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Code-switching in Early Bilinguals

Case study of English-Catalan bilingual children living in Taiwan

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ABSTRACT

This study investigates the use of code-switching by three English-Catalan bilingual children aged: 11, 8, 5, who were born and are currently living in Taiwan. Through recordings of natural speech samples in different communicative contexts provided by their parents, which have been manually transcribed and coded, this study aims to analyse which language predominates in their oral production, and whether the change of interlocutor determines their use of one language or the other. It also seeks to analyse what patterns of code-switching can be observed in their productions, and whether age is a factor in determining the amount or type of code-switching that occurs. The results showed that English is the most dominant language in their oral production, and that the interlocutors they address may influence their choice of one language or the other. In addition, it was found that the patterns of code-switching that occur the most are alternation and insertion, and that intra-sentential code-switching occurs more frequently than inter-sentential code-switching. However, age has not been shown to be a determining factor influencing the amount and type of coding alternation, but other factors may play a role.

Key words: code-switching, bilingual children, English-Catalan, patterns, intra-sentential code-switching.

RESUM

Aquest estudi investiga l'ús de l'alternança de codi (*code-switching*) par part de tres infants bilingües d'anglès i català d'11, 8 i 5 anys que van néixer i viuen a Taiwan. A través d'enregistraments en mostres de parla natural en diferents contextos comunicatius proporcionats pels seus pares, els quals han estat transcrits i codificats manualment, es vol analitzar quina és la llengua que predomina en la seva producció oral, i si l'interlocutor té influència en la selecció d'una llengua o l'altra. També es vol analitzar quins patrons d'alternança de codi s'observen en les seves produccions i si l'edat és un factor que pugui determinar la quantitat o el tipus d'alternança de codi que es produeix. Els resultats demostren que l'anglès és la llengua predominant en la seva producció oral i els interlocutors als quals es dirigeixin poden influir en la selecció d'una llengua o l'altra. A més, s'ha trobat que els patrons d'alternança (*alternation*) i inserció (*insertion*) són els més utilitzats i s'ha demostrat que els canvis de codi dins d'un mateix enunciat (*intra-sentential code-switching*) es produeixen més que a fora d'un enunciat (*inter-sentential code-switching*). No obstant això, no s'ha pogut demostrar que l'edat sigui un factor que influeixi en la quantitat i tipus d'alternança de codi, sinó que n'hi ha altres que hi poden intervenir.

Paraules clau: alternança de codi, infants bilingües, anglès-català, patrons, *intra-sentential code-switching*.

RESUMEN

Este estudio investiga el uso de la alternancia de códigos (*code-switching*) de tres infantes bilingües de inglés y catalán de 11, 8 y 5 años que nacieron y viven en Taiwán. A través de grabaciones de muestras de habla natural en distintos contextos comunicativos proporcionadas por sus padres, las cuales han sido transcritas y codificadas manualmente, se ha querido analizar qué lengua predomina en su producción oral y si el interlocutor influye en la selección de una u otra lengua. También se ha analizado qué patrones de la alternancia de códigos se observan en sus producciones y si la edad es un factor que pueda determinar la cantidad o el tipo de alternancia de códigos que se produce. Los resultados demuestran que el inglés es la lengua predominante en su producción oral y que los interlocutores a los que se dirijan pueden influir en la selección de una u otra lengua. A demás, se ha encontrado que los patrones que más se producen son la alternancia (*alternance*) y la inserción (*insertion*), y que la alternancia de códigos dentro de una misma frase (*inter-sentential code-switching*) se produce más que fuera de una frase (*intra-sentential code-switching*). Sin embargo, no se ha podido demostrar que la edad sea un factor que influya en la cantidad y el tipo de alternancia de códigos, sino que es posible haya otros factores que intervengan en eso.

Palabras clave: alternancia de códigos, infantes bilingües, inglés-catalán, patrones, *intra-sentential code-switching*.

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1. INTRODUCTION

Languages are fascinating. I have always been captivated by the huge number of languages spoken in the world, and how communicating to others is almost the first thing we learn when we are born. Moreover, it is incredible all the cognitive processes that are behind language acquisition and its development.

Therefore, I chose to study Applied Languages. During my studies I discovered that the field that interested me the most was psycholinguistics, thanks to courses such as *Languages and the Mind*, *Cognition and Language*, and *Languages Acquisition*. It seems magical how young children are able to comprehend and produce language, and how their brains are capable to learn to do so with more than one language at a time.

This end-of-degree project comes from a personal motivation, and a family bond. My uncle and aunt –both Catalan speakers– moved to Asia fourteen years ago: they stayed in China for a few years, but a long time ago they settled down in Taiwan, where my three cousins were born, so they have grown in a multilingual environment. On the one hand, they have learned Catalan at home, by talking to their parents, and they also get a small amount of input in Spanish through listening to music and watching some cartoons. On the other hand, they are learning English and Chinese thanks to their schooling.

The fact that they could simultaneously learn this number of languages was always fascinating for me. As I have previously mentioned, in this degree I got the opportunity to study about language acquisition, and I wanted to contribute to these studies and apply all this knowledge on a close experience.

The specific matter I would like to analyse in this project is the simultaneous use of both Catalan and English in a particular case study. What is the language that dominates the most in their oral production? Which factors affect the choice of using one language over the other? What type of patterns can be observed when they code-switch? The aim of this project is to be able to answer all these research questions. Although this phenomenon has been previously studied with other languages, not many have discussed the case of Catalan and English, which will be the goal of this case study.

2. THEORETICAL FRAMEWORK

Between 60 and 75% of the world's population speaks two or more languages (Horno, 2016). The word used to define the ability to speak and comprehend two languages is known as *bilingualism*, yet it may also mean understanding a variety of languages, also referred to as multilingualism (Tavakoli, 2012). The way in which we will understand this term in this paper is that bilingual speakers can speak one of their languages in a particular interactional environment or switch between them while addressing various speakers at the same time. This ability to switch languages is a universal behaviour that characterizes bilingual communities and human being, and it is known as *code-switching*. Bilinguals may introduce single lexical elements from one language into the morphosyntactic structure of another or alternate between languages at clause borders, depending on community norms (Green & Wei, 2016).

This study aims to analyse bilingualism and code-switching in a case study of children. In order to help you to interpret the data that arise in this present experiment, in the first half of the paper you will find the sections of *bilingualism*, *crosslinguistic influence*, *code-switching* and *code-mixing*. Moreover, results from previous research in the area will be discussed in the *previous studies* section. Afterwards, you will find the results of the study that aims to identify the language that predominates in the participants' oral expression, to analyse the different types of code-switching that occur most frequently, and to analyse whether age can be an influential factor in the results.

2.1. Theoretical concepts

2.1.1. Bilingualism

It is fairly difficult to define this concept, since it can be described from multiple perspectives, and there is not always agreement on what qualifies someone as bilingual.

From a socio-political point of view, *bilingualism* can be defined as “the condition in which two living languages exist side by side in a country, each spoken by one national group, representing a fairly large proportion of the people (Aucamp. 1926, in Béziers & Van Overbeke, 1968: 113)”, (Beardsmore, 1986: 2). From a cognitive perspective, bilingualism is defined as the characteristic of a person having two linguistic systems in the mind of a single individual, and that view focuses on the degree of the individual's mastery of the two languages and the cognitive functions in which the languages are

involved (Diaz, 1987). However, in this study a bilingual will be considered from a pragmatic point of view, which is defined as "an individual who switches from one language to the other according to appropriate changes in the speech situation (interlocutors, topics, etc), but not in an unchanged speech situation, and certainly not within a single sentence (Weinreich, 1963)", (Barredo, 1997: 528).

This section will attempt to describe the various types of bilingualism that can be found relative to different aspects. According to competence, a bilingual can be classified as *balanced* or *unbalanced*, or *dominant*. They can be *societal* or *individual* bilinguals depending on the presence in the environment. Also, according to age of acquisition, they can be *simultaneous* or *consecutive* bilingual, if the second language is acquired after the age of l1. Finally, depending on the status, they can be *additive* (when both languages are socially valorized) or *subtractive* bilinguals (if the second language is valorized at the expense of the first language). Some of these are described in more detail below.

Beardsmore (1986) brought up an important distinction between *early* and *late bilingualism*. *Early* bilingualism refers to the learning of more than one language during the preadolescent stage of development. The child acquires the languages simultaneously before the age of three years old. This concept has also been named *infant bilingualism* (Haugen, 1956), *bilingualism as a first language* (Swain, 1972), and *ascribed bilingualism* (Adler, 1977). It can be found a second distinction between *simultaneous bilingualism*, that refers to a new-born child who acquires two languages at the same time, in other words, the child is exposed to both languages from birth, and *successive bilingualism*, related to an infant who has already learned a part of a first language and begins learning a second language at young age (Beardsmore, 1986).

In contrast, *late bilingualism* occurs when a child learns their second or additional languages from the age of eleven, when the first language has been completely acquired, named *achieved bilingualism* (Adler, 1977). According to Baker (2001), *early bilinguals* have the most cognitive benefits over *late bilinguals*. The bilingual cognitive advantage hypothesis claims that bilinguals benefit cognitively from maintaining control and attention to the adequate language system. The magnitude of these cognitive gains, however, should be contingent on factors such as exposure and chance to practice monitoring and managing attention to both language systems. For instance, the more bilinguals utilize both languages, the better they will become at both. As the bilingual obtains fluency in both languages and utilizes them on a daily basis, they will need to

exercise greater control and attention to avoid interference from the incorrect language system. Likewise, early acquisition of two languages offers a bilingual with early exposure to and greater opportunity to practice utilizing and regulating the two languages. (Yow & Li, 2015).

Beardsmore (1986) draws yet another distinction between *balanced* and *unbalanced bilinguals*. In general terms, *balanced bilingualism* occurs when a speaker's knowledge of two languages is nearly equal. These receive similar amounts of exposure and acquire a similar degree of competence in both languages. Thereby, an *unbalanced bilingual* speaker has one dominant language, and is not equally fluent in both languages. These got different amounts of exposure and may be due to two different reasons: on the one hand, it may be that the language is not spoken in the environment, so it could be talking about a minority or heritage language. On the other hand, may well be that the child has received fewer hours of exposure in the family microcosms.

Another type of bilingualism that can be found is *additive bilingualism*, that refers to the balanced manner that both languages have been acquired. Per contra, *subtractive bilingualism* occurs when a person prioritizes learning the second language over learning the first language, particularly if this is a minoritarian language, since, socially, one of the two languages is more highly valued than the other (Beardsmore, 1986).

2.1.2. Crosslinguistic influence

Although it was initially considered that a bilingual was two monolinguals in one (Grosjean, 1989), research has shown that it is not as simple as that. The separation of the two linguistic systems from early bilinguals does not mean that these systems do not influence each other.

Crosslinguistic influence is "a cover term proposed by Sharwood Smith and Kellerman to refer to such phenomena as *transfer*, *interference*, *avoidance*, borrowing, and L2-related aspects of language loss and thus permitting discussion of the similarities and differences between these phenomena" (Tavakoli, 2012: 96).

Crosslinguistic influence exists at the interface between syntax and pragmatics, when one of the languages has two pragmatically controlled grammatical alternatives, but the other language only allows one option, the language that has only one option will influence the decision of the one that has two options. It will influence the decision. Since both

languages are active at all times, they communicate. So, if the challenge of syntactic–pragmatics coordination is difficult for monolingual children, it may be twice as difficult for bilingual children who would map a greater variety of language-specific morphosyntactic constructions into a limited collection of language-universal pragmatic rules (Serratrice et al., 2004).

