SPEAK SIGN SAME-TIME?!:
Code-blending patterns of school aged bimodal bilingual children

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Introduction

The current study examines code-blending patterns in English & ASL narrative retellings of 2 elementary school-aged early bimodal bilingual boys with Deaf signing parents who can hear at 2 points in time (Time 1 ages 6;09 & Time 2 age 8;01 & 8;02). The development of code-blending is viewed through a language synthesis model in which two languages contribute to a single proposition (Koulidobrova, 2013; de Quadros, et al. 2015).

The ASL target narratives are compared to literature on code-blending patterns of bimodal bilingual toddlers engaged in spontaneous conversation with Deaf interlocuters (van de Bogaerde & Baker, 2004; Petitto, 2001; de Quadros, Lillo-Martin & Chen Pichler, 2015), while the English target narratives are compared to adult Codas in a narrative retelling task with Coda interlocuters (Emmorey et al., 2008). The current study adds to the dearth of code-blending between toddler and adulthood.

Previous Research

Studies on early bimodal bilingual adult language mixing show a preference for code-blending instead of code-switching, and found that signed and spoken content is synchronous and semantically congruent. Overall, the adults showed a preference for blending verbs as opposed to nouns and produced more multi-sign blends than single sign blends. Furthermore multi-sign blends containing multiple verbs were rarely found (Emmorey et al., 2008).

Similar patterns have also been found for toddler-aged bimodal bilinguals in their preference for code-blends that provided semantically congruent propositions. It has been noted that code-blending patterns by young bimodal bilinguals display an ability to select differing word and sign orders that adhere to each languages' grammatical constraints (Petitto et., 2001). These findings provide evidence that code-blending is systematic suggesting that children are able to differentiate between their two grammars from a very young age (Chen Pichler et al. 2014; Lillo-Martin et al. 2012, Koulidobrova 2014, Petitto et al. 2001, Van den Bogaerde & Baker 2005).

The Bimodal Bilingual Binational project headed by Chen Pichler, Lillo-Martin, and de Quadros has researched spontaneous longitudinal & experimental data of bimodal bilingual children in many linguistic domains (https://slla.lab.uconn.edu/bibibi/#). In their study of spontaneous communication between Deaf and hearing interlocutors and four bimodal bilingual children (1;04-3;06), two of which include the children in this study as toddlers, the researchers found that the children displayed interlocutor sensitivity and vary their language choice accordingly with some variability (Lillo-Martin, et al., 2014). Importantly, the study also revealed a higher rate of code-blending in the sign target than the speech target by the bimodal bilingual children.

In a rare study of school-aged bimodal bilinguals (ages 6-8) acquiring Italian Sign Language (LIS) and spoken Italian, Branchini & Donati (2016) also found that code-switching was rare; whereas instances of code-blending were observed frequently. Differently, their results revealed instances of independent blending in which two different propositions were expressed in the participants' languages.

Research Question

Do the code-blending patterns of young bimodal bilinguals show developmental shifts in 1) frequency, 2) code-blend type, 3) semantic equivalency, and 4) syntactic category distribution in their narrative retellings in English and in ASL?

Methods

Design

Using a quasi-experimental design, narratives were elicited in ASL and English using a non-verbal video stimulus, as part of the larger Bilingual Bimodal Bilingual Binational project. For the purposes of this study, one narrative retelling was selected which was elicited first in ASL to a Deaf researcher and then retold in English to an adult Coda researcher, providing a bimodal bilingual context. The first set of narratives is time one (T1). The second set of data collected roughly 18 months later is referred to as time two (T2).

Participants

The narratives selected for this study were by two early bimodal bilingual elementary school-aged children who can hear and have two signing Deaf parents, Ben & Tom. At T1 participants were 6;09 years old, with the participants aged 8;01 and 8;02 respectively.

Stimulus

Out of the four video stimuli, one was selected for the purposes of this study, *Lollipop,* The video has no dialogue and features tiny animated creatures: five flies, seven ants, and one opportunistic spider (Giraud & Szabo, 2006). The insects perform a number of activities including flying, running, swinging, and fighting over a lollipop.

