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Pointing and self-reference in French and French Sign Language¹

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Abstract

The aim of this paper is to conduct an exploratory study and compare the development of pointing and its specific use as self-reference in French sign language (LSF) to the development of pointing and self reference in French.

Personal reference is expressed through nominal expressions and pronouns in French. In LSF, the signs used for personal reference have the same form as pointing gestures, which are present in children's communication system from the age of 10-11 months (Bates et. al 1977, Clark 1978). Continuity between pointing gestures and signs is questioned by Bellugi & Klima (1981) and Petitto (1986). For them, signing children's pre-linguistic gestures are different from signs and correspond to two distinct categories of pointing gestures: some indexical and some symbolic. We present arguments for a continuity hypothesis between pointing gestures and signs.

We coded two longitudinal datasets of a French speaking child and a French Sign Language signing child aged seven months to three, filmed at home with their mothers once a month. Our analyses enabled us to underline the continuity between the deaf child's pointing gestures and their incorporation as markers of personal reference into the child's sign language system.

Keywords: pointing; self-reference; first language acquisition; sign language acquisition

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This paper explores the issue of the development of pointing focusing on self-points within a deaf signing child's emerging system of self-reference, compared to a hearing child's use of pointing and self-words. As only one dataset of a French deaf signing child has ever been collected, this is a case study. We present arguments for a continuity hypothesis between first pointing gestures and signs. These arguments can only be confirmed when more data will have been collected in LSF (Langue des Signes Française – French sign language). However our analyses offer perspectives in line with significant studies (Pizzuto 2007), aimed at clarifying the connections between the vocal and the gestural modality in early development, and the more general cognitive origins and developmental roots of language (Volterra, Erting, 1990). Comparisons between hearing children who communicate in two modalities (visual and gestural), and deaf children who communicate in one modality, offer valuable insights about the relation between prelinguistic communication and language. In a usage-based and constructivist approach of language acquisition (Tomasello 2003), the study of pointing is situated within a more general approach of the child's interactive experience and competence, and takes into account the semantic and pragmatic dimensions of the child's language use (personal reference), as well as parental input. Pointing is thus viewed in terms of its function in dialogue. Pointing “gestures” or “signs” are not considered as discontinuous (Morgenstern et al. 2010): pointing is integrated into the child's linguistic system which becomes more and more complex but is based upon first forms of communication. Gesture is an integral part of language.

1. Issues at stake

1.1. Pointing gestures

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Children's neurological maturation enables them to control their bodily movements and transform them into gestures thanks to gradually finer motor skills. Some of these gestures are assigned meaning by their interlocutors. At the same time children develop cognitive prerequisites that allow them to take up symbolic gestures such as the « bye bye » gesture, or the « itsy bitsy spider » routine, from their social environment. The founders of the study of child development and language already had great intuitions about the importance of gestures and their relation to language. In his notes on his son's development, Darwin (1877) stresses the importance of observing the transition from uncontrolled body movements to intentional gestures. Romanes (1889) compares human and animal gestures. He makes fine observations on qualitative differences and mentions the gestural language of deaf people as a sign of the universality of symbolic gestures. Pointing gestures in particular, thus combine motor and cognitive prerequisites with the capacity to symbolize and to take up forms used by adults in dialogue. Stern (1924) considers pointing as a precursor of intentional marking. For Werner and Kaplan (1963), pointing represents children's ability to discriminate between external objects and their own person. Communicational pointing then becomes the basis for referential behavior and reciprocity established in common activities between children and their parents (Bruner 1975). As Tomasello and his colleagues underline, "pointing may thus represent a key transition, both phylogenetically and ontogenetically, from nonlinguistic to linguistic forms of human communication." (Tomasello et al. 2007: 720).

Thus, pointing gestures play an important role in the development of communication: they are grounded in joint attention, they trigger interaction. Children learn to use pointing gestures to designate an entity as a focus for joint attention and exchange with adults, paving the way to early language acquisition. Bruner's classical account (1975) is focused on the adult-child social interaction involved in pointing events grounded in meaningful social exchanges. Pointing is analyzed in the framework of joint attentional situations thanks to

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which infants share information, desires and emotions with helpful adults, as observed by Werner and Kaplan who named them “primordial sharing situations” (1963). Pointing can therefore be viewed as one of children’s first symbolizing devices in the “joint attentional frame” described by Tomasello (1999).

Not only is pointing considered as a key element in children’s communicative system, but developmental continuity between pointing and early linguistic productions such as demonstratives has been discussed as early as the eighteenth century by Condillac (1756). Werner & Kaplan (1963) wondered whether linguistic representation emerges from non-linguistic representation. For Clark (1978), the early vocal demonstratives used by children follow pointing gestures as children shift rather fluidly from pre-linguistic to linguistic communication in a sequence of stages.

Pointing is argued to facilitate the transition from gestures to non-deictic words. Children’s pointing gestures are often taken up by adults, who label the entity at stake, which may in turn trigger children’s labeling of the designated entity (Ninio and Bruner, 1978). Thus, in the development of spoken language in hearing children, pointing facilitates access to verbal naming and may predict lexical development (Bates et al. 1979).

Pointing is part of the set of gestures that are considered to be “the cutting edge of early language development” (Ozçaliskan, Goldin-Meadow 2005) thanks to gesture-speech combinations that precede by several months multiword constructions performed solely in the vocal modality. For example, before a child produces a two-word utterance, she will point at a cookie and say the word “cookie” or point at a bag and say the word “mommy”. Children can produce a construction that could be interpreted as [predicate + argument] in a [pointing gesture + speech] combination. A child’s ability to convey utterance-like meaning across modalities, and the types of gesture-speech combinations that children produce, changes over time. Those combinations predict the production of multi-word combinations.

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Pointing gestures therefore play a crucial role in children's cognitive, social and linguistic development: they allow children to segment their environment, extract an element of the world that surrounds them and direct the adults' attention and speech to it. Inserted in a proto-syntactic structure formed of two elements combining gesture and word, they mark children's entry into syntax through multimodal constructions.

1.2. From Gestures to signs

The issue of continuity between gesture and language is more intricate in the case of sign language since pointing gestures are fully integrated in the linguistic system (see Hoiting, Slobin 2007, for a study of the gesture-to-sign continuum). The analysis of pointing in sign language acquisition is a unique occasion to observe the eventual continuity or discontinuity between gesture and sign.

When children first produce pointing gestures whether in speaking or signing families, they designate a place, an object, a person or sometimes an event. But for the child who is surrounded by sign language, those pointing gestures are progressively incorporated into her formal linguistic system and used for personal reference among other functions.

Continuity between pointing gestures and language is questioned by Bellugi & Klima (1981) and Petitto (1986), based on their observations of a developmental discontinuity in the production of pointing gestures and pronoun reversal in deaf signing children. According to them, children's pre-linguistic gestures are different from signs despite the same hand-shape and may correspond to two distinct categories of pointing gestures: some indexical and some symbolic.

Petitto (1986) observed that the deaf signing child she studied longitudinally started pointing at 10 months. Up to 12 months, the child pointed freely at persons and objects. Between 12 and 18 months, points to persons disappeared. Petitto interprets this

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disappearance as indicating a discontinuity between non-linguistic pointing and linguistic “pronouns”. Another child studied by Petitto even made reversal errors, pointing towards her interlocutor to refer to herself. By 27 months, all the deictic pronouns were correct. The author’s hypothesis is that the child interprets the pronoun YOU as a lexical sign equivalent to her name (see the “name hypothesis”, Clark 1978). The reversal would therefore reveal that the child treats pointing as having linguistic properties and does not take advantage of the transparency of the form-referent relation (which would lead the child to point towards the interlocutor to refer to the interlocutor and not to herself).

