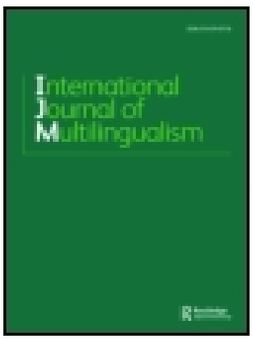

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Code-mixing and language dominance: bilingual, trilingual and multilingual children compared

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ABSTRACT

Acquisitionists generally assume a relation between code-mixing in young bilingual and trilingual children and language dominance. In our cross-sectional study we investigated the possible relation between code-mixing and language dominance in 122 children raised in Spain or Germany. They were bilingual, trilingual or multilingual, the latter acquiring more than three languages. The definition of language dominance is grounded on Birdsong's (2014. Dominance in bilingualism: Foundations of measurement, with insights from the study of handedness. In C. Silva-Corvalán, & J. Treffers-Daller (Eds.), *Language Dominance in Bilinguals: Issues of operationalization and measurement* (pp. 85–105). Cambridge: Cambridge University Press) distinction between domains and dimensions. The main result of our study is that code-mixing is rare in a monolingual setting which means that bilingual, trilingual and multilingual children are able to behave monolingually. Domain-specific language dominance can explain the relatively high mixing rate in the Catalan tests but concerning the dimensions of language dominance no relation was found between the children's code-mixing and language (un)balance. A separate analysis of intra- and intersentential mixing reveals that intersentential mixing is determined by the typological proximity between the child´s languages. All instances of intrasentential code-mixing, were insertional.

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Language dominance; domains and dimensions of language dominance; code-mixing; trilingualism; typology

1. Introduction

It is generally assumed in the literature that bilingual children mix their two languages to considerable degrees and that children with a weak language do so more often than children who are balanced (Bernardini & Schlyter, 2004, Cantone & Müller, 2005 for an overview). Apart from the assumption that code-mixing indicates an unbalanced language development, it is also claimed that language dominance influences the direction of code-mixing, namely from the strong into the weak language. This assumption has been relativised for bilingual children by Cantone (2007), Cantone, Kupisch, Müller, & Schmitz (2008) and Patuto et al. (2014) because, on the one hand, they found a low mixing rate in the speech of bilingual children investigated during a period from 1;6 until 5 years and on the other hand, it was not always possible to establish a relation

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between mixing and language dominance. If it comes to the acquisition of more than two languages from birth, a group of speakers still understudied, most research assumes that there is always (at least) one weak language (Hoffmann, 2001, p. 5). As a consequence, children who acquire more than two languages from birth should mix their languages more often than bilingual children. In what follows, we will study and describe the relation between language dominance and mixed utterances in trilingual children and in children who speak more than three languages from birth and compare them with the mixing behaviour of children who are early bilinguals. In particular, we will look at the children's mixing behaviour in a monolingual speech mode (Grosjean, 2001).

2. Theoretical background

2.1. Code-mixing

In the context of language mixing in bi-, tri- and multilingual children, it is first important to define the term code-switching.[1] According to Müller et al. (2015), code-switching describes a smooth change of languages, observed in bilinguals who master both languages very well. Therefore, it is seen as a speech style (MacSwan, 2000, p. 38) and not produced due to a lack of competence (Müller et al., 2015, p. 24f.). Gumperz (1967), who coined the word, applied it to describe a discourse strategy which is used by bilingual speakers (Riehl, 2014, p. 21). Code-switching is one of various possibilities for bilinguals to express different illocutions and to point out that the listener has to interpret the forthcoming message somewhat differently (cf. metaphorical code-switching, Chan, 2004). For a long time, research on CS has focused on the social factors which favour CS (cf. situational CS, Milroy & Muysken, 1995, among others). Poplack (1980), who analysed bilingual speakers with English and Spanish in New York, concentrated on a further aspect, namely the study of the underlying morpho-syntactic machinery of intrasentential CS (Jansen, Müller, & Müller, 2012, p. 383). This research has led to the distinction between inter- and intrasentential CS, where the former relates to mixing between sentences or larger parts of speech and the latter refers to mixing within sentences (Müller et al., 2015, p. 15).

It has to be stressed that CS is a speech style which many linguists conceive as a sign for a high degree of competence in the respective languages. This competence in both languages, a prerequisite for CS, distinguishes it from other phenomena of language contact, for example from *code-shifting* (Silva-Corvalán, 1983) and *borrowing* (Müller et al., 2015, p. 18; Riehl, 2014, p. 22). Another term to clarify is *transfer*. In contrast to CS, transfer is a process which is not controlled by the speakers (Müller et al., 2015, p. 22). Specifically, the term transfer is used if the speaker uses for example the syntax of language A (her/his mother tongue) and language material from language B (her/his second, third or x-th language). In contrast, CS is characterised by language material in terms of vocabulary items of at least two languages. While CS thus requires a high competence in all languages involved, the process of transfer has often been seen as a strategy of simplification in the context of foreign language learning (Müller et al., 2015, p. 22f.).

In order to illustrate the different functions of CS, see the following example of situational CS taken from Sivakumar (2017) who analysed CS within the (simultaneous) trilingual child Diego. Diego acquires Spanish, Italian and French from birth.

(1) Situation: Diego and his mother are playing to give a present to someone. He turns to his father and gives him a present. While the mother speaks Spanish (SP) with Diego, the language of the communication between the father and Diego is Italian (IT).

Mother	ahí$_{SP}$ no$_{SP}$ está$_{SP}$ / no$_{SP}$ te$_{SP}$ preocupes$_{SP}$ / 'it is not there / do not worry' /
Diego	es$_{SP}$ eh – eso$_{SP}$ eso$_{SP}$ eh eh /ecco$_{IT}$ me$_{IT}$ – questo$_{IT}$ per$_{IT}$ te$_{IT}$ / tiene$_{SP}$ il$_{IT}$ tuo$_{IT}$ legalo$_{IT}$ (= regalo$_{IT}$) / quello$_{IT}$ è$_{IT}$ il$_{IT}$ mio$_{IT}$ legalo$_{IT}$ (= regalo$_{IT}$) / quello$_{IT}$ due$_{IT}$ è$_{IT}$ legalo$_{IT}$ (= regalo$_{IT}$) / 'it is er - this this er er / here I - this is for you / (he/she/it) has your present / that is my present / those two is present' (those two are presents) /
Mother	y$_{SP}$ mi$_{SP}$ regalo$_{SP}$ ↑ / es$_{SP}$ mi$_{SP}$ cumpleaños$_{SP}$ hoy$_{SP}$ lo$_{SP}$ sabes$_{SP}$ diego ↑ / 'and my present ↑ / it is my birthday today you know diego ↑ / (Diego 3;1,13[2])

Example (1) shows an instance of situational CS. In contrast to situational CS, metaphorical CS is rather infrequent in children's productions since it requires a high degree of pragmatic competence which normally appears later in language production (Jisa, 2000, p. 1366). Nevertheless, Sivakumar (2017) also shows that the majority of mixing in the analysed child Diego (from 2;8,10 until 4;9,22) is neither situational nor metaphorical CS. There are often no pragmatic reasons for children to use a language different from the context language (Sivakumar, 2017, p. 91).

Due to the difficulty to differentiate between code-switching and other phenomena of language contact, Muysken (1997) distinguishes different processes when languages are mixed, namely insertion, alternation and congruent lexicalisation. According to Muysken, congruent lexicalisation is characterised by a shared grammatical structure of elements from different languages (Muysken, 1997, p. 362). Furthermore, the effect of going back and forth between the languages suggests that with respect to congruent lexicalisation, there are elements from the two languages inserted into a shared structure (Muysken, 1997, p. 362). Due to the complexity of this process, this phenomenon requires utterances with more words than the children in these studies normally produce since they are still rather young.[3] With regard to the other two processes, insertion can be defined by embedding language material from one into the respective other language (s) of a multilingual speaker (Müller et al., 2015, p. 18), whereas alternation means a smooth change between languages that involves grammar as well as vocabulary (Müller et al., 2015, p. 17). Therefore, intrasentential mixing can contain disintegrated material (insertion) or integrated material (alternation). Alternation is thus assumed to be more complex. Muysken (1997, p. 362) writes from a psycholinguistic perspective that the components of both languages are activated to different degrees: in the case of alternation, activation would switch from one language to the other, in the case of insertion, the activation of one language would be 'temporarily diminished'. Complexity differences are also confirmed by the difficulty to distinguish between insertion and borrowing – a phenomenon that requires less competence in both languages (Müller et al. 2015, p. 18). Having in mind these differences in producing intrasentential code-mixing, a separate analysis of these phenomena may be appropriate.

Important to add in this context is the distinction between multilingual adults or multilingual children. Arguably, the child is still in the process of building her/his competence of the languages s/he hears in the input. In other words, the child is on her/his way to become a competent (native) speaker of the languages. This aspect further complicates the categorisation of a child's utterance that contains vocabulary items from language

A and language B in terms of CS or an outcome of another contact phenomenon (Meisel, 1994). Because of the difficult task of differentiating between the phenomena of language contact in the young child, researchers have used the term *code-mixing* that works as a cover term in order to express the fact that two or more languages are mixed clause-internally or across clauses (Müller et al., 2015, p. 24). For this reason, we will use the term *code-mixing* in what follows to describe the situation that vocabulary items from two or more languages have been used and not the term *code-switching* which would already indicate that mixing languages is used as a discourse strategy. Therefore, the following two examples 2a (intersentential mixing) and 2b (intrasentential mixing) illustrate what will constitute mixing in our analysis.

(2a) Situation: The experimenter is carrying out a grammatical test in German (GER) with a bilingual child who acquires German and Spanish (SP).

Experimenter	$genau_{GER}$ / die_{GER} $spielen_{GER}$ $gitarre_{GER}$ das_{GER} ist_{GER} ja_{GER} $lustig_{GER}$ / 'right / they play guitar it is funny'/
Child	yo_{SP} voy_{SP} a_{SP} $tocar_{SP}$ la_{SP} $guitarra_{SP}$ $así_{SP}$ / 'I will (to) play the guitar like that'/ (Olivia, 3;9,27)

(2b) Situation: The experimenter is carrying out a grammatical test in German (GER) with a bilingual child who acquires German and French (FR).

Experimenter	sur_{FR} ma_{FR} $tête_{FR}$/ 'on my head'/
Child	sur_{FR} le_{FR} $baumstamm_{GER}$ / 'on the trunk' / (Antoine, 4;10,04)

A detailed analysis of these kinds of code-mixing will follow in the fourth section.

2.2. Language dominance

Language dominance describes the fact that one of the languages of a bilingual child is mastered better than the other language or is acquired faster (for the two concepts of language dominance cf. Schmeißer, Hager, Arnaus Gil, Jansen, Geveler, Eichler, Patuto & Müller, 2016b). Research on bilingualism has also used the term of an unbalanced language development (Müller et al., 2015, p. 45). In other words, an unbalanced bilingual child has a strong and a weak language. Strong language refers to the (temporarily) dominant language of an individual while the weak language is the (temporarily) less mastered or less used language (Müller et al., 2015, p. 46). Let us not forget that language dominance measures the pace and proficiency degree of language A in relation to language B and simply assumes that language A and B are not in balance. The pace and proficiency degree of the weak language in relation to that language in a monolingual child is another issue (Cantone et al., 2008), not to be confounded with language dominance. It should be mentioned that some researchers, like Bernardini & Schlyter (2004), have argued against this distinction and assume that the weak language in a bilingual child is also weak in a more general sense, i.e. in relation to monolingual peers (but see Gawlitzek-Maiwald & Tracy, 1996 for a different view).

Various measures to establish an (un)balanced language development have been proposed (cf. Cantone et al., 2008 and Schmeißer et al., 2016b for an overview). Among the criteria are the Mean Length of Utterance[4], the Upper Bound[5], which is based on the

child's utterance with the highest number of words/morphemes/syllables, and the lexicon size. Besides these qualitative criteria and in order to determine language dominance, there are criteria which measure the speed of speech (measured in terms of the number of utterances per minute as in Cantone et al., 2008) or the number of words uttered per minute as in Müller et al., 2015, p. 67) or the speech fluency (number of hesitations as in De Houwer, 1990).

Since the present study of trilingualism is a cross-sectional study, we decided to use the lexicon size in the different languages of the child as a measure in order to determine language (un)balance. We carried out the Peabody Picture Vocabulary Test (PPVT, Dunn, 1959; Dunn & Dunn, 1981, 1997), a test to measure the receptive vocabulary, since it is a standardised test and available for most of the children's languages.[6]

Besides, it is important to add Birdsong's twofold conception (2014) of language dominance. According to this idea, domains and dimensions of language dominance have to be set apart. Domains of language dominance refer to situations, needs, intentions and social functions, whereas dimensions concern the linguistic competence, the production and processing (Birdsong, 2014, p. 86). Hence, dimensions describe language dominance on an individual level, one measure of which is the size of the lexicon as measured in the PPVT. Since this test is suitable to measure the receptive vocabulary of multilingual children, this allows us to make a statement about the linguistic development at the individual learner level. In Birdsong's terminology, the individual language development of a bilingual (or in this case, a tri- and multilingual) is a relevant aspect when asking for the language(s) that is/are better mastered or used more frequently by a multilingual speaker. Sociolinguistic factors are also at play. This means that '[l]evels of fluency in a language will depend on the need for that language and will be extremely domain specific' (Birdsong, 2014, p. 68). Therefore, if code-mixing depends on language dominance, there is a need to specify whether domains and/or dimensions are meant.

