

Joint Attention and Child-Directed Signing in American Sign Language

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1. Introduction

In this paper, we present an analysis of the signing inside and outside joint attention episodes that three deaf mothers directed to their deaf children when those children were between 9 and 24 months of age. Joint attention—a state in which the parent and child share the same object as the focus of attention—has been shown to be related to a child’s language growth and is a privileged state for word learning (Akhtar, 2005; Baldwin, 1991; Tomasello & Farrar, 1986; Tomasello & Todd, 1983). These and other researchers generally agree that joint attention is frequently used in the demonstration of referential intent. For hearing children who are learning a spoken language, a spoken label and gaze at the object being referred to can co-occur, making the establishment of joint attention to an object and the labeling of that object relatively easy tasks for the parent. In contrast, joint attention for deaf children learning a signed language is complicated by the fact that a signed label cannot readily be simultaneous with gaze at the object being labeled. Because signed languages are visual, the child must shift his or her focus between the object and the parent who is signing. The hearing child may choose not to look at her mother and still receive a spoken label aurally. But, if a deaf child chooses not to look at her mother, that child will likely not see the signed label. Thus, a deaf child’s mother would seemingly need to be sensitive to her child’s visual regard and adept at managing her child’s visual attention. This study addresses the issue of joint attention in deaf mother-child dyads through close analysis of child-directed ASL inside and outside episodes of joint attention.

Researchers looking at child-directed signing in a number of sign languages have provided a quite consistent description of the ways that deaf parents modify their signs when addressing their young children (e.g., Erting, Prezioso, & O’Grady Hines, 1990, and Spencer, Bodner-Johnson, & Gutfreund, 1992, for American Sign Language; Mohay, Milton, Hindmarsh, & Ganley, 1998, for Australian Sign Language; Harris, Clibbens, Chasin, & Tibbitts, 1989 for British Sign Language; Masataka, 1992, for Japanese Sign Language; van den Bogaerde, 2000, for Sign Language of the Netherlands, among others). These researchers have noted that modifications in child-directed signing are well-suited to ensuring that mothers’ signs are visible to their children, and that deaf parents are skilled at producing visually accessible sign language input to their children. These modifications may also serve to construct and facilitate joint attention episodes, in that they may assist the child in negotiating the combined visual demands of language and object.

* This research is supported in part by NSF grant #BCS-0447018 to Catharine H. Echols (PI) and Richard P. Meier (co-PI). Thanks also to Jill Arechiga, Ligon Burris, Perry Connolly, Erin Coon, Sarah D’Alessandro, Lynn Hou, Elena Liskova, Jesse Lovegren, Krista Lundquist, Chaleece Sandberg, Sophia Wallingford, and Amelia Zeringue for their help with this project.

2. Methods

We looked at three sessions of videotaped interaction between mother and child for each of three mother-child dyads and an additional two sessions for two of the dyads. Table 1 below shows the pseudonyms of the three children we looked at and their ages at the sessions we analyzed. All three of the children are deaf girls, have deaf parents, and are acquiring ASL as a first language in the home. Each child has at least one deaf grandparent and so has access to a native signing model in at least one of her parents.

Table 1: Children's Ages at Videotaping Sessions

Katie	Noel	Suzie¹
9 mos.	9 mos., 2 weeks	9 mos.
13 mos.	13 mos., 2 weeks	13 mos., 2 weeks
15 mos.	14 mos., 3 weeks	15 mos.
18 mos.	17 mos.	
23 mos., 3 weeks	23 mos., 2 weeks	

We analyzed the first ten minutes of each video, excluding periods of time lasting for one minute or more when either mother or child was off camera or when mother and child were not interacting with each other (e.g., when the mother was chatting with the researcher while she fed the child a bottle). In such cases, additional tape was analyzed to yield ten total minutes of coded video.