While discontinuity between pointing gestures and points used as personal pronouns was illustrated in American Sign Language, the same phenomenon was not confirmed in Italian Sign Language with longitudinal data (Pizzutto, Capobianco 2005), in Hatzopoulou’s dissertation on the acquisition of Greek Sign Language (2008), nor in the longitudinal recordings of two deaf children using Langue des Signes Française (LSF) – French Sign language – (Morgenstern 1997) which showed no clear interruption of pointing toward persons and no pronoun reversal.

The very relevance of the issue of (dis)continuity in the nature of pointing gestures has been questioned. According to Schick (2003: 221), “for the child who produces spoken English, the point is considered a gesture. But for the child learning ASL, because points are considered linguistic in the adult system, it is tempting to consider the child’s points as linguistic”. How are we to decide whether the nature of pointing is linguistic or “non-linguistic”/pre-linguistic? Cheek et al. (2001: 298) in their analysis of the transition between gestures and signs do not consider that non linguistic and linguistic pointing can be distinguished: « Because pointing signs that are glossed as ‘you’, ‘he’, ‘she’, and ‘it’ could not be reliably distinguished from pre-linguistic pointing gestures, such tokens were not included in the set of children’s signs ». Most sign language researchers assume that these

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pointing signs are pronouns as demonstrated in Petitto (1986). That basis lies in the syntactic distribution of these forms (Lillo-Martin, Meier 2011). However that analysis is discussed by Evans and Levinson (2009), as well as Cormier (2010). These authors challenge the direct application of linguistic terminology from one language/modality to another. Pointing signs do not look different on the surface from pointing in non-signers (Kendon 2004, Kita 2003). In both cases, points belong to the deictic system, they index locations of objects, persons, events in the deictic space. Some studies, however, have focused on specific features of pointing in deaf children and on their ability to use different forms and types of pointing for different functions with the combinatorial dimensions of finger, wrist and arm configuration, movement, intensity and speed (see Hoiting, Slobin, 2007). According to Hoiting (2009:84), not only do deaf children use an impressive amount of pointing gestures from very early on, but the functions of these points are “integrated into the process of conventionalization of gesture and control of the signing space”. Her observations and analyses support a very clear impact of child directed language on children’s use of pointing but also show that the distinction between gestures and signs are not clear-cut. These debates indicate that detailed analyses of the different types of pointing used both by hearing and deaf children and their functions in context are still needed to understand whether there are continuities or discontinuities between gestures and signs or words.

But pointing takes on a particular status in sign language when referring to persons and especially in the case of self-reference.

1.3. Self-reference

First person pronouns are a complex category for children to acquire. When they start referring to themselves as subjects, French-speaking children may use standard forms (*je, moi je*) but also non-standard forms (*moi, tu, il/elle, name*) as well as predicates with no overt

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subjects. The analysis of these uses provides us with valuable insights on how children creatively process the language that surrounds them and progressively acquire the tools that enable them to refer to themselves, both as speakers and subjects (Morgenstern 2006, Caët 2013). But first and second person reference is expressed with pronouns in adult French and children need to understand that they refer to the conversational roles of speaker and addressee without any spatial cue. In LSF, as in Swedish sign language (Ahlgren 1990), pointing to the location of self and addressee is used. Conversational role is indicated through gaze as well (Cuxac 2000). Besides, signs for personal reference in LSF take the same form as pointing gestures, which are present in children's communication system since the age of about 11 months (Bates et. al 1977, Clark 1978). LSF is also a language where self-reference is less likely to be explicitly marked than in French since subjects do not always need to be marked and can be either replaced by gaze, movement, or contextual cues (Cuxac 2000). Because of these formal differences, it is particularly interesting to compare children's development of self-reference in French and LSF.

Between the ages of 18 and 30 months, various markers are used by French-speaking children to refer to themselves (Brigaudiot et al. 1994, 2006, Caët 2013): such as the null form, filler syllables, the child's name, the strong pronoun *moi*, (Morgenstern, 2003a) and another person, second or third person (Morgenstern 2003b). Between two and a half and three, the use of *je / I* and of *moi je* (stressed *I*) are progressively stabilized and the other markers tend to disappear in the subject function. At the same time, children start manipulating different tenses, aspects, modalities (Nelson 1989). In the comparison between French and LSF, two forms are particularly interesting: bare predicates and the child's name.

Bare predicates are used even though in standard French, pronouns are a syntactic constraint. Speaking of oneself seems to be implicit when children are very young. They rely on shared situations and the common background with the interlocutor (Morgenstern 2006).

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In that context, it is very interesting to make a comparison with the acquisition of sign languages because the marking of the grammatical subject is not mandatory when it refers to the speaker and when there is no contrastive agency (Bellugi et al. 1988). In the case of first person, since reference to the signer and to the grammatical subject coincide, grammatical markers are not syntactically mandatory, but can be used for pragmatic or semantic purposes (contrastive agency for example).

The use of the child's name, is not conventional in adult language and has been described as referring to the "social self" (Bain 1936, Cooley 1908). Names are often used by hearing adults when addressing their children for pragmatic and discursive reasons, or simply to attract their auditive attention. In contrast, in Sign, vocatives are not used by adults to attract children's attention: if children are not visually focused on the interlocutor, signing their name would not be helpful. Adults usually tap on the children's shoulder, or wave in front of their eyes. Moreover, pointing seems to be more transparent than vocal first and second person pronouns (Morgenstern 1997). Their signed name is therefore not used as much in child directed speech as it is in vocal languages in which names sometimes serve clarifying purposes in the context of the complex acquisition process of dialogic aspects of the pronominal system.

1.4. Influence of modality on linguistic features

Because of the characteristic features of signed communication and in particular because of the central role of gaze, one cannot study the development of self-reference in language acquisition without understanding the use of self reference as a system in sign language. However no full description of the system based on extensive spontaneous interactions is available for LSF. The only existing studies have been conducted on short narratives (Cuxac 2000).

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A signer of LSF can refer to self and the interlocutor with a *hand-shape*, the index pointing towards self or the interlocutor. But this *hand-shape* may also not be used at all. In this case there are several alternatives: signers can use *movement* in the case of directional verbs for which the movement from one location to another location indicates agent and patient or beneficiary. Pointing is not necessary because the marking of the agent is incorporated in the sign itself as in I GIVE YOU signed by using the sign GIVE originating on the signer's torso and ending in mid-air in direction of the addressee. The placement of verbs in space is also very important. I WANT is signed very close to the signer whereas YOU WANT is signed closer to the addressee. However, if location cannot be used, non-manual markers such as *body posture*, *facial expression* and *gaze* can be resorted to.

But a subject can very well, and very often does remain ambiguous and the exact reference is not needed in some cases. For example if the mother signs EAT when the meal is ready, the single verb complemented by gaze on the interlocutors and a facial expression in that context means "it's time to eat"/"let's eat". If the mother simply wants to ask her child if she would like to eat, her facial expression will indicate a question and her gaze all the addressee will also be inquisitive. Context and shared knowledge are thus also what enable the co-speaker to understand the referent of the grammatical subject.

The mother and child therefore have several options at their disposal to refer to themselves in addition to pointing gestures.

