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Testing the Early Differentiation Hypothesis: A Case Study of a Spanish-English Bilingual Child

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ABSTRACT

This paper contributes to the field of simultaneous bilingual first language (2L1) acquisition. Specifically, by using the methodology of case studies, it examines the developmental stages of a bilingual child in two languages, Spanish and English. The analysis is performed by analyzing bilingual acquisition data from the Child Language Data Exchange System (CHILDES) database with the Computerized Language ANalysis (CLAN) software that is designed for the purpose of creating and analyzing transcripts in the CHILDES database. The study aims to provide support in favor of the differentiated language system hypothesis (also known as the Early Differentiation Hypothesis) proposed in the field of the simultaneous 2L1 acquisition. The results show that the developmental stages of a bilingual child correspond to the stages of a monolingual child acquiring a language; the only difference is the number of languages that are being acquired. The data also show that the child's caregivers use certain strategies in their socialization as an important prerequisite for 2L1 acquisition (e.g., input frequency, discourse strategies and maximal engagement with a minority language available in the input). The results of the study confirm the differentiated language system hypothesis that argues for the early language-specific morphosyntactic patterns in child's grammar. The study has important implications for caregivers who raise children in bi- and multilingual communities.

Keywords: Simultaneous bilingual first language acquisition; CHILDES; Code-switching in parental input; The Early Differentiation Hypothesis

1. Introduction

According to Ethnologue (Eberhard et al., 2024) that provides a comprehensive reference on the world's languages, there are approximately 7, 164 living languages in the world, as of 2024. The findings of the various reports published by UNESCO suggest that the majority of the world's population grows up in bilingual or multilingual communities. Taking multilingualism as a norm rather than aberration from the norm (Genesee, 2022), it is stipulated that children, who grow up in multilingual communities, have the potential to become bi- or multi-lingual speakers. Research on simultaneous acquisition of 2 first languages (2L1s) attempts to answer the question of how children who grow up in bi- or multi-lingual communities acquire 2 or more linguistic systems that they are exposed to. Previous research in the field of the simultaneous 2L1 acquisition (see e.g., Genesee, 2001, 2022; Nicoladis and Montanari, 2016) has raised the question of whether or not children who receive input in two languages can differentiate two linguistic systems at the early stages of their linguistic development. One possible answer to this question is that children, who receive input in two languages, initially undergo a monolingual stage that is followed by a bilingual stage where two linguistic systems are differentiated. An alternative view (see e.g., De Houwer, 2007; Genesee, 2001, 2022; Meisel, 2001) is that bilingual children at the early stages of their linguistic development can demonstrate functional differentiation of 2 L1s. The present case study attempts to contribute to this discussion by providing evidence that supports the early differentiation of two linguistic systems in the mind of a bilingual child.

This study has important implications for caregivers who raise their children in bilingual communities. Anecdotal evidence (see e.g., De Houwer, 2023) suggests that some bilingual parents are reluctant to expose their children to the languages they speak for fear of potential language delay or language confusion that they think might happen as a result of simultaneous 2L1 acquisition. Consequently, bilingual parents switch to one, in many cases the more dominant language of the community, and miss on an opportunity to raise a bilingual child. Thus, caregivers and communities need access to scientific evidence that demonstrates that exposing a child to two languages from birth does not necessarily create a situation where a child is confused or unable to become a proficient speaker in two languages. This study can help overcome misconceptions that caregivers might have about the simultaneous 2L1 acquisition and encourage more families to support the bilingual development of their children.

The purpose of this case study is to analyze bilingual language acquisition data from the Child Language Data Exchange System (CHILDES) database with the Computerized Language ANalysis (CLAN) software (CHILDES, n.d.) and relate the findings of the analysis to several hypotheses proposed in the field of simultaneous 2L1 acquisition. The selected data have been taken from the corpus of a 2L1 child (M.) between the ages of 1;3 and 3;3. This child has been chosen for this research because she represents an example of a child raised in a bilingual environment. From her birth, M. was simultaneously exposed to two languages, i.e., English (spoken by her maternal grandmother and her caretakers in the crèche) and Spanish (spoken by her two parents). On average, at the age of 1;3, M. heard Spanish 52% of the time and English 48% of the time (Bilingual Corpora, n.d.).

