerning the trochaic bias hypothesis. However, it is important to keep in mind that these are the results for only one of the cues, F0. The results for duration and intensity follow in the subsequent two sections.

6.6.2 Results for English Productions: Intensity

As opposed to the results concerning F0, the results gathered for English productions with respect to intensity actually point toward a trochaic influence. As mentioned previously, a stronger ultimate vowel would be indicative of an iambic influence while, in contrast, a stronger penultimate vowel would indicate a trochaic influence. As presented in (26), the majority of utterances in both the English and the French sessions have a stronger penultimate vowel as compared to the ultimate. Thus, the majority of the utterances from both the English and the French sessions have a trochaic influence. Collectively, a significantly greater amount of utterances have a trochaic influence (n=29) than iambic (n=12).

(26) Results for Intensity in English Productions

	Ultimate/Iambic	Penultimate/Trochaic	Average (difference in intensity)
English sessions	6/20 (30.0%)	14/20 (70.0%)	-4.4 dB
French sessions	6/21 (29.0%)	15/21 (71.0%)	-3.3 dB
Total	12/41 (29.0%)	29/41 (71.0%)	-3.9 dB

The differences tabulated are all negative, which illustrates that the penultimate vowel had, indeed, more intensity than the ultimate vowel. Hence, these values provide support for a trochaic influence. This overwhelming evidence of a trochaic influence is to be expected given that intensity is one of the main cues for the English language. The clear results found with respect to this cue are in fact comparable to those found in the

French productions with respect to duration. In each case, the most salient cue for the particular language shows a clear effect for a specific stress pattern.

The results illustrated by the salient cue for English, intensity, are in accordance with LaBelle's findings of a trochaic influence. However, they do not necessarily support the hypothesis of a trochaic bias for two reasons. Firstly, Anne is speaking English and, hence, we should expect to find a trochaic influence in these productions, irrespective of any underlying influence. Secondly, because intensity is a salient cue for English stress, we would expect to find the greatest trochaic influence in the results for this particular cue. Thus, the intensity-based findings reported on above rather illustrate Anne's mastery of the English language and her correct usage of the cues in stress assignment.

6.6.3 Results for English Productions: Duration

Turning now to the final cue, duration, the results show that Anne produced, overall, a greater number of longer penultimate vowels, hence, more utterances with a trochaic influence. However, in the English sessions, Anne produced relatively the same number of utterances with an iambic influence (n=10) as she did with a trochaic influence (n=9). With respect to the French sessions, Anne produced more trochaic-influenced utterances (n=13) than iambic (n=6). These results are to be expected however, because the trochaic influence in the French sessions simply shows that the language spoken by the child (in this case, English) is influencing the stress pattern used (trochaic). The results are presented in (27).

When considering these results, however, it is important to note here that there are three exceptions that did not fit into either category. These three examples have a delta of 0, indicating that the penultimate vowel and the ultimate vowel have the same length. These results, along with the very small deltas found overall in the results for the English productions, are suggestive of the fact that, because duration is at best a marginal cue in English, the child does not utilize it in her productions in this language. When cast in the larger context of all of the observations made above about Anne's French and English productions, this observation indicates that Anne has not only mastered the stress systems of both languages but also has acquired a relatively refined control on the acoustic cues relevant to each system.

(27) Results for Duration in English Productions

	Ultimate /Iambic	Penultimate /Trochaic	Exceptions	Average (difference in duration)
English sessions	10/20 (50.0%)	9/20 (45.0%)	1	46 ms
French sessions	6/21 (29.0%)	13/21 (62.0%)	2	-22 ms
Total	16/41(39.0%)	22/41 (54.0%)	3/41 (7.3%)	11 ms

In line with the interpretation proposed in the preceding section, the duration-based results, although they support LaBelle's findings in appearance, are simply indicative of the influence of the language spoken, English, on the stress pattern used. A summary of my results as well as their implications are discussed in the next section.

6.7 Discussion

In this section, I first summarize the results of the French productions as well as the English productions. I then discuss their implications in light of LaBelle's findings and the larger debate concerning the trochaic bias and the neutral-start hypotheses. These findings will be summarized in the (28) as well as discussed in the following chapters. (28) provides the percentages of utterances in which a particular stress cue is used correctly for that language.

