1. Introduction

Here we consider child-directed signing as a register that must be described linguistically. Following a recent definition, “a register is a linguistic repertoire that is associated, culture internally, with particular social practices and with persons who engage in such practices” (Agha 2001: 212). All aspects of language are potential contributors to such a repertoire, whether words, pronunciations, prosody, or sentence types. The features of a register are not random; rather, some “seem to facilitate speedy communication; other features apparently serve to mark the register, establish feelings of rapport, and serve other purposes similar to the accommodation that influences dialect formation” (Ferguson 1994: 20). In the case of child-directed signing, the status of infants as novice language users and the requirement of visual attention for access to language combine to place specific demands on the register. The parent-child relationship allows a degree of physical closeness and emotional rapport not present in most signing between adults; these aspects of the communicative situation may affect the use of space and the amount of physical contact in child-addressed signing. To the degree that this register has become conventionalized, individual parents do not have to invent from scratch a way to sign to their infants. In this paper, we describe the formational features that we have observed in the signing that three deaf mothers addressed to their infants and consider possible motivations for those features of the register.

Research on register variation in signed languages has found that factors such as the degree of formality of a situation and the size of the audience addressed can affect signs’ size, speed, and degree of handshape assimilation (Zimmer 1989), as well as the amount and kind of constructed action used (Quinto-Pozos and Mehta 2010). Omission of the nondominant hand from non-alternating two-handed signs (“weak drop”) appears to be a feature of colloquial and/or rapid signing (Padden and Perlmutter 1987). Analyses of poetic signing in a number of languages have demonstrated register-specific
characteristics in phonology, the use of space, rhythm, and lexical choice (Blondel and Miller 2001 for French Sign Language; Klima and Bellugi 1979 for ASL; Russo, Giuranna, and Pizzuto 2001 for Italian Sign Language; Sutton-Spence 2001 for British Sign Language, BSL).

In many, but perhaps not all (Heath 1983; Ochs and Schieffelin 1984) spoken languages, child-directed speech—sometimes called “motherese”—is a distinctive register. The properties of child-directed speech include shorter utterances, with longer pauses between them. Child-directed utterances tend to be higher-pitched than adult-directed utterances; moreover the pitch contours of child-directed speech are likely to be exaggerated. Infants appear to prefer to listen to child-directed speech over adult-directed speech (Fernald 1985). However, child-directed speech is not simpler in all respects than adult-directed speech: for example, child-directed speech may be more varied with respect to sentence type than is adult-directed speech (Newport 1977). Speech addressed to young children may also have distinctive morphology: thus, Spanish diminutive morphology (compare, niña ‘girl’ vs. niñita ‘little girl’) appears to be more frequent in maternal speech addressed to three-year olds than it is in speech addressed to five-year olds (Melzi and King 2003).

The literature on the acquisition of a number of different signed languages reveals a consistent picture of child-directed signing (for ASL: Erting, Prezioso, and Hynes 1990; Holzrichter and Meier 2000; Launer 1982; Maestas y Moores 1980; for BSL: Harris et al. 1989; for the Sign Language of the Netherlands: Baker and Bogaerde 1996; and for Japanese Sign Language: Masataka 1992). Child-directed signing shows many similarities to child-directed speech. For example, child-directed signing tends to be larger and more clearly articulated than adult-directed signing. It also tends to be slower and to contain shorter utterances, and thus may be more readily segmented than adult-directed signing. Child-directed signing tends to be repetitive. Child-directed signing is also an affectively-laden register that may reinforce emotional bonds between parent and child; certainly it is often produced in an intimate context in which the child is seated on the parent’s lap. The result is that parent and child sometimes share a signing space. Like child-directed speech, child-directed signing is attractive to infants, irrespective of whether they have sign exposure or not. Masataka (1996, 1998) videotaped six-month-old infants (deaf and hearing) while they viewed a tape of seven sentences as addressed to adults or to infants. Both sets of infants were more attentive to the child-directed signing and displayed more positive affective reactions to it.
But some unique factors may also be at work in child-directed signing. In child-directed signing, parents accommodate the visual attentional capacities of their infants. Signing infants must know to shift their gaze between, for example, an object and the signed label for that object. These infants must therefore learn when to look at the signer. In turn, signing parents must know when to wait for their child’s visual regard, when to displace signs into their child’s visual field, and how to attract the child’s visual attention.