In order to link the two previous subsections, namely in which way code-mixing and language dominance correlate or not, we will devote the next section to a brief overview of the existing research about code-mixing and language dominance in bilingual and trilingual children. Before doing so, the concept of typological proximity has to be introduced as another factor that possibly influences language selection made by multilingual speakers.

2.3. Typological proximity

Language distance or typological proximity understood as membership to the same language family – or lack thereof (Liceras & de la Fuente, 2015, p. 329) plays an important role in second language learning. Since there are reasons to assume that this does not only apply for successive language acquisition, but also for the simultaneous acquisition of more than two languages, we intend to apply the concept of typological proximity also to children who are tri- or multilingual from birth. Investigating L3 syntactic transfer selectivity and typological determinacy, Rothman (2011) states that '[…] child bilinguals (simultaneous, heritage bilinguals as well as child L2 learners) would be the only set of bilinguals of interest […] [since they] have two distinct syntactic systems that could theoretically be transferred to the L3/L*n* initial state' (Rothman, 2011, p. 108). With regard to syntactic transfer to the L3, he claims that it comes from either the L1 or the L2 and is conditioned

by typology/psychotypology (Rothman, 2011, p. 110). Therefore, transfer in L3 is not always facilitative, as the Cumulative Enhancement Model (CEM) predicts, but '[…] syntactic properties of the closest (psycho)typological language, either the L1 or the L2, constitute the initial hypothesis in multilingualism' (Rothman, 2011, p. 112). Carrying over these results to the phenomenon of code-mixing, it could be suggested, as an alternative to the influence of language dominance, that typological proximity plays an important role regarding code-mixing in multilingual children. Paralleling Rothman's observations concerning L3 syntactic transfer, one could hypothesise that typological proximity between languages influences the children's code-mixing in terms of the selectivity of the language used within mixed utterances. If language dominance does not explain why a child uses language material from the L1 or the L2 in his/her L3 (in simultaneous trilingual children all languages have to be labelled as L1s, thus L1a, L1b, L1c), typological proximity between the child's languages could be an explanatory factor. As we will see in the following sections, since our data clearly shows that a causal relationship between language dominance and code-mixing in bi-, tri- and multilingual children is not tenable, the influence of typology on code-mixing will be studied as an alternative explanation.

However, Rothman (2011) also emphasises that (psycho)typology only plays the most decisive role in transfer selection of one of the languages available to the speaker, provided a certain grouping of languages (Rothman, 2011, p. 113). It does not seem to be clear which variables determine transfer if typology is not relevant in the particular combination of languages, i.e. 'where the L3 is equally typologically similar to the L1 and the L2; or the L3 is typologically not at all similar to either the L1 or the L2' (Rothman, 2011, p. 122). Following this assumption, typological proximity can only be a decisive factor for mixing languages if a relevant combination of languages is given. This will be taken into consideration in our analysis of code-mixing as well.

Although typological proximity will be defined for our analysis as membership to the same language family, it is noteworthy to mention that Liceras & de la Fuente (2015) differentiate between typological similarity and typological proximity explaining that '[…] there is typological similarity when a typological or formal universal is equally realised in these two typologically-close languages; otherwise, we will talk about typological proximity' (Liceras & de la Fuente, 2015, p. 333). The authors use null/overt subjects in French and Spanish as an example. Although belonging both to the Romance language family, which could be defined as typological proximity, there is no typological similarity if the null subject parameter is taken into account since Spanish is classified as a [+null subject] language, whereas French is considered as a [-null subject] language (Liceras & de la Fuente, 2015, p. 339). Therefore, the reason for this differentiation is that languages, even though they belong to the same language family, may show differences in realising different options of any given parameter (Liceras & de la Fuente, 2015, p. 335).

Another important term which has emerged from Rothman's (2011) Typological Primacy Model is that of 'psychotypology', '[…] the learner's notions of the relations between the L1 and the L2' (Kellerman, 1983, p. 113). It is claimed that the way multilingual speakers perceive the typological distance of the languages involved does also influence transfer but that '[i]n many cases, psychotypological and actual typological proximity are in fact one and the same' (Rothman, 2011, p. 112). However, the concept of psychotypology is not only difficult to define, but also impossible to determine in the case of very young children because they do not possess the necessary meta-cognitive skills to

reflect on language as a system and to verbalise these reflections. Therefore, we will focus in our analysis of code-mixing and typological proximity on typology in the sense of linguistic typology.

3. Previous research about code-mixing and language dominance in bilingual and trilingual children

After having presented the concepts of code-mixing and language dominance as well as typological proximity as an alternative factor which might have an influence on code-mixing, we now have a look at the relation between code-mixing and language dominance as it has already been described in previous studies. Regarding the comparison of bilingual and trilingual children, it has to be said that early child trilingualism is still in its infancy (cf. Unsworth, 2013, p. 41f., Quay, 2001, p. 149, 2011a, 2011b; Hoffmann, 1999, p. 16, 2001, p. 13; Barnes, 2006, p. 28) and that the comparison between early trilinguals and bilinguals is completely unstudied (Barron-Hauwaert, 2000, p. 2). According to Hoffmann (2000) amongst others there is a need to study early child trilingualism in its own right since '[t]rilingualism is obviously placed somewhere between bilingualism and multilingualism, but one should not assume it to be simply an extension of bilingualism. It probably shares features with both, while at the same time retaining characteristics of its own.' (p. 84) Therefore, it is important to consider the phenomenon of trilingualism as an independent area of research because the simple transfer of the results of the studies of bilingualism to the field of trilingualism does not seem to be satisfactory. Nevertheless, according to Hoffmann (2000), bilinguals and trilinguals share the ability '[…] to move between different languages, switching, mixing and borrowing […]' (p. 88) with the difference that trilinguals could involve three instead of two language systems.

Concerning bilingual children, some main observations will be described before comparing those results to the few existing studies about trilingual children and their mixing behaviour. Bilingual children studied longitudinally (balanced as well as unbalanced) do not show a high (intrasentential) mixing rate when observed in a monolingual mode (Patuto et al., 2014, p. 197). The same can be observed for cross-sectional studies on bilingual children, balanced and unbalanced ones (Müller et al., 2015, p. 104). Therefore, it can be supposed that mixing languages intrasententially in early bilingualism is not directly related to language dominance. However, intersentential mixing can be observed more frequently in some bilingual children whereas intrasentential mixing is much less frequent (Schmeißer et al. 2016a, p. 256f.). In accordance with Schmeißer, Eichler, Arnaus Gil, & Müller (2016a), if one defines the use of the non-context language (the use of the language which is not required by the linguistic context and not desired by the adult interacting with the child) as intersentential mixing, this kind of mixing is related to language dominance since mixing occurs in the children's weak language.

The few existing studies of code-mixing in trilingual children are all longitudinal studies. They show that especially intrasentential mixing is rather infrequent (Quay, 2001, 2008; Chevalier, 2015; Hoffmann & Stavans, 2007), whereas intersentential mixing can often be observed in the dominant language, mostly the community language (Sivakumar, 2017). Trilingual children are usually considered to develop one language as their dominant language, which is generally the community language (Chevalier, 2015; Quay, 2001, 2008 for example). Since it is assumed that, generally speaking children with a

weak language mix their languages more frequently, it follows that trilingual children should mix their languages more often than bilingual children, but a systematic study which compares bilingual and trilingual children and takes into account language dominance is still missing (with the exception of Mieszkowska, Luniewska, Kolak, & Kacprzak, 2017, a study which looks at the size of the receptive vocabulary in bilingual and trilingual children between the age of 4;5 and 6;7). From the literature on bilingual children we may deduce that dominance is not the determining factor for the frequency of intrasentential mixing (Patuto et al., 2014) but it does matter if whole sentences, utterances or larger pieces of discourse like turns are taken into account (Schmeißer et al., 2016a). Furthermore, in Müller et al. (2015), it is claimed that, although it occurs rarely, it is possible that the non-community language is dominant in the bilingual child (before the age of 5 which is the time when the investigation in Müller et al. (2015) has stopped). In other words, it is possible that trilingual children may develop an unbalanced trilingualism with the non-community language(s) as dominant language(s). Since the studies on trilingual children are scarce and they have not received much room in the previous literature, we will briefly present the results of those studies which present quantifiable data.

3.1. Chevalier (2015)

One of the most detailed studies on trilingual language development is Chevalier (2015). She investigates the language use of two trilingual children, focusing on contextual factors that influence active trilingualism in early childhood. During the analysed period (2;1–3;1) and with respect to the language use of the two trilingual children Lina (with a Swiss-German mother, a Belgian father who speaks French and an American aunt in the German part of Switzerland) and Elliot (with a Swiss-German father, an English-speaking mother, attending French day-care in the French-speaking part of Switzerland), we can observe that both children use an extremely small amount of intrasententially mixed utterances: In both children, the mixing rate lies under the 5% line, concretely with a mixing rate of 2% for Lina and 3% for Elliot. This result is similar to longitudinal studies of bilingual children where Patuto et al. (2014, p. 197) report a mixing rate of 2.42% during a period between 1;6 to 4. The same can be observed in the present cross-sectional study which will be analysed and discussed in detail in section four. Concerning intersentential mixing, Lina produces a relatively high number of intersentential mixing with 1144 utterances, whereas Elliot nearly always sticks to the interlocutor's language and there are only 210 cases of intersentential code-mixing to be observed. Figure 1 has been produced on the basis of the numbers found in Chevalier (2015).

In order to relate the results of the children's language production to their language dominance in Chevalier (2015), the proficiency in production is measured on the basis of the MLU and the Upper Bound. It is important to note that these are measures for language dominance which rely on production, while we have measured language dominance on the basis of the size of the receptive vocabulary in our cross-sectional research study. Furthermore, it is important to add, with regard to the definition of language dominance in Chevalier (2015), that domain specific language dominance is extremely unlikely for two-year-olds because their sphere of activities is not sufficiently specialised yet. However, according to De Houwer & Bornstein (2016), older children are possibly dominant in different linguistic domains (Chevalier, 2015, p. 95). For the present study which

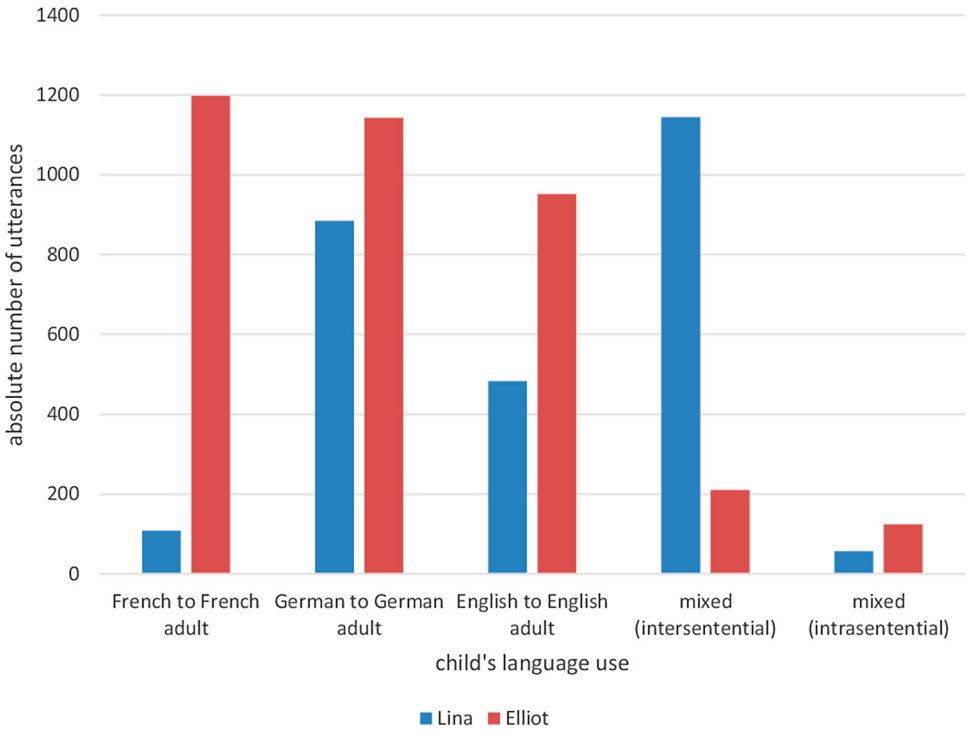

Figure 1. Lina's and Elliot's language use in the context of German, French and English (based on Chevalier, 2015).

looks at children with a mean age of 58 months (4;8), Birdsong's distinction between the domains and dimensions of language dominance will be maintained and considered to be relevant for the description of their language (un)balance. Returning to the trilingual children Lina and Elliot, Lina is clearly most proficient in Swiss German and slightly more proficient in English compared to French according to MLU and UB (Chevalier, 2015, p. 108), whereas Elliot is most proficient in French and more proficient in English than in Swiss German at the beginning of the study. At the end of the study, the order of English and French is not clear anymore if MLU and UB are compared in the two languages. Relating the information about language dominance and code-mixing and taking into account that Chevalier (2015) defines a base language for code-mixing which is the context language, directionality and quantity of mixing and language dominance go hand in hand with the previous literature: Lina mainly uses her dominant language (Swiss German), not only with her German mother, but also with her English aunt and her French father. This applies to intersentential mixing (cf. also Schmeißer et al., 2016a where it is argued that these cases are probably not instances of adult code-switching but instances of the child's choice of the wrong or non-desired language, where language choice is previously negotiated between the adult and the child). Intrasentential mixing is extremely scarce and, since the child is an unbalanced trilingual child, arguably not related to language dominance; if there was a relation between the two, we would expect the reverse, namely that intrasentential code-mixing is high(est) in children with a language dominance and (much) higher in the non-dominant language. Notwithstanding, there is no French or English

language material mixed intrasententially into Swiss German (her dominant language), but there are cases of Swiss German words produced in the context of French or English (Chevalier, 2015, p. 119). Unlike for Lina, there are also examples of intrasentential code-mixing from Elliot's non-dominant language in the context of his stronger languages. Chevalier (2015, p. 125) explains the difference in the two children by the fact that the language development in Lina is extremely unbalanced while Eliot's trilingual language development is more even, in the sense that it is perhaps exaggerated to speak of a dominant language in Eliot's case. Interestingly, Eliot's MLU is rather low in Swiss German at the end of the study which suggests that Eliot's mixing behaviour is best described with respect to different acquisition stages. As with Lina, intrasentential mixing is scarce. Notice that, in contrast to Lina, this is also true for intersentential mixing since Eliot mostly sticks to the language choice of each of his interlocutors (Chevalier, 2015, p. 99f.). This is so, although Eliot's father mixes nearly as frequently the languages (in other words he does not stick to the one person – one language method) as Lina's French father.

