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2 The development of child multilingualism of languages of different modalities

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2.1 Introduction

Bimodal multilingual children form a highly heterogeneous group with varying levels of hearing and access to different languages. This variation affects their development of multilingualism in multiple and significant ways (e.g. Pizzo, 2016). These children can be: 1) deaf children who have Deaf or hearing parents, 2) hearing children of Deaf parents (koda, Kids of Deaf Adults), and 3) hearing siblings of deaf children. Access to different languages varies greatly between hearing and deaf children. The cochlear implant (or other types of hearing aids) does not result in the same level of hearing as that experienced by children with normal audiological status. Thus, access to spoken languages differs, and it can be reduced among these children, compared with their hearing peers. Additionally, in many cases, hearing parents of deaf children rarely have the knowledge of the sign language or the Deaf community before the hearing loss of their child is diagnosed; only after the diagnosis do the parents start to learn the sign language of the community. For this reason, access to natural sign languages for deaf children of hearing parents can vary, being less at least during the early phase of language development, compared with children with Deaf parents or deaf older siblings. The majority (90%) of deaf children are born to hearing parents and the majority (90%) of children born to Deaf parents are hearing (Mitchell & Karchmer, 2004). Thus, only a small number of deaf children have deaf parents. Furthermore, in some cases bimodal multilingual children can be defined as heritage signers and/or speakers. Chen Pichler, Lillo-Martin and Palmer (2018) defined the children who acquire sign language from their fluent signing parents and who do not receive formative education in the sign language used at home as *heritage signers*. With this definition, kodas and deaf children who acquire a sign language in an immigrant context, where at least one of the Deaf parents is using a sign language that is different from the sign language of the larger community, can be regarded as heritage signers.

Research until recently has mainly focused on either bimodal bilingualism of deaf and hearing children when children are acquiring one spoken language and one sign language during childhood (see e.g. Hofmann & Chilla, 2015; Kanto, 2016; Lillo-Martin, de Quadros, Chen Pichler & Fieldsteel, 2014) or on the multilingualism of children acquiring different spoken languages (see e.g. Mieszkowska et al., 2017; Montanari, 2013). To date, only a few recent studies have focused on the multifaceted multilingualism of the signing community and, more specifically, on the multilingualism of deaf and hearing children (e.g. Vere, 2014). Thus, the research on bimodal multilingualism is still in its early stages, even though the number of these children has been growing, for example, due to the migration and globalization of sign language communities during the 21st century (Hiddinga & Crasborn, 2011; Sivunen, 2019). It is clear that this field urgently needs further research. As recent studies have mainly focused on the multilingualism of children acquiring different spoken languages, the question remains: what are the features of being and becoming multilingual across two modalities during childhood? This chapter seeks to address this gap and create an opening for further research and discussion to advance the field of research on childhood multilingualism.

2.2 Multifaceted linguistic landscape and environment of children acquiring multilingualism across different modalities

Multilingualism among children acquiring sign language involves at the same time multilingual language acquisition and the linguistic ability of the individual child, but also a social phenomenon of the community surrounding the child where the multilingual language development takes place (see, e.g., Cenoz, 2013). The status and vitality of different sign languages and Deaf communities in different countries and societies vary greatly (De Meulder, 2016; De Meulder, Krausneker, Turner, & Conama, 2019; Sivunen, 2019). Notably, sign languages always have the minority status and spoken languages the majority status in the community, which traditionally contributes to the multilingualism of signers. In order to integrate into the education system, working life and wider society, knowledge of the spoken/written language of the majority community is necessary for signers. For this reason, multilingualism and multiculturalism where a person uses different modalities (such as signing, writing and speaking) in daily communication are often seen among signers, both adults and children. Thus, the initial setting and context for language acquisition of deaf and hearing children acquiring sign language(s) are at least bilingual but often also multilingual. However, the access to different languages and the visibility of the languages the children acquire across different modalities can vary greatly, depending on the community and the contexts where the languages are used and the language acquisition takes place.