This phenomenon is more likely to happen when the distance between the two languages is short. According to Tavakoli (2012), language distance is "the relative degree of similarity between two languages", it is "used to describe a set of criteria that researchers use in order to see how similar or different languages are to one another. It is linked to the notion of language universals (features of languages which are common to all) and language typology (the categorization of different languages)" (Tavakoli, 2012: 198). Therefore, when we talk about linguistic and cultural distance in the process of second language acquisition, we refer to the typological difference between two or more languages, as the degree of cultural, structural, lexical, etc. the similarities or divergences between them (Clouet, 2015). Tavakoli (2012) summarizes the language distance hypothesis proposed by Corder (1981). The degree to which the L1 and L2 are comparable determines how easily and how long it takes to acquire a L2, since the learning of a second language takes different amount of time than the first one. This idea has, to some extent, aided in the development of criteria for the length of various second language courses. The issue, however, is how to define the term 'similarity' and, as a result, how to classify the world's languages.

In the case of English and Catalan, they are both alphabetic languages, they use the Roman alphabet, and their grammar follow the same structure, as their canonical order is SVO. According to the eLinguistics.net tool, that qualifies the genetic proximity between languages, the genetic proximity between English and Catalan is 56,5, so they are related languages (see Annex 1 for more detailed information). However, one of the most remarkable distinctions is that in English the adjective comes before the noun, while in Catalan it is the other way round (Hill & Bradford, 2000). For example, in English it would be said "I saw a *red car*", the noun is followed by the adjective, whereas in Catalan it would be said "He vist un *cotxe vermell*", the adjective is followed by the noun. It should be mentioned that linguistic distance plays an important role only if the learner has a high level of competence in the source language (Ortega, 2008).

Kecskes (1998) suggested the *Dual Language System Hypothesis*, which states that bilinguals have a separate system for L1 and L2 which they are learning right from the start and so both languages can be acquired simultaneously, and they are able to differentiate them from the start of language acquisition. The way monolingual children in early language development learn one term for each concept, so does a bilingual child, but the bilingual child does so for both L1 and L2. Hence, they know two language terms of the same concept that have similar meaning, so they are equivalents in their translation (Kecskes, 2006). A direct consequence of this theory is code-switching, a phenomenon that can occur when a child knows two or more languages, because, according to this previous hypothesis, as each of them has a separate system, they can interfere between each other.

2.1.3. Code-switching and code-mixing

Because of the simultaneous existence of two language systems, one of the most common phenomena that can be observed in bilinguals is *code-switching*. This phenomenon is the process of shifting from one linguistic code (a language or dialect) to another, depending on the social context, the conversational setting, in order to emphasize, either because of a lack of vocabulary in the other language, especially if they are early bilinguals (Morrison, 2021). Poplack (2001) referred to code-switching as the "mixing, by bilinguals (or multilinguals), of two or more languages in a discourse with no change of interlocutor or topic that may take place at any linguistic structure" (Poplack, 2001: 2). Some authors make also the distinction between *code-switching* and *code-mixing*, which refers to inserting single items from one language into another (Espinosa, 2014). The possible reasons why this occurs might be due to linguistic gaps, expressing ethnic identity, or achieving particular discursive aims, among others.

There are two types of code-switching, and each occur in different parts of an utterance. *Intra-sentential code-switching* corresponds to the idea of switching into another language in any part of the sentence, and it can combine both languages without violating any grammar rule. It can also be referred to as *classic code-switching* or *alternation code-switching*. Per contra, *inter-sentential code-switching* occurs at clause boundaries, (Bullock & Toribio, 2009). Poplack (1980), apart from inter-sentential and intra-sentential code-switching proposed *extra-sentential* switching too, which corresponds to the same idea of *tag-switching* pattern, proposed by Bullock & Torbio (2009). However,

in this study the tag-switching pattern will be classified as an intra-sentential switching. Find an example of each case down below:

Intra-sentential code-switching:

e.g., *Ella vol anar al* ***park***.

[*She wants to go to the park*]

Inter-sentential code-switching:

e.g., *Li vaig dir que no li podia comprar.* ***She got really sad***.

[*I told her I couldn't buy it. She got really sad.*]

Different code-switching patterns can be found:

a) *Alternation*: going from language A to language B. Languages remain relatively separated (e.g., *I can do it,* ***no et preocupis***. [*I can do it, do not worry*]). There is no dominating language in the utterance.

b) *Congruent lexicalization*: mixing a structure with concrete elements from the other language, since both languages share a common grammatical structure (e.g., *Al voltant de* ***100 people lost*** *els seus jobs*. [*Around 100 people lost their jobs*]).

c) *Insertion*: implementing a constituent, usually a word or a phrase, and following a structure ABA, going from language A to language B, and back to language A (e.g., *I can go to the* ***fruiteria*** *and get some apples*. [*I can go to the greengrocer and get some apples*]). One language dominates over the other in the sentence. Such situations, in which productions look like a completely mixed structure of vocabulary from both languages, can be related to the idea of a *compositional matrix language* (Myers-Scotton, 2003), which comes "when speakers produce structures for which the source of structure is split between two or more varieties (2003: 99)" (Bullock & Toribio, 2009: 3). This pattern can also be equated with the term *borrowing*, but slightly differences will be seen and discussed later.

d) *Tag-switching*: inserting a formulaic word or a tag element from language B is inserted into an utterance in language A, usually for pragmatic reasons (e.g., *I like this one,* ***d'acord****?* [*I like this one, right?*]). Bilinguals with minimal skills in one language are more likely to experience this (Bullock & Toribio, 2009).

As can be seen in the previous patterns, distinguished by Bullock & Toribio (2009), code-switching is not the result of a random combination of two languages, as it may be commonly thought.

Code-switching also needs to be distinguished from other contact phenomena such as *borrowing*, *loan translations* or *calques*, *semantic extensions*, *mixed languages,* and *language shifting*, which will not be included in the present study. Although clear distinctions between these phenomena and code-switching are not always possible, they should be made. *Borrowing* is used to define a wide range of approaches, from the transfer of semantic features, for example, suffixes and phonemes, to the transfer of whole clauses. In certain cases, *lexical borrowing* entails phonological and morphological incorporation of a single lexeme. *Loan translations*, also known as *calques*, include importing foreign patters or interpretations while keepings native-language morphemes. Another contact phenomena is that of *semantic extensions*, in which a word from a language takes on new meanings. The term *mixed languages* refers to the "contact varieties that derive components of their grammatical systems from diverse genetic sources" (Bullock & Toribio, 2009: 6); these are languages created from other languages. Finally, the term used when the language spoken at home is different from the one spoken at school, is *language shifting*. When a language is learned at home, it is not planned, sequenced nor organised, young learners acquire their first language in a naturalistic context that features authenticity and spontaneous language use.

2.2. Previous studies on code-switching

There are several studies that have studied code-switching in bilinguals, in both adults and children. The following studies explored this phenomenon from different perspectives. Some from a social point of view, looking at attitudes and behaviours, and others produced more in-depth analyses of the types of code-switching that occurred most frequently. All focused on case studies with participants of different ages.

Numerous studies have dealt with the language dominance. For example, Collins et al. (2012) analysed oral language competences of 163 Latino children of immigrant with dual language profiles of Spanish and English at kindergarten (mean age of 6;1) and second grade (mean age of 8;1). In their study they concur with the conclusion that Genesee et al. (1995) claimed, "dual language children with a regular and rich exposure

to both languages exhibit developmental patterns and milestones in the acquisition of linguistic structures similar to those found in monolinguals" (Collins et al., 2012: 4).

In order to analyse both syntactic and semantic oral language proficiencies in each language, they administered four different individually activities: memory for sentences, picture vocabulary, listening comprehension, and verbal analogies. The school linguistic environment was controlled through teacher questionnaires and classroom observations, as well as the school language use, that was observed between teachers, support staff and children at school. The home linguistic environment —the interactions between the child and their family members— was measured through parent reports.

They found out that, in kindergarten, their language performance was lower in both languages compared to that of a monolingual child. Their findings suggested that bilingual children start school with different skills degrees in both languages, and they need time and support to acquire age-appropriate language skills. They stated that the move from home to school and into the early school years is one of the most critical developmental times in children's life, since for language-minority children of immigrants it means joining a new world with its own set of culture and habits, as well as learning a new language. Although influences from both home and school are linked to dual language profiles, school factors are more important in second grade than in kindergarten.

Some studies observed code-switching from a social point of view, as Toribio (2002), whose study analysed code-switching practices among Spanish-English bilinguals in the United Stated. Participants were 4 teenagers (age is not specified) who had lived for a minimum of fifteen years in a US Latino speech community in Santa Barbara. The study included different tasks to evaluate their attitudes toward code-switching.

The results showed that the quantity and quality of code-switching differed greatly depending on speakers' linguistic and communicative abilities, as well as their attitudes toward code-switching and its importance in forming their sociocultural identity. They observed that code-switching is not an essential trait of US Latino speech, and not all communities practice it. Furthermore, they found that some Latinos feel that they are attached to a stereotype that code-switches, and, therefore, some of them completely refuse to use it. Finally, in one case they found that, on the one hand, code-switching was an indicator of linguistic weakness and loss, although, on the other hand, more affective

factors confirmed that code-switching granted her association with two disparate linguistic and cultural worlds.

In the same line as the previous social study, Juan and Pérez (2001) carried a longitudinal study of a Catalan-English bilingual child from 1;3 to 4;2 years old. Their corpus was also combined with data from other previous studies from the same authors. Juan (1996) recorded the period between 1;3 and 2;11 that included Catalan and English contexts, and Pérez (1996) recorded the period between 2;2 and 4;2 that included only English contexts. Their aim was to analyse the relationship between mixing and pragmatic parental strategies and early bilingual acquisition. To do so, they recorded audios and took notes of naturalistic situations from everyday activities from their main subject together with his parents, and all the recordings were transcribed and coded with SALT 2.0 (Miller & Chapman, 1986).

On the one hand, in order to analyse the child mixes, mixed utterances were divided into grammatical and lexical mixes. In Catalan and English settings, the data showed the percentages of child mixing and proper language choice based on the interlocutor. In Catalan settings, both complete and partially mixed utterances were always maintained to a minimum and tend to decline and nearly disappear with time. Per contra, in English settings, mixed utterances remained a permanent characteristic until the age of three. They also tended to decline after that, until they almost completely disappeared.

On the other hand, their other objective was to analyse the parental strategies towards mixing. The strategies both his parents used were *minimal grasp strategy*, *expressed guess strategy*, *repetition strategy*, *move on strategy* and *code-switching*. The results showed that the most used strategy by the mother is the move on strategy, and occasionally she used the code-switching strategy too. In contrast to his father, who used much more strategies. This seemed inevitable considering that the child, who was clearly Catalan dominant, spoke significantly more Catalan in his father's company than he did in English with his mother. At the end of their research, they could observe that the child had finally mastered the pragmatic rule that allowed him to switch languages depending on the interlocutor, thanks to all the strategies that the parents used during his language development. Without a doubt, the father's persistent and constant choice of language had a significant impact in the child’s development of bilingualism. If the father had given in to code-switching, English would have quickly lost ground and finally disappeared from the child's language repertoire.