Taking the results of the two children together, Lina's case seems to confirm what has previously been observed by most researchers for bilingual children (if intersentential mixing is concerned). For Elliot it can even be confirmed that not only intra- but also intersentential mixing is scarce. Although he develops one language as his weak language, this does not influence the direction of code-mixing.

3.2. Hoffmann and Stavans (2007)

Hoffmann and Stavans (2007) studied mixed utterances of two early trilingual children at different times of their life. Looking at the amount of code-switching (CS) and code-mixing (CM) over time, the results show that the production of CM increases as the children grow older. It is noteworthy that the authors define CM as using language material from different languages within a sentence and CS as mixing elements from two or more languages across sentences (Hoffmann & Stavans, 2007, p. 57). In other words, the difference between CM and CS corresponds to the distinction between intra- and intersentential code-mixing respectively made in the present study. The increasing number of CM (intrasentential mixing) is explained by the also increasing dominance in the three languages since CMs '[…] require not only a deeper understanding of the formal aspects such as lexicon, the morphology and the syntax in each language but also the pragmatic and the functional appropriateness of these forms' (Hoffmann & Stavans, 2007, p. 61). The authors argue that the fewer switches produced by the children at a younger age can be explained by the fact that the three language systems have not been fully acquired yet. Growing older, the child's contact with the language systems increases and her/his general linguistic knowledge is more advanced (Hoffmann & Stavans, 2007, p. 61). Nevertheless, this assumption seems to refer only to intrasentential mixing (i.e. CM) since the rate of intersentential mixing (i.e. CS) is higher at the first time of investigation. This goes in line with the results obtained in Chevalier (2015), namely that intrasentential mixing, in contrast to intersentential mixing, is scarce in young trilingual speakers since it requires an advanced language competence. However, CS decreases in both children over the time, as the two measurement times have shown. In order to explain these observations, the authors hypothesise that '[…] as children grow older, their dominance of the languages increases as evidenced by

the production of fewer switches that require less linguistic knowledge' (CS) (Hoffmann & Stavans, 2007, p. 61). In conclusion, the authors assume that sociolinguistic factors weigh more than psycholinguistic or linguistic ones. Creating a model of developing multilingual competence, the authors regard CS (intersentential mixing) as a basic multilingual competence which is influenced by sociolinguistic factors and occurs at the level of utterances or turns, while the mixing of smaller linguistic units is seen as an indicator for an advanced multilingual competence (Hoffmann & Stavans, 2007, p. 70). Regarding the relation between language dominance and mixing, which is the focus of the present paper, it is shown that first there is no alternation away from English, but extensive intra- and intersentential mixing into English which could be explained by the dominance of English at that time (Hoffmann & Stavans, 2007, p. 62). Later alternations from and to all three languages seem more balanced in the older subject which is explained by the introduction of schooling which enhances trilingual language development and maintenance (Hoffmann & Stavans, 2007, p. 63). In this sense, the study does not indicate whether language dominance causes code-mixing but suggests an influence of language dominance on the directionality of mixing, as also observed in Chevalier (2015).

3.3. Montanari (2010) and Quay (2008)

Comparing the above results with the studies by Montanari (2010) and Quay (2008), we may deduce that age is a relevant factor when it comes to code-mixing in very young trilingual children. Whereas there seems to be a difference between intra- and intersentential mixing in older children (in the sense that intrasentential mixing is rare while intersentential mixing is relatively frequent and related to language dominance), very young children may use intrasentential mixing relatively more frequently due to lexical need. Montanari (2010) for example shows that Kathryn, a child raised in the U.S. with the community her languages English by a Tagalog-speaking mother and a Spanish-speaking father, mixes her languages rather frequently (intrasententially). However, mixing is mostly due to lexical gaps so that children below the age of two possibly have a restricted lexicon in all three languages and mix their languages for reasons of lexical need (Montanari, 2010, p. 79). Quay (2008) states the same for the child Xiaoxiao in Japan with an English-speaking father and a (Mandarin) Chinese-speaking mother. However, she also makes clear that one fifth of a child's input is enough to mainly use English with her father and not mix more in her weakest languages, which is English. In Quay (2001), the language use of the trilingual child Freddy, raised in Japan, is analysed from age 1;1 to age 2;0. It is shown that the child uses many English words in the English recording (and not in the German recording) and German words in the German recording (and not in the English recording), although German, the father's native language, is the child's weak language. Therefore, it has to be questioned if language dominance always influences the direction of code-mixing.

3.4. Hypotheses

From the review of the literature in previous sections, we can state that intrasentential mixing in bi- and trilingual children is rather infrequent (cf. Montanari, 2010; Quay,

2008). With respect to the causal relation between language dominance within the individual and the use of code-mixing, previous studies do not seem to show clear-cut results (for bilingual children and intersentential mixing cf. Schmeißer et al., 2016a, for trilingual children and inter- as well as intrasentential mixing cf. Chevalier, 2015 and Hoffmann & Stavans, 2007). Finally, the study of Quay (2008) seems to suggest a (possible) influence of language dominance on the direction of code-mixing. Having summarised these findings, we can now present the following hypothesis for our research study on code-mixing in bi-, tri- and multilingual children:

> Hypothesis 1: Intrasentential mixing in bi-, tri- and multilingual children will be as scarce as already observed both longitudinally and cross-sectionally in previous studies.
>
> Hypothesis 2: There is no causal relation between language dominance and code-mixing in early bi-, tri- and multilingualism.
>
> Hypothesis 3: Language dominance will not influence the directionality of code-mixing. We would like to assume that the different results observed in the literature can be explained in terms of Birdsong's (2014) distinction between domains and dimensions of language dominance, that is, by taking societal multilingualism into consideration, by differentiating between intra- and intersentential code-mixing and by analyzing insertional and alternational mixing separately.

After having presented the pertinent literature on code-mixing in bilingual and trilingual children with a focus on language dominance and having pointed out the relevant hypothesis, we will now proceed with the findings of our own study.

4. Our own research

4.1. Participants

In our study we examined in total 122 children[7] with more than one language from birth in order to describe their grammatical proficiency in their different L1s. There are 51 bilinguals, 62 trilinguals and 9 multilinguals with different language combinations (cf. Figure 3) and an average age of 58 months (4;8). The bilingual group has an average age of 59 months (4;9), the trilinguals 57 months (4;7), and the multilinguals 55 months (4;5). Therefore, the groups differ in their mean age but the differences are not statistically significant.[8] The age range is from 28 months (2;4) for the youngest child (trilingual) to 127 months (10;5) for the oldest one (bilingual). Figure 2 illustrates the age distribution in the sample. The total amount of 121 children is due to the fact that information about age is missing in one child.

Considering all children in our study, most of them are between 48 and 59 months which means 4 years old ($n = 38$), almost the same number of children is between 36 and 47 months ($n = 34$), namely at an age of 3 years, and there are 28 children between 60 and 71 months, i.e. at an age of 5 years. There are only few children younger than 3 years ($n = 5$) or older than 5 years old ($n = 19$). Taking into account only the bilingual children, the same age distribution can be observed, namely most of them are 4 years old ($n = 19$), fewer are 3 or 5 years old ($n = 11$ or $n = 12$, respectively) and a small number is younger than 3 ($n = 2$) or older than 5 years old ($n = 9$). Regarding the tri- and multilingual children, their age distribution differs in that most of the children are 3 years old. It is important to mention that the group of multilinguals contains only 9 children which makes it difficult to draw any significant conclusions.

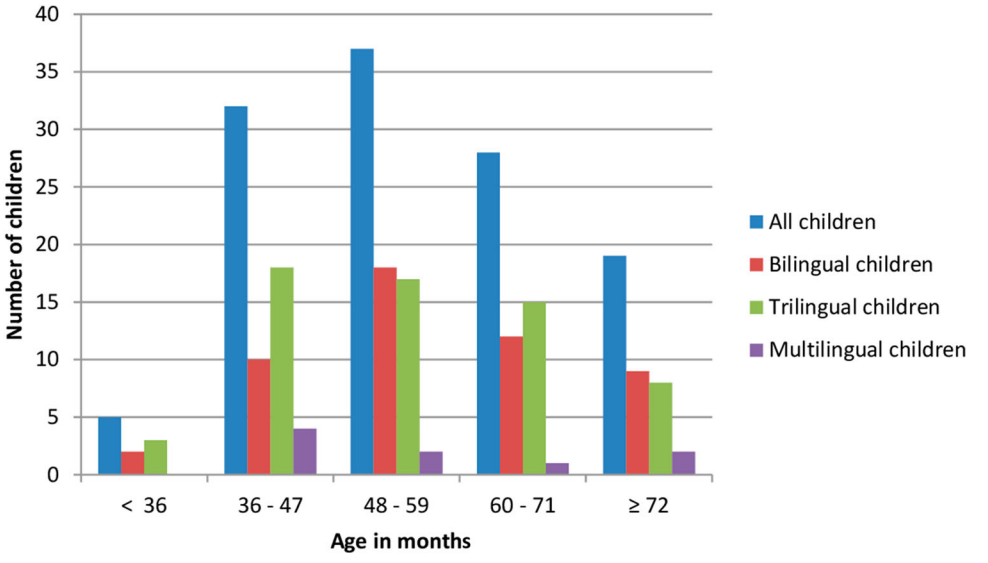

Figure 2. Age distribution of all children in the sample and divided into the bi-, tri- and multilingual groups.

The children who were attending kindergarten were tested in different cities in Germany and in Palma de Mallorca (Spain) at the respective institution. The institutions were bilingual with the community language (German in Germany or Spanish and Catalan in the Balearic Islands) and one of the minority languages of the children. In Figure 3, the different language combinations for the bi- and trilingual children are presented. The multilingual children had the following language combinations: German-French-Spanish-English (1), German-French-Spanish-English-Arabic (1), German-French-Spanish-Catalan (2) German-French-Spanish-Dutch (1), German-Spanish-English-Hebrew (1), German-Spanish-Catalan-English (2) and French-Spanish Catalan-Galician (1).