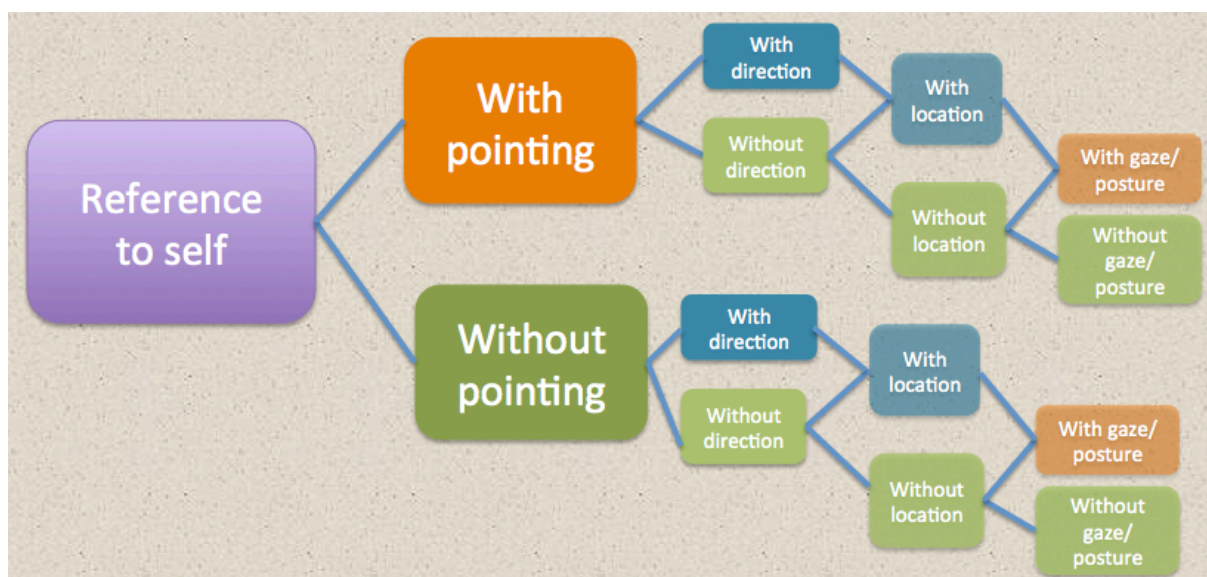


Figure 1: reference to self in LSF (French Sign Language)

1.4. Research issues

Since the studies on the (dis)continuity between pointing and signs have focused on points towards persons and pronominal reversals (Petitto 1986, Petitto 1987), we wanted to investigate the development of pointing towards persons in signing children, compare them to the speaking children's uses and then try to compare the whole system of personal reference in both modalities. Only one longitudinal dataset of a deaf child signing in LSF has ever been collected (Limousin 2010). It is very valuable data but we can only conduct a case study of deaf children's LSF development. In this exploratory paper we address two main issues:

- 1) How pointing gestures and their development compare (quantitatively and qualitatively) in a signing and a speaking child, with a special focus on pointing to persons.
- 2) How the two children refer to self in subject position once their syntax becomes more complete, and the role of self-pointing in the children's language development.

2. Data and Method

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2.1. Data

Madeleine is a French hearing girl with two hearing monolingual parents and an older sister, who also speaks to her in French. Her little brother was born during the data collection. She lives in Paris in an upper-middle class family. She was taken care of by a nanny until she entered kindergarten. Martine Sekali (Sekali 2012) filmed her for approximately one hour once a month from 9 months old until she was seven.

Charlotte is a deaf girl raised by deaf middle-class parents who both use French Sign Language. She is their first child. She was filmed for one hour once a month from 7 months old, to three. Charlotte lives in Paris and attended a day-care center at the time with one deaf educator. She was filmed exclusively by a deaf native signer (author 3). The two girls were quite precocious in their linguistic development (they produced their first words and first combinations early) and could be considered as quite comparable in the two modalities used. Their data was analyzed for various studies focusing on all linguistic levels and on gesture which gives us more insight on their linguistic development (Limousin, Blondel 2010; Morgenstern, Sekali 2009, Morgenstern 2009, Sekali 2012, Limousin 2011, Caët 2013, Morgenstern et al. 2010, Morgenstern 2014).

Since Charlotte was filmed up to three years old, we focused our analyses from the emergence of pointing gestures in the data until three.

2.2. Transcription and coding

The two children were recorded in different research contexts and different tools are necessary according to the nature of the data (sign language and/or spoken language).

All of Madeleine's videos were transcribed in the CHAT format with the CLAN program (MacWhinney 2000, Morgenstern, Parris, 2012). This program, used to link the

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transcription and the video, allows us to keep track of the context in which words and gestures are produced. Since we consider coding and transcription as a representation of our theoretical approach (Ochs 1979), we pay special attention to the features we distinguish. For this study, we made intensive use of important secondary tiers such as %gaze, %point (followed by the function we assigned to pointing gestures according to context, either “show”, “comment” or “request”) and of course %pho (vocal or verbal production transcribed in IPA). Three researchers coded all the pointing gestures and gazes in the transcriptions in CHAT format together in two sessions, they discussed specific cases and constructed a coding guide that was then followed by author 1 who coded the rest of the data. 20% of the sessions were independently coded by another researcher and there was an inter-rater agreement of 96.5%. We were also interested in knowing when Madeleine’s verbal utterances were produced together with a finger point. We therefore also counted all utterances that were simultaneously produced with a pointing gesture (Morgenstern 2014). The CHAT format allows us to automatically count the number of utterances and the number of turns in each session, to find and count all occurrences of pointing to objects, pointing to persons and self-pointing once they are coded as such.

All of Charlotte’s videos were entirely coded with the software ELAN. Two coders coded two sessions together and developed a coding method for the pointing tier in ELAN. Coding was completed by author 3 for her dissertation. Specific tiers were also created for gaze, glosses of the gestures and signs, functions of pointing, object referred to and features concerning the addressee. Three sessions were entirely coded for turns by authors 2 and 3 together and glossed in French in order to compare number of turns between Charlotte and Madeleine.

The study of linguistic productions of children using LSF is at its very beginning, and there is hardly any literature available yet. In her study of Charlotte’s signs and gestures,

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Limousin (2010) identified four categories in Charlotte's data: 1) gestures; 2) pointing; 3) non intelligible signs (NIS) which present all the characteristics of signs but which the deaf adults cannot understand; 4) signs. The distinction between signs and non-intelligible signs is quite difficult to code but the researcher used the fact that those productions resembled signs in all features (configuration, location, movement, facial expressions, gaze...), but that the parents and herself did not understand the child in context. It was also quite complex to distinguish signs and gestures. All the ambiguous occurrences were discussed with two other hearing researchers fluent in LSF and familiar with hearing children's gestures.

We exported all our codings into EXCEL in order to compare the data in the same software.

2.3. Differences in the use of language and communication

There are important distinctions between the two modalities, which we can observe in the interactions between the two mothers and daughters and that have an impact on both the quantitative and qualitative analyses that were conducted in this study.

In spoken languages, in acquisition, sound, gesture and gaze are all extremely important in early communication. In sign languages, gesture and gaze are the central cues used to communicate. A child exposed to sign language might thus be even more sensitive to gestures, facial expressions and postures. Besides deaf adults are going to interpret their children's first hand movements much earlier, just like hearing adults do with babbling.

The deaf child, when not focusing on interactions going on around her, is cut off from non-addressed speech and therefore Charlotte's input consists in less non addressed speech than Madeleine's who like a lot of hearing children, reacts to overheard speech even when she is busy playing.