The videos were analyzed using ELAN, a video transcription software program developed by the Max Planck Institute for Psycholinguistics (Nijmegen, The Netherlands) that allows the transcription to be time-linked to the video. We counted an interaction as an episode of joint attention if it lasted for three seconds or more and the mother and child were mutually engaged with each other and shared the same object or event as the focus of attention. Joint attention episodes were then coded for duration, whether parent or child initiated the interaction, and the activities that took place during the interaction. We transcribed all maternal sign productions, both inside and outside joint attention episodes. We coded all the signs for their place of articulation and for whether they had been modified in some way from their citation form. Based on previous researchers' studies of child-directed signing, the types of modifications that we coded were: *displacement*, *repetition*, *signing on the child's body*, *molding*, *lengthening*, and *enlargement*. Signs were coded as *displaced* if the production was moved from its expected place of articulation into the child's field of vision. An example of such displacement is a mother signing WAIT to her child and moving her hands so that the sign is produced directly in front of the child rather than in the neutral articulation space in front of the mother (Katie, 13 mos.). Signs were coded as *repeated* if the cyclicity of the sign was increased beyond the citation form. For signs with a multicyclic citation form (i.e., where the citation form includes two to three movement iterations), sign tokens produced with four or more movement iterations were coded as repeated (e.g., BOY produced with nine movement cycles, as Katie's mother did when Katie was 23

¹ Suzie's family participated in our study until she was 15 months old, at which point the family moved away and further data collection was not possible.

months, 3 weeks old). For signs for which the citation form consists of a single, non-repeated movement, sign tokens produced with more than one movement cycle were counted as repeated (e.g., DRINK produced with three movement cycles (Suzie, 15 mos.)). Instances when a sign was produced such that the child's body was used for the place of articulation were coded as *signing on the child's body*. The signs MOTHER and FATHER are normally produced at the signer's chin or forehead, respectively. An instance of signing on the child's body occurred when a mother first produced these signs in their normal place of articulation, and then repeated them on the child's chin and forehead (Nicole, 13 mos., 2 wks.). *Molding*, moving the child's hands to make the child produce the sign, occurred when a mother helped her child form the T handshape by manipulating the child's fingers into the appropriate shape (Katie, 23 mos., 3 wks.). *Lengthened* signs were signs that were produced slowly or held in place, thereby increasing the sign's duration. For example, after one mother finished reading a book to her child, she signed FINISH and held the final position (Nicole, 17 mos.). *Enlarged* signs were signs where the movement excursion was increased; for example, a mother reading a book could produce some of the signs larger than normal, as Nicole's mother did when Nicole was 17 months old.

An additional modification we coded for was whether the mother was noticeably leaning in toward the child, rather than sitting or standing upright. Unlike the other modifications, which applied to individual signs, leaning-in generally occurred across an entire utterance or more. Pointing signs were excluded from our analysis since it is often unclear when the signer is using pointing as a gesture or as an ASL sign, such as to name a body part.

Maternal signs were also coded for whether the child had visual access to them. We coded the child's eye gaze for the entire interaction. It is important to note that even when a child was not specifically focusing on her mother's face or hands, it may still have been possible for the child to have visual access to the signs, as long as the 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, along with whether those cues were successful in gaining the child's attention.

3. Results

3.1. Maternal Sign Rate

We measured the number of sign tokens the mothers produced per minute both inside episodes of joint attention and outside such episodes. Since the amount of time spent inside joint attention episodes is unlikely to match the amount of time spent outside joint attention, this normalized measure of signing rate allows us to compare the amount of language produced in these two states. Figure 1 below presents the mean maternal signing rate at each age studied. There is a sharp contrast between the signing rates inside and outside of joint attention, with the rate of signing being higher inside joint attention episodes for each child at each age studied. This demonstrates that children receive richer language input inside joint attention episodes than outside such episodes, which is consistent with findings for spoken language (Tomasello & Todd, 1983). The rate of signing inside joint attention increases as the children mature. This increase is likely due to the children's increased ability to maintain joint attention, as well as to their growing linguistic skills.