4.2. Methodology

The study consisted of several grammatical tests in order to elicit the bi-, tri- and multilingual children's placement of subjects in French (Arnaus Gil & Müller, 2018b), adjective placement in Spanish and French (Arnaus Gil, Zimmermann, Tirado Espinosa, & Müller, 2019), the placement of finite verbs in German (Arnaus Gil & Müller, 2018a) and the use of *ser* and *estar* in Spanish and Catalan (Arnaus Gil, Jiménez Gaspar, & Müller, 2018; Kleineberg, Arnaus Gil, & Müller, 2019). The tests were designed as production and comprehension tasks including a picture story or performing an interactive game with the children. Before starting the grammatical tests, the experimenter always talked a few minutes with the child in order to determine/negotiate the language of the following test and to ask the children implicitly to behave monolingually. Therefore, code-mixing could be observed when, during the tests, the child used another language than the one determined at the beginning of the test phase. As can be seen, the aim of the study was not to elicit code-mixing[9] but to focus on the grammatical proficiency of bi-, tri- and multilingual children. Therefore, the children were expected not only to use the respective

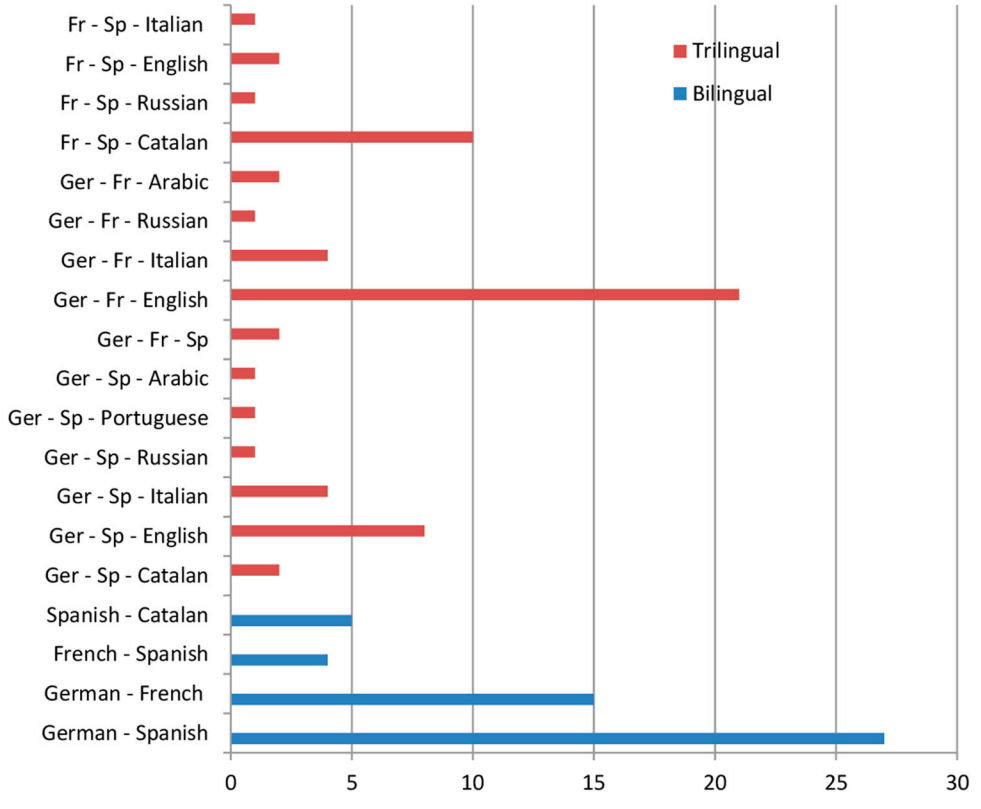

Figure 3. Language combinations: bilingual and trilingual children.

language of each grammatical test but also not to mix their languages. A deviation from this behaviour can thus be analysed in terms of code-mixing. Despite the monolingual setting, some relevant factors which might have influenced the appearance of code-mixing can be therefore investigated.

All 122 children were investigated regarding their mixing behaviour in all linguistic contexts. The mean mixing rate is a result of correlating the observed code-mixing with the entire number of utterances of all children. Notice, however, that the information on the children's language dominance was only available for 107 children.

As mentioned above, the children were implicitly asked to behave monolingually during the tests, i.e. mixing languages was not desired. Initially, the amount of code-mixing was studied in order to prove to what extent the tests worked. However, code-mixing can also be analysed in its own right in order to find out about the influencing factors, more precisely, under which circumstances code-mixing occurred despite the monolingual setting. One of these influencing factors is language dominance, both its domains and dimensions.

4.3. Language dominance

In order to determine the children's language dominance, we measured language proficiency with the PPVT (Peabody Picture Vocabulary Test, Dunn, 1959; Dunn & Dunn,

1981, 1997) from which the size of the receptive (hearing) vocabulary can be inferred. The examiner presents a page with four pictures to the child. S/he produces a word and asks the child to point at the picture that describes the word. The (in)correct response is noted on a record form (Figure 4).

The French version of the test was designed by Dunn, Thériault-Whalen, & Dunn (1993) and covers a broad range of French-language content words and syntactic categories (adjectives, adverbs, verbs, nouns). The test is suitable for children between the age of 2;6 and 18;0. It consists of 170 items equally distributed across item-sets (1 item-set equals 12 items). Administration should take 8 to 15 min. The French PPVT was designed on the basis of a representative sample of 2038 children in Canada. The children came from regions in Canada, where English is spoken in addition to French (especially Québec and Ontario).

The PPVT is a standardised test designed for typically developing French-speaking children to analyse their vocabulary development and in clinical assessment in order to detect language impairments and school readiness. The test allows a comparison with children in several age groups who speak French as their native language (control groups). In the present case, it was used to measure the linguistic competence in the different L1s of children who acquire more than one language from birth. To describe the linguistic competence a raw score is transformed into an age-dependent t-value which is linguistically described as:

Extremely high "excellent" (IQ point above 130)

Moderately high "bon" (IQ-points 115–130)

High average "moyen" (IQ-points 100–115)

Figure 4. Administration of PPVT (http://www.psychometrica.de/ppvt4.html).

Low average “moyen” (IQ-points 85–100)

Moderately low “médiocre” (IQ-points 70–85)

Extremely low “faible” (IQ-points below 70)

The German version of the PPVT has been available since 2015. It was designed by Lenhard, Lenhard, Segerer, & Suggate (2015). The German test covers a broad range of German-language words (adjectives, verbs, nouns). Children between the age of 3;0 and 16;11 can be tested. The test consists of 228 items equally distributed across 19 item-sets (1 item-set equals 12 items). Administration took 20 min. across all children. The German PPVT was designed on the basis of a representative norming sample of 3555 children in Germany, 29% of whom had one parent born outside Germany. The Spanish version was designed by Dunn, Padilla, Lugo, & Dunn (1986). It consists of 125 items and the norming sample consisted of 1219 children from Mexico and 1488 children from Puerto Rico. In the case of the Catalan children, we used a translation of the French and the Spanish version of the PPVT since no standardised test version was available.[10] All other languages that the bi-, tri- and multilingual children in our study acquired were not tested because the focus of the research project lay on the grammatical development of the languages German, French, Spanish and Catalan.

In order to determine the language (un)balance of the tested children, a balanced trilingual child had to be categorised in all her/his languages alike, low average to give an example (Sivakumar, Sette, Müller, & Arnaus Gil, 2019). Remember that the term language dominance expresses the fact that the languages are not in balance, in other words the level of accuracy reached in the languages is not important; it simply matters whether there was a difference between the languages of the speaker or not. The following table 1 is taken from Sivakumar et al. (2019). It shows in more detail the different subcategories for the labels ‘balanced’ and ‘unbalanced’ in our data.

Once the test has been carried out, a raw number is obtained. The test allows us to convert these raw numbers (which, unfortunately, differ from language to language) into IQ-points, by which it is possible to compare the children’s results in the different languages. The difference of IQ-points was taken to divide the bi-, tri- and multilingual children into different groups with regard to their language dominance or balance. Bilingual children can be balanced or unbalanced in their two languages. Trilingual children can be balanced in their three languages, balanced with two languages or balanced with two languages together with the possibility that there is no PPVT available in the third language. With respect to an unbalanced language development, the trilingual children can be unbalanced in three languages or with only two languages, while the PPVT was not carried out in the third language. The children with more than three languages in the present study, the multilingual children, are balanced with two languages, while there was no PPVT carried out in the third and fourth language, or unbalanced with two languages, while there are no results for the PPVT in the other two languages. Furthermore, there is one multilingual child balanced in all the four languages.

The following Figure 5 shows the status of (un)balance of the children tested in our study. It distinguishes between balanced and unbalanced children, abstracting from the subcategories mentioned in Table 1.

As can be seen, there are in general more balanced than unbalanced children ($n = 67$ and $n = 40$, respectively). Taking into consideration only the children with data available concerning their language dominance, 63% of the children are balanced and 37% are unbalanced.[11] For the different groups of bi-, tri- or multilingual children a similar proportion of balance and unbalance can be observed. There are 24 balanced bilinguals (57%) and 18 unbalanced bilinguals (43%), 38 balanced trilinguals (67%) and 19 unbalanced trilinguals (33%), 5 balanced multilinguals (62,5%) and 3 unbalanced multilinguals (37,5%). The balanced trilinguals in our study were mainly tested in Germany and were balanced in the community language and in one of their other L1s.[12] Therefore, we can deduce from these observations that children with more than two languages do not tend to develop the community language as their dominant language, as claimed in the literature. It has to be admitted that the children tested in this study are below the age of compulsory education in Germany. Thus, it is possible that they have not yet developed a language dominance with the community language, which usually comes after the children start formal education (Wang, 2008). However, we would like to point out that Sivakumar et al. (2019) showed that German as the community language does not influence the results in the *Peabody Picture Vocabulary Test*. Language proficiency measured by the receptive vocabulary is even slightly better for the children acquiring German in a non German-speaking community than for the ones living in Germany (Sivakumar et al., 2019, p. 26). Therefore, the assumption that the community language tends to be the dominant language cannot be confirmed, at least for children at kindergarten age. What has to be proved in our following analyses is the proportion of (un)balance for those children who mix their languages in the study in order to describe the relation between code-mixing and language dominance.

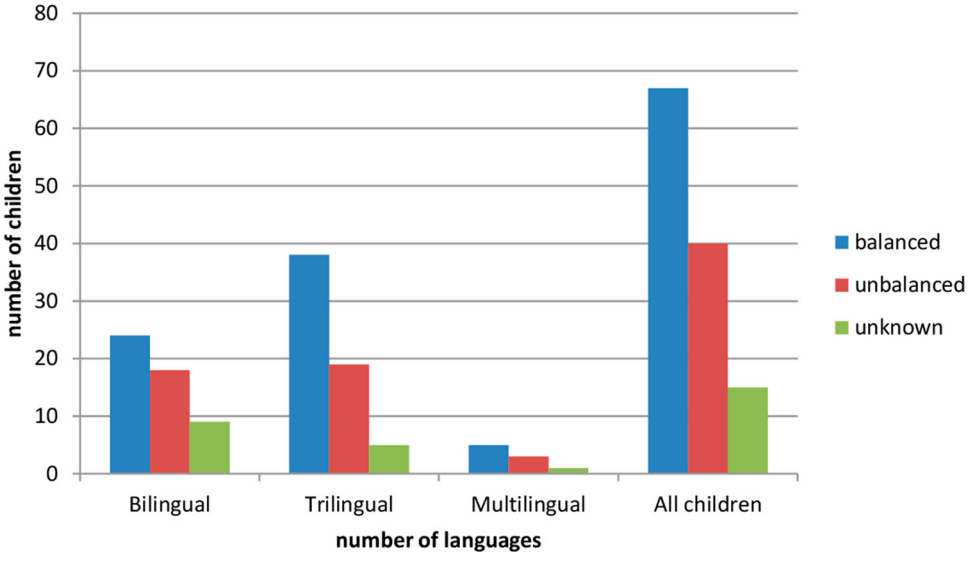

Figure 5. Number of bilingual, trilingual and multilingual (un)balanced children.

Table 1. Categories to capture language (un)balance in bi-, tri- and multilingual children, taken from Sivakumar et al. (2019).

	BIL	TRIL	MULTI
Balanced	balanced with 2 languages	balanced with 2 languages (3rd lg. not measured) balanced with 3 languages	balanced with 2 languages (3rd and 4th lg. not measured) balanced with 3 languages (4th lg. not measured) balanced with 4 languages
Unbalanced	unbalanced with 2 languages	unbalanced with 3 languages unbalanced with 2 languages (3rd lg. not measured)	unbalanced with 2 languages (3rd and 4th lg. not measured) unbalanced with 4 languages

4.4. General results

The first general result is that all children rarely mix their languages. This means that the children are aware of the monolingual setting and use only in 134 out of 1913 cases (utterances) a language other than the requested in the experimental situation. Inter- and intra-sentential code-mixing is collapsed in the 'entire' column in the following Figure 6. This corresponds to a mean mixing rate of 7%. The highest mixing rates can be observed by tri- and multilingual children with 8.78% and 9.3%, respectively, while bilingual children show an extremely low mean mixing rate of 4.32%. These percentages are calculated with respect to the whole number of utterances of each group (bilinguals: 741, trilinguals: 957; multilinguals: 215). Of all 122 children, only 45 children mix their languages at all.[13]

Since the percentage values noted before are calculated for all children participating in the study, it seems interesting to have a closer look at the proportion of mixing for the children who code-mix. In other words, the children who code-mix ($n = 45$) produce 134 mixed utterances out of 792 realised items in the tests in total. This corresponds to a mean mixing rate of 16.92%. Obviously, their proportion of mixing is higher than the

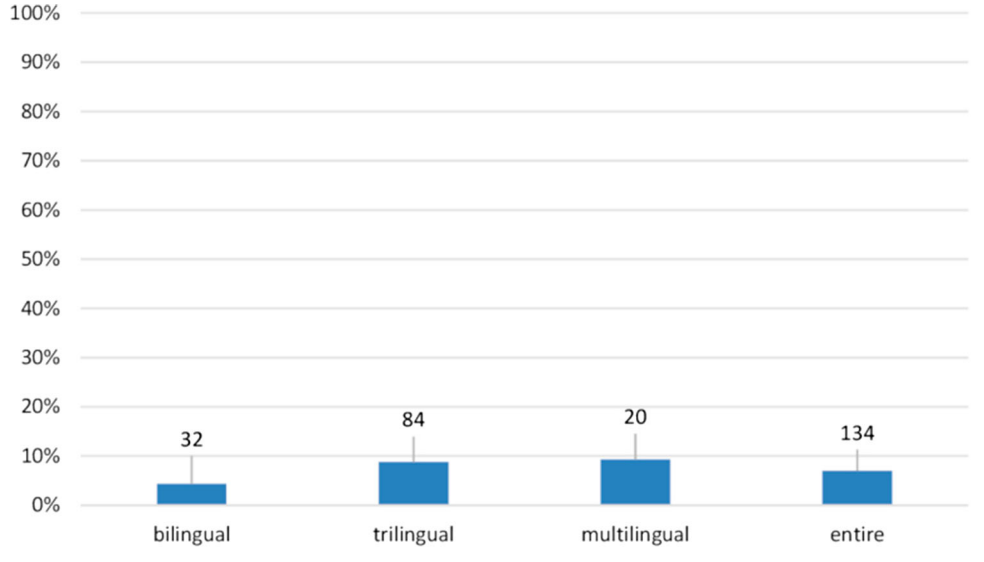

Figure 6. Amount of code-mixing (entire group).

general rate of mixing. In other words, although only a few children code-mix at all, if they do, they code-mix to a degree which cannot be neglected. Regarding the groups of bi-, tri- and multilingual children they behave much alike with respect to their mixing rates. The bilingual children who code-mix show a mean mixing rate of 16.24%, the trilinguals 17.46% and the multilinguals 17.54%. We will discuss the results qualitatively in sections 4.5 and 4.6.