In sum, many discourse properties of child-directed language are likely common to speech and sign; for example, longer pauses than would be expected in adult-directed language may help the child segment the speech or sign stream. Both signing and speaking parents might scaffold the child’s language production by using utterance types that would tend to elicit further contributions from the child. However, as we suggested, child-directed signing may also have properties that are not true of child-directed speech. Characteristics of the articulatory system and of visual attention may help us to explain these properties of child-directed signing. In this study, we investigated the ways that deaf mothers modified their signs (in comparison to the citation forms of those signs) when addressing their deaf infants. Based on previous research, we expected sign modifications that accommodated the children’s visual attention and status as language-learners while showing effects of the physical proximity between parent and child.

2. Data and coding

We analyzed three mother-child dyads. Videotapes of mother-child interactions were made for all three children (pseudonyms Katie, Noel, and Suzie) at the approximate ages of 9 months, 13 months, and 15 months; Katie and Noel were additionally videotaped with their mothers at 17–18 months and 24 months. All three deaf girls have deaf parents and were acquiring ASL as a first language in the home. Each child has at least one deaf grandparent and therefore had access to a native-signing model in at least one of her parents. Katie’s and Suzie’s mothers have hearing parents, and Noel’s mother has deaf parents.

We analyzed 10 minutes of tape from each session. This span was not necessarily continuous, in that we disregarded periods of one minute or more when there was no interaction between mother and child. The 10-minute sections were chosen with a view to minimizing such gaps; i.e., we selected segments of video with a relatively high density of mother-child interac-
tion, rather than starting the segment at a predetermined time code. Using the ELAN annotation program, we transcribed all sign productions in the sample and coded them for place of articulation and for whether they had been modified in some way from their citation form. We excluded pointing signs (i.e., pronouns and body-part signs) from the quantitative analysis of sign modifications because it is difficult to distinguish between linguistic and gestural points, and because pointing signs may have a less certain citation form than do lexical signs. We coded for modifications in sign location by noting instances of displacement (producing the sign away from its citation-form position) and signing on the child’s body (producing a sign such that the child’s body is used for its place of articulation). Modifications to sign movement included repetition (the cyclicity of the sign is increased); lengthening (the sign is held or produced slowly, increasing its duration); and enlargement (the movement excursion of the sign is increased). Additional modifications for which we coded were molding (moving the child’s hands to make her produce the sign) and whether the mother leaned into the child’s visual space across a span of signs, rather than sitting or standing upright. Previous research did not lead us to expect modifications to maternal handshape, so we did not devise a code specifically for handshape changes, and we did not discover a need for one while coding.

All maternal signs were also coded for whether the child had visual access to them. In a separate coding pass, we coded the child’s eye gaze, or where she was looking at any point in the interaction. It is important to note that even when a child was not focusing on her mother’s face or hands, she may still have had visual access to the mother’s signs, as long as those signs were produced somewhere within her visual field. Finally, we coded the attention-getting cues produced by the mother, such as touching or waving at the child; we also coded whether those cues were successful in gaining the child’s attention. In this category of attention-getting cues, we included only those designed to draw attention to the mother, rather than cues, such as points, that the mother used to draw attention to an object or to another person.

3. Results

In our samples of child-directed signing, we identified 517 modified signs out of a total of 1114 lexical sign tokens: 46% of the mothers’ sign tokens were modified in one or more ways. As seen in Figure 1, the most frequent sign modifications were leaning into the child’s visual field and repeating
the sign (i.e., increasing the number of movement cycles). The least frequent modification type was molding: two mothers (Katie’s and Noel’s) occasionally manipulated their children’s hands to make the children articulate signs, but Suzie’s mother never did this. Because some sign tokens were modified in multiple ways, the number of modifications shown in this graph exceeds 517, the number of modified signs.

![Figure 1. Modified signs (n = 517) in child-directed signing. We report the frequency of seven modification types: leaning (LN); repetition (R); displacement (DIS); lengthening (L); enlargement (BIG); signing on the child’s body (SOC); and molding the child’s hand(s) (M).](image)

Figures 2 and 3 show the proportion of child-directed signs that were modified, as a function of the child’s age. A decline in modifications with the child’s age is evident for both Katie’s mother and Suzie’s mother; see Figure 2. However, much of this decline is attributable to a drop-off in the amount of leaning between the 9- and 13-month recording sessions for Suzie’s mother and between the 13- and 15-month recording sessions for Katie’s mother. Excluding signs whose only modification was leaning, the percentage of signs that each mother modified remained relatively stable across the period we studied; see Figure 3. The fact that modifications other than leaning continued throughout the period under study may indicate that the factors that elicit the register are similarly persistent at least until the child’s second birthday.