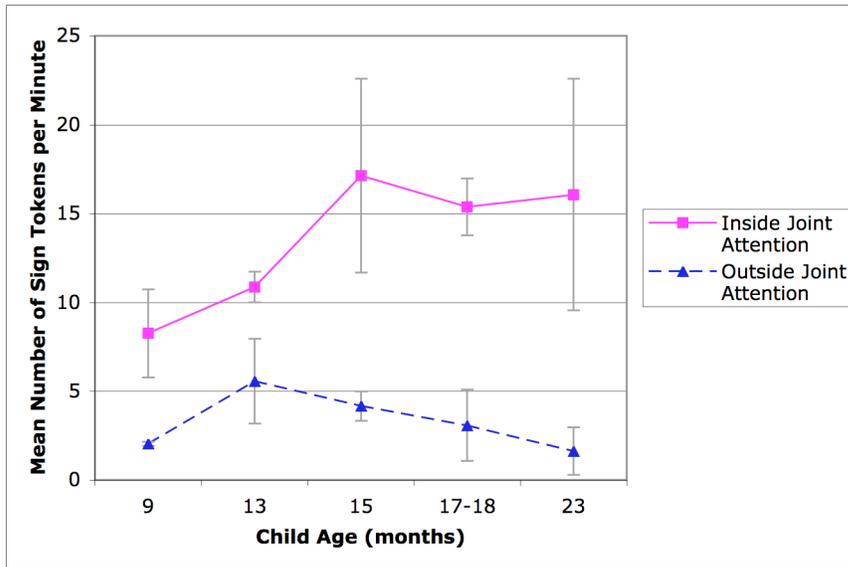


Figure 1: Maternal Sign Rate Inside and Outside Joint Attention Episodes

3.2. Sign Modification

Mothers modified their signs at a higher rate inside than outside joint attention episodes, shown below in Figure 2. Assuming that children are more attentive to their mothers during joint attention episodes, this finding is not what we would expect if sign modifications were solely motivated by attempts to attract the child’s gaze. However, to the extent that these modifications increase the salience of signs, having more modifications inside joint attention would contribute to those episodes being prime areas for vocabulary learning.

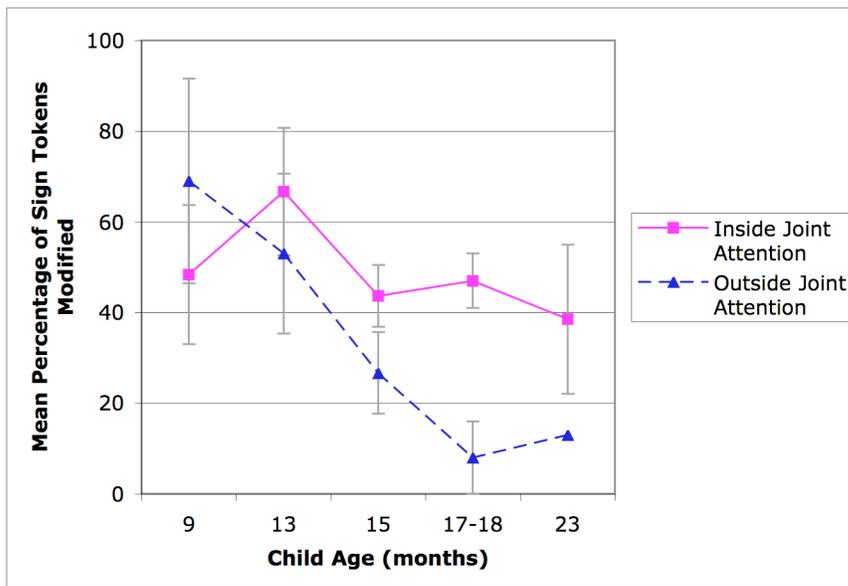


Figure 2: Percentage of Modified Sign Tokens Inside and Outside Joint Attention

3.3. Initiation of Joint Attention

An episode of joint attention was judged to be initiated by the mother when she overtly attempted to engage the child by introducing an object into the child's visual field or by using an attention-getting action such as touching the child or waving. Child-initiated episodes were those in which the child was already focused on some object and the mother subsequently followed the child's gaze to make that object the focus of the episode. When the mothers initiated joint attention episodes, they most commonly attracted their children's attention by presenting or manipulating an object or by touching the child. Less commonly mothers used a conventional gesture (either a wave, or a point to an object). Mothers used a lexical sign to attract their children's attention in just 4% of the episodes. For example, a mother signed WHERE MOMMY? to attract her child's attention to a family photo, with no accompanying gesture or other attention-getting cue (Nicole, 14 mos., 3 wks.). This difference is shown below in Figure 3.