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The deaf dyad relies solely on the visual modality, whereas the hearing dyad can use both the vocal and visual modality. Thus, one of the major differences between the two mother-child dyads lies in the use of gaze. The eyes of Charlotte's mother are her essential link with her child and enable her to check how safe and well she is at all times. However, when her mother is not focusing on her and the child wants to draw her attention, Charlotte makes intense movements using her head, legs, and torso. She can also repeat the pointing gesture. Another of her strategies is to become totally still and gaze fixedly at her mother. Therefore the amplification or absence of movement are marked forms as opposed to normal gestures. These strategies indicate how Charlotte is able to monitor her mother's attention.

Because gaze is so central to communication, the articulation between daily activities and language is totally different. In the hearing dyad, the mother is often engaged in other activities while she talks to her child. It is much harder to communicate in sign language while being involved in another manual activity: one cannot easily sign and cook, change a diaper or clean at the same time. The interactional mode is therefore quite specific especially since the eyes replace the ears, the mother is constantly « visually listening » to her child. The language moments are intense; both participants are concentrated on the other. Language is mostly a single activity. Of course when children grow up, they acquire the ability to be engaged in other activities and sign much more simultaneously.

Any comparison between deaf and hearing children should thus take those differences into account when possible.

We conducted quantitative analyses to compare the two children's quantity of turns in the data, their use of pointing in general, pointing to persons and pointing to self and finally compared their overall self-reference system. Those results are then complemented by qualitative analyses of prototypical examples of self-reference for each child.

3. Results

3.1. Density of the interactions

In order to have a measure for “talkativeness” in the two children and their mothers’ data, we made a tentative analysis of turn-taking in the signing and speaking dyads at three different ages (for which sessions were entirely glossed and annotated in ELAN) as is presented in table 1. Our analysis showed that the number of turns exchanged in the hearing dyad is at least twice as high as the number of turns exchanged in the signing dyad. Thus, all numbers introduced in the result section should be considered in the light of this discrepancy.

Table 1: Number of turns produced by the two children per hour at 1;7 and 2;0 and 2;7

	1;7	2;0	2;7
Charlotte	134	152	129
Charlotte's mother	140	160	141
Madeleine	285	395	399
Madeleine's mother	338	378	355

This result indicates an impressive difference in the number of conversational turns between the two dyads due to the specific differences in the management of interaction and actions conducted in the visual modality alone. But it is also to be linked with other reports suggesting that signing children may receive substantially less input than do hearing children for various reasons. Spencer & Harris (2006) explain that deaf parents never sign to their children when they are not looking at them. Despite these differences in the quantity of input, research on sign language has shown that language development of deaf signing children is quite similar to that of hearing children. In their paper, Spencer & Harris defend quality

versus quantity of input and make the hypothesis that child-directed signing is sufficiently adjusted to the children's cognitive development and atuned to their attentional capacities. In the case of Charlotte, she is provided with excellent signing input from her family and in daycare.

3.2. Overall development of points in the two children's data

We first focused on the two girls' use of pointing gestures from the beginning of the data up to two years old. Our hypothesis was that Charlotte would produce more points than Madeleine because pointing is part of the linguistic system of LSF. In order to draw a comparison between the two girls, we extracted the total number of pointing gestures per one-hour session in our data (Figure 2).

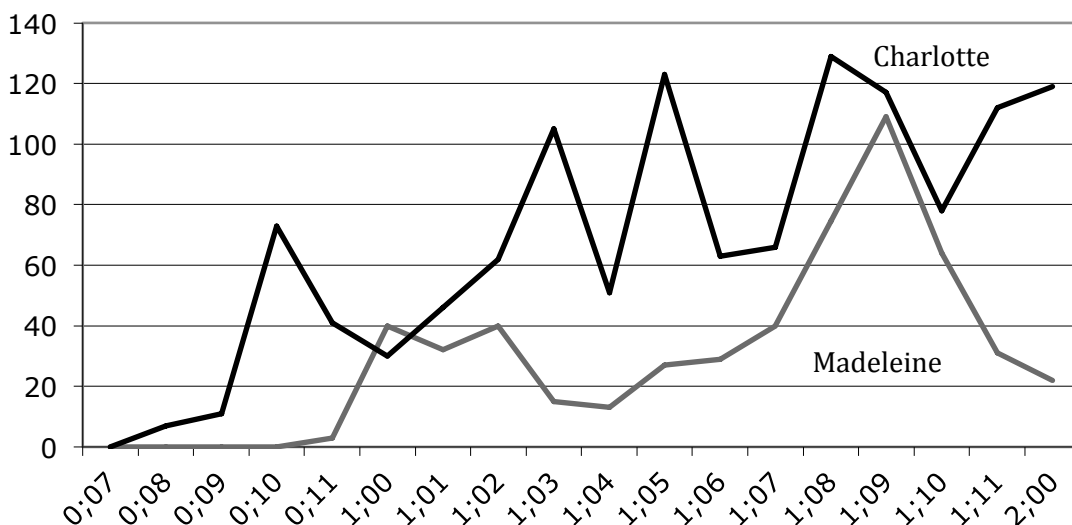


Figure 2. Number of pointing gestures produced in an hour for the two children according to age

For each child, the number of pointing gestures is very variable from one session to another according to the various situations. Nevertheless, Charlotte produces over two times more pointing gestures in the 18 recordings (1187 in total) than Madeleine (465) whose

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pointing gestures are much more numerous in book-reading activities, which are not as frequent in Charlotte's data, than in other situations. The frequency of points Charlotte produces increases irregularly but gradually between 7 months and 2 years. Madeleine produces her first pointing gestures three months later than Charlotte and her use is much more irregular than Charlotte's with a very striking decrease from 1;09 to 2;0.

Morgenstern (2014) has shown that the ratio of Madeleine's points over the total number of her vocal utterances decreases from 90 % of her utterances at 1;0 (which means that almost all her vocal utterances were either accompanied or preceded/followed by a point), to 5 - 10% between 2;0 and 3;0. We cannot conduct the same complete measures on Charlotte for lack of full transcriptions, but if we take into account the measures shown in table 1, at 1;07, Charlotte produces 66 points for 134 turns which is a ratio of almost 50% whereas Madeleine produces 40 points for 285 turns, which is a ratio of 14%. At 2;0, Charlotte's proportion of pointing has drastically increased since it is 119 pointing for 152 turns (78%) whereas Madeleine has decreased to 22 for 395 turns (5%). Pointing is thus a predominant feature of Charlotte's communicative system whereas it has become much less important in Madeleine's productions after 2;0.

3.3. Pointing gestures towards persons

We compared the number of pointing gestures/signs towards persons² in the two little girls' data (Figure 3). Our hypothesis was that the difference observed for all pointing gestures would be even more accentuated because in sign language, pointing gestures are one of the main resources to refer to people and to designate them (names are indeed not often

² For this study, we only included persons and not characters in books or toys.

used in our data) whereas in spoken language, the child can use both verbal and non-verbal resources.