Coding

Code-blended utterances: the target language is accompanied by the non-target language (note: the speech had to be audible)

Code-switched utterances: the target language ceased being produced in favor of producing the language and then resuming

Translation Equivalents: the code-blended elements are semantically equivalent

Single sign/word code-blend: a single sign/word is simultaneously produced in the target and non-target language

Multi sign/word code-blend: multiple signs/words are simultaneously produced in the target and non-target language

Syntactic category distribution: code-blended elements are coded for grammatical category

English non-target code-blend category: verb, noun, pronoun, adjective, adverb, other

ASL non-target code-blend category: depictive verb, verb, adverb, other (adjectives, indexical signs, conjunctions)

Results

Table 1: ASL target narrative, English code-blend frequency by child, time, and type.

Child	Time	Utterances	Code-blended utterances	Code-blend %	Single word code-blend	Multi-word code-blend	Semantic Equivalency
Ben	T1	29	15	52%	4	7	100%
	T2	19	17	89%	4	13	100%
Tom	T1	28	27	96%	2	26	100%
	T2	16	16	100%	2	14	100%

In Table 1, ASL target narrative Tom overwhelmingly produced more code-blend utterances in the ASL target at T1 (96%) and fully code-blended at T2. At T1 Ben blended almost half of his utterances and increased at T2 to 89%, approaching Tom's production levels at T1.

The results seem to echo findings on bimodal bilingual toddler—as the children increase in age, the amount of code-blended utterances increase as well (Petitto et al. 2001; Van den Bogaerde & Baker, 2008). Additionally, in an earlier study including Ben (2;0-2;06), his use of code-blended utterances in both sign and speech target sessions made up only 17% of his utterances combined (de Quadros et al. 2015), which points to his increasing use of code-blending over time that has continued from toddlerhood.

Table 2: English target narrative, ASL code-blend frequency by child, time, and type.

	Utterances	Code-blended utterances	Code-blend %	Single sign code-blend	Multi-sign code-blend	Semantic Equivalency %
Ben T1	22	15	68%	5	10	93%
Ben T2	19	10	53%	6	4	100%
Tom T1	25	12	48%	7	5	100%
Tom T2	26	12	46%	7	5	92%

English target narrative in Table 2, Ben slightly decreased his frequency of code-blended utterances (T1, 68% vs. T2, 53%). While Tom, like the ASL target, was consistent in the amount of code-blending yet at a lower rate at both times. Ben & Tom at both times produced more code-blending when conversing with an adult Coda than has been previously found in adult Codas in a narrative retelling task with other adult Codas, 29% (Emmorey et al., 2008).

Coda adults in the Emmorey study, and Koda children in the current study rarely code-switched, with Ben at T1 producing three instances of code-switching in English target narrative. Another similarity between Coda adults is the prevalence of semantic equivalents in code-blended utterances. Like previous studies of younger bimodal bilingual children (Petitto et al. 2001, Van den Bogaerde & Baker 2008, de Quadros et al. 2015), both Ben and Tom provide translation equivalents for all of their code-blended utterances in the ASL target narrative session.

Lastly, Ben & Tom each showed different code-blend type preferences in their ASL and English target narratives. Ben at T1 preferred fully blended utterances (93%) in the English target, while at T2 he shifted to a partial code-blend preference (70%). Conversely, at T1 Tom preferred partially blended utterances (67%) and shifted to a fully code-blended preference (67%).

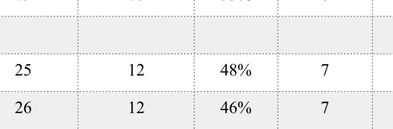

Figure 1: Ben T2 English Target, ASL equivalent single-sign, code-blend
and then they threw the stick
THROW
And then [the flies] threw the stick.