In multilingual developmental paths, the environment plays a crucial role. Many previous studies on multilingual children acquiring different spoken languages have focused on the amount of language exposure experienced by the studied children (Paradowski & Bator, 2018). However, in contexts where children are acquiring multilingualism across different modalities it is also important to take a broader perspective vis-à-vis the environment, namely, the kind of linguistic landscape in which these children are developing their multilingualism. The term "linguistic landscape" traditionally refers to the language used visibly and seen in public spaces, as well as the motivations and ideologies behind the display of different languages (see review in Gorter, 2018). Majority spoken languages commonly have more written displays in public spaces, compared with minority sign languages, and in this way the linguistic landscape reflects the power of languages in different contexts. Spoken and written languages contribute to the majority part of the linguistic landscape of children acquiring both spoken and signed languages, as sign languages do not have a written form and can rarely be seen on signs and in public spaces. Macalister (2010) noted in his research on New Zealand that there was no awareness of the Deaf community or of New Zealand Sign Language in the linguistic landscape he studied. In addition, sign language and Deaf Communities still suffer from varied aspects of suppression and stigmatization (De Meulder, Kusters, Moriarty & Murray, 2019). Research on the linguistic landscape has grown rapidly during the past years, which has deepened the theoretical framework and broadened our understanding of the concept of the linguistic landscape and its role also in educational settings (see, e.g., Cenoz & Gorter 2008). However, the majority of these studies have focused on spoken and written languages, perhaps because sign languages and the Deaf community are lacking in the linguistic landscape in general.

The linguistic landscape in educational settings of bimodal multilingual children varies greatly. Hearing bimodal multilingual children mainly attend mainstream schools and often do not receive teaching in sign language and nor do they have sign language lessons in the curriculum. Thus, they often acquire the sign language in the home language context. Deaf bimodal multilingual children also often attend mainstream schools, due to inclusion, where usage practices and the visibility of sign languages vary from co-teaching with two teachers (one using the sign language and one using the spoken one) to classrooms where sign language is not used at all (Swanwick, 2017). The challenge that lies in mainstream schools is often (i) the smaller amount of sign language in the environment compared with the amount of spoken language and (ii) the lack of age peers, (iii) other children using a sign language, and (iv) the Deaf community. Notably, the World Federation of the Deaf estimated

that 80% of children with hearing loss have no access to education and of those children just 1–2% receive education in a sign language.

The research on the linguistic landscape of multilingual children is still in its early steps. As previous studies have noted that languages in the linguistic landscape also function as a recourse of input for learning languages and gaining language awareness (Barni, Kolyva, Machetti & Palove, 2014), it might be reasonable to question how the lack of visibility of the Deaf community and the sign language(s) that the child is acquiring from his or her linguistic landscape influence the children's own attitudes towards spoken and signed languages. The rapid development of technology has changed the Deaf community and also the access to sign languages for children. However, this raises the question of how much and from how varied of sources the children see spoken and signed languages around them, if the features of the linguistic landscape have an impact on the quantity and quality of the linguistic exposure of the languages the child is acquiring, and how sign language(s) are valued in the environment where the child is developing his or her multilingual identity and language abilities at the same time. Thus, this field of research would make an important contribution to the study of both childhood bimodal multilingualism and linguistic landscape in minority language context.

2.3 Multilingual language exposure and the input of children acquiring multilingualism across different modalities

Similar aspects (e.g. globalization, mobility, new technologies and media) that have contributed to the current degree of multilingualism among spoken communities have furthered the multilingualism of signing communities. Sign language communities around the world have become more global during the 21st century (Hiddinga & Crasborn, 2011). The amount of national and transnational migration has increased in recent years as people move to different countries, integrate into new cultural and linguistic landscapes, and form intermarriages and multilingual families. At the same time, parents in multilingual families are concerned about what languages should be used when communicating with their children, what languages of their multilingual children should be maintained and supported to develop further, and what factors and practices support or constrain the multilingual development of their children.

According to the previous studies on children acquiring sign languages, these children are often acquiring different sign languages in the home context and spoken languages both at home and outside the home, as can be seen in the cases presented in Table 2.3 (see also Kanto, Huttunen, & Laakso, 2013). To describe the multifaceted linguistic environment of children acquiring multilingualism across different modalities, four case examples (two hearing and two deaf children of Deaf parents) were chosen from a larger (N=87) and still unpublished data set on language development and assessment of children acquiring Finnish Sign Language in Finland (Hanhikoski, forthcoming). From the data on 87 children, parents reported that 34 (39%) children were exposed to at least three different languages and used these languages on a regular basis (at least once in two weeks). In all the case examples presented in Table 1, children were exposed to at least two sign languages and two spoken languages. Concordantly, Pizzo (2016) found that approximately 35% of school-age deaf children in the USA are multilingual. These findings clearly show that multilingualism plays a considerable role for children acquiring a sign language and it should be studied more thoroughly.