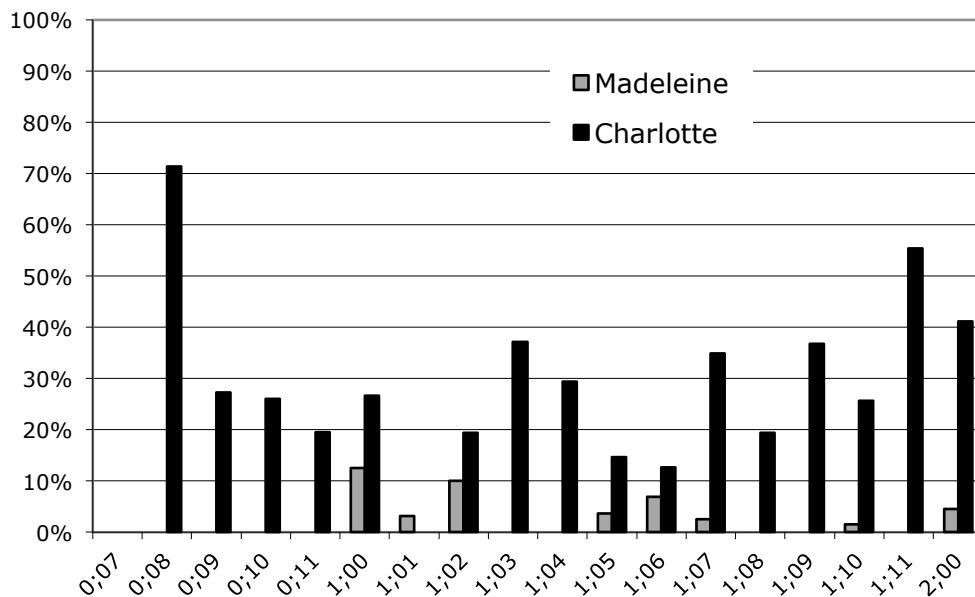


Figure 3. Percentage of pointing gestures towards persons out of all pointing gestures produced according to age in Madeleine and Charlotte's data

Similarly to results concerning overall pointing gestures presented above (amounts are still very much linked to context), Charlotte globally produces more pointing gestures towards persons (357) than Madeleine (16) and all the sessions in Charlotte's data include pointing towards persons, which means that there is no discontinuity in her use. The number of pointing gestures increases from 8 months up to 2 years. Pointing gestures towards persons represent around 30% of all pointing gestures in Charlotte's data, and this proportion is much higher than in Madeleine's data. Madeleine produces her first pointing gestures towards persons four months later than Charlotte (at 1;0) and she globally produces fewer pointing gestures to persons than Charlotte, although the number of pointing gestures also increases between 12 and 24 months. The proportion of her pointing gestures towards persons often represents less than 10% of all her pointing gestures. Globally, pointing towards persons

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increases after 1;2 for the little girl surrounded by sign language whereas it strongly decreases in the hearing non signing child's data. If we take into account the difference in number of turns in the two little girls' data, the use of pointing to persons is extremely different since at 1;7, the ratio for Charlotte's pointing to persons over all points is 17%, whereas for Madeleine it is 0.35%. At 2;0, the ratio of points towards persons over all points is 32.2% for Charlotte and 0.25 % for Madeleine.

3.4. Pointing gestures towards self

Since the studies on the discontinuity between pointing and signs have focused on points towards self and on pronoun reversals (Petitto 1986, 1987), we investigated the development of pointing towards self in the two little girls' data (Figure 4). Our hypothesis was that pointing gestures towards self would be rare in Madeleine's data because the first person pronoun in French (with the form *je/I* and the use of *moi je/stressed I* to create contrast) are becoming the main markers to refer to the speaker. In Charlotte's data, pointing towards self would be more frequent because it is her only means to clarify the reference to self. Graph 3 illustrates the proportion of pointing towards self in Charlotte's data out of all pointing gestures to persons. There are no occurrences of points to self in Madeleine's data.

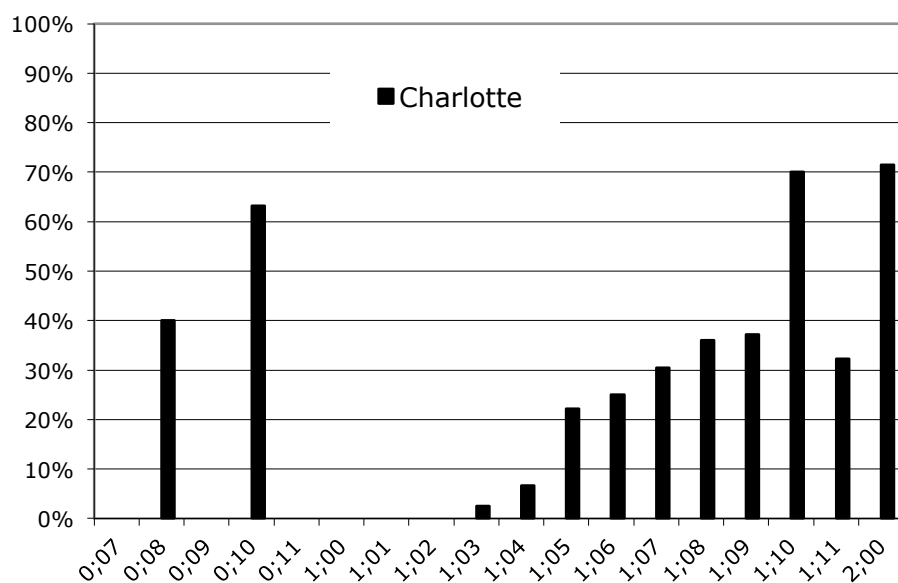


Figure 4. Percentage of self-pointing gestures out of all pointing gestures towards persons in Charlotte's data

Charlotte produces 123 occurrences of self-point in total. After a momentary pause in the data, the number of pointing gestures towards herself increases from 1;3 until 2;0, up to 35 self-points (more than 70% of all pointing towards persons). The pause in her use of self pointing is quite interesting and could seem to indicate evidence for a discontinuity between gestural and linguistic pointing. However, we can observe that only pointing towards SELF is not used (in the sessions recorded) whereas other pointing towards objects and persons are maintained. Besides, this absence of self-points corresponds very clearly to the beginning of her use of lexical terms to refer to actions as we will show in the next section.

Madeleine does not use self-pointing at all in the data recorded. This does not mean that all hearing non-signing children do not use self-pointing and she of course continues to use pointing gestures as seen in the previous section. We have some examples of self-pointing gestures in our other longitudinal data of hearing children exclusively surrounded by French-

speaking interlocutors (Morgenstern 2009). But self-points remain infrequent; we never have more than one or two per hour session outside specific play situations.

The ratio of self-points over total number of turns is of course 0% for Madeleine at 1;7 and 2;0. It is 5% for Charlotte at 1;7 and 21.7% at 2;0.

3.5. Subject Self-reference

Since Madeleine did not produce any self-point whereas Charlotte regularly and increasingly produced them, we wanted to understand how the hearing girl marked self reference. We thus further investigated the development of all cases of marked or non-marked subject self-reference in Charlotte (Figure 5) and Madeleine (Figure 6) and their mothers up to 3 years old.