Analysing code-switching from another perspective, Yow et al. (2016) carried a naturalistic observation study with 36 bilingual Mandarin-English children between the ages of 5;5 and 6;7 years old from private schools in Singapore. They aimed to explore the impact of code-switching exposure and behaviour on Singapore children's linguistic competence in English and Mandarin, and they wanted to contrast code-switching behaviour between children from two schools with different sociolinguistic contexts, one of which seemed to have a more active code-switching setting than the other. They suggested that bilingual child's language learning, and code-switching activities were influenced by two significant factors: the child's home language context, and the child's larger social climate.

Likewise, they had several observation sessions of the children in naturalistic context interactions at school, and these were transcribed according to CHLDES (MacWhinney, 2000), and these transcriptions were analysed through CLAN (MacWhinney, 2000). Their basic unit of analysis was an *utterance*, defined as "a word or group of words with a single intonation contour (Lanza, 1992, p.638)", and they computed the following variables: "the number of different word roots", "mean length of utterance", "the number of code-switch utterances", and "the number of pure utterances", (Yow et al., 2016: 86-87).

The results of the analysis showed that children's unintentional code-switching activity in the classroom, as well as parental statements of code-switching exposure at home, had no negative correlation with their English receptive vocabulary, lexical diversity (number of different word roots), and linguistic complexity (mean length of utterance), which indicated that code-switching between English and another language (in this case, Mandarin) had no negative effect on children's receptive and expressive linguistic competence. If anything, the sum of code-switching and Mandarin lexical richness and linguistic difficulty had positive correlations. In comparison to bilingual children who code-switched less, those who code-switched more showed a higher degree of expressive linguistic competency in Mandarin, while manifesting no indication of lower level of competency in English, what suggested that code-switching could be a sign of linguistic competency.

While increased Mandarin exposure at home may well have benefited children's linguistic competence in Mandarin, code-switching activity with peers at school might play an equal, if not greater, impact on the development of Mandarin. They observed that

children that used purer Mandarin utterances, had richer Mandarin lexicons, and, therefore, they were able to produce more complex Mandarin utterances. They also code-switched more than the children that had predominant conversations in English among themselves. These observations suggested that children's language behaviour is largely influenced by their social environment.

Concerning the types of code-switching with regard to written and oral productions, Montes (2000), investigated various aspects of the linguistic behaviour of Spanish-English bilinguals in California, and looked at how people's beliefs towards code-switching influenced the types of code-switches that could be observed in oral and written narratives. The participants of the project were 10 people (six males and four females) from 19 to 27 years old, whose Spanish was their first and dominant language. The results showed that they could equally code-switch in written productions as in oral productions, and they also found out that intra-sentential switches were more frequent in writing than in oral productions. They concluded that code-switching was usually seen positively by the subjects, and it was not seen as a result of a lack of language proficiency; therefore, the author argued that younger generations of college-educated bilinguals had developed a more positive attitude towards this phenomenon. In both written and oral modes, the intra-sentential type was more produced and elaborated than the inter-sentential type. As a result, when subjects with negative attitudes toward code-switching were required to swap languages, they did not typically produce the less elaborated inter-sentential type, since this constitutes a more complex mode of production, and speakers who do not frequently code-switch would be unlikely to try this kind of switching in speech.

Regarding the types of code-switching, Koban (2012) carried out a study in which explored patterns of code-switching in the speech of first- and second- generation Turkish-English bilingual adults from 20 to 57 years old using Poplack's (1980) model: *inter-sentential*, *intra-sentential*, and *extra-sentential* code-switching. Intra-sentential code-switching, according to Poplack, is the most difficult method of code-switching since it allows bilingual speakers to provide a thorough understanding of both languages' grammars. As a result, the more fluent the speaker is in both languages, the more easily they can code-switch between them within a single sentence or clause. Their project aim was to observe the code-switching in the speech of 20 Turkish-English bilinguals in the United States. After recording and transcribing the individual 30-minute interviews, they found that intra-sentential code-switching was represented in great numbers in their data

and was more produced than inter-sentential and extra-sentential code-switching. Their study was consonant with Poplack hypothesis, which claimed that intra-sentential code-switching is highly produced when speakers are balanced bilinguals.

Genesee et al. (1995) also investigated this aspect, but with younger participants. They carried out a study about simultaneous acquisition of two languages at early childhood. The study examined five bilingual children from 1;10 to 2;2, and the spoken languages were French (father's dominant language) and English (mother's dominant language), although all parents had at least some knowledge in their spouse's language. This study uses the term 'code-mixing' to refer to sentences that mix, in this case, English and French. Instead of referring to this phenomenon as 'code-switching', they use the term 'code-mixing', but the underlying idea is the same.

The study lasted for three weeks, during which families were visited by a bilingual observer in three different contexts. On two occasions the children were observed interacting with each of their parents separately, and on the third occasion with both parents present. The parents were asked to do whatever they usually did in a free play environment during the observation sessions; in some situations, the free play period automatically transitioned into mealtime. The sessions lasted 45 to 60 minutes each. When communicating with the parents, the observers were told to use both languages to the show the children that it was natural. All the sessions were video, and audio recorded and transcribed, according to CHAT transcription system from McWhinney and Snow (1990). The first five minutes were skipped in order to give the families time to get used to being filmed.

In order to observe the language dominance, they calculated the mean length of utterance (MLU) and the upper bound, that was calculated by the number of morphemes in the child's language record's longest utterance. They discovered significant individual variations in the level of these children's linguistic development, and they calculated in which language each child was dominant in.

One of the aims of the study was to observe if children were able to differentiate each language. They first hypothesized that if bilingual children were unable to distinguish their developing languages, they would not use each language just with the respective parent that speaks it, in this case. English for mothers and French for fathers. As an alternative, if the children were able to distinguish between their languages, they should be expected to speak to one parent's main language rather than the other. The results

showed that each child used mostly English with their mothers and mostly French with their fathers when they were alone, but also when both parents were present, but Gen (the oldest child), who, with both parents, spoke almost the same amount of each language.

With the interaction of the stranger, only Gen and Will were observed, since they were the oldest. They both used more English-only utterances than French-only or mixed utterances, and they clearly differentiated them. When the stranger seemed not to understand something, in almost most of the situations they managed to reformulate the utterance or used non-linguistic repair. They recollected in percentages each child's use of French, English and mixed utterances with a stranger, the mother and the father.

These previous results indicated that even the youngest bilingual children were able to distinguish their languages, as well as the most dominant ones, and even with limited skills of the other language, they were able to talk to their parents. Furthermore, they found that if the input to which infants were exposed was systematically mixed, they were doing so as well. From their results, they saw that more systematic parental mixing, which they observed, was needed to have an effect on the children's mixing. Also, they tended to code-mix more when they were using the non-dominant language, rather than when using the dominant one. They concluded that bilingual children use all the linguistic resources they have access to in both languages to express themselves.

The previous studies were organised into groups of fields that analyse code-switching from different perspectives. To sum up, Collins et al., (2012) did not do a direct study on code-switching, but on language dominance and the environment factors that may interfere in their language's competence. They analysed syntactic and semantics language proficiencies in dual Spanish-English bilinguals. Their study showed that in kindergarten monolingual children performed better than bilingual ones, but they showed competent profiles at second grade. They observed that home and school were highly associated with dual language profiles, but school factors were more relevant during second grade than kindergarten. From a social perspective, Toribio (2002) study wanted to analyse the attitudes before code-switching in a US Latino speech community. The results showed that the quantity and quality of code-switching indicated differed greatly depending on speakers' linguistic and communicative abilities, as well as their attitudes toward code alternation and its importance in forming their sociocultural identity. It was concluded that code-switching is not an essential trait of US Latino speech, and some of them refuse to use it for completely. Furthermore, considering whether parental attitudes could have

an effect on the children's mixing, Juan and Pérez (2001) study demonstrated the strategies that parents use to get children to speak a language clearly influences how much of a language the child will speak.

Following a different line of study, Yow et al., (2016) demonstrated that code-switching between English and Mandarin, which have large linguistic distance, had no negative effect on their lexical diversity, neither their linguistic complexity, in fact, Mandarin richness had positive correlations in their linguistic competence. They showed that children who code-switched more, had a higher linguistic competency in Mandarin.

Working with adults, Montes (2000) research showed that adult bilinguals can equally code-switch in written productions as in oral productions, and they also found out that in both modes, the intra-sentential type was more produced and elaborated than the inter-sentential type. Moreover, the author saw that this phenomenon was usually seen positively by the subjects, but when subjects with negative attitudes toward code-switching were asked to swap languages, they did not produce the less elaborated inter-sentential type. As well as Koban (2012), who also proved that intra-sentential code-switching was widely more used for balanced bilinguals than inter-sentential code-switching.

Lastly, Genesee et al. (1995) study partly consisted of calculating the MLU of each of their bilinguals, to know which language they were dominants in. They were also able to claim that the children were able to distinguish each language, so alternating languages was a conscious process, since each child used the respective language their parents when they were alone with their child, and also when they there were both of them.

To the best of the author’s knowledge, there are no studies that have worked with English-Catalan bilingual infants living in Taiwan. Nor, to the best of the author's knowledge, are there any case studies that have examined which code-switching pattern is most used, but rather studies that analysed code-switching patterns from a theoretical (Bullock & Toribio, 2009; Muysken & Muysken, 2000), or social (Iipinge, Makamani, & Ashikuti, 2019) perspective.

2.3. Aims and research questions

The purpose of this study is to investigate code-switching in the speech of three Catalan-English early bilinguals (aged 11, 8 and 5) that have been exposed to four different languages since they were born, and which they use in different contexts. This present study aims at exploring what code-switching patterns can be observed. Moreover, following up on prior studies, it also seeks to find out whether age is a factor that can determine the amount and type of code-switching that occurs, and whether intra-sentential switches occur more frequently than inter-sentential switches with early bilingual children. Finally, the calculation of the Mean Length Utterance (MLU) will also be object of study in this project to determine whether there is one language that predominates in their oral productions.

This will be a qualitative study, since the naturalistic oral speech of a determinate group of three children will be analysed. However, it will also contain parts of a quantitative study, as it will be necessary to answer the research questions that will follow. As it is case study, focused on the comprehension of a specific situation, the comparison of thee results with other cases will be done with caution.

The research questions that were asked to develop this study are the following ones:

- What is the language that dominates the most in their oral production? Does the choice of using one language over the other depend on the interlocutor?
- Which patterns of code-switching can be observed in their oral performance? Does the amount of code-switching vary across languages?
- Does age affect the amount and type of code-switching?

3. METHODOLOGY

This study is focused on the analysis of naturalistic samples of speech production, which have been recorded in four different contexts: in the first one, kids were talking to their parents while having dinner all together; in the second one, they were playing a board game with their parents, but at some point, their parents were no longer in the conversation, and the children were drawing, and writing on a notebook; in the third one, they all were travelling by car; and in the fourth one, they were at home (sometimes the three children were talking alone, and sometimes their parents were present in the conversation). All recordings of the infants have been provided by the parents and used

with their consent. In the following sections the description of the subjects of study and the procedure for data analysis can be found.

3.1. Participants

This naturalistic observation study has been conducted with three Catalan-English bilingual children: Ina is 10 years old, Nau is 8 years old, and Eix is 5 years old. They were born in Taichung (Taiwan), of Catalan immigrant parents. The languages that coexist in their environment are Catalan, English, Spanish, and Chinese. However, in this study only Catalan and English will be compared. All the following information about the language use and exposure was provided by their parents through a short phone interview (see Annex 2 for the asked questions).