Table 2.3 Examples of multilingual children acquiring sign language(s) and spoken language(s) from their linguistic environment in Finland.

Child	Languages used at home				Languages used outside the home				Relative amount of exposure estimated by the parents			Different language users that the child meets regularly* outside the home	
	with parents		with siblings		with close relatives and family friends		at the school/ day care centre						
hearing (5;10)	SignL	X	SignL	X	SpokenL	X	SpokenL	Y	SpokenL	Y	50%	SpokenL	Y
	SignL	Y	SignL	Y					SignL	Y	25%	SpokenL	X
	SpokenL	Y	SpokenL	Y					SignL	X	20%	SignL	X
									SpokenL	X	5%	SignL	Z
												SignL	W
deaf (6;1)	SignL	X	SignL	X	SignL	X	SpokenL	X	SignL	X	50%	SignL	X
	SignL	W	SpokenL	X	SpokenL	X			SpokenL	X	45%	SpokenL	X
					SignL	W			SignL	W	5%		
hearing (7;4)	SignL	X	SpokenL	Y	SpokenL	X	SpokenL	Y	SpokenL	Y	50%	SpokenL	Y
	SignL	Y	SignL	X					SignL	X	30%	SpokenL	X
	SpokenL	Y	SignL	Y					SpokenL	Y	15%	SignL	X
									SpokenL	X	5%	SignL	Z
												SignL	Y
deaf (7;11)	SignL	X	SignL	X	SignL	X	SignL	X	SignL	X	50%	SignL	X
	SignL	W	SpokenL	X	SpokenL	X	SpokenL	X	SpokenL	X	50%	SpokenL	X
					SignL	W	SignL	W					

To protect the anonymity of the children studied, the languages the children are acquiring are referred by language 'w, x, y, z,' and SignL = Sign Language, SpokenL = spoken language.
* at least twice in two weeks

The data presented in Table 1 was collected by using a parental questionnaire that aimed to investigate the linguistic environment of the studied children. The questionnaire was based on the parental questionnaire methods of PaBiQ (Questionnaire of Parents of Bilingual Children in Tuller, 2015), BiLEC (Bilingual Language Experience Calculator in Unsworth 2013) and MAIN (Multilingual Assessment Instrument of Narrative in Gagarina et al., 2012), which have been used in previous research on bilingual and multilingual children. In Finland, in addition to the two national languages (Finnish and Swedish), Saami, Romani, Finnish Sign Language (FinSL) and Finland-Swedish Sign Language (FinSSL) are officially recognized as minority languages.

The amount of exposure in the languages the child receives has been found to be an important predictor of multilingual development, but the relationship between the amount of exposure and the rate of acquisition is not straightforward (De Houwer, 2007; Hoff et al., 2012; Thordardottir, 2011). Monolingual children receive their language input only from one language. Whereas, the language input for multilingual children is divided between the languages the child is acquiring. Even though the language input for multilingual children is divided between the languages, this does not necessarily lead to slower acquisition. In the past studies on bilingual children, researchers have found that the child needs to receive at least 20% of their input in a language in order to be able to speak it (Pearson et al., 1997; Hoff et al., 2012). However, among multilingual children in the context where the languages have considerably different status, the language exposure needed for multilingual development in a particular language might be different compared with that of bilingual children. The case examples presented in Table 1 show considerable differences in their relative exposure and how much exposure the children received in the different languages on a daily basis. In some cases presented here, the relative exposure from a particular language is highly limited, which might predict slower development and lower abilities to produce the languages according to previous studies. Additionally, in a heritage language context, De Houwer (2017) noticed that at least one of the parents needs to speak a heritage language in order to maintain the child's competence in it, and she argued that families whose parents mixed both heritage and community languages at home were often unable to maintain the heritage language among their children. However, as mentioned above, signers are often bilingual or multilingual, and a mixed use of the heritage sign language and the majority spoken

language has been reported in many different studies (e.g. Kanto, Laakso, & Huttunen, 2017; Lillo-Martin et al., 2014; Pizer, 2018). According to the questionnaire, Deaf parents reported sign languages to be the main language they used when communicating with their child. However, with hearing children, the spoken language was used regularly by both the deaf and hearing parents and the children.