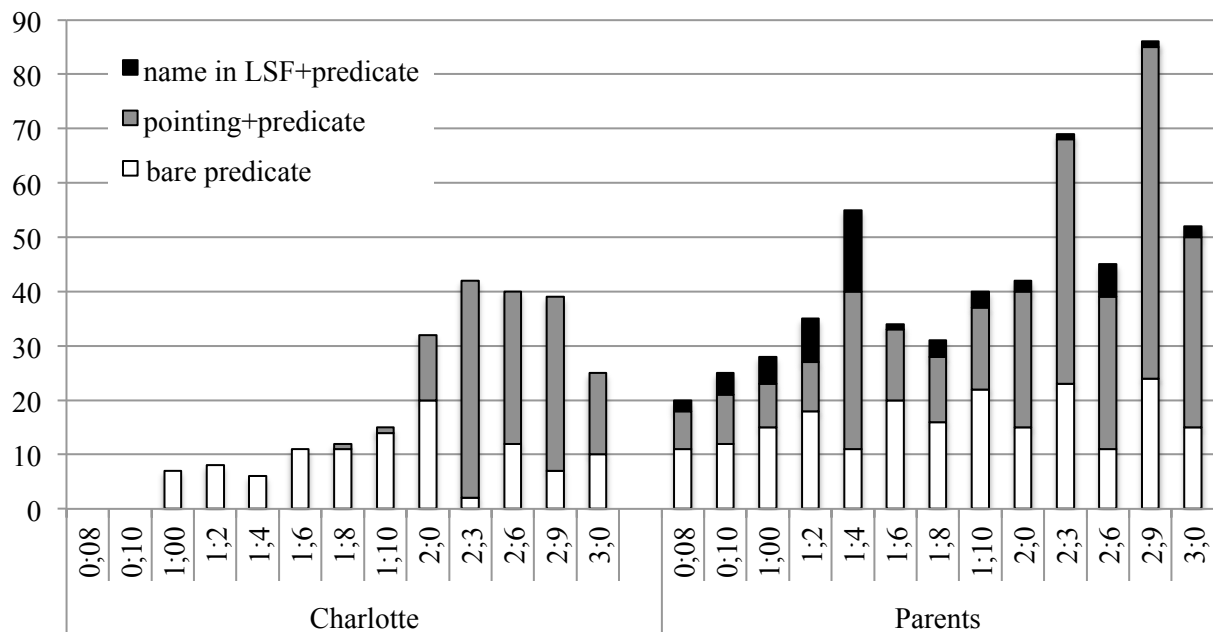


Figure 5. Subject self-reference (bare predicate, name and self-pointing)

in Charlotte and her parents' data according to age

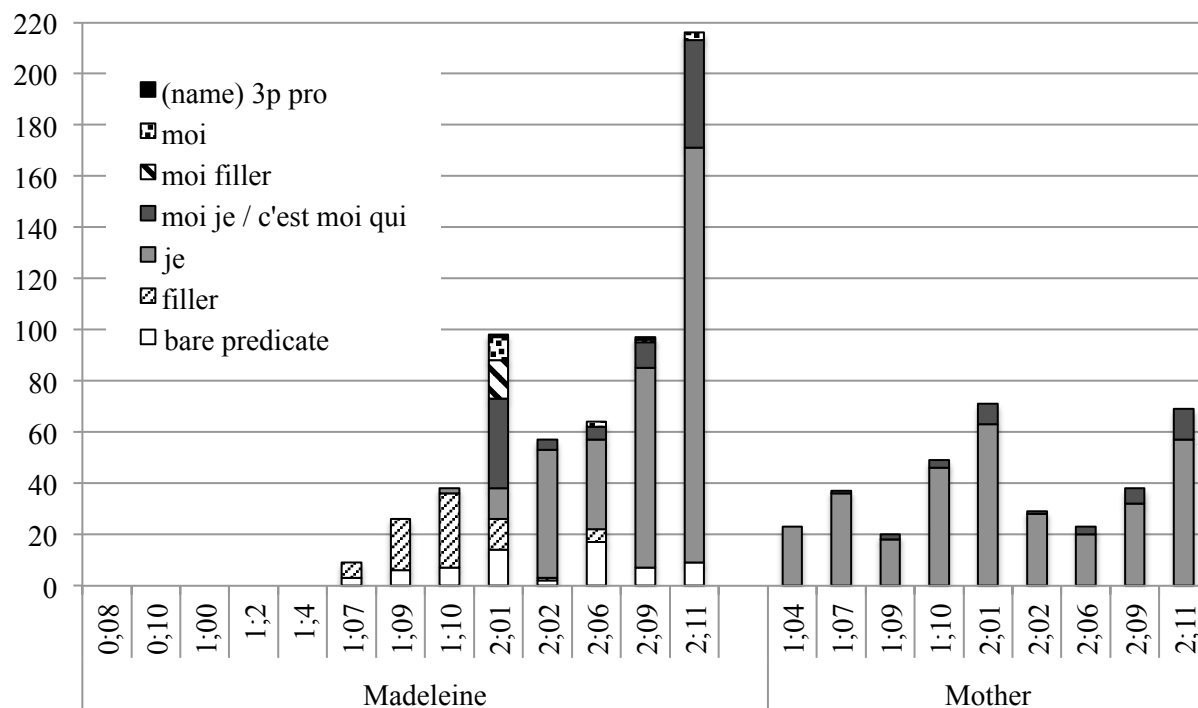


Figure 6. Subject self-reference in Madeleine's data according to age in comparison with her mother's overall forms of self-reference

In Charlotte's data, overt self designation (self-pointing) is not always used. Interestingly enough, if we compare Figure 4 and Figure 5, as already observed in the previous section, Charlotte stops using self-pointing for a few months as of 11 months exactly when she starts using predicates without an overt subject (thus self-reference, interpreted by the two coders thanks to the context, is unmarked). We note that overt forms (as opposed to predicates without an overt subject) are used in 65% of Charlotte's productions at the end of the data (her mother uses 40 to 80% throughout the data) whereas Madeleine uses overt forms in 95% of her utterances at the end of the data (her mother uses 100%). As explained in section 2, in LSF, reference to the speaker can be left unmarked in some cases (either for pragmatic reasons or because the reference is marked in the shape, the movement, the directionality of the sign used for the predicate or in gaze). In the production of Charlotte's parents, up to 50% of self references are not marked, contrarily to what we observe in the

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productions of Madeleine's mother where the first person subject pronoun is always marked as *je* or *moi je*. Charlotte does not produce her signed name although her parents use it from time to time to refer to her (Limousin 2010) and use the sign MUMMY or DADDY to refer to themselves.

Madeleine, as we have observed in graph 3, uses no pointing towards herself at all in the data, but a very large number of verbal elements (including fillers as in “[ə] veux gâteau”/[a] want cake”), which vary over time (graph 5). She only starts referring to herself as semantic subject as of 1;7 with predicates either without explicit syntactic subject or with filler syllables. She starts using clear self-designations several months later than the deaf child (Charlotte at 1;8 with pointing and Madeleine at 2;1 with several forms including *moi/me*), even though her linguistic competence is quite high. These results could be connected to the language modality: when signing, pointing towards one's body is a transparent gesture whereas the use of the first person pronoun is more complex to decipher and to produce (in French “je” is produced later than in English probably because of the phonological complexity of the consonnant, Morgenstern 2006, Caët 2013). Madeleine uses her own name in subject position extremely rarely.

4. Qualitative analyses and discussion

In order to discuss our results, we complement the quantitative analyses with qualitative analyses organized in chronological order for each child.

4.1. Qualitative analyses of Charlotte's subject self-references

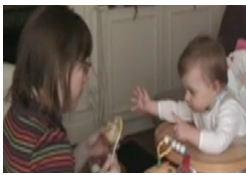
As shown by Limousin (2010), the first occurrences of self-reference in the data recorded consist of a series of self-points related to her wanting her mother to give her the baby food contained in a small jar she is holding (1).

(1) Charlotte 0;10

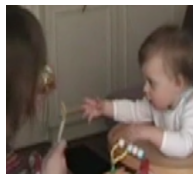
The mother is holding the small jar and a spoon.

Mother: GOOD THIS

Charlotte holds out her right hand, points to the jar with her left hand and does what could be called a protosign for WANT with her right hand.



POINT-JAR



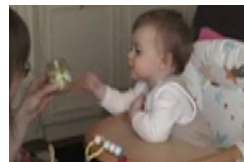
POINT-SELF



POINT-JAR



POINT-SELF



Charlotte holds out both her hands towards the jar and then touches it.