(28) Summary Table of The Production of Stress Cues

	French Utterances (n=36)	English Utterances (n=41)
F0	36.1%	70.7%
Duration	77.8%	53.7%
Intensity	47.2%	29.3%

In her French productions, the results from F0 and intensity —excluding those from duration for the time being— indicate that Anne fails to display a significant trochaic influence. If there were an underlying trochaic influence, we would expect to find a trochaic pattern. Thus, these results do not support a trochaic bias hypothesis. However, still considering F0 and intensity only, Anne does not show overwhelming iambic influence either. In fact, the results are somewhat mixed: trochaic and iambic influences are found across the examples, without an obvious pattern emerging from either of these cues. However, when duration is taken into consideration, an overwhelming iambic influence emerges. This is in line with the observation that duration is the most central acoustic parameter of stress in French, as reported in section 6.2.1. I hypothesize that the other two cues do not produce as strong an iambic effect, not only because they are not as salient for the French language, but also because Anne realizes that duration is the important cue for French and thus uses this cue instead of F0 or intensity. Based on these observations, we can conclude that Anne uses an iambic stress pattern while speaking French, and also has good mastery of the main phonetic correlate of stress in this language.

Turning now to the English productions, with respect to F0, Anne shows evidence of an iambic influence, something which contradicts LaBelle's (2000) findings. However,

for both intensity and duration, Anne shows a trochaic influence. The trochaic influence is particularly evident in the results for intensity. This correlates with the observations that intensity is an important acoustic correlate of stress in English. In sum, Anne shows not only good mastery of the stress system of the language that corresponds to the word produced, but she also shows good mastery of the related acoustic cues. This latter observation, which holds for both French and English, provides additional support to the observation that “by age 3-4 years, children mark differences in stress with all acoustic features” (Kehoe, Stoel-Gammon & Buder, 1995: 340).

6.8 Conclusion

While analysing an English-French bilingual child’s utterances, LaBelle found “a predominantly trochaic pattern for both [the] English and French lexicon” (LaBelle, 2000: 479). If LaBelle’s findings were to extend to all other English-French bilingual learners, Anne should have displayed a trochaic influence when speaking English and even when speaking French. However, the current results contradict LaBelle’s in that they show evidence of an iambic influence in French and a trochaic influence in English, both of which are realized with what can be considered the most central acoustic cue in each language. While the difference in the results between LaBelle’s and the current study may be caused by the different methodologies used, as discussed in section 6.4, the current results provide support for the neutral-start hypothesis in which children “begin the learning process with no stress preferences” (Hochberg, 1988: 275) but then, over time, use the correct stress patterns for the particular language.

These results are also significant in that they disfavour the ULS hypothesis discussed in the introduction. If Anne abided by the ULS, we should expect to see the influence of one of the stress patterns in both her English and French productions. However, this is not the case. Anne uses an iambic stress pattern when speaking French and a trochaic stress pattern when speaking English. Her use of the two patterns, the correct pattern for each language, in fact, suggests that she has mastered two separate systems. This conclusion is in accordance with work done by various other scholars (e.g. DeHouwer, 1990; Goodz, 1994; Genesee, Nicoladis & Paradis, 1995; Quay, 1995; LaBelle, 2000; Barlow, 2002) and provides evidence that bilingual children have two separate grammars.

In summary, based on the results obtained from my study, Anne seems to have acquired and mastered the relevant cues for stress assignment, both generally and language-specifically. Thus, at this time, there is no clear evidence of transfer from either language. I hypothesize that this is a direct result of her mastery of the stress cues. However, it must be noted that, due to the small size of my corpus, these results are based on a limited number of examples. It is possible, therefore, that a larger, more exhaustive study would have provided evidence, if only subtle, of phonological transfer. This issue, however, must be left for further research. It is also important to note that because of the small number of French examples, it was impossible to determine the presence of particular developmental stages. I leave this issue, thus, for further study on a corpus with a larger data set.