2. Theoretical framework and literature review

The traditional view of bilingual language development has been heavily influenced by a monolingual perspective. As a result of this, bilingual children were often seen as two monolinguals in one, with the assumption that learning two languages simultaneously would be more challenging and can potentially lead to confusion and even language impairment. However, this perspective has been increasingly challenged in recen.d.cades. Researchers (see e.g., Genesee, 2022) have recognized the need to move away from simplistic comparisons between bilingual and monolingual children, and instead focus on the unique features and characteristics of bilingual language development. Thus, bilingualism should be recognized as a distinct field of study, rather than just a specific type of monolingual language acquisition.

One of the key debates in the field of the simultaneous 2L1 acquisition has been the question of language differentiation, that is whether and when young bilingual children differentiate language-specific sounds, words, and rules for each of their languages. According to the unitary language system hypothesis (Volterra and Taeschner, 1978, as cited in Nicoladis and Montanari, 2016), the linguistic behavior of bilingual children resembles the behavior of monolingual

children in that bilingual children initially create one linguistic system that combines the elements of the sound system, lexicon and syntax of the two languages present in the input. Gradually, bilingual children start differentiating the two linguistic systems and the process of differentiation is argued to be complete by the age of 3.

The proponents of the differentiated language system hypothesis (see e.g., Genesee, 1989, as cited in Genesee, 2022) claim that bilingual children show signs of language differentiation from the early stages of their linguistic development. The assumption is that by the time children, who are exposed to two languages in the input, begin talking, they show the signs of differentiation of their linguistic systems. The evidence for language differentiation comes from studies that demonstrate that bilingual children, who may occasionally mix the languages or code switch between them, show that they can use their languages appropriately with different interlocutors, e.g., their parents and interlocutors with whom they have had no prior interaction. For example, Quay (2011) found that trilingual toddlers attendin.d.ycare could use the majority language of the daycare setting for at least 90% of their utterances. This discourse separation and interlocutor accommodation demonstrates their ability to activate the appropriate language system and to conform to the grammatical constraints of each language.

Studies on the use of translation equivalents (i.e., the use of lexical items, such as *book* in English and *libro* in Spanish, see e.g., Quay and Montanari, 2016) have shown that bilingual children demonstrate language-specific lexical knowledge at the early stages of their linguistic development. Furthermore, studies have shown that bilingual children's total conceptual vocabulary can be on a par with or even exceed that of their monolingual peers, challenging the earlier assumptions that bilingual children have smaller vocabularies when compared to monolingual children (see e.g., Poulin-Dubois et al., 2011, 2013). This evidence suggests that the language faculty is well-equipped to handle multiple languages that are present in the input.

The calls to investigate bilingualism as a unique process of linguistic development and to shift away from having it compared to the process of monolingual language acquisition has important implications for bilingual communities. New studies on bilingualism can greatly inform language practices at the micro- (e.g., families) and macro-levels (edu-

cational policies), and promote a more inclusive and supportive environment for bilingual individuals. The present study addresses the call to examine the process of simultaneous 2L1 acquisition on its own terms without comparing it to the process of monolingual first language acquisition. The findings of the study are important because they challenge the earlier predictions of bilingual language delay and suggest the importance of input for successful simultaneous 2L1 acquisition.

3. Methodology

This study uses the methodology of case studies to report on the simultaneous bilingual development of both English and Spanish in the case of one child. As the name of the methodology suggests, case studies are used to study individual examples of a certain phenomenon, in this case, the phenomenon of simultaneously acquiring two language systems in childhood. The data used in the present study comes from the CHILDES, a large-scale multi-lingual platform which contains transcripts of audio and video files of conversations with children (MacWhinney, 2019).

By usin.d.ta from this corpus, we can answer the following questions: How much of English and Spanish does the child under investigation know? What is the mean length of an utterance produced by the child under investigation in English or Spanish at a certain developmental stage of acquisition? At what age does the child under investigation show signs of acquiring a specific morpho-syntactic feature of the two languages the child is being expose to? Does the child under investigation seem to perceive the two languages they are exposed to as one or two distinct systems?