4.4.1. Results in relation to societal language dominance

If we consider the children's language combinations, a clear picture emerges with the children who acquire Catalan. The mean mixing rate calculated for all children in the sample decreases from 7% to 4.7%, once the testing in Catalan is excluded[14], which means that only 83 out of 1767 utterances are mixed. The trilingual's mean mixing rate decreases to 5.1% and the multilingual's mean mixing rate to 4.44%. The percentage of code-mixing within the bilingual children stays the same with 4.32% because there are no bilingual children with the combination Catalan + X who were tested in both languages. Therefore, the mean mixing rate is below 5% and classified as extremely low. Regarding the number of languages of a child, the trilinguals show the highest mixing rate with 5.1% and the bilinguals the lowest one with 4.32% (cf. Figure 7).[15]

Interestingly, the children who use Spanish in the Catalan testing did not mix their languages when they had to speak Spanish. Furthermore, they mixed Spanish linguistic material into Catalan (and not from their other languages). The reason for the relatively high mixing rate in Catalan is argued to be related to the linguistic situation in Spain. All Catalan speaking children were tested in Palma de Mallorca, a region that benefits from societal bilingualism, a fact which might have fostered mixing. Boix-Fuster & Sanz (2008) claim that societal bilingualism in Catalonia is asymmetrical in favour of Spanish in most situations. If we can extend their results to the Balearic Islands, the children might have assumed that all people who are able to speak Catalan are also able to

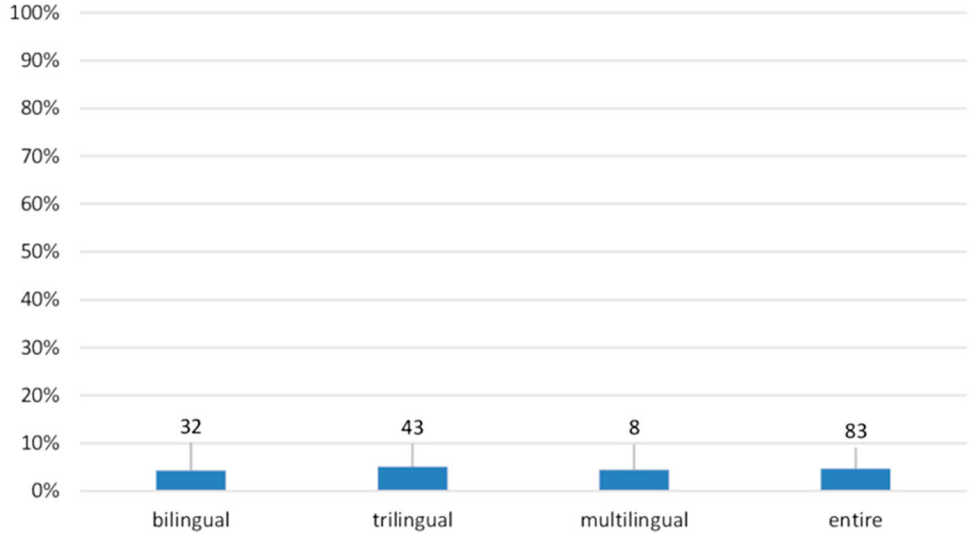

Figure 7. Amount of code-mixing excluding the testing in Catalan.

speak Spanish but not vice versa. According to this assumption, it seems appropriate to apply the distinction between domains and dimensions of language dominance. Regarding the Catalan children's proficiency in the PPVT, the majority of the children who mix Spanish into Catalan reached high scores ('moderately high', 'extremely high') in Catalan. Therefore, the dimension of language dominance, that is, the linguistic competence within the individual, cannot explain the relatively high mixing rate in Catalan. With respect to Birdsong's (2014) concept of the domains of language dominance, the results in Catalan indicate that Spanish is the preferred language in the school context in Palma de Mallorca where the children were tested.

Apart from the possibility that language dominance in the sense of the domains of language dominance might have fostered code-mixing in the Catalan tests, the influence of the individual language dominance, in Birdsong's conception, the dimension of language dominance, will be statistically investigated in what follows.

4.4.2. Results in relation to individual language dominance

As mentioned before, we used the results of the PPVT to determine language dominance within the individual. According to this classification, 21 out of 43 children who mix their languages are classified as balanced, while the other 22 children are unbalanced. Therefore, 48.84% of the children who produce code-mixing are balanced and 51.16% are unbalanced. Thus, it cannot be confirmed that children who mix their languages show an unbalanced language development (Eichler, 2011). The reverse is also unlikely, namely that unbalanced children mix more often their languages, as is generally assumed in the research literature on bilingual children. In total, there are 77 children who do not mix their languages, for 63 of them data concerning language dominance is available. These children are classified as balanced (63.49%) and as unbalanced (36.51%). In other words, we could suppose that it is less likely for balanced children to mix their languages since there are slightly more balanced than unbalanced children within the group of children who do not mix their languages. However, there are more balanced children (63%) than unbalanced ones (37%) in the whole sample (see Figure 2). Put differently, the slightly higher number of balanced children in the group of children who do not mix their languages could be linked to the overall higher number of balanced children. In what follows, we will show on the basis of statistical analyses that there is no relation between language dominance and code-mixing in bi-, tri- and multilingual children.

Among the bilingual, trilingual and multilingual children, there were balanced as well as unbalanced children (cf. Figures 8 and 9). Is there a relation between the children's code-mixing and language dominance within the bilingual, trilingual or multilingual group?

A chi-squared test revealed no statistically significant relation assuming a random probability under 5% ($X^2 = 2{,}751$, df(1), $p = 0{,}97$). Notice, however, that the tri- and multilingual children have been combined in one group in order to obtain a reliable result since the multilingual group consisted of less than 5 individuals.[16] The same result is obtained if the children who mix their languages in the Catalan tests are excluded: There is no statistically significant difference between the bilinguals and the children with more than two languages regarding code mixing and language dominance ($X^2 = 1.551$, df(1), $p = 0.213$). Nevertheless, it is important to analyse not only the relation between

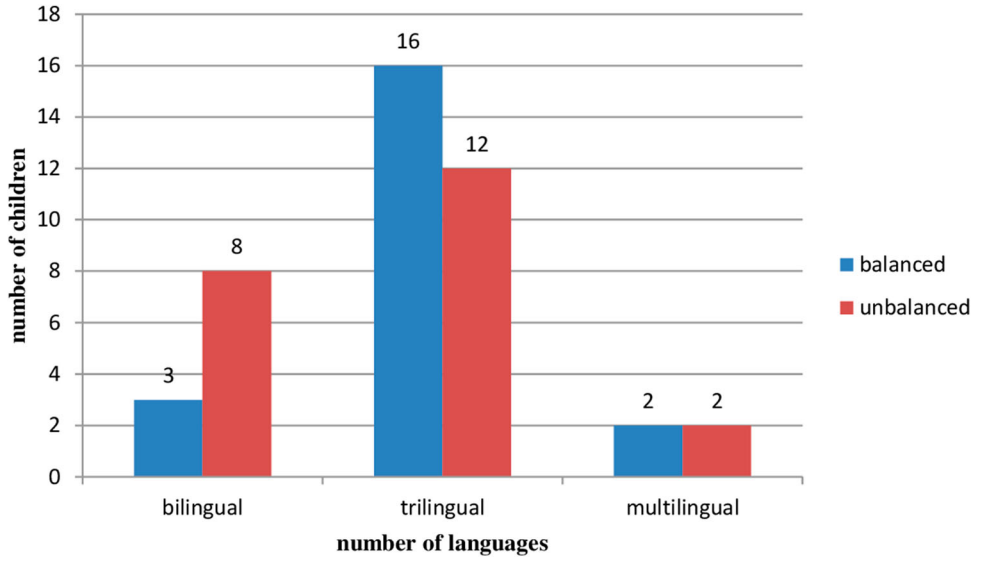

Figure 8. Number of bilingual, trilingual and multilingual (un)balanced children who mix their languages (entire group).

code-mixing and language dominance on the one hand and the relation between code-mixing and the number of languages acquired by the children on the other hand but also to compare the mean proportion of code-mixing between groups (bi-, tri- or multilinguals) split by language dominance. Therefore, we carried out a two-way ANOVA to check whether there is a significant interaction between language dominance and language

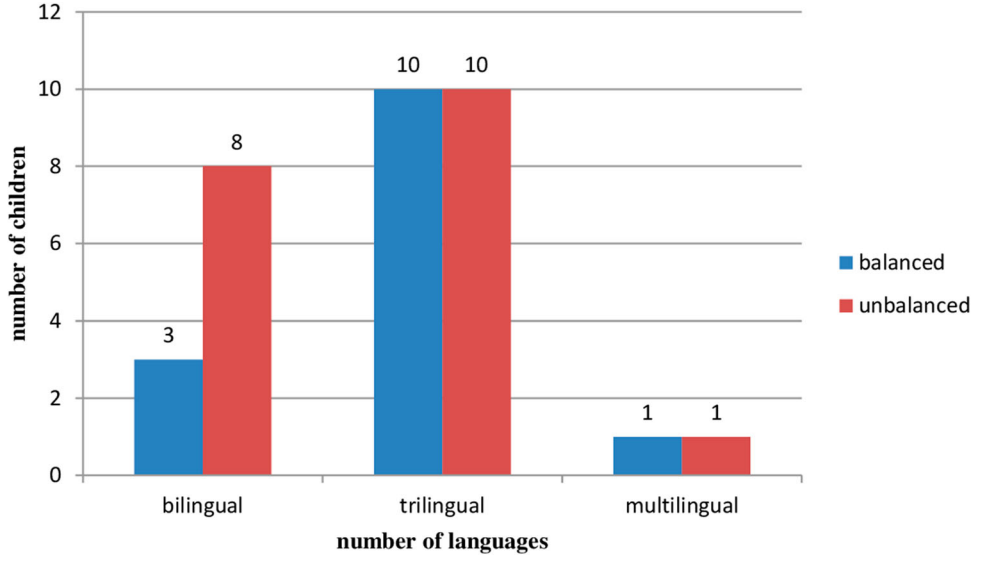

Figure 9. Number of bilingual, trilingual and multilingual (un)balanced children who mix their languages (without Catalan tests).

group with respect to the amount of code-mixing. The percentages of code-mixing were considered as the dependent variable whereas language dominance and language group were treated as independent variables, also called factors. The statistical analysis revealed no significance, in other words, the amount of code-mixing is unrelated to language dominance and to the number of languages known ($F(4,37) = 0.677$, $p = 0.514$).[17]

Furthermore, we can add information on the family attitudes towards code-switching since these may vary largely and probably influence the children's amount of mixing. The attitudes towards CS may differ for example in allowing, encouraging, discouraging or banning CS in the participating families. For this reason, we use the results of the input questionnaires which were given to the parents of the children.[18] These questionnaires are available for 57 of 122 children and contain – among other things – information about the language/s spoken in the family and about the language/s the mother and the father respectively speak with their child. Out of these 57 questionnaires, there are 19 from children who produce mixed utterances and 38 from children who do not mix their languages. With regard to the children who code-mix, there are only six parents (32%) who indicate having only one family language whereas 13 parents (68%) indicate having more than one family language. In contrast, the relation is in balance if it comes to the children who do not code-mix. 19 of the families (50%) indicate having one family language and 19 of the families (50%) indicate having more than one family language. Thus, having more than one family language does not cause code-mixing but children who mix their languages do often speak more than one language in their family communication. Furthermore, for seven of the children who code-mix (37%) the parents indicate that that each parent speaks only one language with the child. Regarding the parental questionnaires of the children who do not produce mixed utterances, it can be observed that 22 parents (58%) indicate that each parent speaks only one language with the child. Therefore, the situation that each parent only speaks one language with the child is less frequent for children who mix their languages. Due to the scarce amount of data, we may only deduce very carefully that having more than one family language and addressing the child in more than one language in adult–child interaction demonstrates a more tolerant handling of code-mixing on the part of the parents and thus in the child´s input. A liberal attitude towards code-mixing on part of the parents will possibly give rise to a liberal use on part of the child as well. The following figures illustrate the described information from the parental questionnaires for the children who code-mix (Figure 10) and for the children who do not mix their languages (Figure 11).