CHAPTER 7: Conclusion

7.1 Introduction

The overarching topic of this thesis focuses on whether the two languages of a bilingual child are mixed or separate in the linguistic competence. This issue has been the subject of debate for many years in the field of acquisition. I approached this issue from three perspectives: lexical, syntactic and phonological. In this chapter, I briefly discuss each of the perspectives by summarizing the findings from the previous chapters. I also discuss the shortcomings of the current study. Building on this discussion, I offer possible suggestions for improvement.

7.2 Thesis Summary

In Chapter 4, I examined code switching from a lexical point of view. This portion of the study focused especially on the hypothesis that code switching originates from a lack of translation equivalents (Genesee, Nicoladis & Paradis, 1995; Nicoladis & Genesee, 1996; Nicoladis & Secco, 1998). My results provided only mild support for this hypothesis due to the high amount of translation equivalents found in previous sessions.

At first glance, these results may seem like a contradiction of this hypothesis. However, the occurrence of the translation equivalent could also be illustrative of the period of alternation between the two words when translation equivalents are being acquired by the child as proposed by LaBelle (2000). There is, however, no independent way to verify this hypothesis from the data available in the corpus.

Chapter 5 focuses on the mechanisms that constrain the manifestation of code switching. An examination of which elements were code-switched in Anne's data supported the Cooccurrence Constraints Hypothesis, (Hasselmo, 1972; Petersen, 1988; Lanza, 1993). However, in an attempt to go beyond this merely descriptive hypothesis, I took an excursus into the possible syntactic reasons why one particular type of combination, namely a grammatical item from the non-dominant language and a lexical item from the dominant language, cannot occur. I proposed that functional heads from the dominant language can select items from either language as their dependents but that functional heads from the non-dominant language are syntactically more constrained in that they can *only* select items from the non-dominant language as dependents. This proposal suggests that the two languages of a bilingual speaker are hierarchically-organized, and that this hierarchy is reflected in constraints on syntactic constructions. While this hypothesis can account for the data under consideration in this thesis and in the previous literature cited, it needs to be tested on a larger, cross-linguistic set of data on bilingual acquisition.

The focus of Chapter 6 is on the acquisition of stress in each language Anne is learning. I found that Anne produced the correct stress pattern in each of her languages: a trochaic pattern when speaking English and an iambic when speaking French. In fact, not only did she use the correct stress pattern, but she also displayed full mastery of the most prominent stress cues in each language: intensity for English and duration for French. These results thus indicate that even though Anne's use of French was recessive, she had already acquired a fairly sophisticated knowledge of refined phonetic properties

of this language instead of drawing from her knowledge of English, her dominant language.

7.3 Discussion

In this section, I discuss some shortcomings of my work as well as possible means through which this study could be refined.

First of all, this thesis discusses evidence from only one child. This is restrictive because the findings are not analyzed in reference or in comparison to other children. Thus, my findings can only be taken as tendencies evidenced for one child; it would be premature to extend the generalizations attained here to the larger population of English-French bilingual learners.

A direct consequence of this situation is the limitation it imposes in terms of data availability. As noted in section 6.4, the relatively small amount of relevant data I could find in my corpus imposed restrictions on my analysis of stress patterns. Because of this, I was not able to access factors such as those related to syllable structure. Instead, I could only perform a less complete analysis based on vowel quality, which prevented an all-encompassing characterization of Anne's stress productions. The use of specific flash-cards or other word-eliciting methods at the time of recording would have helped eliciting the sought-after syllable types and thus, enabled a more complete analysis of all potential factors involved. Note, however, that the results attained in the current study, albeit not ideal, are highly suggestive of a clear differentiation between the two languages.

Another limitation of my study is the context during which the recording sessions took place. Partly due to Anne's lack of familiarity with the French interlocutor at the beginning of the interview process, her productions in this language were probably more limited than what they would have been had the child been more familiar with the interlocutor at the time. Before the commencement of the recording sessions, thus, it would have been preferable if Anne had already had some interactions with the French interlocutor.

Despite these limitations, this thesis provides a contribution to the existing body of evidence on language development in a bilingual context. The results obtained, which offer a stepping stone for further research in this field, do suggest that there is a separation of the linguistic systems. This is most clearly illustrated in both the restrictions on the manifestations of code switching as well as use the stress patterns evidenced in both languages.

