



Signs of Acquiring Bimodal Bilingualism Differently

A Longitudinal Case Study of Mediating a Deaf and a
Hearing Twin in a Deaf Family

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Abstract

This dissertation based on a case study explores the acquisition and the guidance of Swedish Sign Language and spoken Swedish over a span of seven years. Interactions between a pair of fraternal twins, one deaf and one hearing, and their Deaf¹ family were video-observed within the home setting.

The thesis consists of a frame which provides an overview of the relationship between four studies. These describe and analyze mainly storytime sessions over time. The first article addresses attentional expressions between the participants; the second article studies the mediation of the deaf twin's first language acquisition; the third article analyses the hearing twins acquisition of parallel bimodal bilingualism; the fourth article concerns second language acquisition, sequential bimodal bilingualism following a cochlear implant (CI). In the frame, theoretical underpinnings such as mediation and language acquisition were compiled, within a sociocultural frame. This synthesis of results provides important information; in the 12- and 13-month sessions *simultaneous-tactile-looking* was noted in interchanges between the twins and their mother; mediation of bilingualism was scaffolded by the caregivers with the hearing twin by inserting single vocal words or signs into the language base used at that time, a finding that differs from other reported studies; a third finding is the simultaneousness in which the deaf child's Swedish Sign Language skill worked as a cultural tool, to build a second and spoken language.

The findings over time revealed actions that included all the family members. Irrespective of the number of modes and varied types of communication with more than one child, mediation included following-in the child's initiation, intersubjective meaningfulness and encouragement. In accordance with previous research, these factors seem to promote the acquisition of languages. In conclusion, these findings should also prove useful in the more general educational field.

Keywords: bimodal bilingual acquisition, Swedish Sign Language, spoken Swedish, case study, longitudinal, sociocultural, mediation, interactional, twins, different hearing statuses, cochlear implant

¹ Deaf with a capital 'D' is commonly used for cultural affiliation whereas lower case 'd', as in deaf, refers to audiological status (Monaghan, Schmalin, Nakamura & Turner, 2003).

To my growing Family

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List of Articles

The present doctoral thesis is based on four studies presented in the following articles, which will be referred to by Roman numerals I - IV:

- I. Cramér-Wolrath, E. (2011). Attention Interchanges at Story-Time: A Case Study From a Deaf and Hearing Twin Pair Acquiring Swedish Sign Language in Their Deaf Family. *Journal of Deaf Studies and Deaf Education*. First published July 8, 2011
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- II. Cramér-Wolrath, E. (submitted). Mediated First Language in Gestural Modality: Native Swedish Sign Language Acquisition Interactions at Storytime.
- III. Cramér-Wolrath, E. (accepted). Parallel Bimodal Bilingual Acquisition: A Hearing Child Mediated in a Deaf Family. *Sign Language Studies* 13 (4).
- IV. Cramér-Wolrath, E. (submitted). Sequential Bimodal Bilingual Acquisition: Mediation Using a Cochlear Implant as a tool.

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Introduction

How is language acquired? Is learning how to write harder if you have a dialect? Such were the questions I posed as a seven year old. Later in my teens I worked as a sign language teacher and was asking myself: what in language is necessary in order to function in interaction? This is still the basic question after more than twenty years of educational work among young children and parents. Thus, curiosity about what happens in interactions has followed me and grown during the years. Finally, I could not resist taking time to try to find out more about how the process of native sign language is displayed.

The first time I met hearing parents of deaf children was as a teacher of Swedish Sign Language (SSL) in the nineteen seventies. At that time, signs were being increasingly used in preschools for deaf children in Sweden. Sign language research started at Stockholm University and in 1981 SSL was recognized as Deaf¹ people's first-language (Proposition, 1980/81:100). Consequently, SSL became a subject in 'The special schools for the deaf' (Svartholm, 2010). Eventually, hearing parents of deaf children were also guaranteed a government grant for studying SSL (SOU, 1996:102) and an SSL introduction is offered in the regional early intervention program.

The Swedish population is small, about 9 million people, and there are no national statistics of how large the deaf population is. However, most parents of deaf children are hearing and seldom know sign language prior to their child's birth. Roos (2009), in a questionnaire to all centers of audiology in Sweden, found nationally fewer than 18 per cent of the deaf children born in 2007-2008 had at least one deaf parent.