Until now, we focussed on the children who mix their languages. In what follows, we will investigate the relation between code-mixing and language dominance on the basis of the 134 instances of inter- and intrasentential code-mixing. Information regarding the children's language dominance is available in 129 cases. The fact that 43 children produce 134 mixed utterances shows that several children change their languages more than one time between or within utterances. An independent two-sample *t*-test reveals that there is no statistically significant[19] difference between the amount of code-mixing that was produced by a balanced child and the amount of code-mixing that was produced by an unbalanced child ($t = 1{,}162$, df(39), $p = 0{,}252$). 72 out of 114 instances of code-mixing can be assigned to balanced children and 57 to unbalanced ones. The difference between code-mixing produced by balanced and by unbalanced children does not reach statistical significance, not even if the Catalan tests are excluded ($t = 0{,}861$, df(19), $p = 0{,}4$). Therefore, language dominance does not seem to determine code-mixing.[20]

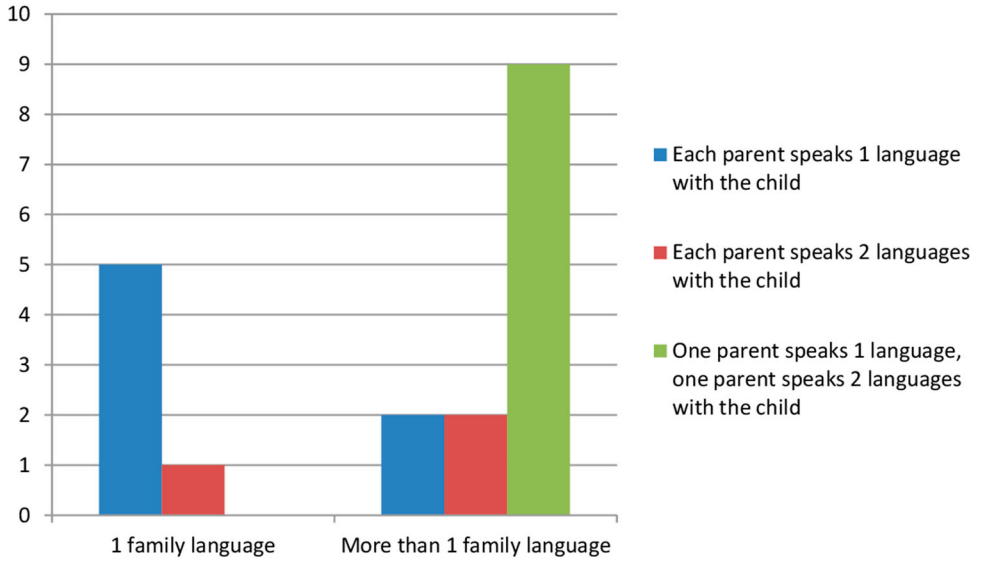

Figure 10. Information about the family languages of the children who mix their languages.

4.5. Analysis of code-mixing: intersentential

Our review of the literature has suggested a difference between inter- and intrasentential mixing. Until now, we have collapsed the two. In what follows, we will study inter- and intrasentential mixing separately.

111 out of 134 instances of code-mixing can be classified as inter-sentential mixing – 106 with data available regarding language dominance. Hence, there is a clear imbalance in favour of intersentential mixing. This result coincides with the results in Schmeißer et al.

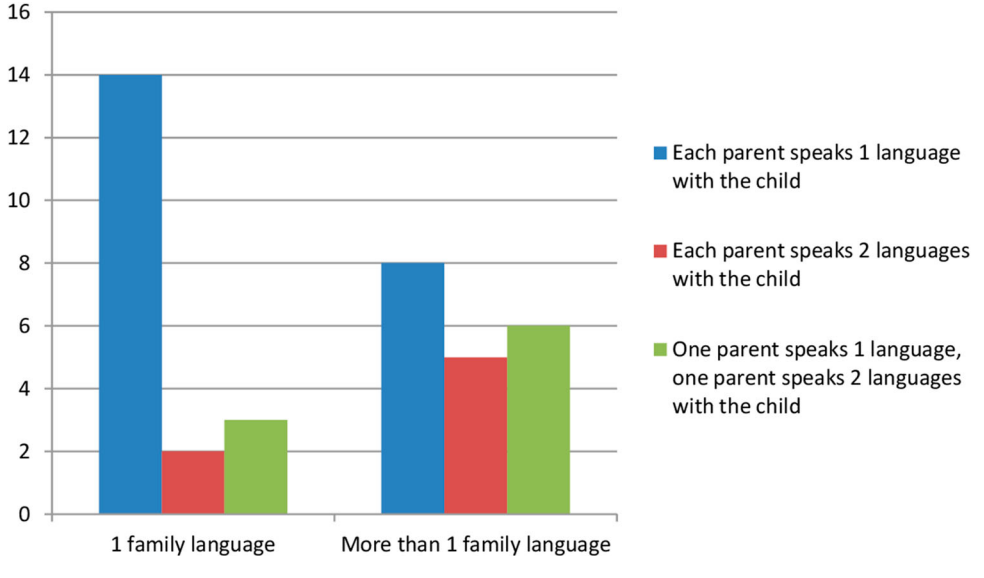

Figure 11. Information about the family languages of the children who do not mix their languages.

(2016a, p. 261) according to which intersentential mixing is generally more frequent than intrasentential mixing.

57 out of 106 instances of code-mixing were produced by balanced children and 49 by unbalanced ones. An independent two-sample *t*-test reveals that there is no statistically significant difference among the groups ($t = 0{,}118$, df(32), $p = 0{,}907$). In other words, language dominance and intersentential mixing are unrelated. 58 instead of 106 instances of code-mixing are observed if we exclude the Catalan tests, due to the reasons already mentioned above. The difference between code-mixing produced by balanced ($n = 26$) and by unbalanced children ($n = 32$) is not statistically significant either ($t = -0{,}393$, df (16), 0,699).[21] This result stands in sharp contrast to Schmeißer et al. (2016a) who observed mainly intersentential mixing in the weak languages of four (German-French) bilingual children. Notice, however, that the children of the study by Schmeißer et al. (2016a) were younger than the children of the present study and they were also analysed longitudinally.

4.6. Analysis of code-mixing: intrasentential

On the basis of 23 cases of intrasentential code-mixing out of 1913 utterances in total, we may only outline some tendencies concerning intrasentential mixing in multilingual children.

While 13 cases of code-mixing were produced by seven balanced children, ten mixed utterances can be observed in eight unbalanced children. This balance according to language dominance and code-mixing is confirmed by an independent two-sample *t*-test which reveals no statistically significant difference ($t = 1{,}245$, df(8), $p = 0{,}248$). The same results are obtained if we exclude the Catalan tests. The absolute number of intrasentential code-mixing produced by balanced children is eleven, whereas the number of code-mixing produced by unbalanced children is nine. The difference is not statistically significant ($t = 1{,}892$, df(4), $p = 0{,}146$). Although the number of intrasentential mixing is rather small, it can be deduced that language dominance is not a determining factor when it comes to mixing languages within one utterance.

5. An alternative analysis

From the literature on (successive) third language acquisition (Rothman, 2011, 2015), we know that (psycho-) typology is an important concept in order to explain cross-linguistic influence. With regard to intersentential mixing in the analysed children, in 51 cases the language used is typologically closer to the context language of the test (cf. Figure 12).

As already mentioned, 'typological proximity is understood as membership to the same language family' (Liceras & de la Fuente, 2015, p. 329). For the present dataset, we can mainly distinguish between the Germanic and the Romance language family. Furthermore, Spanish and Catalan can be seen as typologically closer to one another than French (for example, the first two are null-subject languages whereas the latter is not pro-drop). In 51 cases of intersentential mixing, the typologically closer language is involved. This can be explained, among other things, by the higher number of Spanish utterances in the Catalan tests. Only in eleven cases does the switch come from the typologically more distant language, i.e. from a language of a different language family,

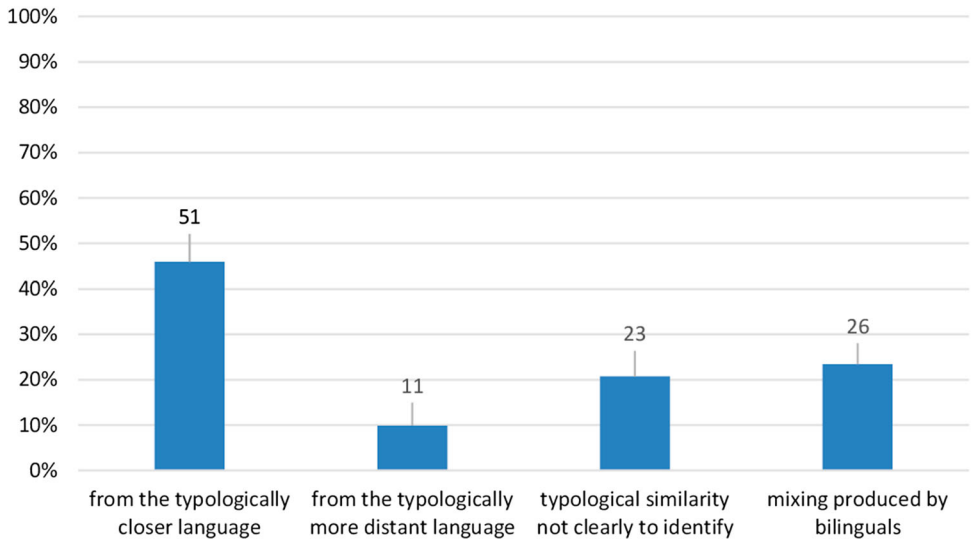

Figure 12. Directionality of intersentential mixing in relation to typological proximity.

although the child would have had access to a language from the same family as the context language. An independent two-sample *t*-test reveals that the difference is statistically significant ($t = 3{,}13$, df(13), $p = 0{,}008$). In other words, the proximity between the languages of tri- and multilingual children influences the direction of intersentential mixing. There are 23 cases of intersentential mixing for which it cannot be decided which language is the typologically close one. For 21 of these 23 cases, the language of the mixed utterance is the community language. Put differently, if there is no typologically closer language which can clearly be identified, the children seem to use the language spoken in their community. Concerning the bilinguals' 26 cases of intersentential code-mixing, nothing can be said with respect to typological proximity since the bilingual child has no choice, i.e. s/he cannot decide between two languages L_B or L_C to mix in L_A.

Let us turn to the children's intrasentential code-mixing. While in ten cases, the typologically closer language is used, in seven cases it is the typologically more distant one. Nothing can be said with respect to the six bilingual children. We are therefore led to believe that typological proximity plays no role in intrasentential code-mixing. As reported earlier, an influence of typological proximity on intersentential code-mixing could be proved. Having a closer look at the different processes of intrasentential mixing, namely insertion and alternation, the former involves disintegrated language material and is, therefore, more similar to intersentential mixing than the process of alternation. Consequently, we could assume that, just like with intersentential mixing, instances of intrasentential code-mixing which can be classified as insertion are related to typological proximity while the 'integrated' mixing (alternation) is not.

The introduction of language material from a bilingual's respective other language or from one of the other languages of a multilingual speaker is one characteristic of the process of insertion. Insertion denotes a change between languages introducing language material of language A into language B (Muysken, 1997, p. 363). Insertion always needs a base language into which material from another language is inserted. In contrast,

alternation means the change between languages that comprises grammar as well as the lexicon of the two (or more) languages (Muysken, 1997, p. 362f.).

Based on the assumption that CS-processes can be studied empirically, Muysken proposes different criteria to determine the processes underlying mixed utterances. The diagnostic criteria constituency, peripherality, nestedness, selectivity, linear equivalence, length and complexity, bidirectionality, embedding in discourse, structural position, flagging, category and adaptation are shown in Table 2.[22] Besides, Table 2 includes all three CS-processes (insertion, alternation and congruent lexicalisation). The plus sign means that the criterion is an indicator of the particular CS process.[23]

We will illustrate the application of some of the features of Table 2 to intrasentential code-mixing by using example (3) from our study.