In the following pages, we discuss individual modification types.
On occasion, parents may adopt an overt teaching role and manipulate the child’s articulators to form a sign (Maestas y Moores 1980). For example, Noel (1;5,29) sat on her mother’s lap while her mother named the colors of the blocks on the floor in front of them. The mother picked up the blue block and, holding it in one hand, used her other hand to twist Noel’s forearm to form a facsimile of the sign BLUE, illustrated in Figure 4. She followed this molding with her own production of the sign.
As it happens, the early instances of molding in our data involved the molding of movement (as in the just-mentioned example) or location (as in Noel’s mother moving Noel’s hand to her forehead for an approximation of the sign HORSE at 1;2,20). In contrast, the last instances all involved the molding of handshapes of the manual alphabet (Katie, 1;11,12, 6 tokens). Given that young children’s accuracy in handshape production is low (Meier 2006), this possible change from molding location or movement to molding handshape may reflect a corresponding change in the mothers’ expectations for their children’s sign production as their children mature.

3.2 Signing on the child

In the episode described above when Noel’s mother was labeling colors, one of the blocks was orange. Unlike the ASL color signs for the other blocks (GREEN, BLUE, and YELLOW), which are produced in neutral space, the sign ORANGE is articulated at the signer’s mouth, as shown in Figure 5. If the mother had produced this sign in its expected place of articulation at her own mouth, it would not have been visible to Noel, who was seated on her lap. In this situation, Noel’s mother had a number of options. She could lean around the child, giving her peripheral visual access to the sign; she could attempt to draw Noel’s gaze up and backwards toward her face; she could dispense with contact and produce the sign in the neutral space in front of the child; or she could articulate the sign on her child’s mouth. In fact, all five tokens of ORANGE that the mother produced during this episode were signed on the child.
This strategy of signing on the child was used by all three mothers in the sample. About half of the tokens signed on a child were produced when the children were on their mothers’ laps, but all three mothers also signed on their children when facing them or when sitting next to them. With one exception, all tokens signed on a child were specified for contact with—or proximity to—the head or torso. As we will discuss in the next section, signs specified for contact were never displaced into neutral space (so this strategy was not available to make head- or torso-contacting signs visible to the child). However, other strategies for making signs visible to a child on the lap were occasionally used. For example, while Noel (1;1,12) sat on her lap, her mother juxtaposed the signs MOTHER and FATHER as articulated respectively on the child’s chin and forehead with those same signs produced at the expected locations on her own body; as she did this, she was leaning her head into Noel’s peripheral vision. Such juxtapositions were relatively infrequent when the child was on her mother’s lap: of 23 tokens signed on a child who was on her mother’s lap, only five—all during the same session—were alternated with signs in the expected location. However, when the mothers signed on their children with the two facing each other or next to each other (20 tokens), the mothers alternated signs on their children with signs in the expected location in a majority of instances (13 tokens or 65%). All three mothers produced such alternations.

A different class of signs that were sometimes produced with contact on the child’s body were pronominal points. As stated above, we did not include pointing signs in our calculations of sign modifications because of the difficulty of making a principled distinction between gestural and linguistic points. However, we noted a number of instances from both Noel’s and Katie’s mothers in which their pronominal points contacted the children’s
torsos. For example, Noel’s mother held Noel (1;2,20) on her hip while they looked at photos hanging on the wall. The mother signed the following (her gaze direction is indicated above the gloss):

(1) 

\[
\begin{array}{c}
\text{photos} \quad \text{Noel} \\
\text{POINT}[\text{photo}] \quad \text{POINT-touch}[\text{Noel}] \quad \text{NOEL}
\end{array}
\]

‘That’s you—Noel.’

\[
\begin{array}{c}
\text{photos} \quad \text{Noel} \\
\text{ALL}[\text{across photos}] \quad \text{POSS-touch}[\text{Noel}] \quad \text{NOEL}
\end{array}
\]

‘All of them are yours—Noel’s.’