Paradowski and Bator (2018) found in their study that parental language use and usage practices were among the most important factors affecting the language the child would eventually use. Parents thus provide both their language use and input but also their attitudes and ideals towards the languages the child is acquiring and towards the multilingualism of their child (Gharibi & Boers, 2017). This might influence how the child eventually values multilingualism and the different languages being acquired and what motivates the child towards multilingualism.

Research on family language policy among signing multilingual families is still rather limited (see, e.g., Kanto, 2016; Pizer, 2018). However, further research in this field could provide important knowledge on the forms of multilingual language practices, ideology and management; how the features of family language policy is influenced and motivated by the Deaf parents' own past experiences with languages; how family members use the family language policy as their linguistic resources; and how deliberate and explicit or subconscious and imprecise the parents' investments are when providing the multilingual language context for their children (Curdt-Christiansen & Lanza, 2018). Lanza and Curdt-Christiansen (2018, p. 231) point out that, "*As language plays a key role in multilingual families, family members' social aspirations mediated through language may be confronted with challenges within the family and in society*." The examples presented in Table 1 show that both different sign languages and spoken languages are used in the home context, which suggests multidimensional practices of family language policy in these families. However, further study is needed.

In addition to the amount of input and the family language policy, the opportunities to use the heritage language with other language users outside the home, as well as engagement and attainment with the minority community, have been found to be beneficial for heritage language development and thus also for the development of multilingualism and multiculturalism (Paradowski & Bator, 2018). Additionally, access to many different speakers of the heritage language has not been found to negatively affect the majority language development. Thus, it would be important to discover how access to other signers and attainment within the Deaf community affect the multilingual development process of children.

A recently published paper on deaf asylum seekers brings forth an important group of signing families. Describing the experiences of deaf adult asylum seekers during the asylum process in Finland, Sivunen (2019) found that the sign language proficiency of deaf asylum seekers varied from gesturing and home sign to fluent Arab Sign. Some of the deaf asylum participants received formal FinSL teaching and started to use FinSL with family members. FinSL teaching was only provided to deaf adults, even though hearing children (and other hearing family members) were often functioning as language brokers communicating on behalf of their deaf parents. However, after FinSL began to be used in daily interaction between family members, hearing children of deaf asylums also started to learn and use FinSL daily. This group of bimodal multilingual children is unique, and it is often invisible and understudied.

The factors affecting the developmental path of bimodal multilingual development may vary over time, and can shift throughout the course of the child's development due to dynamic environmental features causing changes in language dominance. In terms of the minority home language, the home

language tends to be dominant during the child's early years but after starting school the exposure from the majority language increases, resulting in the shift of language dominance towards the majority language. This is especially the case among hearing children of Deaf parents, who are also regarded as heritage signers (Chen Pichler et al., 2018).

2.4 Becoming bimodal multilingual

Defining the multilingualism of children is problematic. In past research, many different main characteristics of multilingualism have been highlighted, including communicative competence and the level of proficiency and usage of multiple languages (Cenoz, 2013). However, because the languages of the child are still developing, the definition cannot be based only on proficiency level, competence and usage. Among multilingual children, linguistic exposure and the quality and quantity of language input play important roles (De Houwer, 2007; Hoff et al., 2012; Thordardottir, 2011). Notably, it should not be assumed that all the languages the child is exposed to and acquires in his or her environment would follow identical developmental patterns. There are many factors affecting the developmental patterns of different languages and the multilingualism of individual children, and proficiency level, competence and usage may change in different periods, phases or even contexts. Additionally, many bimodal bilingual children are often heritage signers, which has been found to have an influence on the developmental patterns of languages in multiple and unique ways (Chen Pichler et al. 2018).

In several previous studies (Cenoz, 2013; Hoffmann, 2001), many different paths to becoming multilingual during childhood have been reported. The child might be exposed to different languages from birth and start to acquire and use languages *simultaneously*; alternatively, he or she might be exposed to different languages *successively* and accomplish multilingualism later on during childhood. In the latter case, the acquisition of the new language is added (*additive multilingualism*) to the linguistic resources of the child while the first language continues to develop as well. Additionally, *subtractive multilingualism* is often found in the immigration context, as the different language of the new home county is acquired, eventually replacing the first language, especially in circumstances where there is no support to maintain the development of the first language (Cenoz, 2013). Recent findings support the idea that actual usage practices and experiences in languages may play a more important role than the age of onset for the different languages the child is acquiring on the multilingual developmental path (Paradowski & Bator, 2018). However, the most important factor for multilingual development among bimodal multilinguals is to secure exposure and access to the languages being acquired, as discussed earlier in this chapter. Additionally, in the context of bimodal multilingualism, the different developmental paths of various types of multilingualism need to be explored and described more profoundly.