In (1), it is difficult to separate actions, gestures and signs. The pointing gestures could correspond to demonstratives and first person pronouns in an oral language like French, but the fact that Charlotte actually points all the way towards the jar and touches it seems to

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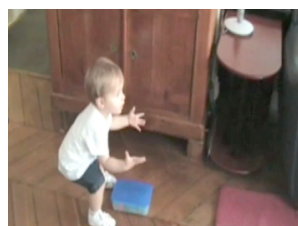
indicate that she still establishes contact with the objects she points at (the jar as well as herself) and that it does not have a clear symbolic function. Similarly, the grasping gesture produced in mid air could be a proto-sign, but at the end of the sequence, she then uses the same grasping gesture to actually hold on to the jar and might be looking for the stimulation of the contact with the object. Her movements are thus not entirely symbolic but are linked to the objects she is referring to through sensori-motor contact.

Zlatev (1997) suggests that sensorimotor schemas provide the “grounding” of language in experience and will then lead to children’s access to the symbolic function. Infants’ imitation and general production of gestures have indeed been studied as a prerequisite to construct “pre-linguistic” concepts, as a pathway into the symbolic function of language or a bridge between language and embodiment. Gestures are viewed as representational structures, constructed through imitation, that are enacted overtly and can be shared with others. Mimetic schemas for imitable actions, shared representations of objects that can be manipulated, ground the acquisition of children’s first gestures and first words or signs. In the first example, Charlotte’s gestures are still grounded in action but clearly indicate in her interactions with her mother that she wants the content of the jar for herself.

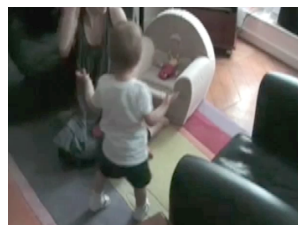
In (2), Charlotte is actually using a sign (WANT) without overt marking of the syntactic and semantic subject, repeatedly indicating that she wants the box to be opened (and asks for her mother’s assistance because she cannot do it herself). Self-pointing is not used in our data between 0;11 and 1;2. What is interesting about this period is that Charlotte seems to be concentrating on producing her first signs or proto-signs such as the signs for objects (BEAR, RABBIT, HAT, BALL), or actions (JUMP, EAT). She is also acquiring new verbs and expresses predications in which she is the agent but produces them with no overt subjects in dialogues in which the grammatical subject is explicit thanks to the context.

(2) Charlotte 1;0

Charlotte is in front of a closed plastic box of crayons. She signs what we could gloss as “WANT” and then repeats the sign, opening and closing her two hands repeatedly in front of the box.



After a while, she runs up to her mother and signs “WANT” but her mother is involved in her conversation with a friend and does not pay attention.



Charlotte runs back to the box, sits next to it, gazes at her mother and when she finally catches her attention, repeats the sign “WANT” and points at the box.



The mother finally comes and opens it for her.



In example (2) Charlotte is clearly expressing her desire for the box to be opened, but the source of the desire, being the signer, does not need to be marked. It is also the case in French in which the verb *vouloir* has a special status in language development : children say “veux” (want) for a very long time with no subject self word (Morgenstern 2006 ; Caët 2013). The actual source of the desire is implicit when it is the speaker.

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Six months later, Charlotte is combining several signs, she starts producing complex utterances with at least three different elements. She associates both pointing and predicates when referring to herself as presented in example 3.

(3)³ Charlotte 1;8

Charlotte: PT-OBJ (THIS) (points behind her)

Mother: WHAT? WHERE?

Charlotte: BOOK YES.

Mother: PHOTO ALBUM? WANT PHOTO ALBUM?

Charlotte: PHOTO ALBUM. **SELF-PT** WANT PT-OBJ.

In example (3), which is the first example of self-pointing referring to self as grammatical subject in the data, Charlotte's point disambiguates the referent of the grammatical subject as source of the desire. SHE wants the book. The mother herself does not use the pronoun YOU (pointing at Charlotte) with the predicate WANT: the source of the desire is extremely explicit in context and the sign WANT is complemented by gaze on her daughter indicating the grammatical subject. In adult sign and Child Directed Sign, first and second person pronouns are thus not always mandatory in contrast to French.

In (4), at 1;10 Charlotte uses explicit self pointing when addressing her doll.

(4) Charlotte 1;10

Charlotte is putting a diaper on her doll. She stops her actions to sign to her.

³ We chose to only use full translation in English when the turns were in standard LSF.

We used glosses in English for each sign produced for the rest of the data.

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Charlotte: PT-DOLL **PT-SELF. SELF-PT DRIVE. SELF PT DRIVE.**

She signs quickly in a closer sign space and then enlarges her movements and puts a lot of emphasis as if using Child Directed Sign. She repeats the same signs a few times.

She then turns to her mother.

Charlotte: SELF-PT DRIVE (she looks at her mother)

Mother: YES DRIVE SWIMMING POOL.

Charlotte repeats the self pointing probably because she is indicating that SHE is responsible for driving the doll with her, she repeats the form quite a lot and is insistent about this responsibility.

At 2;3, she also marks her own pleasure with a self point as we can see in (5).

(5) Charlotte 2;3

Mother: WHAT ELSE ?

Mother: BI...

Charlotte: BIKE BIKE BIKE BIKE

Mother: BIKE YES. TAKE A RIDE (we biked yes, we took a ride)

Charlotte: PEDAL (we pedaled)

Mother: MUMMY DADDY THE THREE OF US (the three of us pedaled)

Charlotte: PEDAL (we pedaled)

Mother: TAKE A RIDE YES (we took a ride yes)

Charlotte: PEDAL (we pedaled)

Charlotte: SELF-PT PEDAL (I pedaled)

Mother: SEE WHAT? ANIMAL PT-CHARLOTTE REMEMBER? (What did we see?

An animal, you remember?)

Charlotte: SHEEP

In this extract, through her self point, Charlotte expresses her own involvement and her pleasure and pride in being able to pedal with her parents. Charlotte starts pointing at herself very early on in the data but then seems to stop when she starts acquiring lexical signs and is able to refer to herself predicatively. She then starts combining pointing gestures and predicates when her syntax becomes more complex with one, two or three argument constructions. Self-pointing thus seems to enable the child either to clarify the referent of the subject, to insist on a predication when it has not been understood, to underline contrastive agency or to indicate great involvement of the grammatical subject in the activity referred to by the predication. But of course, there are other means in sign language than this particular hand-shape to achieve similar functions, such as gaze, location of the sign, direction of the sign and using contextual cues to disambiguate the referent.

In example (6) Charlotte is talking about cleaning, but without self-pointing. However she goes to the kitchen herself to look for a sponge after she has talked about cleaning.

(6) Charlotte 2;1

Mother gives a cup of water to Charlotte for her to drink

She claps hands - cheek point to Charlotte in order to ellicit the next production.

Charlotte: THANK YOU

Mother: OKAY

Charlotte drops water on the floor

The mother helps Charlotte with her cup

Mother: SLOW – DRINK (dring slowly)

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Charlotte does a palm down gesture expressing what could be interpreted as « oh my oh my! ».

Charlotte: CLEAN + gesture

(She does a palm down gesture expressing what could be interpreted as “oh my oh my!”). She goes in the direction of the kitchen to get a sponge.