The point and the possessive pronoun that touched Noel’s chest were smoothly integrated into the sentence. Such points with contact are different from other signs produced on the child’s body; these other signs are lexically specified for contact, while second-person points are not. Moreover, the contact was referential in the case of the pointing signs (including the possessive pronoun), but was not referential in the production of signs such as MOTHER or FATHER on the child. However, both kinds of signs that contacted the child’s body were likely made possible by the physical closeness between the parent and child, the resultant potential for their signing spaces to overlap, and the frequent use of touch in their interactions.

Signing on the child accommodates the child’s visual attention, especially when the child is on her mother’s lap (Harris et al. 1989; Waxman and Spencer 1997). When both mother and child are facing the same direction, signing on the child may ease the problem of visual perspective-taking in representing new signs (Shield 2010). In such instances, the child views the signs from the signer’s perspective, rather than from the addressee’s perspective. When parents juxtapose a sign on the child with the same sign articulated in its expected position, they produce a sample that not only provides two different visual perspectives on the shape of the sign, but that also provides tactile information about the sign’s place of articulation.

3.3 Displacement

A relatively common modification in child-directed signing is to displace a sign from its expected location. Such displacement may have two potential motivations: a sign may be displaced toward its referent, thereby enhancing the association between the two (Launer 1982), or displacement may be used
to move signs into the child’s visual field (Harris et al. 1989; Waxman and Spencer 1997). In an example of the latter function, Katie’s mother built a tower of stackable toys that Katie (1;1,5) was eager to knock down. The mother signed 8 tokens of WAIT, a two-handed, neutral-space sign made with a 5-handshape (i.e., all fingers extended and spread) and a wriggling movement of the fingers. For all tokens, she stretched one or both hands forward, interposing them between Katie and the toy tower that the child was looking at, rather than producing the sign within her own normal signing space. (Naturally, when her mother briefly looked away, Katie immediately knocked the tower down.) [See video clip 1.]

It can be difficult to discriminate between the two possible motivations for displacement (spatially associating a sign with a referent, versus making the sign visible to the child). If the child is looking at an object, and the mother displaces her hands into the child’s visual field to comment on that object, then her signs necessarily move toward it. We had no examples in our sample where signs were displaced toward their referents in ways that did not also accommodate the child’s gaze. Interestingly, we saw cases where highly-repeated signs started out non-displaced, and the mother displaced them—while continuing to repeat—after the child initially failed to look (e.g., the sign NO, 9 cycles, last 4 displaced, addressed to Katie at 1;11,12; see video clip 2) or after the child had shifted her gaze away (e.g., TOILET, 8 cycles, last 2 displaced, addressed to Katie at 1;11,12). In these examples, both from the same book-reading session, displacement of the signs was unambiguously motivated by the child’s gaze direction; the fact that displacement also moved the signs toward the book the mother was talking about appeared to be incidental.

In our data, only neutral-space signs and signs specified for contact on the non-dominant hand were displaced (cf. Holzrichter and Meier 2000). As mentioned above, when signing in the expected position was not feasible for signs specified for contact, those signs were articulated on the child’s body rather than being signed without contact. This pattern in child-directed signing suggests a possible difference with other registers. For example, contact on the signer’s face is sometimes not achieved in deaf-blind signing (Mesch 2001), presumably because such contact would require a very long movement excursion of the addressee’s hand.

Harris et al. (1989) found a decline in the percentage of displaced signs (pooling the types of signs we coded as displaced with those we coded as signed on the child) as the children got older and more skilled at shifting attention back and forth to their mothers. In their data, out of all signs that were visible to the child (over 70% of the total), three of the four mothers
displaced a majority of signs when their children were younger but switched to producing a majority in the expected location by the 20-month recording session. In our data, the percentage of sign tokens that Katie’s mother produced outside of the expected position showed a similar decline with her child’s age, moving from 31% at 13 months to 13% at 15 months and settling at 5-7% during the last two sessions. There was not a similarly clear pattern for Noel’s mother. (No comparison is possible with Suzie’s mother, because Suzie was only 15 months old at her last recording session.)