Monolingual children receive all of their language exposure only from one language, while among multilingual children the language input is divided between the different languages the child is acquiring. Thus, the quantity of language exposure for each of the languages is less compared with that of the monolingual peers. In many previous studies, reduced input from each language among bilingual and multilingual children has been found to have an influence, for example, on the development of both the receptive and expressive vocabulary of the languages the child is acquiring. Mieszkowska et al. (2017) found that in the immigration context, trilingual children acquired vocabulary knowledge of the majority language equally well as their monolingual peers. However, the vocabulary knowledge of the minority language (home language) was significantly lower compared with that of the monolingual peers. Thus, the exposure to the majority language seemed to be sufficient to ensure a favourable development. However, the exposure to the minority language in the home context seemed to be clearly lower and not enough to ensure its development equally well

as the majority language (see also Grosjean, 2010). As noted earlier in this chapter, sign language always has the minority status, and it is mostly used in a home language context. Similar kinds of developmental trends in vocabulary development were noticed by Kanto (2016) among bimodal bilingual children, but studies on bimodal multilingual children are still lacking and this subject demands further research. If the home language is the clear minority and social prestige language of the surrounding community, as different sign languages often are, it may require more attention and support for favourable development (Gathercole & Thomas, 2009). In some cases, parents may have different sign languages as their mother tongues than the sign language used in the community (e.g. in the immigrant context). In these situations, a single parent may be the only one providing exposure for the child from his or her mother tongue as was shown by the data. For this reason, the quantity of exposure to this language is inevitably lower than to the other languages that the child is acquiring. As the quantity of exposure is lower, the quality of the exposure needs to be highlighted.

Qualitative input factors have been studied in previous research by exploring, for example, the number and percentage of native language users, receiving input from multiple sources, different conversational partners providing input in a given language for the child, and the degree of language mixing by parents (Byers-Heinlein, 2013; Hammer, Davison, Lawrence & Miccio, 2009; Place & Hoff, 2011). Hammer et al. (2009) found that non-native input is less likely to support language acquisition than native input. However, in the context of signers the definition of a native language user is problematic (Costello, Fernández, & Landa, 2006). Additionally, the hearing parents of a deaf child often start to learn sign language only after their child being diagnosed with hearing loss. For this reason, it is highly challenging for hearing parents to reach native-like or near-native language competence in sign language. In the context of sign language users, varying levels of code-blending of Deaf parents and bimodal bilingual children were reported by Kanto (2017). However, the findings of previous studies suggested that a high amount of language mixing by parents predicted a smaller vocabulary of bilingual children acquiring two spoken languages (Byers-Heinlein, 2013). Thus, in the home language context it has been recommended that at least one parent should use only the home language, with no code-mixing (De Houwer, 2007). The child should be provided with rich and varied child-directed input in different interaction contexts with different people, as well as opportunities to use the language with others. Thus, it would be important to research the roles and influence of the quality features of input (e.g. diversity of vocabulary, grammatical structures and language context) among bimodal multilingual children, in order to study the factors that contribute to the development of multilingualism among these children.

When building their lexicon, multilingual children need to acquire at least some *translation equivalents*; this refers to words in two or more languages that share the similar meaning (Montanari, 2010). Previous studies have shown considerable variation in the amount of translation equivalents in the developing lexicon of bi- and multilingual children. In her study, Kanto (2016) found that approximately 43% of kodas' productive vocabularies between the ages of 12 and 30 months consisted of translation equivalents. The share of translation equivalents seemed to increase by age. Among bimodal multilingual children, however, this area is still understudied. It would provide important knowledge on how children build their vocabulary across different languages in different modalities. De Weerdt and De Weerdt (2017) described the language use of multilingual koda acquiring simultaneously VGT (Flemish Sign Language), FinSL and spoken Finnish. In their article, they described, for example, how a child at the age of 18 months first used the FinSL sign for 'frog' and then produced a translation equivalent in VGT.