4. The MLU and the English/Spanish word pairs

The child's Mean Length of Utterance (MLU) for interactions in English and Spanish is presented in **Table 1** at three different stages. MLU has been calculated to demonstrate the developmental stages in the child's 2L1 acquisition, i.e., a one-word developmental stage for both languages at the age of 1;3, and a two-word developmental stage at the age of 2;1–2;2. Based on the calculated MLU, it has been found that M.'s developmental stages correspond to the stages of a

monolingual child acquiring a language (see e.g., Mitchell and Myles, 2019); the only difference is the number of languages that are being acquired. At the age of 1;3, M. can produce a one-word utterance in both languages, English and Spanish, and at the age of 2;1–2;2, she can produce a two-word utterance in both languages. In comparison, a monolingual child would produce the same number of words in the utterance but only in one language, e.g., either in English or in Spanish, according to the input that is provided to them by their caregivers.

The analysis of the data also demonstrates that at the one-word stage (1;3.4–1;3.8), M. was capable of producing a word in English and Spanish with the same referent, for example *daddy/papá; mummy/mamá; baby/bebé*. The two Excerpts presented below provide evidence for the child's knowledge of the above-mentioned word pairs.

Excerpt 1 (861002eg.cha)

```
%act: looking at a picture of M's father
*GRA: who is it?
*CHI: papá
%eng: daddy
*GRA: is that pa?
*CHI: pa
%act: touching the picture with her finger
```

Excerpt 2 (870402eg.cha)

```
*CHI: mummy
*MOT: yes
*CHI: mummy (…)
*CHI: [-es] Mamá
*GRA: and +
*CHI: ++ mummy
```

At a later age (1;7.8), the child acquired a number of other word pairs in English and Spanish with the same referent, for example *zapato/shoe.*

Excerpt 3 (870201sf.cha)

```
*FAT: eso qué es ?
%mor: pro:dem|eso=that_one pro:int|qué=what vpres|se-3S&PRES=be ?
*CHI: [- en] shoe …
*FAT: qué es esto ?
%mor: pro:int|qué=what vpres|se-3S&PRES=be pro:dem|esto=this_one ?
%gpx: gets shoe out of box
CHI: zapato .
```

5. Bilingual patterns of interaction

Based on the evidence presented above, the conclusion is made that by the age of 2;6, M. acquired a number of English/Spanish word pairs. The data presented in excerpts (4–6) provide evidence to answer the questions of whether or not M. was able to differentiate between English and Spanish, and what the reaction of M.'s caregivers was if M. used "the wrong language".

Based on the above-mentioned examples (Excerpts 4, 5), the English-speaking caregivers of M. did not seem "to mind" M.'s use of the Spanish words, such as *ninã* and *si,* in an English-speaking context. For example, in line 4.2, M.'s English-speaking grandmother acknowledged the child's ability to connect the word *ninã* with its referent *little girl* by saying "yes" (4.2; 4.10) and continued using its English equivalent (4.4) while interacting with the child. Similarly, in Excerpt 5, no corrective feedback was provided by M.'s mother in reaction to the child's "wrong" use of Spanish *si* (5.2) instead of the "correct" English *yes* required by the English-speaking context. M.'s mother neglected "the error" and continued her conversation in English (5.3). However, in Excerpt 6, the mother explicitly indicated to the child that her code-switching to Spanish had not been approved (6.2; 6,4) because of M.'s friend, Joshua, who did not speak Spanish. It should be noted that M. mother's discourse strategy was successful and M. produced an English word *wet* (6.7) for its Spanish equivalent *frio* (6.1; 6.3).

One of the strategies used by M.'s caregivers in reaction to her "wrong" choice of the language was to provide positive evidence in the input. For example, the input of the English words *girl* and *boy* was reinforced by the child's mother (4.3; 4.13) immediately after the child's use of the Spanish word *ninã* (4.1) and *ninõ* (4.12) respectively. Similarly, the Spanish word *zapato* (7.3) (see Excerpt 7) was supplied by the child's father in response to her use of the "wrong" English word *shoe* (7.2).