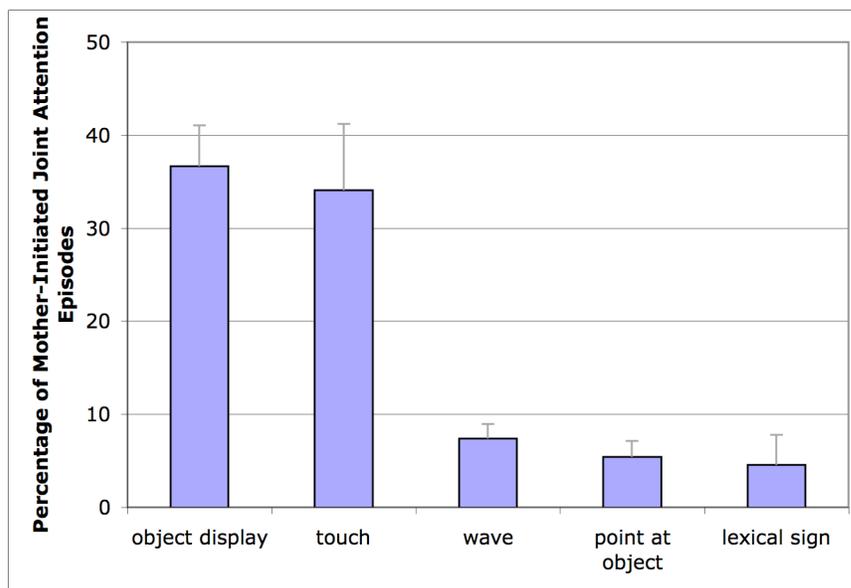


Figure 3: Maternal Techniques for Initiating Joint Attention (n=103)

Touching the child or waving in the child's visual field are strategies of attention-getting that are frequent among deaf parents and deaf children, but Waxman and Spencer (1997) and Spencer (2000) report that hearing parents with hearing children do not utilize these strategies to gain the child's attention. Instead, hearing parents might use verbal cues, such as names or deictic terms, to attract their child's attention (Estigarribia & Clark, 2007). Estigarribia and Clark (2007) report that gestures sometimes accompany verbal attention-getters, but they do not report use of gestures alone. This method of attracting a child's attention is different than the attention-getting cues used by deaf mothers with deaf children in that the cues provided by hearing parents are primarily linguistic; the cues provided by the deaf mothers in our study—displaying an object, touching and waving—are generally non-linguistic cues. The deaf mothers in our study very infrequently used lexical signs to gain their children's attention.

3.4. Sign Modification and Child Gaze

Some kinds of modifications, such as displacement and leaning, are clearly motivated by the child's gaze. For example, a mother in a standing position next to the child might lean down or move her hands so that her signing is maximally visible to the child (e.g., Katie, 23 mos. 3 wks.). In some instances in our data, modifications such as repetition and lengthening also appeared to be motivated by the need to attract the child's gaze: the mothers repeated or held the sign until the child looked. These examples were consistent with previous findings of an association between increased duration in child-directed signing and a lack of eye contact with the child (Holzrichter & Meier, 2000). However, in this study, the child's gaze does not appear to be the primary determinant of repetition and lengthening: the children were already looking at their mothers before half of the repeated and lengthened signs (mean = 52%, s.d. = 9.4%), as shown below in Figures 4 and 5. This suggests that the function of repeating and lengthening is not solely to increase the duration of a sign's production until an inattentive child looks.