INA

Ina is 11;7 years old. She has acquired the Catalan language at home, since it is the first language of both her parents. She was first exposed to English and Chinese at the age of 1;10, when she started kindergarten, although at the age of 3 to 5 years old, she was moved to an international kindergarten where only English was taught. While her first kindergarten programme provided fairly equivalent amounts of English and Chinese, and her second kindergarten provided only English lessons, the currently elementary bilingual education programme is advocated mostly in an English curriculum. Although Chinese is also present, English governs the interactions with her classmates, and the instruction by the teacher in the classroom. Ina engages in a variety of extracurricular English-language activities on a daily basis, such as piano, basketball, football, swimming, hip-hop, and she is a member of the school choral. She listens to music and watches television programs or cartoons in Catalan, Spanish, and English. She reads Catalan, and English books, but she can also read in Spanish. Besides, she was asked what her favoured language was, and she answered, without hesitation, English.

Her parents aside, she also speaks Catalan with Catalan-dominant speakers, mainly adult family members, or cousins who are around her age. They all live in Catalonia and with whom she speaks through phone calls when they are not together. She uses English with other children, as her classmates, and her siblings, but on some occasions also with her parents.

NAU

Nau is 8;10 years old. Like Ina, he has acquired the Catalan language at home. He was first exposed to English at the age of three, when he started kindergarten (3-5). While his kindergarten programme provided only English, his currently elementary bilingual education programme is advocated mostly in an English curriculum, but Chinese is also present on it. However, English governs interaction with his classmates, and instruction by the teacher in the classroom. Nau also engages in a variety of extracurricular English-language activities on a daily basis, such as swimming and football, as his sister does, and technology. He listens to Catalan, Spanish, and English music as well. He watches television programs or cartoons also in the three languages, and he usually reads Catalan, and English books, but he can also read in Spanish. As his sister, his preferred language is also English.

As Ina, his parents aside, he also speaks Catalan with Catalan-dominant speakers, mainly adult family members, or relatives his age. They all live in Catalonia and communicate with him via phone calls when they are not together. He uses English with other children, such as his classmates, and his siblings, but on several occasions also with his parents.

EIX

Eix is 5;8 years old. Like his siblings, he has acquired the Catalan language at home. As his older siblings already spoke English, he was first exposed to English at home as well. Unlike his siblings, he was first exposed to Chinese at the age of three, when he started kindergarten (aged 3-4). While his kindergarten programme provided mostly Chinese (although English was also introduced). As his siblings, his elementary bilingual education programme is advocated mostly in an English curriculum, but Chinese is also present on it. However, English governs interaction with his classmates, and instruction by the teacher in the classroom. Eix plays in the football team, like his siblings, as an extracurricular activity. He listens to Catalan, Spanish, and English music, and watches television programs or cartoons, also in the three languages as his siblings do. As he is younger than them, he still cannot read perfectly, but he is starting to read in English.

As both his siblings, he also speaks Catalan with Catalan-dominant speakers, mainly adult family members, or cousins who are around his age. They all live in Catalonia and with whom he speaks through phone calls when they are not together. He uses English with other children, as his classmates, and his siblings, but sometimes with his parents as well.

3.2. Procedure

First of all, the participants parents were first contacted to ask if they wanted to participate in the study. They were informed of the main objective of the project and asked for their collaboration and consent to work with their children. A semi-structured interview was conducted to find out more about their children's languages curriculum, and to get information about their school background, the languages that learned in each different context, and at what age they learned them, their current languages' environment, and leisure time activities languages (see Annex 2). After, parents were asked to record random moments of the day when their children were interacting with each other for three weeks.

Voice recordings. The parents were asked to record the children in separate occasions during the time span of approximately three weeks. As noted earlier, four different contexts were observed. On the first one, the children were interacting with their parents, and three different samples were recorded, each of them of 10:42, 06:01, 04:12 minutes, respectively, so a total of 20:55 minutes were collected on the first setting. On the second one, they were also interacting with parents at first, but then only between them, and it was recorded in five segments, each of them of 01:06, 02:10, 0:21, 06:53, 09:37 minutes, respectively, so a total of 20:21 minutes were collected on the second setting. On the third one, the five of them were going back home by car, and the three kids were taking to their parents. This setting was recorded in two audios, one of 3:52, and another of 5:12 minutes, so a total of 9:04 minutes were collected. On the fourth one, the family was at home, and the children were talking on their own. In this setting two samples were recorded; a first one of 8:49 minutes, and a second one of 9:57 minutes, so a total of 19:01 minutes were collected on this last setting. All the samples consisted in the recording of naturalistic speech, as the aim was to collect data that was ecologically valid. The parents were asked to do what they simply did when they were talking to their kids, and they used both languages as they commonly do. The children were not aware of being recorded.

Transcriptions. All the data was only audio recorded, and a total of 1 hour, 9 minutes, and 21 seconds from four different days were obtained. They were fully transcribed in a Word document, and each language was highlighted in a different colour (blue for English, and green for Catalan). All the children's utterances and clearly comprehensible words of each language were transcribed in the orthography of that language. This document contained the complete dialogues transcribed. The fragments that were

unintelligible due to background noise or low voice tone, were replaced by a "[…]", and the words that were not clear enough were marked with a "[?]" next to them, what was not taken into account in the calculations. This document was created for a qualitative purpose: to analyse what was said in their oral productions and to pay attention to the interlocutors, and to the switches that occur when the interlocutor changes.

Coding. Data from the transcriptions was moved to an Excel document in order to analyse the code-switching patterns of each child. All utterances were added and coloured in its respective language colour. This document had three sheet tabs, one per child, only with their utterances written on the first column. Its objective was to code the following patterns: *utterance*, *alternation*, *congruent lexicalization*, *insertion*, *tag-switching*, *English only*, *Catalan only*, *intra-sentential code-switching*, *Catalan morphemes*, and *English morphemes*. *Inter-sentential code-switches* were calculated separately with the Word document. The number of times each item appeared was written next to its utterance (see Annex 3). The Excel document was created for a quantitative purpose, in order to calculate the number of utterances that were produced in each language, the number of times they code-switched, and the frequency each pattern was produced.

The way the utterances were coded in order to be classified as one pattern or another is exemplified in Table 1 below.

TABLE 1. *Exemplified patterns of code-switching*

Alternation	Nau: vull treure la *hard thing* [*I want to take out the hard thing*]
Congruent lexicalization	Eix: *està* so close *per la* Africa. Spain *està* close *per la* Africa [i*t's so close to Africa. Spain is close from Africa*]
Insertion	Ina: però ja estic *out* papa? [*but am I already out, dad?*]
Tag-switching	Eix: […] almost under water, *a que sí*? [*almost under water, right?*]

4. RESULTS

Language dominance

The first research question aimed at exploring which language dominated the most in their oral production and whether the choice of using one language over the other depended on the interlocutor they were addressing.

The children's respective use of English and Catalan was calculated both, when they were interacting with their parents and when they were interacting only the three of them, as a percentage of the total number of utterances. As seen below, Table 2 shows the total number of utterances that each sibling produced in English and Catalan only, as well as the utterances in which code-switching was used.

TABLE 2. *Classification of utterances by language*

	Number of utterances	*English only utterances (%)*	*Catalan only utterances (%)*	*Code-switched utterances (%)*
Ina	121	69 (57,0%)	26 (21,5%)	26 (21,5%)
Nau	95	75 (78,9%)	9 (9,5%)	11 (11,6%)
Eix	103	75 (72,8%)	10 (9,7%)	18 (17,5%)

The data shows that 57,0% of the utterances Ina produced were in English, 21,5% were in Catalan, and 21,5% were code-switched utterances. Nau produced 78,9% of the utterances in English, 9,5% in Catalan, and 11,6% were code-switched utterances. Eix produced 72,8% of the utterances in English, 9,7% in Catalan, and 17,5% were code-switched utterances.

A quick look at the data can already reveal that English is the predominant language in their speech. To further assess the weight of each language in their speech, the Mean Length Utterance (MLU) was calculated. To do so, the number of morphemes in each language was divided by the total number of utterances. Each of the interventions was separated into utterances. These utterances consisted of a minimum of one word and a maximum of one structure formed by a subject, a verb and an object. For this reason, some utterances were shorter than others, as one child may have spoken more than

another. Thus, an intervention could have several utterances. Table 3 shows the total number of utterances annotated for each child, the total number of morphemes they produced in English and Catalan, and then the calculation of the MLU for each language.

TABLE 3. *Mean Length Utterance*

	Number of utterances	*Morphemes in English*	*Morphemes in Catalan*	*MLU (English)*	*MLU (Catalan)*
Ina	121	422	379	3,49	3,13
Nau	95	351	61	3,69	0,64
Eix	103	491	174	4,77	1,69

As can be seen in Table 3, Ina produces a higher number of utterances than their brothers do, and the MLU scores in both languages are quite similar: 3,49 in English and 3,13 in Catalan. She is followed by Nau, who produces a smaller number of utterances than his siblings, and as can be seen in the previous table, very few morphemes in Catalan, leading to a short MLU of 0,64 in Catalan, whereas his MLU in English is 3,69. Eix produces fewer utterances than his sister but, in fact, there is a greater difference in the scores between one language and the other: 4,77 in English compared to 1,69 in Catalan. The level of English dominance is much stronger in his case, much like his older brother. These results indicate that English is the language that dominates the most in their utterances, although Ina's results are very similar in both languages.

In order to answer the second part of the first research question (*Does the choice of using one language over the other depend on the interlocutor?*) see the following example:

(1) Dad: aix si embrutem el cotxe de la mama...

[*ouch, if we mess up mom's car...*]

Nau: ja ho ha fet, allà, allà i allà

[*he has already done it, there, there and over there*]

Nau: put it in your mouth

In this setting, in the first answer Nau addresses his father in Catalan, while right after ("put it in your mouth") he addresses Eix in English. As can be seen in Table 2 and Table 3, Ina produces a higher level of morphemes and utterances only in Catalan than her siblings. This is due to the fact that she mostly speaks to her parents in Catalan, unlike Nau and Eix, who do it less frequently. The following dialogue is an extract of Ina talking to her father:

(2) Ina: però que no trucaves a l'àvia?

[*Weren't you going to call grandma?*]

Dad: després truquem a l'àvia

[*Later we'll call grandma*]

When she addresses her parents, she does it in Catalan. This does not mean that she does not code-switches when talking to them, since different code-switching patterns can also be seen in her speech (e.g., "però havies de dir més que *eighteen*!" [*but you had to say more than eighteen*]). However, she does not code-switch as often as her brothers do, she tends to maintain the language in which they address to her.

In the following example it can be clearly seen an alternation from English to Catalan when Eix addresses his brother, versus when he wants to say exactly the same to his dad:

(3) Eix: Nau I wanna ride on one of them. Papa vull fer *ride* amb un.

[*Nau I wanna ride on one of them. Dad I wanna ride in one.*]

Here is the example of another extract, where the three of them had been talking in English for a while, without their parents interacting in the conversation and, at this point of the dialogue, Nau was drawing a monster on his notebook. They were talking about the drawing:

(4) Ina: Nau, what is it?

Eix: a ghoul!

Ina: what is it?

Nau: that's a ghoul

Ina: ahhh... makes sense, now it does

However, Ina suddenly addresses her mother, who was not into the conversation, and switches from English to Catalan completely, but when she addressees her brother again, Ina switches back into English:

(5) Ina: mama, quin és el meu vas?

[*Mum, which is my glass?*]

Ina: Nau do you want your cup?