First, the observation that cooccurrence constraints on code switching apply asymmetrically between the dominant and the non-dominant languages provides evidence that there is a distinction between the two systems. Indeed, if this distinction did not exist, there would be no basis for this constraint and, thus, code switching would have taken place in a more random fashion than what is observed in the data.

Second, the differences observed between the stress patterns realized in each language also provide evidence for a distinction between the two languages. If this distinction did not exist, we would expect phenomena such as a clear influence of one language in the manifestations of stress in the other language (e.g. French productions

with trochaic instead of iambic stress). However, this is not the case. As my results suggest, the appropriate stress pattern was used for each language. This illustrates that there is a separation between the two languages, for both the relevant phonological parameters regulating stress and the production of cues related to the acoustic manifestation of stress.

References

- Allen, G. D. and S. Hawkins (1980). Phonological Rhythm: Definition and development. *Child Phonology* 1:227-256.
- Archibald, J., ed. (1995). *Phonological acquisition and phonological theory*. Hillsdale, NJ: Erlbaum Publishers.
- Arnberg, L. (1987). *Raising Children Bilingually: The Pre-school Years*. Clevedon, U.K.: Multilingual Matters Ltd.
- Arsenian, S. (1945). Bilingualism in the post-war world. *Psychological Bulletin* 42:65-85.
- Barlow, J. A. (2002). Error Patterns and Transfer in Spanish-English Bilingual Phonological Development. *Proceedings of the 26th Annual Boston University Conference on Language Development* 1:60-71.
- Bolinger, D. L. (1958). A theory of pitch accent in English. *Word* 14:109-149.
- Borden, G. J., K. S. Harris and L. J. Raphael (2003). *Speech Science Primer: Physiology, Acoustics, and Perception of Speech*. Baltimore: Lippincott Williams & Wilkins.
- Bosch, L. and N. Sebastián-Gallés (2003). Simultaneous Bilingualism and the Perception of a Language-Specific Vowel Contrast in the First Year of Life. *Language and Speech* 46(2-3):217-243.
- Burns, T. C., J. F. Werker and K. McVie (2003). Development of Phonetic Categories in Infants Raised in Bilingual and Monolingual Environments. *Proceedings of the 27th Annual Boston University Conference on Language Development* 1:173-184.
- Caldecott, M. J. (in press). Acoustic Correlates of St'át'imcets Stress.
- Darcy, N. T. (1953). A review of the literature on the effects of bilingualism upon the measurement of intelligence. *Journal of Genetic Psychology* 82:21-57.
- DeCasper, A. J. and M. J. Spence (1986). Prenatal maternal speech influences newborns' perceptions of speech sounds. *Infant Behaviour and Development* 9:133-150.
- DeHouwer, A. (1990). Language Choice and Mixed Utterances. In *The Acquisition of Two Languages from Birth: A Case Study*. Cambridge, New York: Cambridge University Press. 90-114.

- Diebold, A. R. (1968). The consequences of early bilingualism on cognitive development and personality formation. In *The Study of Personality: An Inter-disciplinary Appraisal*, E. Norback, D. Prince-Williams and W. M. McCord (eds.). New York: Holt, Rinehart and Winston. 218-245.
- Fabbro, F. (2001). The Bilingual Brain: Bilingual Aphasia. *Brain and Language* 79:201-210.
- Fry, D. B. (1955). Duration and intensity as physical correlates of linguistic stress. *Journal of the Acoustic Society of America* 27:765-768.
- (1958). Experiments in the perception of stress. *LgSp* 1:126-152.
- Genesee, F. (1989). Early bilingual development: one language or two? *Journal of Child Language* 16:161-177.
- (2003). Rethinking Bilingual Acquisition. In *Bilingualism: Beyond Basic Principles*. Clevedon, UK. 204-228.
- Genesee, F., I. Boivin and E. Nicoladis (1996). Bilingual children talking with monolingual adults: A study of bilingual communicative competence. *Applied Psycholinguistics* 17: 427-442.
- Genesee, F., E. Nicoladis and J. Paradis (1995). Language differentiation in early bilingual development. *Journal of Child Language* 22:611-631.
- Goffman, L. (1985). Some pragmatic considerations in phonetic and syllable production: Influences of informativeness and stress. Purdue University, West Lafayette, IN.
- Goodz, N. (1994). Interactions between parents and children in bilingual families. In *Educating Second Language Children*, F. Genesee (ed.). New York: Cambridge University Press. 61-81.
- Gussenhoven, C. and H. Jacobs (1998). *Understanding Phonology*. New York: Oxford University Press.
- Hasselmo, N. (1972). Code switching as ordered selection. In *Studies for Einar Haugen*, E. S. Firchow, K. Grimstad, N. Hasselmo and W. A. O'Neil (eds.): The Hague: Mouton. 261-280.
- Hayes, B. (1995). *Metrical Stress Theory, Principles and Case Studies*: The University of