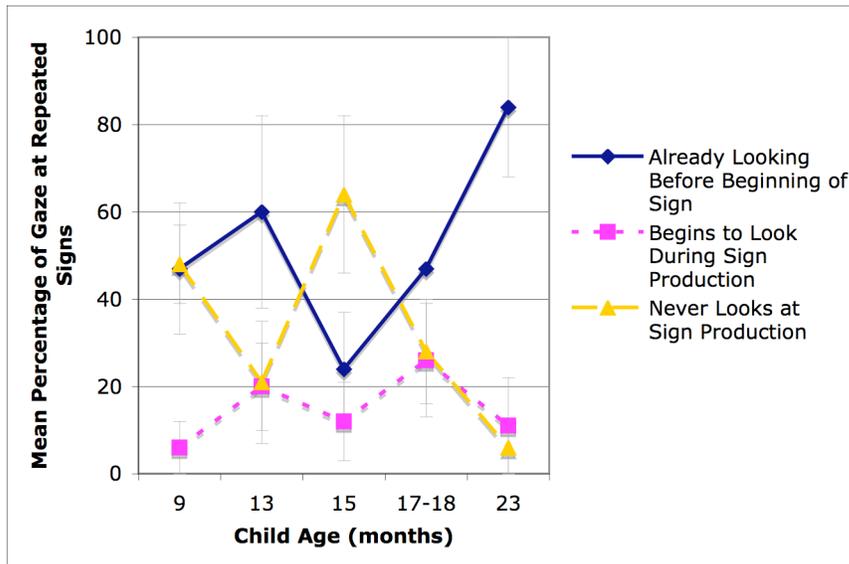


Figure 4: Timing of Child Gaze at Repeated Signs

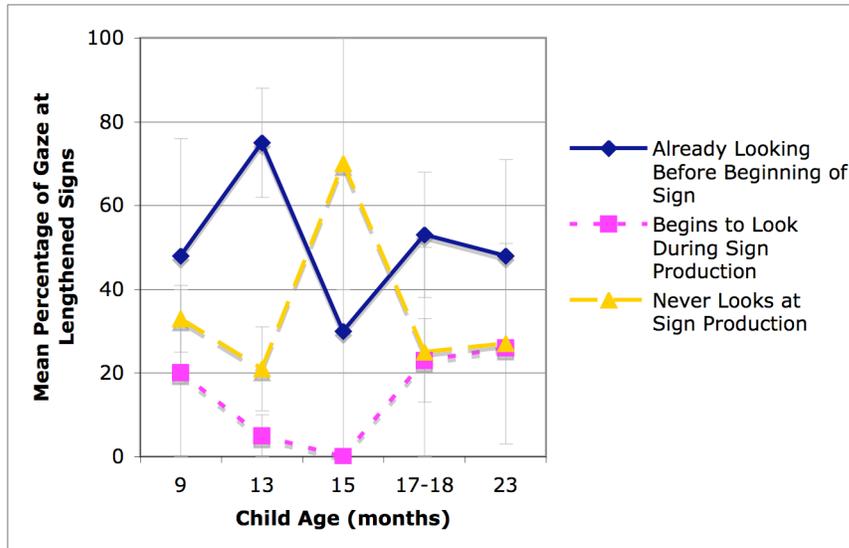


Figure 5: Timing of Child Gaze at Lengthened Signs

3.5. Discourse Functions for Modified Signs

Rather than being driven primarily by child gaze, repetition and lengthening are likely also related to ASL prosody or discourse factors (cf. Pizer & Meier, 2006). Utterance-final signs may be lengthened in adult-directed forms of ASL (Perlmutter, 1992; Brentari, 1998). In this study, the majority of lengthened signs occurred in utterance-final position in questions. Many repeated signs were followed by the child imitating the sign, especially at older ages (e.g., 84% of repeated signs to Katie at 23 months, 3 weeks); a significant function of repetition appears to have been to elicit imitation from the child (also observed by Woll, Kyle & Ackerman, 1998). In a book-reading interaction, for example, Katie’s mother frequently repeated signs until Katie produced the sign herself.

Other discourse functions for repeated and lengthened signs included commands and the correction of a child’s utterance. While increasing the duration of a sign may not necessarily be motivated by waiting for the child’s gaze, it may often be motivated by waiting for a child’s linguistic or non-linguistic response.

4. Conclusions

In ASL, as in speech, joint attention episodes are rich areas for vocabulary acquisition. Mothers most commonly use means other than lexical signs to initiate joint attention episodes, such as manipulating an object or touching the child. Mothers sign more to their children inside than outside joint attention. Mothers modify their signs in ways that may increase their visibility and salience to their children and do so at higher rates inside than outside joint attention. However, not all modifications to child-addressed signs are motivated by the necessity to attract the child’s gaze. Repeated and lengthened signs may be strongly motivated by discourse functions such as marking questions or eliciting the child’s imitation of the sign. An integration of this work with in-depth studies of the prosodic and discourse functions of these kinds of modifications in

adult-addressed signing is required before we can tease apart the roles of prosody, discourse, and child gaze in signing addressed to children.

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