From a heterogeneous group of bimodal multilingual users described in the beginning of this chapter, some children acquire their multilingualism in a heritage language context. The acquisition of languages in a heritage language context creates a special form of language acquisition conditions,

which is highlighted by the minority status of the home language to which the child is exposed to a limited degree outside the home. Often during the early years of language acquisition, the development of the home (minority) language is progressing but especially after attending a mainstream school where the formal education is in the majority language, language dominance often changes towards the majority language. Heritage language users are commonly shown to be weaker in their home (minority) language (e.g. competence of grammar and vocabulary) compared with their competence in the majority language (Gharibi & Boers, 2017). Due to the limited amount of exposure to the home language, language skills can be affected by language attrition or development may show divergent patterns compared to that of non-heritage language users. In order to prevent language attrition, the importance of frequency of language use cannot be highlighted enough.

Regarding the multilingualism of a bimodal child, the primary challenge is to maintain proficiency in the minority language, particularly in sign languages. Previous studies on bimodal bilinguals have shown developmental trends parallel to heritage speakers but divergent from the development of Deaf children of Deaf parents, who acquire the languages in a non-heritage context; for instance, productive skills are clearly lower than receptive skills in the heritage sign language, being marked by the increased number and type of phonological, lexical and grammatical errors (Chen Pichler et al. 2017; Chen Pichler, Lillo-Martin, & Palmer, 2018; Palmer 2015; Reynolds 2018). Research into heritage signers is still in its early stages, having mainly been based on bimodal bilingual language users, and many questions are still unanswered.

2.5 Dynamic linguistic proficiency and languages in use

Bimodal multilingual children acquire a broad repertoire of linguistic and communicative resources because of the differences of the modality and communication patterns of the languages the child is acquiring. Thus, a bimodal multilingual child navigates between different languages and different ways of communicating, following the different patterns of spoken and signed communication (e.g. different usage of gaze and non-manuality to share meanings). Such communicative sensitivity and language differentiation are part of the metalinguistic awareness, language proficiency and competence in language use that the child is acquiring and developing.

In their article, De Weerdt and De Weerdt (2017) describe the finely developed communicative sensitivity and multilingual language differentiation across different modalities of their hearing bimodal multilingual child at the age of four. The authors detail the patterns of both code-blending (simultaneous production of lexical items from different modalities within the same utterance) and code-switching produced by the child. In *code-blended* utterances, the child often produced simultaneously spoken words from his acquired spoken languages (Finnish and English) and signed signs from his acquired sign languages (FinSL and VGT) within one utterance. In *code-switched* utterances, the child produced lexical items from the languages that shared the same modality within the same utterance, which happened especially between the sign languages (FinSL and VGT) the child acquired. Thus, both code-blending and code-switching are combined among bimodal multilingual children in a unique way that is still rather understudied but would make an important contribution to the field.

Past research on code-blending focused mainly on bimodal bilinguals acquiring one spoken and one signed language (see the review of Tang and Sze, 2018). Considerable research has pointed out that the amount of code-blending among bimodal bilingual children and adults is higher compared with code-switching produced by bilingual peers acquiring two spoken languages (Emmorey, Borinstein, Thompson & Gollan, 2008; Petitto et al., 2001). It has been suggested that the found differences between the amount of code-blended and code-switched utterances between bimodal and unimodal

bilinguals relate to the lower cognitive cost in language inhibition during the language production process. As bimodal bilinguals can access two linguistic systems simultaneously like other bilinguals, but sign language and spoken language are produced in two different modalities and spoken words and signed signs can be produced simultaneously, bimodal bilinguals do not need to inhibit the languages to the same extent as unimodal bilinguals need to (Emmorey, Petrich & Gollan, 2012; Emmorey, Giezen & Gollan, 2016). Many previous studies focused on the structural patterns of code-blended utterances and the contextual features that motivate and shape them (Kanto et al., 2017; Lillo-Martin et al., 2014; Tang & Sze, 2018). Children have been found to combine linguistic elements from one language to another in highly systematic and synchronic ways following the semantic and syntactic patterns of each language, as presented in Table 2.5. The language developmental patterns and contextual patterns have been found to have an effect on the amount of code-blending, as children have been determined to produce more code-blended utterances when communicating with their Deaf parents than with a hearing adult (Kanto et al., 2017).