Excerpts 7 and 8 provide evidence for the child's ability to differentiate between the two languages. At first, the child made an "incorrect" attempt to use an English word *shoe* for the referent 'shoe' (7.2) while playing with her Spanish-speaking father. In response, the word *zapato* was introduced in the input (7.3). In the interaction that followed, M. ignored the Spanish word and insisted on its English equivalent (7.4). However, later, she used the Spanish word *zapato* (8.2), and her father acknowledged that with an exclamation *muy bien! (very well)* (8.3). Excerpt 9 is an interesting example of code-mixing, which is available in the input of the child and the father. While playing with her Spanish-speaking father, M. used an English word *dear* (9.1) and the discourse marker *oh dear* (9.2). Immediately, the father switched into English and repeated the expression after the child (9.3), thus indicating that the child's code-switching was appropriate and acceptable in the context of a child's game. Then the father switched to Spanish (9.7) and the child responded to the question in Spanish (9.8).

Table 1. M.'s MLU in English and Spanish [1].

Age	English MLU	Age	Spanish MLU
1;3.8	1.0	1;3.4	1.25
2;1.4	2.5	2;2.5	2.1
2;6.21	2.9	2;6.2	2.0

[1] M.'s parents are bilingual English and Spanish speakers, and occasionally they would code-switch into English while interacting with the child.

Excerpt 4 (870402eg.cha)

(M., her grandmother and mother are looking at the pictures).
4.1 *CHI: [-es] ninã
%eng: girl
4.2*GRA: yes
4.3*MOT: girl
4.4*GRA: girl with a +
4.5*CHI: [-es] ninã
4.6*MOT: with a doll (…)
4.7*CHI: [-es] < ninã>
4.8*GRA: granny had dolls, didn't she?
4.9*CHI: [-es] ninã
%eng: girl
4.10*GRA: yes (…)
4.11*MOT: &mm (.)and here?
4.12*CHI: [-es] niño .
4.13*MOT: boy .
4.14*CHI: boy

Excerpt 5 (870402eg.cha)

5.1*MOT: M. could you take this book to granny please?
5.2*CHI: [-es] si
5.3*MOT: thank you (.) show granny the book

Excerpt 6 (870823ej.cha)

(M. is playing with Joshua, a child who does not speak Spanish)
6.1 *CHI: [- es] frio ?
%mor: adj|frío-MASC=cold ?
%act: touching the ground-sheet with her hand and looking at Joshua
6.2*MOT: tell him in English M.
6.3*CHI: [- es] frio .
%mor: adj|frío-MASC=cold .
%act: looking at MOT and smiling
6.4*MOT: well how do you say that in English ?
6.5*CHI: sorry
6.6*MOT: no how do you say that in English ?
6.7*CHI: wet

M.'s caregivers used certain strategies in their socialization with the child, which were targeted at a balanced 2L1 acquisition. First of all, the child was exposed to two languages since her birth. Second, it was assumed that the child received equal input in both languages. Third, the caregivers used discourse-based strategies (Genesee, 2001, p. 156) allowing for code-switching at the two-word stage in some situations. In other words, they allowed one language to be present in the context of another language.

The strategies mentioned above were considered by De Houwer (2007) as an important prerequisite for developing and maintaining a child's bilingualism. The author emphasized the role of frequency of input, discourse strategies and maximal engagement with a minority language as important variables available in a parental input that predict success in maintaining individual bilingualism. The author also added that it is not only the frequency of the input that matters, rather the success of maintaining a less dominant language could be explained by "the particular combination of how the two languages are used by the parents" (p. 420). The results of her study demonstrated the ineffectiveness of the one parent – one language strategy in keeping a minority language.