3.4 Leaning into the child’s visual field

Given that signs on the face or body are not displaced in child-directed signing, one way that parents make their signs visible (without signing on the child) is by leaning forward during a span of signs (cf. Harris et al. 1989). In the following example reported in Meier (2008), Katie (1;1,5) and her mother were looking at a picture book; see video clip 3. Mother and daughter were seated on the floor, with the mother behind and to the left of Katie. The mother’s left and right hands are indicated in the transcription as LH and RH, respectively:

(2) M’s gaze: book Katie book Katie
M’s posture: leaning in
RH: POINT-touch(book) DUCK5x POINT-touch(book) DUCK5x
LH: DUCK5x
K’s gaze: to book......................to Mom...............to book............to Mom

At the first token of DUCK (a one-handed sign articulated at the mouth that suggests the opening and closing of a duck’s bill), the mother leaned in, thereby making it possible for her daughter to see this sign that is articulated on the face. She continued to lean in for the remainder of the interaction. All three mothers used leaning in this way; as shown above in Figure 1, leaning was the most frequent method of sign modification.

3.5 Repetition

Maternal signs were coded as repeated if single-cycle targets had 2 or more cycles and multi-cycle targets had 4 or more cycles. For example, Suzie’s mother pointed to a red toy and then signed RED with six cycles; Suzie (1;1,11) shifted her gaze from the toy to her mother’s sign on the third cycle.
A possible motivation for increasing the cyclicity of a sign may be to repeat the sign until the child looks, as was perhaps true in this last example. However, as shown in Figure 6, for roughly half of the repeated tokens in our data, the child was already looking at the mother before she started to sign (Pizer, Shaw, and Meier 2007). Given that the mother already had the child’s visual attention in these cases, there must have been another reason for her to increase the cyclicity of these signs.

A second hypothesis is that increasing a sign’s cyclicity may be a way to induce the child to imitate the sign (Woll, Kyle, and Ackerman 1988). For example, Katie’s mother pointed to the book she and Katie (1;11,12) were reading and asked who was pictured; see video clip 4. Not receiving a response, she tapped Katie’s leg, pointed again to the book, and signed MOTHER with nine cycles. Katie pointed to the book on the first cycle of her mother’s sign, looked up on the second cycle, and signed MOTHER herself beginning at her mother’s seventh cycle. After the imitation, Katie’s mother nodded and moved on to the next page of the book. During this session, 59% of the mother’s repeated signs were followed by imitation from Katie (19/32).

The mean number of cycles for increased-cyclicity signs with multicyclic targets was between five and six for most sessions. The only exceptions were Noel’s mother at the 24 month session, when she produced only a single increased-cyclicity token with four cycles, and Katie’s mother, who exceeded that range at both the 9 month session (mean 10.2 cycles) and the 24 month session (mean 6.8 cycles). Her maximum number of cycles...
showed a similar U-shaped pattern, with peaks of 15 cycles at 9 months and 13 cycles at 24 months. Although the number of cycles was similar at these two sessions, it is likely that her motivation for increasing the cyclicity of her signs was different.

One reason that increased cyclicity in child-directed signing is of interest is because of the existence of noun-verb pairs in ASL that are distinguished by cyclicity (e.g., multicyclic AIRPLANE vs. single-cycle FLY). Launer (1982) suggested that the maternal tendency to add repetition to non-repeated signs may affect children’s learning of the noun-verb distinction in ASL. Our data include instances of single-cycle verbs that have repeated movement in child-directed signing: e.g., both Suzie’s mother and Katie’s mother asked their daughters to sit on the floor using multicyclic tokens of SIT.

Children tend to err in early sign production by adding repetition to single-cycle target signs in ASL (Meier et al. 2008) and BSL (Morgan et al. 2007). As Meier et al. observed, increased cyclicity in child-directed signing complicates the effort to separate motoric effects on children’s early sign production from environmental effects.

3.6 Lengthening

Like increased cyclicity, increasing the duration of a sign by slowing the movement or lengthening the final hold could be a way to continue a sign until the child looks. As with repeated signs, there were examples of a child looking halfway through a lengthened sign. However, analyses of the timing of the child’s gaze toward lengthened signs is very similar to the results for repeated signs: for lengthened signs as well, about half of the time the child was already looking at the beginning of the mother’s sign production.

Another parallel between lengthened final holds and increased cyclicity is that both may be used to elicit imitation from the child. During her last session, Katie (1;11,12) imitated 83% (25/30) of her mother’s lengthened signs (16 of them during a recitation of the manual alphabet). In total, during this session Katie imitated 41 signs that her mother had lengthened and/or repeated; she imitated only 18 signs from utterances in which her mother had produced no lengthening or repetition.