(3) äh die_{GER} $vispa_{SP}$ (= $avispa_{SP}$) / ´er the wasp´

Since this instance of intrasentential mixing occurs during testing in German, we have to consider 'vispa' as the element mixed into an otherwise German utterance. According to the features which determine the CS processes, it can be classified as a single constituent, indicating therefore insertion as the underlying process. Furthermore, the mixed element is not situated in a peripheral position. Since a peripheral position indicates alternation, the non-occurrence of this feature results in the respective other CS process, namely insertion. With regard to nestedness, no result is obtained because there is no element following the mixed element ´vispa but it can be classified as 'selected element' which is indicative of insertion. However, the linear equivalence between the German and Spanish structure of a noun phrase shows characteristics of alternation. With respect to features 6 and 7, the mixed element is neither considered as long (utterances with more than 3 words are defined as long) nor as complex since complexity is given if the mixed element is a subordinate clause. Musyken describes the feature of embedding in discourse as another possibility to indicate a type of switching. 'Consider a mixed clause starting in language A and, ending in language B. If the preceding utterance is in A, and the following clause is in B, alternation is a plausible analysis' (Muysken, 1997, p. 371). Due to the fact

Table 2. Diagnostic features of the three processes of code-switching (Modified according to Muysken, 1997, p. 373).

		Insertion	Alternation	Congruent lexicalisation
1. number of constituents	single	+		
	several		+	
	non			+
2. peripheral			+	
3. nestedness	nested a b a	+		
	non-nested a b a		+	+
4. selected element		+		+
5. linear equivalence			+	+
6. length			+	
7. complexity			+	
8. embedding in discourse			+	
9. major clause boundary			+	
10. flagging			+	
11. type of category	lexical category	+		
	function word			+
	adverb, conjunction		+	
12. adaptation		+		+

that in the example there is no utterance of the child which either precedes or follows the mixed one, the negation of this feature makes insertion more plausible. Mixing within a syntactic phrase, like it is observed in example (3), indicates insertion, while the lack of flagging before the switch, given by a pause or a particle such as ´euh´, makes insertion less likely. Concerning the type of category, the mixed element is a noun and thus a lexical category which indicates insertion whereas absence of adaptation of the mixed element to the base language of the utterances is a sign for alternation. In conclusion, nine features are indicative of the process of insertion and only two of the process of alternation. For one feature no result is obtained.

After having presented one example, we will now describe the results of the analysis for all instances of intrasentential code-mixing in the present study. As can be seen in Figure 13 below, after having applied Muysken's classification to the children's productions of intrasentential mixing, there are two cases in which seven features indicate insertion, two cases in which eight features point to the process of insertion, 17 cases in which nine features correspond to insertion and one case in which eleven features indicate insertion.

If we postulate that insertion is present, if more than half of the features (= 7) are in favour of this CS-process, then 23 out of 23 cases of intrasentential code-mixing can be classified as such. An important result of this analysis is the fact that the processes of insertion and alternation constitute a continuum. This result is described in Poeste (2017). Muysken himself characterises the features used to distinguish the CS-processes as features which make a certain process more or less likely (Muysken, 1997, p. 365ff.).

In the present dataset, 13 cases of intrasentential code-mixing classified as insertion are produced by balanced children and five by unbalanced children. For four children, the relation cannot be investigated since information regarding language dominance is missing. The data is too scarce for further analysis. Notwithstanding, we believe that the

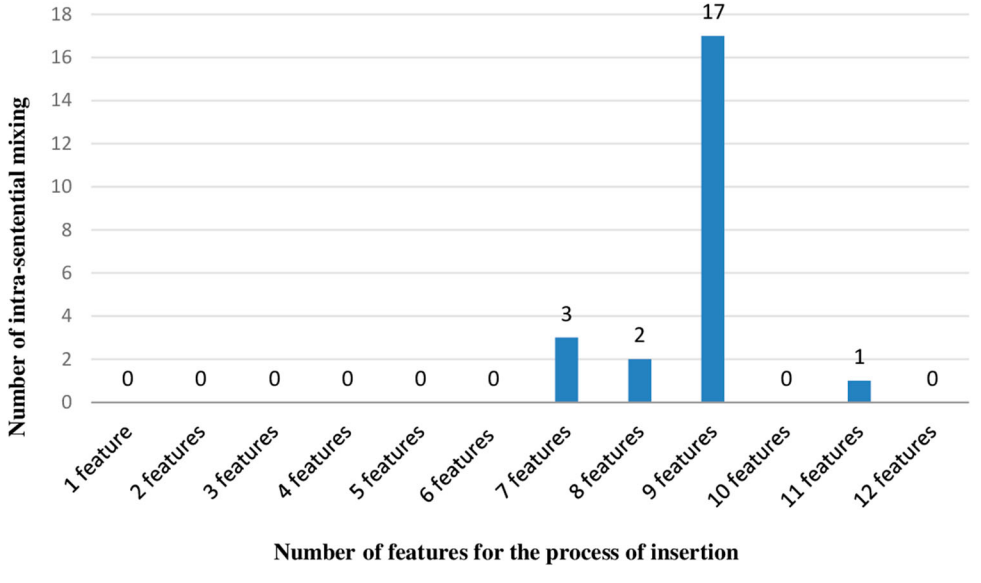

Figure 13. Assignment of intrasentential mixing to CS-processes by means of the features of insertion.

result that all cases of intrasentential code-mixing are cases of insertion is interesting as such and should be pursued in future research.

6. Discussion

A central result of our study is that code-mixing is rare in a monolingual setting (mean mixing rate of 7.27% and 4.81% when excluding Catalan tests). Therefore, not only bilingual but also trilingual and multilingual children are able to behave monolingually in a monolingual setting. Furthermore, the assumption formulated in the literature that an unbalanced language development exercises an influence on code-mixing can only be partly confirmed. Considering the distinction between domains and dimensions of language dominance (Birdsong, 2014), we can presume domain-specific language dominance in the children who speak Catalan. Domain-specific language dominance could explain the relatively high mixing rate in the Catalan tests. However, if it comes to the dimensions of language dominance, i.e. the relation of the languages measured in the individual, no relation was found between the children's code-mixing and language (un)balance. The result remains if a subdivision is made between inter- and intrasentential mixing. Consequently, an unbalanced language development does not cause the appearance of code-mixing. The study of intersentential code-mixing has suggested an influence of the child's typologically close language. With respect to intrasentential mixing, all instances could be identified as instances of insertional code-mixing.

How can we account for the relevance of typological proximity and the process of insertion? It seems plausible to assume that it is easier to process typologically related languages, due to their structural similarities, than typologically distant languages. Notwithstanding, it is also probably more difficult to keep typologically closer languages apart, or, to speak with Grosjean's (2001) terminology, to always behave in a monolingual mode and suppressing the non-desired language. Furthermore, since insertion always demands a base language (a feature which insertion shares with borrowing, a process which can also occur in otherwise monolinguals), it is arguably less complex than alternation. But here are exactly the limits of our research study. We do not know why the children code-mixed at all, nor do we know how they behave if a multilingual setting is conveyed (but see Patuto et al., 2014).

Our results stand in sharp contrast with existing studies in the literature on trilingual and bilingual children with regard to the relevance of language dominance. We believe that this is the case because we started to apply the distinction between domains and dimensions of language dominance to our dataset. We propose to consider societal multilingualism as a factor that influences the children's mixing behaviour as well as a distinction between the different CS-processes since it makes a difference mixing integrated or disintegrated language material. Possibly, the relation between language dominance and code-mixing differs depending on the level of complexity of mixing. In the case of early child trilingualism, all existing information comes from longitudinal studies. Hopefully, future research will include a fine-grained conception of language dominance, a shift in the methodology and multilingual children who acquire more than two languages and, therefore, have a choice!

Notes

1. Abbreviated as CS.
2. Years;months,days.
3. A detailed description of the participants in our study will follow in section 4.1.
4. Abbreviated as MLU.
5. Abbreviated as UB.
6. Although language dominance is generally determined by measuring MLU or Upper Bound, we decided to use a measure of receptive vocabulary (size of receptive vocabulary, as measured by PPVT) for the following reasons: First, the children's results in the Peabody Picture Vocabulary Test describe not only language performance but also language competence which is not clear when using the MLU to determine language dominance (De Houwer, 1990, p. 15). Second, it was not possible to measure the MLU for all children because at least 100 utterances in each of the children's languages would be needed. This would have required a spontaneous recording of around 20 min. per language.
7. As a matter of fact, the study counts 126 children but there are no transcriptions available for three of them and one child was not predisposed to speak. The latter was also the youngest with 22 months (1;8). Therefore, in what follows, the total number of children will be 122.
8. An independent two-sample *t*-test reveals that there is no statistically significant difference between the mean age of the bilingual and the trilingual group assuming a random probability under 5%. ($t = 0{,}85$, df(102), $p = 0{,}398$). There is also no statistically significant difference between the mean age of the trilingual and the multilingual group ($t = 0{,}23$, df(9), $p = 0{,}82$) and between the bilingual and the multilingual group ($t = 0{,}81$, df(12), $p = 0{,}433$).
9. It is important to note that code-mixing is rather difficult to elicit. In cross-sectional studies bilingual children mix rarely their languages if addressed in one of their languages (mean mixing rate of 0.94% in Müller et al., 2015, p. 109). Patuto et al. (2014) show that mixing is difficult, if not impossible to elicit in production, since it is generally assumed that bilingual speakers mix their languages spontaneously. In the study of Patuto et al. (2014), bilingual children had to repeat a sentence with code-mixed material but, although they were able to repeat the sentence, they 'corrected' the mixed material and produced the sentence with lexical material from one of their languages. When repeating the sentence, they tended to choose the language of the last word of the adults' utterance.
10. Admittedly, it is problematic to use a translation of the French and the Spanish PPVT in order to examine the children's vocabulary size in Catalan. Such practice may result in obtaining items which are close in meaning but do not necessarily correspond in respect to other criteria, e.g. structural word complexity, cultural interpretation, familiarity, or frequency of occurrence (Peña, 2007). Nevertheless, looking at the French and Spanish PPVT in detail, even though the norming sample and the total number of test items differ, the distribution of the standard scores and the linguistic categories are the same (cf. Dunn et al., 1986; p. 40 and Dunn et al., 1993, p. 37). Since no other solution was available at the time of testing, the Catalan translation of the French and the Spanish PPVT were thus implemented in order to measure the Catalan receptive vocabulary.
11. The children's language dominance is sometimes unknown due to two reasons. First, for some children there is no PPVT available. Second, difficulties arise when comparing the results of the PPVT and the results of the Wechsler Intelligence Test, which was used during a time of testing when the German version of the PPVT was still not available (Petermann, 2011[2]). There are children who were too young or too old, making it impossible to convert the age-based scaled scores (with a mean of 10) of the Wechsler Intelligence Test into IQ-points (Lenhard et al., 2015), a necessary step in order to determine the children's language dominance.
12. This result corresponds to 36 of the 38 balanced trilingual children (the other minority language, namely English, was not tested). Notice that only two of the 38 balanced trilingual children were tested in all three languages and the latter show a balanced relation among their three L1s. More research is needed which measures all three languages in the trilingual children.

13. This is a relevant fact. From the 45 children who code-mixed, we will only refer to a total amount of 43 since there is data available on language dominance for only these 43 children.
14. There were no bilingual Catalan-Spanish children tested in both languages. Therefore, we do not know whether there is a difference in the mixing behaviour of bilingual and trilingual children. We carried out two quantitative analyses, one including the Catalan tests and one excluding them, in order to find out whether societal bilingualism has an impact on the mixing behaviour of the tri- and multilingual children.
15. The illustration of the data in figure 7 parallels the one in figure 6.
16. We are aware of the fact that the group of children who mixed their languages is relatively small. Nevertheless, this shows that the children behaved according to the monolingual setting as outlined in the study.
17. It is noteworthy that the statistical analysis was carried out with the percentages of mixing for the corresponding children who code-mix and not with the absolute number of code-mixing of each child.
18. For a detailed analysis of the parental questionnaires see Arnaus Gil, Müller, Sette & Hüppop (2019).
19. Statistical relevance is given by a random probability under 5%.
20. In addition to measuring language dominance based on the receptive vocabulary of the child, a reviewer suggested exploring the correlation between the children's general verbosity and the proportion of CS in future research. In this respect, it is possible to assume that children who talk more (e.g. produce longer speech samples) also code-switch more.
21. The statistical programme calculated a negative value for *t* because the mean value of the first group (balanced)) was lower (2,17) than the one of the second group (unbalanced, 2,46).
22. Regarding the criteria of constituency, Muysken (1997) proposes that when the switched element is a single, well-defined constituent it is likely that insertion is the underlying process. For peripherality, he claims that a mixed element at the periphery of an utterance indicates the process of alternation. The term nestedness means that there exists a structural relation between the mixed element and the preceding and following elements in the respective other language. Given this structural relation, insertion is probable. Concerning selectivity, it can be said that if the mixed element is selected by an element in the other language, insertion seems to be the underlying process. Linear equivalence between the languages involved, for example the same word order, indicates alternation or congruent lexicalisation. With regard to length and complexity, Muysken suggests that the more words a mixed fragment contains, the more likely it is alternation. The same applies for complexity. Bidirectionality refers to the fact that no matrix language can be determined within a mixed utterance indicating, therefore, a shared structure. This criterion might help to identify the process of congruent lexicalisation. The way the mixed utterance is embedded in discourse can also be indicative of the CS process. This is explained in more detail in the analysis of example (3). Looking at the structural position of the mixed element, a switch at a major clause boundary has to be distinguished from one internal to a phrase. The latter is more likely when talking about insertion or congruent lexicalisation. If a change between two languages is flagged by a pause or a particle like 'euh' alternation between codes seems more probable. With single mixed words it is also important to consider their lexical category. Whereas content words are likely to be insertions, mixing discourse particles and adverbs may indicate the process of alternation. Adapting means that a mixed fragment is adapted morphologically or syntactically to the other language. Given this modification, insertion or congruent lexicalisation is more likely.
23. The negation of features 2, 4–10 and 12 results in the respective other CS process, for example selected element = insertion/congruent lexicalisation and non selected element = alternation (feature 4).