Nau: no, I don't

Dad: és aquest diria

[*I think it's this one*]

Eix: aquest és meu! Que el tenia la Ina, però després hem fet *swap*!

[*This is mine! Ina had it, but then we swapped them!*]

Once again, it can be observed that Ina's utterance is completely in Catalan, without any traces of English. Per contra, Eix's utterance when he talks to his parents includes an English verb, so the insertion pattern is shown.

Data provided a total of 14 examples like this one, in which in the same setting, depending on the interlocutor to whom they are addressed, they code-switch. Ina switches language according to the interlocutor 7 times, Nau twice, and Eix 5 times. When their parents were not taking part in their conversations, they used mostly English, and hardly any traces of Catalan were found in their speech. As their parents were in the setting at all times, whether they talk or not, all the data was pooled from both parent-participatory and sibling-only interactions. In addition, all the collected utterances were grammatically correct, as can be seen in examples (1), (2), (3), (4) and (5), and no ungrammatical sentences were recorded.

Thus, the choice of using one language over the other depend on the interlocutor they are addressing to. It can be observed that the use of English is more frequent when they speak to each other, rather than when they speak to their parents. When they address to their mother or father, they tend to use more Catalan, although English may be used in some parts of the utterance. However, the same does not apply when the three of them interact alone with each other, as they mostly use English.

Code-switching patterns

The second research question aimed at observing the patterns of code-switching that were used in their oral performance. In this section the utterances in which only English or Catalan are used will be left aside, and the analysis will be focused on those that code-switching is proceeded. To do so, every time one of the patterns was produced, it was tallied, as stated at 2.1.3. The following percentages were also calculated according to the total of times that code-switching had been carried out to be able to compare the use of the patterns among siblings, as can be seen in Table 4.

TABLE 4. *Code-Switching Patterns*

	Number of code-switches	*Alternation*	*Congruent lexicalization*	*Insertion*	*Tag-switching*
Ina	29	13 (44,8%)	2 (6,9%)	13 (44,8%)	1 (3,5%)
Nau	11	8 (72,7%)	1 (9,1%)	2 (18,2%)	-
Eix	33	9 (27,3%)	4 (12,1%)	19 (57,6%)	1 (3,0%)

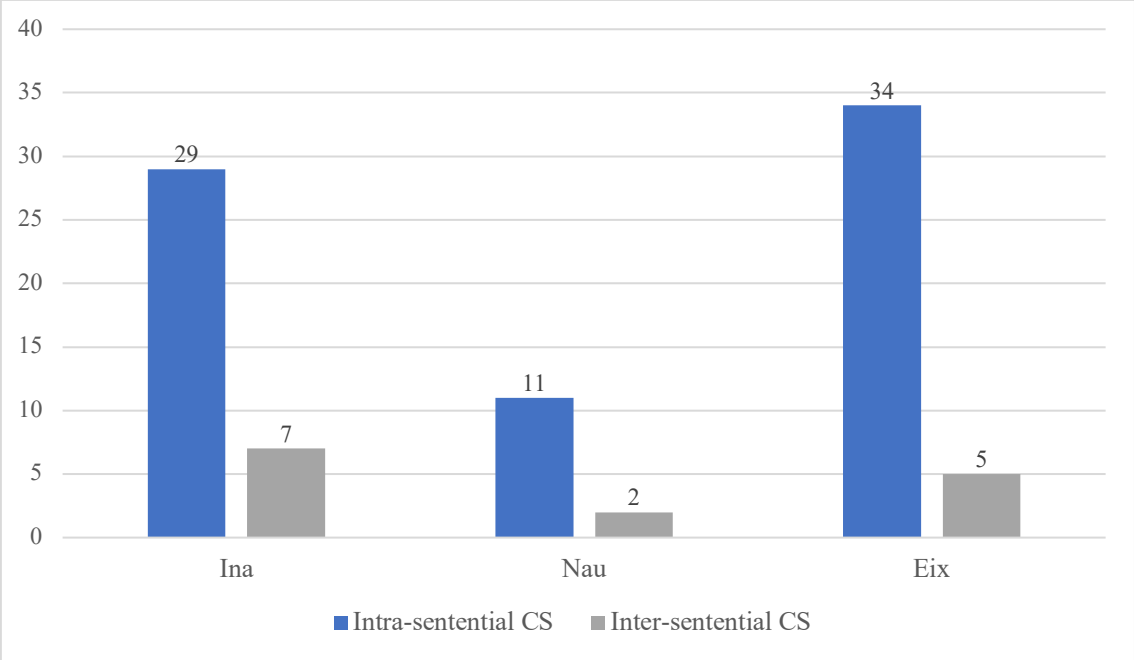
Almost all patterns of code-switching can be observed in their oral performances, and *alternation* and *insertion* are the ones that dominate the most. As we can appreciate in Table 4, Ina's patterns choice is balanced between *alternation* and *insertion* patterns. *Congruent lexicalization* and *tag-switching* patterns are not as frequently used by any of the children as its respective table can show. Nau has a much lower number of times of code-switching, and the predominant pattern is *alternation*. Meanwhile, Eix follows a similar line to Ina's, although he presents more cases of the *insertion* pattern. Specifically, more than 50% of his code-switches follows this pattern. Ina and Eix only use one time the *tag-switching* pattern, but Nau does not use it at all.

The data shown in Table 4 clearly distinguishes that Ina uses all the patterns, and the most used ones are *alternation* and *insertion*, in a balanced way. Nau does not use as much code-switching as his siblings, and the one he uses the most is *alternation*. Finally, Eix also produces all the patterns, and the one he uses the most is *insertion*.

Age factor

The third research question aimed at determining whether age affects the amount and type of code-switching. In order to answer this question, the percentages of use of each pattern shown in Table 4 will be considered. *Alternation*, *congruent lexicalization*, *insertion* and *tag-switching* patterns are classified as *intra-sentential code-switching*, whereas each time the children changed language between one utterance and another, they were counted and classified as *inter-sentential code-switching*. The following graph visually shows the produced amount of both types of switches.

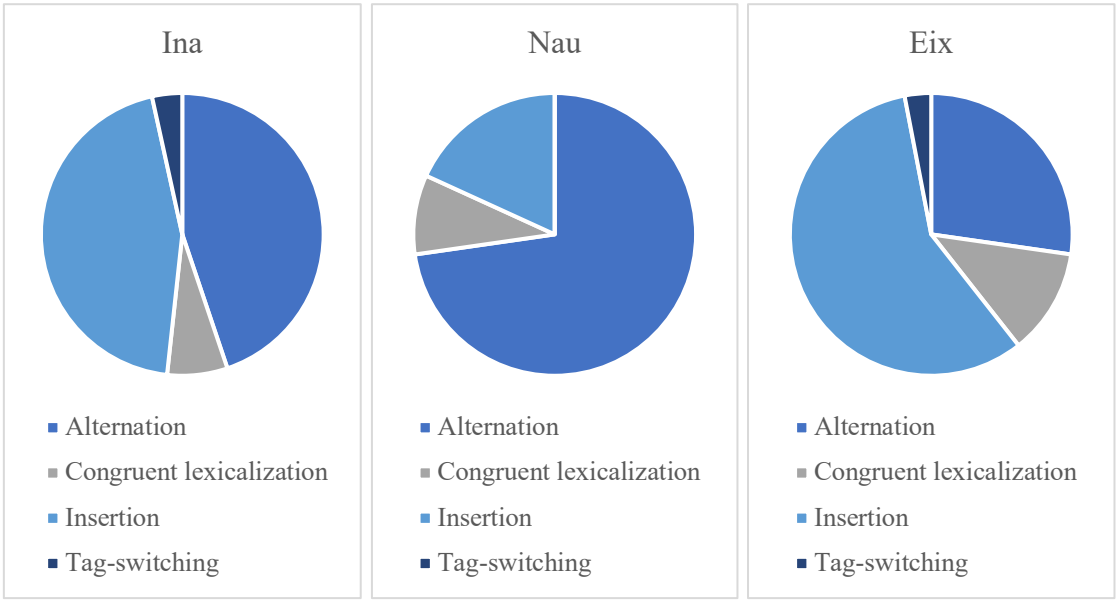
FIGURE 1. *Intra-sentential and inter-sentential code-switches*



Ina presents 29 intra-sentential switches, and 7 inter-sentential switches; Nau produced 11 intra-sentential switches, and 2 inter-sentential switches; and Eix produced 34 intra-sentential switches, and 5 inter-sentential switches. Eix, who is the youngest sibling, produces a higher number of code-switches. Ina, who is the oldest one, produces a smaller but similar number of switches as Eix does. Nau, who is the medium one, produces a considerable smaller amount of code-switching compared to his siblings.

Regarding the subtype of patterns that they produced, the following graph shows the same results stated in Table 4 in a more visual form.

FIGURE 2. *Display of Code-Switching Patterns*



As Figure 2 shows, alteration and insertion patterns are the ones that occur most frequently at the three different ages. Ina, who is the oldest sister, produces a balanced amount of alternation and insertion switches. However, she uses congruent lexicalization and tag-switching patterns less frequently. Nau, who is the middle brother, mostly uses the alternation pattern, followed by the insertion pattern and less frequently the congruent lexicalization pattern. He does not use the tag-switching pattern even once. Finally, Eix, who is the youngest brother, mostly uses the insertion pattern, followed by the alternation pattern. He also uses the congruent lexicalization pattern, although less frequently, and, as his siblings, the tag-switching pattern is the least used.

5. DISCUSSION

This was an exploratory study of a family living in Taiwan, where Mandarin Chinese is the official language, but the language they learned at home is Catalan, and English at school. The overall aim of this study was to analyse the use of code-switching through a case study of three early bilingual children. By means of recordings of natural produced speech, the aim was to investigate the amount and type of code-switching present in their oral production, as well as those factors that could have an influence on it.

In the first research question, the aim was to find out which language was the most dominant in the children's oral productions, and whether the choice of using one language over the other depended on the interlocutor. According to the data, it can be asserted that

English is the language that dominates the most in their speech. The data showed that the siblings spoke mostly English between them, and Catalan was present in their interactions only when the parents were with them. As the language they have learned at school is English, a possible explanation as to why they communicate in this language with each other might be that they associate English with children. This falls in line with Collins et al. (2012)'s study, in which it was observed that home and school were highly associated with dual language profiles, and the present study data contributes on this affirmation. That being said, the subjects in the present study were born and live in a country where Mandarin Chinese is spoken, at school they learned English, at home they speak Catalan and, very occasionally, there is Spanish presence. With so many languages around them, it must be very difficult to determine a clear linguistic profile.

In addition, and in line with Juan and Pérez (2001)'s study, in the present study it has also been found that the choice of using one language over the other depended completely on the interlocutor. Although this study did not look at the mixing strategies of the parents, but focused on the code-switching strategy of the children, it could be said that the parents had a great deal of influence on the amount of code-switching that the children produced, as they also made use of this strategy. Thus, in line with Toribio (2002)'s study, parents did not show negative attitudes towards the use of code-switching.

At first, it seemed that data could suggest that they were not aware of when they code-switched. However, based on the findings of similar studies, a more plausible explanation is what Genesee et al. (1995) argued. When they investigated if children were able to differentiate each language, they first thought that if bilingual children were unable to distinguish their developing languages, they would not use each language just with the respective parent that spoke it, but they did. Restating the first premise, the same reasoning can be applied to this present research. If they were not able to distinguish both languages, they would not address their parents in Catalan and their sibling in English in the same sitting. Thus, they do differentiate them.