Table 2.5a Example 1. Code-blend utterance produced by Lauri at the age of 24 months (Kanto, 2016, p. 58).

(1) Utterance	Spoken	Haukku-huu	pupu-ø	hauhhu-u		pupu-ø		
	Signed	KOIRA	PUPU	HAUKKUA	KOIRA	PUPU	JUOSTA	point
Glossing	Spoken	bark-3sg	bunny-nom.sg	bark-3sg		bunny-nom.sg		
	Signed	DOG	BUNNY	BARK	DOG	BUNNY	RUN	point
Translation		'The dog is barking at the bunny (and) the dog is chasing the running bunny.'						

Even though a significant amount of research on code-switching (the production of e.g. lexical items within the same modality within the same utterances among bilingual persons using two spoken languages) has been published so far, among sign bilingual users with the knowledge in two different sign languages it is still an emerging field of research. There are only a few studies conducted on the code-switching of sign languages among adults (e.g. Quinto-Pozos, 2009; Zeshan & Panda, 2015) and even fewer among children (De Weerdt & De Weerdt, 2017). The findings and descriptions of these studies suggest that code-switching between different sign languages is not random, following certain patterns, being partly concordant but also different from the findings of previous studies on code-switched patterns among spoken bilinguals and code-blended patterns among bimodal bilinguals (see Table 2.5b). Zeshan and Panda (2015) pointed out that the previous studies and theoretical viewpoints on code-switching among spoken language bilinguals (e.g. the Matrix Language / Embedded Language distinction) seemed not to offer a universally valid approach for research on signed discourse. Researchers found that participants code-switched linguistic elements that were closely related with both sign languages that complicated to determine the base language. Due to the high number of ambiguous and shared forms, lexical overlap, indexical points, highly iconic classifier constructions, and directional signs that can be found in most of the different sign languages, the researchers were not able to determine which sign language (Burundi Sign Language or Indian Sign Language) the person was producing in each moment. Results also showed a rather high frequency of code-switches produced by the participants.

Table 2.5b Example 2. Code-switched utterance produced by Leon at the age of 18 months (De Weerdt & De Weerdt, 2017).

(2) Utterance	Signed	Point_to_book	FROG_in_FinSL	FROG_in_VGT
Translation	'It is a frog.'			

The past research on the code-blending of bimodal bilinguals and code-switching of unimodal sign bilinguals opens the door for further research among bimodal multilinguals (e.g. on the inhibitory control of children acquiring multilingualism across different modalities). These findings raise highly interesting questions on the structural patterns, contextual features, cognitive processing and on the modality effect of both code-blending and code-switching patterns among bimodal multilinguals; how they might diverge from other bilinguals and multilinguals is a topic for further research. Such research could focus on questions about how different languages are selected, how different linguistic elements are code-blended and code-switched, and how this is influenced by the different language developmental patters of children.

In addition to code-blending and code-switching, varied cross-linguistic influences can also be found from the language production of children acquiring two or more languages. Cross-linguistic influence is not yet a very researched phenomenon among multilingual children acquiring different spoken languages at the early phase of language development (Paradis, 2007), and it is even less studied among children acquiring bimodal multilingualism. Cross-linguistic research between signed and spoken languages has been found to vary from sign language structured spoken language (also referred to as Coda-talk), discovering features related to heritage language users (Lillo-Martin, Koulidobrova, de Quadros & Chen Pichler, 2012) signing in spoken word order (also referred to as Manually Coded English) and strategies of translanguaging, a concept which is sometimes also used in the educational context of deaf children (Bishop, 2010; Tang & Sze, 2018). Regarding children acquiring a sign language, the different studies have mainly focused on the cross-linguistic influence between the spoken and signed languages among bimodal bilingual children. Lillo-Martin et al. (2012) found cross-linguistic influence in both directions among bimodal bilingual children as a result of their simultaneous acquisition of both sign and spoken language. The researchers found that in spoken utterances, bimodal bilingual children produced significantly more non-sentence-initial *wh*-questions that are grammatical in the sign language the children acquired, and in their sign language utterances children produced significantly more sentence-initial *wh*-questions than their monolingual peers. As the relative degree of exposure and language dominance have been found to motivate the cross-linguistic influences among bilingual children, these questions would be highly interesting to follow up among multilingual children between their different signed languages as well. This would also deepen our understanding of the relationship of input factors and language production among multilingual children.