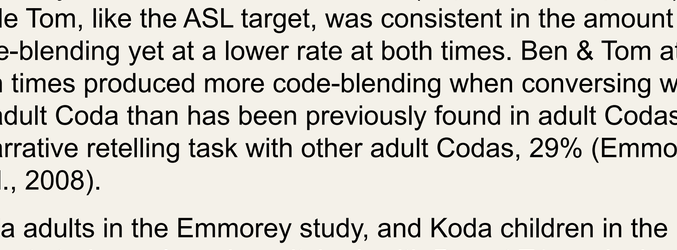

Figure 2: Tom T1 ASL Target, English equivalent multi-word code-blend
IX (flies) SEE IX (ants) FS (aXs) HAVE FS(a) LOLLIPOP
they see the a// ants have a// a popsicle
They see the ants have a popsicle.

Results

Table 3: ASL target narrative, English code-blend by time, type, and grammatical category

Time	Code-blend type	Verb	Noun	Pronoun	Adjective	Adverb	Other
T1	Single word (n=8)	12.5 (1)	**50 (4)**	0 (0)	25 (2)	12.50 (1)	0 (0)
	Multi-word utterances (n=34)	**79.41 (27)**	67.64 (23)	38.23 (13)	20.58 (7)	55.88 (19)	79.41 (27)
T2	Single word (n=6)	16.66 (1)	**50 (3)**	0 (0)	0 (0)	33.33 (2)	0 (0)
	Multi-word utterances (n=27)	48.14 (13)	**70.37 (19)**	25.92 (7)	14.81 (4)	59.25 (16)	81.48 (22)

The **ASL target narrative results in table 3**, display the percentages of English words in each grammatical category for single-word code-blends, code-switches, and the percent of multi-word code-blends containing at least one word within a grammatical category.

Similar to Coda adults, the language sample contained more multi-sign code-blends than single-sign code-blends. Differently than the coda adults in the Emmorey study, single-word English code-blends were observed in the ASL target for these Kodas (2008: 48, 51).

Table 4: English target narrative, ASL code-blend by time, type and grammatical category

Time	Utterance Type	Depictive Verb	Verb	Adverb	Other
T1	Single sign code-blend (n=13)	**84.61 (11)**	15.38 (2)	0 (0)	0 (0)
	Multi-sign code-blend (n=15)	**80% (12)**	20% (3)	13.33 (2)	26.66 (4)
	Code-switch (n=3)	**100 (3)**	0 (0)	0 (0)	0 (0)
T2	Single sign code-blend (n=13)	**53.83 (7)**	23.07 (3)	7.69 (1)	15.38 (2)
	Multi-sign code-blend (n=9)	**88.88 (8)**	11.11 (1)	0 (0)	11.11 (1)
	Code-switch (n=0)	0 (0)	0 (0)	0 (0)	0 (0)

English target narrative results in table 4 display percentages of ASL signs in each grammatical category for single-sign code-blends, code-switches, and percent of multi-sign code-blends containing at least one sign within a grammatical category.

Similar to patterns found for adult Codas, the percentage of single-sign code-blends that contained a verb was considerably higher than the percentage that contained a noun. Differently, the data displayed multi-sign code-blends containing more than one verb; this could take place as a verb (V) and depictive verb (DV) being blended in the same utterance, two separate verbs being blended in the same sentence, as well as verb repetition in which speech matched the aspectual morphology of the sign (Emmorey et al. 2008).

Conclusion

ASL narratives for both children show an increasing preference to fully bimodal utterances. Ben at T1 showed a slight preference for expressing the narrative in ASL (sign base) and shifts to a majority of bimodal utterances in T2, whereas Tom overwhelmingly preferred bimodal utterances in T1 and fully produced bimodal utterances at T2. Differently, the English narratives show an increasing preference for non-blended utterances. These findings seem to suggest an ease in suppression of ASL in English narratives, unlike English in the ASL narratives. The language synthesis model does account for the patterns in the current study, showing the complex language interactions that may shift overtime (de Quadros, et al. 2015). Our findings, albeit a small number of participants, provide a snapshot of the developmental shifts within a few years of school-aged bimodal bilinguals.

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Acknowledgements & Further Information

Bimodal Bilingual Binational Project: Deborah Chen Pichler (Gallaudet University), Diane Lillo-Martin (University of Connecticut), Roncie Müller de Quadros (Universidade Federal de Santa Catarina)

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