The second research question aimed at identifying which code-switching patterns were most frequent in their oral performance, and whether the amount of code-switching vary across languages. Data shows that Ina uses the *alternation* and *insertion* patterns with the same frequency; Nau uses the *alternation* pattern in more than half of the code-switched utterances; and the *insertion* pattern is the one that occurs most frequently in Eix's code-switched utterances. Intra-sentential code-switching occurred to a greater extent than

inter-sentential code-switching in all three children's data. In agreement with Koban (2012) and Montes (2000) studies with adults, the present study has also been found that intra-sentential switches were significantly more widely used even with children. This present study did not analyse written productions as Montes (2000) did, but only speech productions. Consequently, it can only be argued that they produced more intra-sentential code-switches in oral production.

Furthermore, the data of this present study showed that the subjects tended to code-switch more when they were using the non-dominant language (Catalan), rather than when using the dominant one (English), which answers the second part of the second research question. The amount of code-switching does vary across languages. This coincides with Genesee et, al. (1995)'s study, that also reached the same conclusion.

Although code-switching was present in their speeches, this did not affect the quality of the discourse. As it could be seen that all the sentences the children produced during the recordings have been linguistically well produced, both in Catalan and in English. As Catalan and English have the same sentence structure (SVO), this facilitates their code-switched utterances production. In the hypothetical case that Spanish had also been analysed, and that they had the same knowledge of the language as English or Catalan, the results would probably be similar. Since Spanish has also the same SVO structure and, therefore, it would also be easy to produce code-switched utterances. In the recordings, no traces of Mandarin Chinese were found, although perhaps if they had been recorded in a school context, it might have shown up. As the linguistic distance between Mandarin Chinese and Romance languages is very large, it is not known how the patterns of code-switching that have been analysed in this experiment would have manifested. Yow et al. (2016)'s study showed that, by using code-switching, there was no negative effect on linguistic diversity and linguistic complexity of the participants productions. In fact, children who code-switched more showed a positive correlation in their linguistic competence. This present study has not analysed whether the production of more code-switching has a positive correlation with their linguistic competence. However, no negative effects on linguistic complexity, neither in terms of vocabulary nor syntax, could be observed.

The third research question aimed at identifying whether age affected the amount and type of code-switching. The three children produced code-switched utterances, and data showed that there seems to be a tendency of producing intra-sentential switches over

inter-sentential switches. Ina produced 29 code-switched utterances, of which the alternation and insertion patterns were predominant, Nau produced 11, of which the alternation pattern was predominant, and Eix produced 33, of which the insertion pattern was predominant. We can extract that, at a certain age, such as Ina's, the patterns are more systematic and occur in a balanced way. In contrast to Nau and Eix, who are still younger and there is a pattern that clearly dominates the most in their choice. As stated before, in the case of Nau, this pattern is alternation, and in the case of Eix, it is insertion. However, according to the results obtained, it is not clear whether age is a factor in the production of more or fewer code-switches in a sentence, nor in the type of pattern, as alternation and insertion patterns are common in the productions of all three children. It is true that the results between siblings change, and that the younger one produces more code-switched sentences than the older one. But an assertion that age is an influencing factor would make sense if the number of code-switches decreased linearly in age. But Nau, who is the middle brother, produces the least code-switching. So, it is possible that there are other factors that can explain the different amounts of code-switching production, such as the character of the child, whether they are more or less talkative, whether they have been recorded at a time of the day when they were in a good or bad mood, the context, or the topic of conversation they were having.

6. CONCLUSIONS

This study contributes to the area of code-switching by investigating a case study of English-Catalan early bilingual children living in Taiwan. The analysed aspects were the most dominant language in their speech, whether the interlocutors could interfere in that decision, the patterns of code-switching that occurred most often and whether age could interfere in all these outcomes.

It has been found that the language that dominates the most in their oral productions is English, and that the choice of one language or another depends on the interlocutors they are addressing. Among the three siblings, they speak mostly in English, and it is when they interact with their parents that they make use of Catalan, and here also emerges code-switching constructions between these two languages.

Intra-sentential code-switching, in other words, the switching from one language to another within a single utterance, is most frequently used rather than inter-sentential code-switching. These results have been able to show that this phenomenon does not happen

only to adult bilinguals, but also infant bilinguals. As for the patterns of intra-sentential changes, alternation and insertion are the most frequently used by these particular children.

According to the data obtained, alternation and insertion patterns dominate the most in their oral productions, and hardly any examples of congruent lexicalization, nor tag-switching are produced. The youngest child is the one that produces the most code-switches in the same utterance. Although there are only six years of difference between the oldest and the youngest sibling, and there is not a huge difference in their results, these may not be significant enough to claim that age affects the amount and patterns of code-switching. It is possible that other factors, such as the child's personality, whether they were recorded during a time of day when they were in a positive or negative mood, or the content of the talk, might have played a role. Regardless, it can be seen that intra-sentential changes are more common than inter-sentential changes at any age. Thus, it can be concluded that it cannot be confirmed that age is a factor affecting the amount and type of code-switching generated.

The study has some limitations that should be noted. Firstly, it was a case study, so the results should be interpreted with caution, as only three particular subjects in four particular settings were observed, so the results may not be generalizable to other studies.

A second limitation is that the audios were recorded by the parents. This was done to obtain complete natural speech production, but the fact that parents were present in most of the recordings may also have influenced the results, because it has been seen that children speak Catalan when addressing their parents. In addition, as it was natural speech, the results could have been completely different if they had been recorded on different occasions, or even if more data had been provided. In the same line, since a part of the recordings were in natural contexts, such as in a bar, some fragments were lost because of background noises and other people talking. Although this may sound like a handicap, it is what allowed us to fully analyse the natural oral production, as there was no interference that could alter the natural produced speech.

There are many possible future lines of research in the area. On the one hand, the number of participants could be increased, and more recordings could be obtained from different contexts. On the other hand, apart from the children’s code-switching, the oral productions of the parents could also be analysed, as well as the mixing strategies that they used. Moreover, semi-directed activities could also be introduced, in order to

compare code-switching within the same topic and see if there are patterns in common among participants. Another follow-up study could also introduce an only-Catalan, and an only-English interlocutors, to see whether the siblings would also produce code-switching, or whether they would be aware that they are only understood if they speak in one of the languages. In this study only English and Catalan have been taken into account, but it would have been interesting to analyse other contexts in which Spanish and Mandarin Chinese were present. Future research should look into all these questions, as there are still many aspects to be analysed in the field of code-switching and bilingualism.

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8. ANNEX 1. Comparison Catalan to English

eLinguistics.net
Quantifying the genetic proximity between languages

Compare languages

Comparison Catalan to English

Go to query

English	Catalan	English	Comments	Points
Death	**-M-R-** Morir [1]	**-D-TH-** Death		0,00
Ear	**-R-L-** Orella	**-R-** Ear	Exact consonant match -R-/-R-	50,00
Eye	**-L-** Ull	**-J-** Eye		0,00
Four	**-K-T-R-** Quatre	**-F-R-** Four	Exact consonant match -R-/-R- Too weak signals! -> no point	0,00
Hand	**-M-** Ma	**-H-N-D-** Hand		0,00
I	**-ZH-** Jo	**-J-** I		0,00
Name	**-N-M-** Nom	**-N-M-** Name	Exact consonant match -N-/-N- Exact consonant match -M-/-M-	100,00
Night	**-N-T-** Nit	**-N-T-** Night	Exact consonant match -N-/-N- Exact consonant match -T-/-T-	100,00
Nose	**-N-S-** Nas	**-N-S-** Nose	Exact consonant match -N-/-N- Exact consonant match -S-/-S-	100,00
Sun	**-S-L-** Sol	**-S-N-** Sun	Exact consonant match -S-/-S-	50,00
Three	**-T-R-S-** Tres	**-TH-R-** Three	Exact consonant match -R-/-R- Related consonant match -T-/-TH-	59,41
Tongue	**-L-N-G-** Llengua	**-T-N-G-** Tongue	Exact consonant match -N-/-N- Exact consonant match -G-/-G-	66,67
Tooth	**-D-N-T-** Dent	**-T-TH-** Tooth	Related consonant match -T-/-TH- Related consonant match -D-/-T-	52,01
Two	**-D-S-** Dos	**-T-** Two	Related consonant match -D-/-T-	38,89
Water	**-G-** Aigua	**-W-T-R-** Water		0,00
Who	**-K-** Qui	**-W-** Who		0,00
Wind	**-V-N-T-** Vent	**-W-N-D-** Wind	Exact consonant match -N-/-N- Related consonant match -V-/-W- Related consonant match -T-/-D-	88,11
You (thou)	**-T-** Tu	**-TH-** Thou [2]	Related consonant match -T-/-TH-	78,24

Analysis:
Total Points/#words: 783,34/18 (=43,519/100). This value has to be reverted (100-Result) to get the Genetic distance:

Genetic distance: 56,48

These langages are **related!**

Period Catalan: **Year 2000**, Period English: **Year 2000**.

Agree? Disagree? Please CONTACT! - Share in:

Statistics for this comparison (exposure to chance - explanation here):

→ **Mathematical expectation (μ): 89,13**
→ **Standard deviation (σ): 4,57**
→ ***p*-value = $f(^{56,48}, \mu, \sigma)$: $4,591 \times 10^{-13}$**

This comparison has a probability lower than **0,01%** to get results below **56,48** if conducted with random values.

References:
1. To die (root)
2. The older "thou" is being used for comparison purposes instead of today's common "you".

9. ANNEX 2. Semi-structured interview

Information parents were asked to provide for the description of each of the infants:

- Date of birth
- Parents and other relatives first language
- Kindergarten language curriculum
- Actual schooling language curriculum
- Leisure time activities' language curriculum
- Language they listen to music in
- Language they watch the television in
- Language they read in

10. ANNEX 3. Transcriptions and coding

In the following pages you will find the sheet Excels with the coded utterances of each of the children, in case you want to see more examples of their interventions. The first four are Ina's, the following two are Nau's, and the last three are Eix's.