Charlotte produces a predicate with no overt subject to express her own project to go and clean the water she has spilled on the floor as she was drinking. In this extract there is no need to disambiguate the agent as she takes full responsibility for having spilled the water, expresses her “guilt” repeatedly with her gestures. The sign CLEAN is immediately followed by her action: she goes to get the sponge in the kitchen.

Charlotte therefore seems to adapt the forms she produces to the context and to pragmatic functions: she uses overt marking - self-pointing - when she needs to clarify the referent or when she wishes to focus on contrastive agency.

4.2. Qualitative analyses of Madeleine’s self-references

As mentioned in section 2, Madeleine does not point to herself at all in the sessions that were coded. Yet, the development of self-reference in her productions is similar to Charlotte’s. The development of her personal references has been described in detail in Caët (2013). Madeleine starts referring to herself in utterances containing predicates at 1;7, and uses only bare predicates or filler syllables in subject position. At 2;1, there is a transitional period as she produces many different forms in subject position, half of them being non standard forms (bare predicate, fillers, *moi*) and half standard ones (*je, moi je, c’est moi qui*). Structures containing the strong pronoun *moi* are over-used compared to the adult system. Surprisingly enough, considering her rapid language development, she continues to produce

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non-standard forms, and in particular, predicates with no overt subject. Her system progressively becomes closer to her mother's but like other typical children between the ages of two and three, she self designates herself much more frequently than her mother does (Caet 2013).

At the end of the data, when Madeleine talks about her desires or her projects, she is more likely to use the unmarked forms, either the bare modal verb “veux” (want) or the first person pronoun “je” (I) as in example 7 when she wants the observer's son, Lucas, to come in the picture with her own brother.

(7) Madeleine 2;7

Mother: Côme ? tu fais un sourire à ta grande soeur? (Côme, are you gonna smile at your big sister ?)

Madeleine: clicliclic@o.

Mother: cliclac@o Kodak .

Madeleine: mais **veux** que Lucas vienne. (But want Lucas to come)

Mother: ah tu veux prendre Lucas en photo aussi ? (Oh you want to take a picture of Lucas as well?)

Madeleine: oui. (Yes)

Observer: faut l' appeler. (You need to call him)

Mother: mais il est allé jeter un coup+d'oeil pis il va redescendre. (But he just went to give a look and then he's going to come back).

Madeleine: **je** préfère qu' il vienne. **je** vais aller le, aller voir. (I'd rather he came back. I'm going to look for him).

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In French, one can use a strong pronoun *moi* together with the subject clitic *je* to add emphasis or contrastive value on the reference to self. Thus, children hear [*moi je*+predicate] constructions in the input, and use these constructions themselves. Yet, they also produce [*moi*+predicate] constructions, without the clitic pronoun.

As we can see in (8), a little earlier in the same session, Madeleine made a very contrastive use of self reference.

(8) Madeleine 2;7

Madeleine: tu peux aller chercher mon appareil photo? (Can you get my camera?)

Mother: je crois qu' il est dans la cuisine. (I think it is in the kitchen).

Madeleine: [ə] **vais aller le chercher**. (a'm gonna get it)

Observer: allez on va le chercher. (Come on let's go get it).

Madeleine: tu restes ici parce-que **moi vais** aller chercher **toute seule** mon appareil.

(you stay here because **I'm** gonna get my camera **by myself**).

Madeleine produces the marked contrastive pronoun *moi* to express contrastive agency. These uses are quite similar to Charlotte's uses of self-pointing which are much more frequent than in the adult data from 2;03 to 2;09. For both children there seems to be a transitional phase when marked agency is overtly used with self pointing in child LSF and *moi* or *moi je* in child French (Morgenstern 2006). Thus, the deaf signing child's overuse of self-pointing seems to correspond to the hearing child's use of *moi* and *moi je* when they are clearly marking contrastive agency, as it has already been clearly shown in the literature on hearing English speaking children (Bates 1990, Budwig 1995) and French children (Morgenstern 2006, Caët 2013).

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The two little girls' self-reference system are made of different forms because of the linguistic differences between French and LSF and of the specific features linked to the visual and auditory modalities. However, they both follow similar pathways into the full use of the adult system. When they start producing predicates, they both do not use explicit subject marking. They then both overuse markers of contrastive agency (a large number of self-pointing for Charlotte, *moi* and *moi je* for Madeleine), before the occurrences of these markers decrease.

Conclusion

Probably due to the specific features of the languages in their input and to the differences in speech and sign, the two little girls do not have the same production of pointing in their longitudinal data.

Charlotte points a bit earlier and more frequently than Madeleine. As shown in previous analyses (Morgenstern 2014), she produces combinations of [pointing + another gesture] very early on when Madeleine uses [pointing + a vocal production]. The same study has also shown that her use of gaze is more diverse and complex at an early age than Madeleine's.

Both Madeleine and Charlotte point at persons, but only Charlotte points at herself in the data we have collected. In Charlotte's data, there is no discontinuity in the production of pointing to persons. Self-pointing, first used on its own, is not produced for a few months in the sessions videotaped in our data. This corresponds to the period when she starts to use more lexical signs for objects and actions. Just like children acquiring spoken languages, Charlotte does not make multi-sign productions as she enters syntax and produces predicates rather than subjects. When self-pointing reappears with predicates, there are no reversals in our data. Our analyses were not conducted with the purpose of finding formal differences

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between pointing “gestures” and pointing used as linguistic signs. We have not observed any specific features that could indicate any formal differences so far. However, pointing is more and more combined to other signs, facial expressions, gaze, in complex linguistic productions and with more and more deictic and anaphoric values. The production of complex signed utterances in which pointing is embedded, is what gives pointing its linguistic qualities. We believe that pointing gestures and points grammaticalized as grammatical items in sign language, form a continuum and that the progression from gestures to words and from gestures to signs in early child communication is not discontinuous (Hoiting, Slobin, 2007, McNeill 1992). We do not restrict the notion of language to verbal or signed units. Gestures, verbal productions, gaze, facial expressions, postures are all part of our socially learned, intersubjective communicative system, and human beings combine modalities with all their representational skills to share meaning, to refer to present and absent entities and events, to express their projects, their desires and their inner feelings.

Charlotte develops the use of pointing with predicates and also uses predicates without overt syntactic subject in signed utterances referring to herself as subject. Madeleine develops several different verbal forms of self-reference: predicates with no overt subject or preceded by *moi*, fillers, *je*, *moi je*. These forms carry comparable functions, but each child creates her own system, based on the linguistic input she receives. Progressively, the children’s systems will resemble their parents’. Children’s increasing capacity to analyze the input guide their usage. They assemble pieces of various structures without having full control over the complexity of each grammatical marker or each construction. They elaborate creative transitory systems (Cohen 1924), which contain non standard forms, and it takes time for them to learn all the relevant conventional forms. But through constant exposure to adult input, children’s language slowly develops, gets enriched and becomes closer and closer to the model they hear.

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The children's productions, be they gestures, signs or words are constructed in dialogue and depend on the modality they are the most exposed to. Based on these first results, our hypothesis is that Charlotte uses more pointing than Madeleine because she is surrounded by a language in which pointing is integrated in the linguistic system. Madeleine however continues to use pointing in more and more complex ways as co-speech gestures (Morgenstern 2014) as she becomes an expert multimodal speaker. Charlotte uses self points to refer to herself especially often during a transitional period when marked forms enable her to position herself in contrast or in opposition to other potential agents where Madeleine herself overly resorts to the forms used in her French speaking environment. The two children internalize the adult's role and appropriate linguistic tools, social codes and behaviors, which are intertwined in the language that is used with them and around them, in and thanks to dialogue.

Acknowledgement

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