Working as a consultant for deaf and hard-of-hearing young children, I educated hearing parents in SSL. At this time, the parents, a Deaf sign language teacher and I jointly explored possible ways for the parents to gain, for them, satisfactory communication with their deaf child (Cramér-Wolrath, 1999). In this action-research-inspired project (Cramér-Wolrath & Karlsson, 1998) I realized we needed more knowledge about young children's developmental acquisition of SSL. Only two Swedish studies of deaf children of Deaf parents and SSL acquisition were known at that time. One reported aspects of cognitive language development of two children on a few occasions during the ages 9 months to 4 years (Ahlgren, 1980). The other study reported early communication from the age of 6 to 18 months

(Malmström & Preisler, 1991). The overwhelming number of studies were international, mainly based on American Sign Language (ASL), or from the Netherlands. Most studies were linguistic in character, describing various structural parts. Few studies had a longitudinal perspective.

To get more knowledge of the native acquisition of Swedish Sign Language and spoken Swedish it was necessary to gain entrance to Deaf families and thereby have the possibility of longitudinally following children's language acquisition while growing up in a sign-language environment. In order to follow such process, the current study sought Deaf families through the preschools for deaf children, as described in the ethical paragraph. One family consisting of Deaf parents with three children signed up for this case study. The younger children are twins, one deaf and one hearing and they were mainly studied by video-observed interchanges with their parents. The study ranges from the twin's age of 10 months until they were eight years old (96 months).

In order to investigate phenomena concerning language acquisition, an explorative method was chosen for studying interactions between Deaf parents and young children with different hearing statuses. During the study new questions appeared, for example: Does knowledge of structural language differences influence parents in their language approach and use of bilingualism while interacting with their children? In parenting twins, with different hearing statuses, are mediating variations likely to be expected?

Aim

The overall purpose of this longitudinal interactional case study was to explore, analyze and describe phenomena in early communication and language. This concerns acquisition of Swedish Sign Language and spoken Swedish, as well as the guidance or mediation² of this bimodal bilingualism.

The following was studied in a Deaf family:

- Attention interchanges with a deaf and a hearing twin (I)
- Native Swedish Sign Language in a deaf child (II)
- Bilingualism from birth in a hearing child (III)
- Spoken Swedish in a child using a cochlear implant (IV)

² Mediation is dynamic both guiding and evolving through the social interaction that occurs during meaningful joined activity. In this dialectic process and according to the context, the more experienced uses knowledge in action as a cultural tool (Karpov, 2003; Kozulin, 2003; Vygotsky, 1934/1962).

Articles I to IV

Participants

In all four articles the family participating in this case study consists of fraternal twins, one of whom is deaf, fictively called Diana, and one is hearing, Hugo. Their elder sister, Nicolia, and the parents are deaf. At the onset of the study, the twins were ten months old and at the offset they were eight years old.

Father attended school for the deaf where communicative varieties were used: spoken Swedish with signs, spoken Swedish, speech-reading and Swedish Sign Language (SSL). Mother grew up as hard-of-hearing and attended a school where speech and hearing aid technology was used. From the first grade she used signs among friends. Both parents are bilingual; however; they preferred SSL for interaction. The family considered themselves to be members of the Deaf community.

Nicolia, like Diana, went from the age of 16 months to full-day preschool and later to school with an SSL approach. Diana received a high technological hearing aid device at the age of 35 months. Hugo went from the age of 18 months, for the full day, to the local preschool. From the first grade Hugo, like all kids of deaf adults (KODA) in Sweden, was offered to join an SSL class for one week twice a year.

Most of the video-recordings were with the twins and their Mother. However, Nicolia and Father also frequently participated. Occasionally, friends of the family visited. For reasons of confidentiality information about the participants is kept at a minimum.

Summaries

Article I:

Attention Interchanges at Story-Time: A Case Study From a Deaf and Hearing Twin Pair Acquiring Swedish Sign Language in Their Deaf Family

Background and aim

Considerable research has been conducted concerning hearing caregiver-young child interactions regarding the upbringing of twins, as well as research pertaining to the ways mothers vary their attention-getting strategies depending on their own and the child's hearing status. On the other hand, there is a lack of longitudinal research concerning the combination of these parameters with the interactional functions of expressions initiating and continuing joint attention between three or more persons and also from the children's different modality perspectives.

The purpose of this case study was to longitudinally analyze and describe the changes in attentional expressions used in interchanges between a pair of fraternal twins, one deaf and one hearing, from the age of 10 to 40 months, and their deaf family members, viewed within an interactional frame.

Research questions concerned how the twins initiated and re-established attention with their family members and vice versa and how these changed over time. For example, what similarities and differences were detected between the deaf bilingual caregiver, the hearing twin and the deaf twin in their use of attentional expressions?

The video-observed attentional expressions of initiating and re-establishing interchange were grouped in five functional categories: getting, directing, maintaining, redirecting and checking attention.