Phrase-final lengthening has been noted as a characteristic of ASL phonology/prosody (Brentari 1998; Perlmutter 1992), and almost all of the mothers’ lengthened signs were phrase final (albeit many were in single-sign utterances). Neither our study nor most studies of adult-directed signing have quantified sign duration, although, for example, Liddell (1984) has reported
evidence of lengthened final holds in isolated, citation-form signs. Analyses of sign duration in phrase-final and non-phrase-final position will be needed before we can state to what degree signs are lengthened in child-directed signing and what patterns that lengthening might follow.

3.7 Enlargement of signs

Some of the mothers’ signs were produced with a larger movement excursion than would be expected in adult-addressed signing. Such enlargement could possibly serve to emphasize a sign, making it particularly clear or salient to the child. One means of enlarging signs is proximalization, that is, using a joint of the arm or hand that is closer to the torso than would be expected. Holzrichter and Meier (2000) reported that, in child-directed signing, parents frequently added path movement at the elbow or shoulder to signs with hand-internal movement (e.g., RED or ORANGE). A few instances of maternal proximalization were observed in the current sample. For example, Katie’s (1;3,0) mother signed BOOK with longitudinal rotation at the shoulder, rather than only rotation of the forearm as in the citation form of that sign.

Proximalization has been found to be characteristic of infant sign production (Meier et al. 2008). This fact raises the same question as discussed above for increased cyclicity: is proximalization in development driven by input factors or by infant motor development or by both? Further research analyzing whether there are systematic differences in how adults and children proximalize may contribute to answering this question. For example, Meier et al. (2008) noted that adults and children sometimes proximalize in different ways, with parents preserving the overall shape of signs whereas children may sometimes distort those shapes.

4. Conclusions

In this paper, we have observed features of naturalistic signing in mother-child conversations. Some features (e.g., displacement and leaning) arise from apparent attempts to accommodate the child’s visual attention. However, other modifications that may sometimes serve an attention-getting function (e.g., repeating or holding a sign until the child looks) were also frequently used when the child was already attending. In such circumstances, these modifications may sometimes serve to elicit imitation from the child, highlighting the parent’s and child’s respective roles as language expert and language novice. Instances of sign teaching through molding of the child’s
hands highlighted these same roles. The physical closeness between parent and child allowed the parent to share the child’s signing space and sign on the child’s body, providing the opportunity for the child to see and feel signs from the signer’s perspective.

To the degree that other signing situations share characteristics of parent-child communication, signing in those situations might be profitably examined to see if it exhibits the features described above. For example, we might expect commonalities with other situations in which the signer must accommodate the addressee’s attention (e.g., when the addressee is driving). Some features of child-directed signing that are tied to the problems of getting and maintaining a child’s attention may also characterize attention getting in other kinds of signed conversations. Coates and Sutton-Spence (2001) described turn-taking behaviors in casual BSL conversations among groups of friends. They observed that signers often start to sign without first acquiring the others’ attention; they may then 1) repeat signs after the others look, 2) start to form a sign and hold it until everyone looks, or 3) begin signing in the others’ line of sight, outside of the normal signing space, and return to the normal signing space after everyone looks. These attention-getting strategies resemble the repetition, lengthening, and displacement observed in child-directed signing.

Other features of child-directed signing might be shared with other intimate registers. Emmorey (2002) described an example of a signer moving her hands into her best friend’s signing space to refer to locations that the friend had set up; she observed that such sharing of signing space is rare and considered amusing. It appears that displacement into an interlocutor’s signing space or producing signs that contact the interlocutor’s body may violate common norms for adult-addressed signing; however, studies of signing between close friends or romantic partners may reveal whether intimate registers other than child-addressed signing allow such productions.

Variation in the size of signs and in the use of joints of the hands and arms has also been observed in adult-addressed signing; for example, Crasborn (2001) found proximalization to be characteristic of distance signing in the Sign Language of the Netherlands and distalization to be characteristic of whispering.

Understanding the properties of different sign registers will require transcription and measurement of the features noted in this paper (displacement, increased cyclicity, proximalization, sign duration, etc.). It is clear that these articulatory features will be useful in describing many sign registers, not just child-directed signing, and that the details of how signs vary within and across registers will likely provide crucial insights into the phonological structure and representation of signs.
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