UTTERANCE	Alternation	Congruent lexicalization	Insertion	Tag-switching	English only	Catalan only	Intra-sentential CS	Morphemes in Catalan	Morphemes in English
[…] you're gonna make them […] could be women	0	0	0	0	1	0	0	0	9
They're weird but there's still a lot of it	0	0	0	0	1	0	0	0	11
però que no trucaves a l'àvia?	0	0	0	0	0	1	0	7	0
papa t'he agafat l'espardenya	0	0	0	0	0	1	0	6	0
coses que van amb water?	1	0	0	0	0	0	1	4	1
buses?! Autobusos?	1	0	0	0	0	0	1	1	1
ah sí?	0	0	0	0	0	1	0	2	0
aquest?	0	0	0	0	0	1	0	1	0
mama demà no tinc […] m'ha dit que agafi la samarreta per si de cas.	0	0	0	0	0	1	0	16	0
M'agafo la samarreta i prou o m'he d'agafar el mono també?	0	0	0	0	0	1	0	6	0
Mama, vols dir que tancarà això?	0	0	0	0	0	1	0	6	0
get the Mario	0	0	0	0	1	0	0	0	3
papa made fruit!	1	0	0	0	0	0	1	1	2
que hi vam anar amb aquesta bus papa?	0	0	1	0	0	0	1	7	1
I think it's the same thing	0	0	0	0	1	0	0	0	7
It's the same thing, that's just a bus it holds a bus going into the water	0	0	0	0	1	0	0	18	0
can you drive already too?	0	0	0	0	1	0	0	0	5
search partly. Taiwan capital Taipei […]	0	0	0	0	1	0	0	0	5
veus mama, Barbie Cafe	1	0	0	0	0	0	1	2	2
East Road District […Chinese adress]	0	0	0	0	1	0	0	0	3
Barbie Cafe	0	0	0	0	1	0	0	0	2
mama demà per P.E. ens hem de posar pantalons llargs?	0	0	1	0	0	0	1	9	1
you […] more chicken	0	0	0	0	1	0	0	0	3
very clumsy	0	0	0	0	1	0	0	0	2
el papa és clumsy	0	0	1	0	0	0	1	3	1
you […] the wrong fruit […]	0	0	0	0	1	0	0	0	4
has agafat the wrong kiwis i ara només queda una banana	0	1	1	0	0	0	2	7	4
ja! Però has fet servir the wrong i ara només queda one banana	0	1	1	0	0	0	2	10	3
kiwis and banana	0	0	0	0	1	0	0	0	3
Arnau wants super cup	0	0	0	0	1	0	0	0	4
sí!	0	0	0	0	0	0	0	1	0
la mama talla els trossos més petits	0	0	0	0	0	1	0	7	0
tu els fas més grans	0	0	0	0	0	1	0	5	0
la mama el talla més petit, el papa fa els talls més grans	0	0	0	0	0	1	0	13	0
la mama com que sempre me'l talla petit quan fica el dels bocates és el que tenia més bé	0	0	0	0	0	1	0	20	0
però el papa quan se fa els sandwiches enorme, un tall més gran, com que tampoc se'l talla, el papa fa…	0	0	1	0	0	0	1	21	1

la mama fa els tallets així!	0	0	0	0	0	1	0	6	0
i si diu: I believe in you, jo li haig de donar això?	0	0	1	0	0	0	1	9	4
sí, és possible, pot treure el six	1	0	0	0	0	0	1	6	1
puc dir el número que vulgui?	0	0	0	0	0	1	0	6	0
don't show anyone and count what of the numbers are	0	0	0	0	1	0	0	11	0
pick it a pair	0	0	0	0	1	0	0	0	4
count all the numbers	0	0	0	0	1	0	0	0	4
do you know the number?	0	0	0	0	1	0	0	0	5
ok, give it to Arnau... wait, però papa que diu el number l'Aleix?	1	0	1	0	0	0	2	7	7
you can say the number, or you can say a different number	0	0	0	0	1	0	0	0	12
believe or not?	0	0	0	0	1	0	0	0	3
espera't que estem jugant amb three dices	1	0	0	0	0	0	1	5	2
però puc dir, si per exemple el meu number és fiveteen, puc dir [...]	0	0	2	0	0	0	2	11	2
ok! Say a number	0	0	0	0	1	0	0	0	4
it's an eight, nine, ten	0	0	0	0	1	0	0	0	6
l'Arnau havia dit seventeen	1	0	0	0	0	0	1	4	1
això què vol dir?	0	0	0	0	0	1	0	9	0
per què l'Arnau comença? No comença l'Aleix?	0	0	0	0	0	1	0	9	0
papa, que no hauria de ser una persona, per exemple, quan l'Arnau estava out havia de continuar el joc, però sense l'Arnau?	0	0	1	0	0	0	1	23	1
comença l'Aleix	0	0	0	0	0	1	0	3	0
clar, s'ha acabat el joc	0	0	0	0	0	1	0	6	0
podem fer six dices quan comencem a sapiguer... ok	0	0	1	1	0	0	2	6	3
it has to be less than eighteen	0	0	0	0	1	0	0	0	7
un joc que pots dir mentides?!	0	0	0	0	0	1	0	6	0
do you believe it?	0	0	0	0	1	0	0	0	4
llavors què passa?	0	0	0	0	0	1	0	3	0
continuem el joc?	0	0	0	0	0	1	0	3	0
[...] the beginning	0	0	0	0	1	0	0	0	2
no	0	0	0	0	1	0	0	0	1
four, five, six	0	0	0	0	1	0	0	0	2
ten, believe it or not?	0	0	0	0	1	0	0	0	5
que no has dit believe it or not!	1	0	0	0	0	0	1	4	4
em toca a mi	0	0	0	0	0	1	0	4	0
mentida	0	0	0	0	0	1	0	1	0
six, seven…	0	0	0	0	1	0	0	0	2
però papa, després de la mama em tocava a mi, no a tu!	0	0	0	0	0	1	0	13	0
or mama, tu i l'Aleix ho feu junts	1	0	0	0	0	0	1	8	1
seventeen, believe it or not?	0	0	0	0	1	0	0	0	5
then open it	0	0	0	0	1	0	0	0	3
believe it	0	0	0	0	1	0	0	0	2
quin numero havia dit?	0	0	0	0	0	1	0	4	0
i que ha de ser més big?	1	0	0	0	0	0	1	6	1
ahhhhhhh… més de catorze… eighteen	1	0	0	0	0	0	1	4	1

però ja estic out papa?	0	0	1	0	0	0	1	4	1
però havies de dir més que eighteen!	1	0	0	0	0	0	1	0	1
true or not true?	0	0	0	0	1	0	0	0	4
you're supposed to round… tie bou! [?]	0	0	0	0	1	0	0	0	7
I have a rou… what?	0	0	0	0	1	0	0	0	5
roller game?	0	0	0	0	1	0	0	0	2
another game and the ball hits someone's head	0	0	0	0	1	0	0	0	9
now I'll write one	0	0	0	0	1	0	0	0	5
six!	0	0	0	0	1	0	0	0	1
what is that? That looks like a jail [?] What is this?	0	0	0	0	1	0	0	0	11
Arnau what is it?	0	0	0	0	1	0	0	0	3
ahhh… makes sense, now it does	0	0	0	0	1	0	0	0	6
wait, so, they score and then, fight!	0	0	0	0	1	0	0	0	7
c, o, u, n, t, i, n, u, e	0	0	0	0	1	0	0	0	8
[…] so for […] been doing anything	0	0	0	0	1	0	0	0	1
it's more irascible [?]	0	0	0	0	1	0	0	0	4
and here you go, and now you […]	0	0	0	0	1	0	0	0	7
[…] broken by the way, or were you doing this?	0	0	0	0	1	0	0	0	9
then I do like this	0	0	0	0	1	0	0	0	5
by the way, where are your other tissues?	0	0	0	0	1	0	0	0	8
you've not a carnal… it's blue and it's up here	0	0	0	0	1	0	0	0	13
isn't it in the back […]? [?] and which […]?	0	0	0	0	1	0	0	0	8
oh, then it's a new one […], is it?	0	0	0	0	1	0	0	0	9
mama quin és el meu vas?	0	0	0	0	0	0		6	0
Arnau do you want your cup?	0	0	0	0	1	0	0	0	6
cause I didn't want ice	0	0	0	0	1	0	0	0	6
need some red, do you need some? You need red?	0	0	0	0	1	0	0	0	10
what other colours do you have?	0	0	0	0	1	0	0	0	6
Doesn't matter, right?	0	0	0	0	1	0	0	0	4
can I have your eraser, please?	0	0	0	0	1	0	0	0	6
should be some doodling [?] in your book.	0	0	0	0	1	0	0	0	7
it's a comzy, it says that on the front	0	0	0	0	1	0	0	0	1
not gonna leave an orange but yellow mark [?]	0	0	0	0	1	0	0	0	8
look!	0	0	0	0	1	0	0	0	1
you said it doesn't matter what eraser I use.	0	0	0	0	1	0	0	0	10
I'll use another one. This one?	0	0	0	0	1	0	0	0	7
Omg it's orange! Arnau, what happened here?	0	0	0	0	1	0	0	0	8
Oh, wait, I'll erase pencil! I'm fixing one with the eraser	0	0	0	0	1	0	0	0	13
mmm no ho sé	0	0	0	0	0	1	0	3	
it's a firework!	0	0	0	0	1	0	0		4

igual no les tenen sempre, igual ho han fet avui perquè així sàpigues a quina casa	0	0	0	0	0	1	0	16	0
at the very beginning in the quarter his brother and the dog where there	0	0	0	0	1	0	0	0	14
TOTAL	13	2	13	1	69	26	29	379	422
								MLU = 3,11	**MLU = 3,46**

UTTERANCE	Alternation	Congruent lexicalization	Insertion	Tag-switching	English only	Catalan only	Intra-sentential CS	Morphemes in Catalan	Morphemes in English
here's a lot of it	0	0	0	0	1	0	0	0	6
the part midgets	0	0	0	0	1	0	0	0	3
[…] amb això?	0	0	0	0	0	1	0	2	0
però tu has dit under	1	0	0	0	0	0	1	4	1
Martina, come…	0	0	0	0	1	0	0	0	2
Martina!	0	0	0	0	1	0	0	0	1
it's like this	0	0	0	0	1	0	0	0	4
see it! See it! See it!	0	0	0	0	1	0	0	0	6
but you said you wanted chicken!	0	0	0	0	1	0	0	0	6
daddy	0	0	0	0	1	0	0	0	1
no m'agrada	0	0	0	0	0	1	0	3	0
perquè té aquesta hard thing	1	0	0	0	0	0	1	3	2
vull treure la hard thing	1	0	0	0	0	0	1	3	2
he acabat chicken	1	0	0	0	0	0	1	2	1
I don't like it	0	0	0	0	1	0	0	0	5
jo també una	0	0	0	0	0	1	0	3	0
i si fas lower?	1	0	0	0	0	0	1	3	1
i si has fet ten i six?	0	0	2	0	0	0	2	5	1
all together	0	0	0	0	1	0	0	0	2
say it!	0	0	0	0	1	0	0	0	2
per què?	0	0	0	0	0	1	0	1	0
twelve	0	0	0	0	1	0	0	0	1
fiveteen més que fiveteen…	0	1	0	0	0	0	1	2	2
puc dir twenty-five?	1	0	0	0	0	0	1	2	1
pot dir two hundred and fifty bilion?	1	0	0	0	0	0	1	2	5
no, I don't believe it	0	0	0	0	1	0	0	0	6
two, six... seven!	0	0	0	0	1	0	0	0	3
nooooo, you're out	0	0	0	0	1	0	0	0	4
ten	0	0	0	0	1	0	0	0	1
mama ho podem posar així?	0	0	0	0	0	1	0	5	0
fake!	0	0	0	0	1	0	0	0	1
i jo no puc jugar?	0	0	0	0	0	1	0	5	0
and then… fight!	0	0	0	0	1	0	0	0	3
this!	0	0	0	0	1	0	0	0	1
you have another	0	0	0	0	1	0	0	0	3
head in capitals	0	0	0	0	1	0	0	0	3
three and three […] and then just come […]	0	0	0	0	1	0	0	0	7
that's a ghoul	0	0	0	0	1	0	0	0	4
yeah, they fight, and then they continue	0	0	0	0	1	0	0	0	7
c, o, u, n, t, i, n, u, e, continue	0	0	0	0	1	0	0	0	9
irascible [?]	0	0	0	0	1	0	0	0	1
no!	0	0	0	0	1	0	0	0	1
oh well	0	0	0	0	1	0	0	0	2
maybe the other one	0	0	0	0	1	0	0	0	4
no, I don't	0	0	0	0	1	0	0	0	4
no! This is a […]!	0	0	0	0	1	0	0	0	4
orange, red	0	0	0	0	1	0	0	0	2
[…] green then	0	0	0	0	1	0	0	0	2
ohh now I have two reds… oh no, this is a different one	0	0	0	0	1	0	0	0	13
yeah, just a random doodle [?] draw […]	0	0	0	0	1	0	0	0	6