Results and discussion

In this case study, changes appear to be associated with development during the twins' ages of 10-13, 15-24 and 28-40 months, including the use of vision in communication. During the 10-13 month segment, Mother encouraged both twins to use mutual eye-contact, which they also used to initiate communication with their parent. In the second segment, the previous more or less blocked eye-contact transformed into a flexible gaze-contact. Consequently redirecting initiations were observed at the end of the second segment. In the final segment, the parents used their gaze for structural purposes instead, checking for the interlocutor's attention here-

by seemed to be expected. This dynamic visual-contact was observed a few months earlier in Diana's SSL compared to Hugo.

While there are similarities in the changes of each twin's communicative initiations, there are also differences based on hearing status, personality and use of modality. This is evident in the ways in which each twin's individual attention interchanges unfold over time; it is also connected with the parents' negotiating attention and arranging seating positions with them. Implications and findings for special-educational purposes are discussed.

Article II:

Mediated First Language in Gestural Modality: Native Swedish Sign Language Acquisition Interactions at Storytime

Background and aim

Phenomena concerning young children's sign language have been studied over the past fifty years. However, longitudinal studies of sign language acquisition are few and there is a lack of studies focusing on the mediation of sign language acquisition. This especially regards more than one child and with different hearing statuses. In this qualitative, longitudinal, single-case study, naturalistic interactions between Deaf family members' and Diana, their deaf twin child, were video-observed. The aim was to explore and describe action and language structure concerning the corresponding ways of mediating Swedish Sign Language acquisition. The family was video-observed on 12 occasions from the child's age of 10 months to 40 months.

Results and discussion

The analyses revealed transformations in three segments comprising actions in interactional style, gaze and structure of utterances. The first segment, from the child's age of 10 to 13 months, included primarily one-sign phrases with steady eye-contact or focus on an object. In joint attention, at storytime the Mother performed the mediating, by displacing the conventional signing tactilely on and in front of the deaf child. This was *as if the child made the signing - from the child's perspective*. In this way, the deaf child does not have to break visual focus on the target in order to get information about it. Previously, such a gaze-shift from the immediate perception has been frequently discussed as a difficulty in deaf children's early language acquisition. This mediating action seems to be a functional solution for other pedagogical settings as well.

Secondly, from 15 to 24 months, an altering flexible gaze-contact, multi-phrases and narrative structure were mediated and acquired. The child used non-manual components and a few classifiers. These were made with some 'errors', in comparison to adult signing. However, at the age of 24

months the face had turned blank, which probably indicated a temporary analytic phase for language structure.

Thirdly, from 28 to 40 months, conversations in dynamic visual-contact utilizing both gaze-constraints and non-manual facial structure characterized the mediation and eventually were shown in the child's language.

Overall, the parents informed themselves of the child's interests by following-in the focuses and by changing the what-question format over time. Mediating factors are discussed and appear useful for pedagogical purposes.

Article III:

Parallel Bimodal Bilingual Acquisition of a Hearing Child: Mediation in a Deaf Family

Background and aim

Deaf people mostly give birth to hearing children who acquire sign language as their first language. However, the children also acquire spoken language and thus become bimodal bilingual. The few studies on young hearing children's bimodal bilingualism have focused on linguistic and bimodal phenomena.

The aim of this qualitative longitudinal case study was to explore and describe action and language structure in the corresponding ways of acquisition and mediation, that is, *critical changes*. This was carried out by video-observing 12 sessions of naturalistic interactions between a hearing child, Hugo, and his Deaf family. The study was conducted from Hugo's age of 10 months until he was 40 months old.

Results and discussion

The family language was Swedish Sign Language (SSL). Hugo was initially positioned face to face with the parent, thus probably giving them a possibility to also lip-read Hugo's vocal expressions. The parents, unlike in previous studies, used one language base at the time. To this base single gestural signs or vocal words were often simultaneously inserted, the latter when not in visual contact. Thus, displaced signing was used in Hugo's peripheral visual field and close to targets but rarely tactilely. However, from the 15-month session the parents decreased their vocal utterances and increased their gestural ones. This coincided with Hugo being motorically active and the parents realizing that his vocal utterances were not perceived. At the 24-month session the parents clearly differentiated the languages. However, with hearing people around they often simultaneously blended both languages. A few such utterances were also observed with Hugo at the 40-month session. Thus the parents seemed to wait for Hugo to show language recognition before blending the languages.

Hugo, on the other hand, blended both languages frequently and also simultaneously from the onset of the study and until the 17-month session. Hugo showed awareness of visual attention to SSL communication at 22 months and differentiated vocal and gestural modality according to his partner two months later. During the 28-month and 32-month sessions Hugo's SSL was rare. Reasonable explanations for this seem to be his use of spoken language during the full day at the preschool combined with a grammatical analytic phase. Thus, at the 36-month he used and separated both languages and at the 40-month session he used non-manual components like gaze constraints, facial expressions and classifiers. He also located reference in the signing space and referred to it.