Recent research on code-blending, code-switching, cross-linguistic influences and translanguaging among sign language users has opened new highly interesting theoretical viewpoints on the multifaceted ways in which semiotic and linguistic resources and multimodality are used in different communicative contexts. These studies also question the idea of language as discrete bounded entities, and they challenge us to consider bimodal multilingual children's languages as a hybridity of features and resources in their multilingual communication. Children immersing in these different multimodal multilingual contexts and acquiring multifaceted linguistic proficiency across different modalities provide fascinating perspectives and openings for further research. Thus, these findings suggest that the child starts to acquire dynamic and adaptive linguistic resources from an early phase onwards and uses his or her linguistic resources in multiple ways in different interaction contexts with varying conversational topics. Children use the acquired languages as resources, and they employ elements from the different languages in different modalities at their disposal.

2.6 Conclusion

Multilingual language acquisition across different modalities challenges the traditional definition of multilingualism and the process of language acquisition. As demonstrated by this chapter, bimodal multilingual acquisition is a highly complex and dynamic process that is influenced by multi-layered features in the linguistic landscape, as well as language exposure, and represents an entity which is manifested by the acquired languages, the attitudes and sociocultural factors in the environment, and the policy and features of their language use in different contexts. The linguistic landscape and multilingual exposure of bimodal multilingual children comprise a summary of multifaceted features of the hearing status, family language policy, accessibility and visibility of different languages, educational settings and engagement in multilingualism and multiculturalism. Also, the challenges that families with bimodal multilingual children encounter in the surrounding majority community need to be noted.

As highlighted in this chapter, further studies are needed and they will deepen our understanding of the relationship between the different features of language exposure and the developmental patterns of the acquired languages, especially among bimodal multilingual children. Further research in this field will make important contributions and should be broadened also to include multilingual heritage signers. For future research, an increased knowledge on the relationship between reduced language exposure and the acquisition of different grammatical aspects is clearly needed, and it would provide us with important information about the requirements for ensuring heritage language development and bimodal multilingualism.

However, the research of bimodal multilingual children should bear in mind a holistic view on their multilingualism, remembering that language resources and competence are variable and shift in multiple and dynamic ways according to the course of the child's development and changing environmental features (Herdina & Jessner, 2002). Among bimodal multilingual children, the languages should be seen as dynamic and adaptive linguistic resources supporting the attainment of hybrid linguistic resources and multiculturalism. A special attention should also be paid to ensuring the development of bimodal multilingualism and the maintenance of language abilities acquired as heritage language users. It is necessary to focus on the linguistic and cognitive abilities that bimodal multilingual children display, applying caution when comparing them with their monolingual peers. Additionally, in that the communicative context of a bimodal multilingual child is highly multimodal – including visual, sound, textual and different semiotic symbols and resources, where the boundaries between languages and different semiotic devices are blurred – this ought to be studied further. Using languages across different modalities in different interaction contexts requires sensitivity and acknowledgement of communicative situations, metalinguistic awareness, language competence and the differentiation of children.

The great challenge for research on bimodal multilingual language acquisition is in the high heterogeneity and the small number of available children for the study. However, the special nature of this type of multilingual language acquisition can reveal new insights into the faculty of human language and deepen our understanding of multilingual language processes. The challenges surrounding a small and heterogeneous group of children highlight the need for detailed descriptions and well-planned research methods as well as international research collaboration, especially among small communities. In this way, these challenges can be overcome and altered, with the power of research bringing forth the findings of this unique type of multilingualism for more general multilingual research, establishing more fluid and dynamic features of multilingual language acquisition, and expanding our understanding of the faculty of human language.

This chapter described the multifaceted linguistic landscape and environment of bimodal multilingual children, the access to different languages of bimodal multilingual children, and the diversity in the use of different languages in a variety of social contexts. Additionally, the chapter focused on the process of bimodal multilingual language acquisition and attainments of hybrid linguistic resources and multiculturalism during childhood as well as the challenges to maintain the acquired language abilities as heritage language users. The aim of this chapter was to build a holistic view of bimodal multilingualism by bringing forth a different dimension of this special type of multilingualism: bimodal multilingual children as language users and their linguistic resources across different modalities and the social context where development takes place. All of these topics address gaps in the current research and call for further study.

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131.