Chicago Press.

- Kamiyama, T. (2002). Les aspects suprasegmentaux des phrases déclaratives courtes en français lues par les apprenants japonais. ILPGA, Paris III.
- Kehoe, M., C. Stoel-Gammon and E. H. Buder (1995). Acoustic Correlates of Stress in Young Children's Speech. *Journal of Speech and Hearing* 38:338-350.
- Klein, H. (1984). Learning to stress: A case study. *Journal of Child Language* 11:375-390.
- LaBelle, C. L. (2000). A Longitudinal Study of Lexical and Prosodic Differentiation by a Simultaneous French/English Bilingual Child (1;5-2;3). *Proceedings of the 24th Annual Boston University Conference on Language Development* 2:474-485.
- Labov, W. (1972). *Sociolinguistic Patterns*. Philadelphia: University of Pennsylvania Press.
- Ladefoged, P. (1993). *A Course in Phonetics*. Florida: Harcourt Brace and Company.
- (2001). *A Course in Phonetics*. Boston: Heinle and Heinle.
- Lanza, E. (1993). Language Mixing and Language Dominance in Bilingual First Language Acquisition. *The Proceedings of the Annual Child Language Research Forum* 24:197-208.
- Laver, J. (1994). *Principles of Phonetics*. Cambridge: Cambridge University Press.
- Lea, W. A. (1977). Acoustic Correlates of Stress and Juncture. In *Studies in Stress and Accent*, L. M. Hyman (ed.). 83-119.
- Leopold, W. (1949). *Speech Development of a Bilingual Child*. Evanston: Northwestern University Press.
- Lieberman, P. (1959). Some Acoustic Correlates of Word Stress in American English. *Journal of the Acoustic Society of America* 32:451-454.
- Macnamara, J. (1966). *Bilingualism and Primary Education*. Edinburgh: University Press.
- Meisel, J. M. (1990). Grammatical Development in the Simultaneous Acquisition of Two First Languages. In *Two First Languages: Early Grammatical Development in Bilingual Children*, J. M. Meisel (ed.). Dordrecht, Holland: Foris Publications.

- Mertens, P. (1991). Local Prominence of Acoustic and Psychoacoustic Functions and Perceived Stress in French. *Proceedings of the 12th International Congress of Phonetic Sciences* 3:218-221.
- Monik, C. (1991). *Conditions on Phonological Government*. Cambridge, MA: Cambridge University Press.
- Morton, J. and W. Jassem (1965). Acoustic Correlates of Stress. *Language and Speech* 8:159-181.
- Nakatani, L. and C. H. Aston (1978). Acoustic and Linguistic Factors in Stress Perception.
- Nicoladis, E. and F. Genesee (1996). Bilingual Communication Strategies and Language Dominance. *Proceedings of the 20th Annual Boston University Conference on Language Development* 2:518-527.
- (1997). The Role of Parental Input and Language Dominance in Bilingual Children's Code-mixing. *Proceedings of the 21st Annual Boston University Conference on Language Development* 2:422-432.
- Nicoladis, E. and G. Secco (1998). The Role of Translation Equivalents in a Bilingual Family's Code-Mixing. *Proceedings of the 22nd Annual Boston University Conference on Language Development* 2:576-584.
- Paradis, J., E. Nicoladis, F. Genesee (2000) Early emergence of structural constraints on code-mixing: Evidence from French-English bilingual children. *Bilingualism: Language and Cognition* 3:245-261.
- Paradis, J., S. Petitclerc and F. Genesee (1997). Word Truncation in French-Speaking Two Year Olds. *The Proceedings of the 21st Annual Boston University Conference on Language Development*:441-452.
- Pearson, B.Z., S.C. Fernández, Lewedag and D.K. Oller (1997). The relation of input factors to lexical learning by bilingual infants (ages 10 to 30 months). *Applied Psycholinguistics* 18: 41-58.
- Petersen, J. (1988). Word-internal Code-switching Constraints in a Bilingual Child's Grammar. *Linguistics* 26:479-493.