xampany	0	0	0	0	0	1	0	1	0
legos i... how do you say it?	1	0	0	0	0	0	1	2	5
ja ho ha fet	0	0	0	0	0	1	0	4	0
allà, allà i allà	0	0	0	0	0	1	0	4	0
that he shoot the holes [?]	0	0	0	0	1	0	0	0	5
the water	0	0	0	0	1	0	0	0	2
put it in your mouth	0	0	0	0	1	0	0	0	5
give me the bag	0	0	0	0	1	0	0	0	4
what do you think?	0	0	0	0	1	0	0	0	4
also put this	0	0	0	0	1	0	0	0	3
just in case it falls	0	0	0	0	1	0	0	0	5
you put it	0	0	0	0	1	0	0	0	3
this one isn't	0	0	0	0	1	0	0	0	4
of course!	0	0	0	0	1	0	0	0	2
there isn't more water in that one	0	0	0	0	1	0	0	0	8
it's too funny	0	0	0	0	1	0	0	0	4
what thing, I can't see	0	0	0	0	1	0	0	0	6
it's a weird one	0	0	0	0	1	0	0	0	5
one, two, three, four, five, six, seven, eight, nine, ten	0	0	0	0	1	0	0	0	10
one circle and three squares	0	0	0	0	1	0	0	0	5
sorry but no!	0	0	0	0	1	0	0	0	3
Eix is annoying me! […]	0	0	0	0	1	0	0	0	4
one, two, three, four, five, six, seven, eight, nine, ten	0	0	0	0	1	0	0	0	10
I didn't!	0	0	0	0	1	0	0	0	3
what? Però estic menjant, la Ina!	0	0	0	0	0	0	1	5	1
[…] one more book!	0	0	0	0	1	0	0	0	3
[…] and you are forced to fix it thousand times	0	0	0	0	1	0	0	0	9
cause it's actually trimmed	0	0	0	0	1	0	0	0	5
cause it's just too […]	0	0	0	0	1	0	0	0	5
or just what I said	0	0	0	0	1	0	0	0	5
good try!	0	0	0	0	1	0	0	0	2
no puc, necessito ajuda per posar les estovalles	0	0	0	0	1	0	0	0	8
not on Thursday, Friday	0	0	0	0	1	0	0	0	4
Thursday, Eix! Castigat!	0	0	0	0	1	0	0	0	3
no, that's Ina's	0	0	0	0	1	0	0	0	5
and what do you wanna be called, poop, dummy, dumb or poopy?	0	0	0	0	1	0	0	0	12
Eix is the dummest of all	0	0	0	0	1	0	0	0	6
Eix, Aix or Oix?	0	0	0	0	1	0	0	0	4
which one?	0	0	0	0	1	0	0	0	2
Eix, Aix, or Eics, or, Lex, which one?	0	0	0	0	1	0	0	0	8
these are my stickers!	0	0	0	0	1	0	0	0	4
which points as everything as I say!	0	0	0	0	1	0	0	0	7
they even bite […]	0	0	0	0	1	0	0	0	3
we're coming!	0	0	0	0	1	0	0	0	3
we're coming to eat you!	0	0	0	0	1	0	0	0	6
TOTAL	8	1	2	0	75	9	12	61	351
								MLU = 0,63	**MLU = 3,66**

UTTERANCE	Alternation	Congruent lexicalization	Insertion	Tag-switching	English only	Catalan only	Intra-sentential CS	Morphemes in Catalan	Morphemes in English
[…] know a lot like milk […] no they're not […] like a popconsing […] chicken hamburger	0	0	0	0	1	0	0	14	0
està so close per la Africa, Spain està close per la Africa	0	4	0	0	0	0	4	6	6
[…] should we go on those kinds of […] on water	0	0	0	0	1	0	0	0	9
papa, eh que hi ha coses que van amb water?	1	0	0	0	0	0	1	9	1
coses que van amb water	1	0	0	0	0	0	1	4	1
weird	0	0	0	0	1	0	0	0	1
[…] under water then	0	0	0	0	1	0	0	0	3
però papa, també poden anar land a que si?	0	0	1	0	0	0	1	8	1
unes poden anar under water i a top de water, almost under water a que si?	0	0	3	1	0	0	4	9	7
sí, però unes només poden anar under i on top. Unes només poden anar under i on a land.	1	0	4	0	0	0	5	12	7
Those are very special buses	0	0	0	0	1	0	0	0	5
You cannot find them in Taiwan rarelly when you go to that country, on around all the […] I like the bigger […]	0	0	0	0	1	0	0	0	21
Arnau I wanna ride on one of them.	0	0	0	0	1	0	0	0	8
Papa vull fer ride amb un.	0	0	1	0	0	0	1	5	1
I can't go under the water […] I can't go under the water […]	0	0	0	0	1	0	0	0	14
I want to go a lot in the water one	0	0	0	0	1	0	0	0	10
papa com faig flote up a water?	0	0	2	0	0	0	2	4	3
yeah I can go under water, I can go under water […]	0	0	0	0	1	0	0	0	11
I'll go on the bus	0	0	0	0	1	0	0	0	6
what is that? Partly [...]	0	0	0	0	1	0	0	0	4
I can go down on water	0	0	0	0	1	0	0	0	6
Some can go down under water	0	0	0	0	1	0	0	0	6
[…] on water, so we'll flote, right? None can go under water	0	0	0	0	1	0	0	0	12
Barbie Cafe?! Girlish!	0	0	0	0	1	0	0	0	3
I hate it I don't wanna go in here	0	0	0	0	1	0	0	0	10
It's too girly. No mama, hi ha moltes pink coses!	1	0	1	0	0	0	2	6	5
no vull anar de pink perquè ha de tenir moltes pink coses	0	0	2	0	0	0	2	10	2
no anything […] què vol dir…	1	0	0	0	0	0	1	3	2
que vull anar al Toilet Restaurant again	1	0	0	0	0	0	1	4	3
el food si que era bé	0	0	1	0	0	0	1	5	1
papa! […] to the restaurant […]	1	0	0	0	0	0	1	1	3
[…] thick ice cream […] I do not want a chicken because, never met before [?]	0	0	0	0	1	0	0	0	13

I didn't, that was a trick!	0	0	0	0	1	0	0	0	7
aquest és el […] and this is […] kind of whatever it is	1	0	0	0	0	0	1	3	8
mama no podem […] el nostre […]	0	0	0	0	0	1	0	5	0
jopeta! Això és per la Martina! […]	0	0	0	0	0	1	0	6	0
Martina I guess you wanna be the super cup	0	0	0	0	1	0	0	0	9
mmm yeah	0	0	0	0	1	0	0	0	1
who is the best cutter in the house, Arnau?	0	0	0	0	1	0	0	0	9
cutter in the world!	0	0	0	0	1	0	0	0	4
no, in the world!	0	0	0	0	1	0	0	0	4
saps per què m'agraden els dos?	0	0	0	0	0	1	0	6	0
Perquè m'agrada com fa el sandwich, després només ha de fer un cut i després ja pots fer el sandwich	0	0	3	0	0	0	3	18	3
[…] work in the toilet?	0	0	0	0	1	0	0	0	4
yay mama, he guanyat Arnau	1	0	0	0	0	0	2	4	1
you said you didn't like chicken!	0	0	0	0	1	0	0	0	7
i jo també una	0	0	0	0	0	1	0	4	0
[…] and I want to eat	0	0	0	0	1	0	0	0	4
m'agrada	0	0	0	0	0	1	0	2	0
[…] chicken Martina	0	0	0	0	1	0	0	0	2
and now what do I do? I count all of them?	0	0	0	0	1	0	0	0	11
fiveteen	0	0	0	0	1	0	0	0	1
però jo...	0	0	0	0	0	1	0	2	0
sixty nine	0	0	0	0	1	0	0	0	2
nine	0	0	0	0	1	0	0	0	1
no, me toca a mi!	0	0	0	0	0	1	0	5	0
one seven	0	0	0	0	1	0	0	0	2
fourteen! One, four	0	0	0	0	1	0	0	0	3
number one, number two…	0	0	0	0	1	0	0	0	4
a ghoul!	0	0	0	0	1	0	0	0	2
aquest és meu! Que el tenia la Martina, però després hem fet swap!	0	0	1	0	0	0	1	12	1
not the first person?	0	0	0	0	1	0	0	0	4
no ho sé	0	0	0	0	0	1	0	3	0
what's that?	0	0	0	0	1	0	0	0	3
xampany	0	0	0	0	0	1	0	1	0
papa tens […] aguantar?	0	0	0	0	0	1	0	3	0
a […] broken bag?	0	0	0	0	1	0	0	0	3
a little brick, a little plant around here	0	0	0	0	1	0	0	0	8
do you feel like any little plant?	0	0	0	0	1	0	0	0	7
Nau, can you put this in the back?	0	0	0	0	1	0	0	0	8
then it comes from here	0	0	0	0	1	0	0	0	5
don't come from […]	0	0	0	0	1	0	0	0	4
you know this is not mine?	0	0	0	0	1	0	0	0	6
I think it is	0	0	0	0	1	0	0	0	4
ok, it's mine	0	0	0	0	1	0	0	0	4
there's no water right into here	0	0	0	0	1	0	0	0	7
sometimes Mr. [name]	0	0	0	0	1	0	0	0	3
sometimes […] are so thick, awesome!	0	0	0	0	1	0	0	0	5
and sometimes he is giving chased by someone	0	0	0	0	1	0	0	0	8

and he's trying to cross	0	0	0	0	1	0	0	0	6
sometimes like I come behind, and someone comes behind	0	0	0	0	1	0	0	0	9
Nau, what do you call this?	0	0	0	0	1	0	0	0	6
this little thing is…you call them shoes	0	0	0	0	1	0	0	0	8
not this thing Nau	0	0	0	0	1	0	0	0	4
and I put this here	0	0	0	0	1	0	0	0	5
Nau put this in there	0	0	0	0	1	0	0	0	5
I can't do [...]	0	0	0	0	1	0	0	0	4
in three, two, one... Nau stop it!	0	0	0	0	1	0	0	0	7
Ina […] third color want to be	0	0	0	0	1	0	0	0	6
yes, I said it before	0	0	0	0	1	0	0	0	5
just looking at you	0	0	0	0	1	0	0	0	4
it's Ina on Wednesday	0	0	0	0	1	0	0	0	5
Nau, it wasn't me, Wednesday, Nau?	0	0	0	0	1	0	0	0	7
no, I'm talking about yours	0	0	0	0	1	0	0	0	6
què és això?	0	0	0	0	1	0	0	0	3
what do you wanna be called?	0	0	0	0	1	0	0	0	6
To be Nau, poopy Nau or donkey Nau?	0	0	0	0	1	0	0	0	8
I just said a normal name	0	0	0	0	1	0	0	0	6
nooo, I don't wanna… that's not an action	0	0	0	0	1	0	0	0	10
Nau that's not a good one!	0	0	0	0	1	0	0	0	7
that's not broken	0	0	0	0	1	0	0	0	4
they even bite […]	0	0	0	0	1	0	0	0	3
[…] that bites everyone!	0	0	0	0	1	0	0	0	3
TOTAL	9	4	19	1	75	10	34	174	491
								MLU = 1,67	**MLU = 4,72**