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References

Arnaus Gil, L., Zimmermann, K., Tirado Espinosa, M., & Müller, N. (2019). The acquisition of French adjective placement in monolingual, bilingual, trilingual and multilingual children: A robust syntactic domain. Manuscript, Bergische Universität Wuppertal.

Arnaus Gil, L., Jiménez Gaspar, A., & Müller, N. (2018). The acquisition of Spanish SER and ESTAR in bilingual and trilingual children: Delay and enhancement. In A. Cuza & P. Guijarro-Fuentes (Eds.), *Language acquisition and contact in the Iberian Peninsula* (pp. 91–124). Berlin: de Gruyter.

Arnaus Gil, L., & Müller, N. (2018a). Acceleration and delay in bilingual, trilingual and multilingual German-Romance children: Finite verb placement in German. *Linguistic Approaches to Bilingualism*, 1–29. Published online. doi:10.1075/lab.17081.arn

Arnaus Gil, L., & Müller, N. (2018b). French postverbal subjects: A comparison of monolingual, bilingual, trilingual and multilingual French. *Languages*, *3*(3), 1–28. doi:10.3390/languages3030029

Arnaus Gil, L., Müller, N., Sette, N., & Hüppop, M. (2019). Active bi- and trilingualism and its influencing factors. In International Multilingual Research Journal. Submitted.

Barnes, J. (2006). *Early trilingualism. A focus on questions*. Clevedon: Multilingual Matters.

Barron-Hauwaert, S. (2000). Issues surrounding trilingual families: Children with simultaneous exposure to three languages. *Zeitschrift für Interkulturellen Fremdsprachenunterricht*, *5*(1), 1–13.

Bernardini, P., & Schlyter, S. (2004). Growing syntactic structure and code-mixing in the weaker language: The ivy hypothesis. *Bilingualism: Language and Cognition*, *7*(1), 49–69.

Birdsong, D. (2014). Dominance in bilingualism: Foundations of measurement, with insights from the study of handedness. In C. Silva-Corvalán & J. Treffers-Daller (Eds.), *Language dominance in bilinguals: Issues of operationalization and measurement* (pp. 85–105). Cambridge: Cambridge University Press.

Boix-Fuster, E., & Sanz, C. (2008). Language and identity in Catalonia. In M. Niño-Murcia (Ed.), *Bilingualism and Identity: Spanish at the crossroads with other languages* (pp. 87–106). Amsterdam: Benjamins.

Cantone, K. F. (2007). *Code-switching in bilingual children*. Dordrecht: Springer.

Cantone, K. F., Kupisch, T., Müller, N., & Schmitz, K. (2008). Rethinking language dominance in bilingual children. *Linguistische Berichte*, *215*, 307–343.

Cantone, K. F., & Müller, N. (2005). Code-switching at the interface of language-specific lexicons and the computational system. *International Journal of Bilingualism*, *9*(2), 205–225.

Chan, B. (2004). Beyond "contextualization": Code-switching as a textualization cue. *Journal of Language and Social Psychology*, *23*(1), 7–27.

Chevalier, S. (2015). *Trilingual language acquisition*. Contextual factors influencing active trilingualism in early childhood. Amsterdam/Philadelphia: Benjamins.

De Houwer, A. (1990). *The acquisition of two languages from birth: A case study*. Cambridge: Cambridge University Press.

De Houwer, A., & Bornstein, M. (2016). Balance patterns in early bilingual acquisition: A longitudinal study of word comprehension and production. In C. Silva-Corvalán & J. Treffers-Daller (Eds.), *Language dominance in bilinguals: Issues of operationalization and measurement* (pp. 134–155). Cambridge: Cambridge University Press.

Dunn, L. M. (1959). *Peabody picture vocabulary test*. Circle Pines, MN: American Guidance Service.

Dunn, L. M., & Dunn, L. M. (1981). *Peabody picture vocabulary test – revised*. Circle Pines, MN: American Guidance Service.

Dunn, L. M., & Dunn, L. M. (1997). *Peabody picture vocabulary test* (3rd ed.). Circle Pines, MN: American Guidance Service.

Dunn, L. M., Padilla, E. R., Lugo, D. E., & Dunn, L. M. (1986). *Test de Vocabulario en Imágenes Peabody. Adaptación Hispanoamericana*. Minneapolis, MN: Pearson.

Dunn, L. M., Thériault-Whalen, C. M., & Dunn, L. M. (1993). *Échelle de vocabulaire en images Peabody*. Toronto: Pearson.

Eichler, N. (2011). *Code-Switching bei bilingual aufwachsenden Kindern. Eine Analyse der gemischtsprachlichen Nominalphrasen unter besonderer Berücksichtigung des Genus*. Tübingen: Narr. (Tübinger Beiträge zur Linguistik 528).

Gawlitzek-Maiwald, I., & Tracy, R. (1996). Bilingual Bootstrapping. *Linguistics*, *34*, 901–926.

Grosjean, F. (2001). The bilingual's language modes. In J. Nicol (Ed.), *One mind, two languages: Bilingual language processing* (pp. 1–22). Oxford: Blackwell.

Gumperz, J. J. (1967). On the linguistic markers of bilingual communication. *The Journal of Social Issues*, *23*(2), 137–153.

Hoffmann, C. (1999). Trilingual competence: Linguistic and cognitive issues. *Applied Linguistic Studies in Central Europe*, *3*, 16–26.

Hoffmann, C. (2000). Bilingual and trilingual competence: Problems of description and differentiation. *Estudios de Sociolingüística*, *1*, 83–92.

Hoffmann, C. (2001). Towards a description of trilingual competence. *The International Journal of Bilingualism*, *5*(1), 1–17.

Hoffmann, C., & Stavans, A. (2007). The evolution of trilingual codeswitching from infancy to school age: The shaping of trilingual competence through dynamic language dominance. *International Journal of Bilingualism*, *11*(1), 55–72.

Jansen, V., Müller, J., & Müller, N. (2012). Code-switching between an OV and a VO language: Evidence from German-Italian, German-French and German-Spanish children. *Linguistic Approaches to Bilingualism*, *2*(4), 337–378.

Jisa, H. (2000). Language mixing in the weak language: Evidence from two children. *Journal of Pragmatics*, *32*, 1363–1386.

Kellerman, E. (1983). Now you see it, now you don't. In S. Gass & L. Selinker (Eds.), *Language transfer in language learning* (pp. 112–134). Rowley, MA: Newbury House.

Kleineberg, D., Arnaus Gil, L., & Müller, N. (2019). The acquisition of the Spanish copula system in mono-, bi- and trilingual children. Submitted.

Lenhard, A., Lenhard, W., Segerer, R., & Suggate, S. (2015). *Peabody picture vocabulary test* (4th ed.). Frankfurt am Main: Pearson.

Liceras, J., & de la Fuente, A. A. (2015). Typological proximity in L2 acquisition. The Spanish non-native grammar of French speakers. In T. Judy, & S. Perpiñán (Eds.), *The acquisition of Spanish in understudied language pairings* (pp. 329–358). Amsterdam: Benjamins.

MacSwan, J. (2000). The architecture of the bilingual language faculty: Evidence from codeswitching. *Bilingualism: Language and Cognition*, *3*(1), 37–54.

Meisel, J. M. (1994). Code-switching in young bilingual children. The acquisition of grammatical constraints. *Studies in Second Language Acquisition*, *16*(4), 413–439.

Mieszkowska, K., Luniewska, M., Kolak, J., & Kacprzak, A. (2017). Home language will take care of itself: Vocabulary knowledge in trilingual children in the United Kingdom. *Frontiers in Psychology*, *8*, 1–11.

Milroy, L., & Muysken, P. (Eds.). (1995). *One speaker, two languages. Cross-disciplinary perspectives on code-switching*. Cambridge: Cambridge University Press.

Montanari, S. (2010). *Language differentiation in early trilingual development. Evidence from a case study*. Saarbrücken, Germany: Verlag Dr. Müller.

Müller, N., Arnaus Gil, L., Eichler, N., Geveler, J., Hager, M., Jansen, V., Patuto, M., Repetto, V. & Schmeißer, A. (2015). *Code-Switching: Spanisch, Italienisch, Französisch. Eine Einführung*. Tübingen: Narr.

Muysken, P. (1997). Code-Switching processes. Alternation, insertion, congruent lexicalization. In M. Pütz (Ed.), *Language Choices: Conditions, constraints, and consequences* (pp. 361–380). Amsterdam: Benjamins.

Patuto, M., Hager, M., Arnaus Gil, L., Eichler, N., Jansen, V., Schmeißer, A., & Müller, N. (2014). Child-external and -internal factors in bilingual code-switching: Spanish, Italian, French and German. In A. Koll-Stobbe & S. Knospe (Eds.), *Language contact around the globe. Proceedings of the LCTG3 Conference* (pp. 191–209). Frankfurt am Main: Lang.

Peña, E. (2007). Lost in translation: Methodological considerations in cross-cultural research. *Child Development*, *78*(4), 1255–1264.

Petermann, F. (Ed.). (2011[2]). *Wechsler preschool and primary scale of intelligence-III (WPPSI-III)*. Frankfurt am Main: Pearson.

Poeste, M. (2017). Code-Switching als Insertion oder Alternation: Eine empirische Studie bilingualer Kinder mit Deutsch und einer romanischen Sprache. Unpublished bachelor thesis, Bergische Universität Wuppertal.

Poplack, S. (1980). Sometimes I'll start a sentence in Spanish y termino en español: Toward a typology of code-switching. *Linguistics*, *18*(7), 581–618. Retrieved from https://www.degruyter.com/downloadpdf/j/ling.1980.18.issue-7-8/ling.1980.18.7-8.581/ling.1980.18.7-8.581.pdf

Quay, S. (2001). Managing linguistic boundaries in early trilingual development. In J. Cenoz & F. Genesee (Eds.), *Trends in bilingual acquisition* (pp. 149–199). Amsterdam: Benjamins.

Quay, S. (2008). Dinner conversations with a trilingual two-year-old: Language socialization in a multilingual context. *First Language*, *28*(1), 5–33.

Quay, S. (2011a). Introduction: Data-driven insights from trilingual children in the making. *International Journal of Multilingualism*, *8*(1), 1–4.

Quay, S. (2011b). Trilingual toddlers at daycare centres: The role of caregivers and peers in language development. *International Journal of Multilingualism*, *8*(1), 22–41.

Riehl, C. (2014). *Sprachkontaktforschung. Eine Einführung*. Tübingen: Narr.

Rothman, J. (2011). L3 syntactic transfer selectivity and typological determinacy: The typological primacy model. *Second Language Research*, *27*(1), 107–127.

Rothman, J. (2015). Linguistic and cognitive motivations for the typological primacy model (TPM) of third language (L3) transfer: Timing of acquisition and proficiency considered. *Bilingualism: Language and Cognition*, *18*(2), 179–190.

Schmeißer, A., Eichler, N., Arnaus Gil, L., & Müller, N. (2016a). Mélanges interpropositionnels chez les enfants bilingues français-allemands: est-ce vraiment du code-switching? *Language, Interaction and Acquisition LIA*, *7*(2), 238–274.

Schmeißer, A., Hager, M., Arnaus Gil, L., Jansen, V., Geveler, J., Eichler, N., Patuto, M., & Müller, N. (2016b). Related but different: The two concepts of language dominance and language proficiency. In C. Silva-Corvalán & J. Treffers-Daller (Eds.), *Language dominance in bilinguals: Issues of operationalization and measurement* (pp. 36–65). Cambridge: Cambridge University Press.

Silva-Corvalán, C. (1983). Code-Shifting Patterns in Chicano Spanish. In L. Elías-Olivares (Ed.), *Spanish in the U.S setting: beyond the Southwest* (pp. 69–87). Rosslyn, VA: National Clearinghouse for Bilingual Education.

Sivakumar, A. (2017). Die soziolinguistischen Faktoren des Code-Switching bei trilingual aufwachsenden Kindern: Eine empirische Untersuchung eines trilingual spanisch-französisch-italienischen aufwachsenden Kindes. Unpublished master's thesis, Bergische Universität Wuppertal.

Sivakumar, A., Sette, N., Müller, N., & Arnaus Gil, L. (2019). Die Entwicklung des rezeptiven Wortschatzes bei bi-, tri- und multilingual aufwachsenden Kindern. Submitted.

Unsworth, S. (2013). Current issues in multilingual first language acquisition. *Annual Review of Applied Linguistics*, *33*, 21–50.

Wang, X. (2008). *Growing up with three languages. Birth to eleven. parents' and teachers' guides*. Bristol: Multilingual Matters.