- Pollock, K. E., D. Brammer and C. F. Hageman (1993). An Acoustic Analysis of Young Children's Productions of Word Stress. *Journal of Phonetics* 21:183-203.
- Quay, S. (1995). The Bilingual Lexicon: Implications for Studies of Language Choice. *Journal of Child Language* 22(2):369-387.
- Rose, Y., B. MacWhinney, R. Byrne, G. Hedlund, K. Maddocks, P. O'Brien and T. Wareham (in press). Introducing Phon: A Software Solution for the Study of Phonological Acquisition. *Proceeding of the 30th Annual Boston University Conference on Language Development*.
- Swain, M. (1972). Bilingualism as a first language. Unpublished PhD. University of California, Irvine.
- Tucker, G. R. (1988). A Global Perspective on Multilingualism and Multilingual Education. In *Beyond Bilingualism: Multilingualism and Multilingual Education*, J. Cenoz and F. Genesee (eds.). Clevedon: Multilingual Matters. 3-15.
- Volterra, V. and T. Taeschner (1978). The Acquisition and Development of Language by Bilingual Children. *Journal of Child Language* 5:311-326.

Appendix A

List of French Utterances with a Grammatical Morpheme

Age	Utterance
02;01.03	un autre
02;01.03	une autre chien
02;02.24	un bébé
02;02.24	un poisson
02;04.04	un chien
02;04.04	un escargot
02;04.04	un pantoufle
02;04.04	un coccinelle
02;04.18	un oeuf
02;04.18	une tasse
02;04.18	oui du lait chocolat
02;04.18	le petit chien
02;04.18	un igloo
02;04.18	une vache
02;06.22	le petit cochon

Appendix B

Exemplars Analyzed from Chapter 6

Age	English Utterance
2;00.25	cookie
2;00.27	chicken
2;00.27	teddy
2;01.10	chicken
2;02.03	present
2;02.03	hockey
2;02.17	horsie
2;02.17	horsie
2;02.17	birthday
2;02.17	balloon
2;02.17	balloon
2;02.17	horsie
2;04.18	hotdog
2;04.18	music
2;05.10	chicken
2;05.10	napkin
2;06.18	cookie
2;06.22	hiding

2;06.22	pocket
2;06.22	nothing
2;06.22	nothing
2;08.16	monkey
2;08.16	chicken
2;08.16	hello
2;09.00	duckie
2;09.00	baby
2;09.00	fishing
2;09.00	monkey
2;09.00	doggie
2;09.00	horsie
2;09.00	painting
2;09.10	blanket
2;09.10	barbie
2;09.10	babies
2;09.28	rainbow
2;09.28	rainbow
2;09.28	mommy
2;09.28	mommy
3;00.05	maybe
3;00.05	rabbits

3;00.05 monkey

Age French Utterance

2;00.25 poisson

2;00.27 bateau

2;00.27 poisson

2;00.27 poulet

2;00.27 mouton

2;01.03 monsieur

2;01.03 monsieur

2;01.03 madame

2;01.03 garçon

2;01.03 orange

2;01.03 garçon

2;01.03 bateau

2;01.03 monsieur

2;01.03 surprise

2;02.13 tombé

2;02.13 lapin

2;02.13 gateau

2;02.13 chapeau

2;02.13	soulier
2;02.13	hibou
2;02.17	bateau
2;02.17	bateau
2;02.17	bateau
2;02.24	fourchette
2;02.24	un couteau
2;02.24	un poisson
2;02.24	tombé
2;02.24	un poisson
2;02.24	tombé
2;03.22	nounou
2;05.10	couteau
2;06.18	fourchette
2;06.18	fourchette
2;06.18	fourchette
2;06.18	couteau
2;06.18	fourchette