It should be noted that M.'s caregivers followed the one parent - one language rule where each caregiver was using either English or Spanish while communicating with M.; however, they occasionally switched between the two languages. Thus, between the ages of 1;3 and 3;3., M.'s language acquisition was balanced with a slight dominance of the English language. (See e.g., the data presented in **Table 1**, where M.'s English MLU (2.9) exceeded her Spanish MLU (2.0), thus inferring that the child used more English morphemes per utterance as compared to Spanish.) This slight imbalance between the two languages can be explained by the fact that the child probably received additional input in English from her caretakers in the crèche. Generally, it could be argued that the older the child, the more difficult it is for his/her bilingual parents to control the amount of input the child receives from outside. Therefore, the success of raising children to speak two languages highly depends on the "language choice patterns" (De Houwer, 2007, p. 421) of their bilingual parents that "can be planned ahead of time and modified to suit families' needs" (p. 421).

Except 7 (870201sf.cha)

7.1*FAT: eso qué es ?
7.2*CHI: [- en] shoe .
7.3*FAT: zapato [>] ?
7.4*CHI: [- en] shoe [<] .

Excerpt 8 (870201sf.cha)

8.1*FAT: qué es esto ?
%gpx: gets shoe out of box
8.2*CHI: zapato .
8.3*FAT: muy bien !

Excerpt 9 (870201sf.cha)

9.1*CHI: [- en] mm, dear, dear
%gpx: leans into box
9.2*CHI: [- en] oh dear .
9.3*FAT:[- en] oh dear xxx(…)
9.4*CHI: [- en] oh dear .
9.5*FAT: [- en] oh dear .
9.6*FAT: pss .
%com: attracting M's attention
9.7*FAT: (.) quieres ver esto?
9.8*CHI: bebé .

6. One syntax or two?

The question that has been raised with regards to the acquisition of syntax is "whether the child had an initial linguistic system which subsequently divided into two, or whether a division corresponding to the two sources of linguistic input could be ascertained from the beginning of linguistic production" (Bilingual Corpora, n.d.). Thus, in the area of syntax, the research question was whether the 2L1 child had oneor two separate syntactic systems.The analysis of the selected data presented below provides evidence for the language-specific morphosyntactic patterns for Spanish and English. For example, at the age of 2;6 (871226 sf.cha) the child produced the sentence *tengo un coche* ((I) have a car) that has no subject. This can be explained by the fact that Spanish is a pro-drop language that "licenses the omission of subjects in certain contexts" (Genesee, 2001, p. 159). In addition, M. correctly used the inflectional morpheme that marks the plural number in Spanish, and the Spanish word order in a noun phrase, where a noun precedes its modifier. For example, *tengo dos manos* (n/mano – PLU & FEM) ((I) have two hands), and *zapato rojo* (red shoe). In contrast, M.'s English two-word and three-word utterances (870728er.cha) were constrained by the rules of the English syntax. Although she occasionally produced sentences with an omitted subject, such as *got cake*, a number of M.'s utterances included subject, for example *I close it, now I want another one* and *M. take shower*. The following sentence *This little finger on my right* (880114eg.cha) has the English word order where a modifier *little* precedes a noun *finger* in the noun phrase *this little finger*. Thus, the examples presented above provide evidence that supports the early differentiation of two linguistic systems in the mind of a bilingual child.

7. Conclusion

The purpose of this paper was to analyze bilingual language acquisition data in relation to several concepts and/or hypotheses proposed in the field of 2L1 acquisition. The data analysis presented above suggests that firstly, balanced bilingualism can be achieved at an early age. Second, the success of raising a bilingual child depends to a large extent on the parental input patterns that can be modified and readjusted according to the needs of the child and the family. Finally, and most importantly, the corpus of a bilingual child and its data analysis seem to question the unmarked status of a monolingual mind as a prerequisite for a child's normal development, and support ideas proposed by a number of 2L1 researchers (see e.g., Genesee, 2022; Meisel, 2001; Nicoladis and Montanari (2016)) of a "a bilingual or even multilingual mind" (Genesee, 2001, p. 164).

Author Contributions

Iryna Lenchuk: Designed the study, collected the data, analyzed the data and wrote the manuscript. Amer Ahmed: Contributed to the interpretation of results, reviewed the manuscript and edited the manuscript for clarity.

Conflict of Interest

The Authors declare that there is no conflict of interest.

Data Availability Statement

The data used and analyzed in this study is available from the open-access corpus titled The Child Lan-

guage Data Exchange System (CHILDES), accessible at https://childes.talkbank.org/.

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