The latter structural components might be specialized for sign language environments and bilingual research. However, the findings focus on components in communication that should also be interesting for a broader educational audience, cognitive research etc.

Article IV:

Sequential Bimodal Bilingual Acquisition: Mediation Using a Cochlear Implant³ as a Tool

Background and aim

Unlike Diana in this study, most Deaf children are born into hearing families without prior knowledge of sign language or Deaf culture. In Sweden as in many countries around the world deaf children are given cochlear implants (CI). With this technical hearing aid device the children aurally receive to varying extents language useful for developing vocal speech. In this case study, the deaf child received a CI as late as at the age of three years. However, Diana had from birth acquired Swedish Sign Language as a first language.

The aim of this qualitative, longitudinal, single-case study was to explore and describe mediation of bimodal bilingual acquisition of a deaf child in a Deaf family. Naturalistic interactions in the Deaf family were video-observed and analyzed for actions and language structure. The family language used when gathered was Swedish Sign Language and in face-to-face

³ A Cochlear Implant (CI) is a high-technological hearing aid device. The external part includes a *microphone* and a *speech processor* that selects and sends sound to the *transmitter*, which code and send signals across the skin to the, internal array *receiver* installed by surgery. The electronic signals stimulate the hearing nerve, which by the brain are perceived as sounds.

situations spoken Swedish was also used with a hearing sibling. The study is triangulated with information from the CI records spanning Diana's age from 31 months to 8 years.

Results and discussion

From her first language, Diana knew the meaning of language and the use of language as a tool. She already had the foundation of function, pragmatics and structure of one language in place. Results describe vocal transforms over time in episodes of storytime interaction. In this, Diana's second language vocal utterances were simultaneously blended-in and built on her sign language.

Soon after the CI was activated Diana added vocalizations to her signing while communicating with her hearing twin-sibling, Hugo. Diana's use and reception of vocal modality seemed to influence her partners' choice of communicative type. Thus, after a year, Hugo simultaneously blended both modes (SimBlend) after two years and onwards he primarily used spoken Swedish with her. After two years their mother, in face-to-face situations (storytime), was observed to use SimBlend or to separate the two modes with Diana. Eventually and spontaneously, Diana developed spoken Swedish as a second language in vocal-aural modality.

At Diana's biological age of eight years she had had the CI for five years, which corresponded to her expressive speech. However, the receptive skill of vocal mode was assessed to be 7 years and 11 months, that is, appropriate to her biologic age. Her spoken Swedish was built on SSL and acquired despite late admission to aural sound reception, limited exposure being in educational settings with an SSL approach and no formal speech-training, which was the parents' choice. However, this relation between achievement and exposure seem to have had a bridging effect. This acquisition is discussed and the pedagogical aspects reported can be used, for example in inclusive education, and thus might influence a broader field of education.

Theoretical Framework

Within this thesis, the cultural complexity in which social interactions like acquisition and mediation take place is framed in the ecological model. This section will provide a theoretical summary of the ecological model, followed by subsections describing the sociocultural perspective, bilingualism, language structure, interaction and joint attention, parenting twins and guidance.

Ecological Model

In order to picture how cultural heritages interact with mediation, the ecologic model of Bronfenbrenner (1979) is used to display special education in a system of four environmental levels. The first involves environments which have a direct effect on a child's development. This includes the family's everyday routines, traditions, preschool and the like, in the center (micro-system) surrounded by the factors most closely concerned like free-time activities, neighborhood, actions of habilitation and so on (meso-system). The third layer (exo-system) relates to environments that indirectly affect the individual, for example creating documents and structural systems for education (including intervention and preschool), health care and so on. Finally, the overarching pattern of these systems is characteristically embedded in a given society including laws, recourses, subcultures and life course options (macro-system).

Within an ecological system several levels interact and have an effect on each other. For example, concerning education on the macro-level, the Swedish parliament's acknowledgement of Swedish Sign Language as the Deaf population's official first-language (Proposition, 1980/81:100) had an impact on the special schools for the deaf, on the exo-level. For example, two years later the curriculum changed, on the meso- and micro-levels, to include SSL in the special schools (Skolöverstyrelsen, 1983; Roos & Takala, 2012). In the habilitation service, support was given for hearing parents learning SSL from the early nineties. On the exo-level, additional support for hearing parents, hearing siblings and hearing children of Deaf parent was investigated in a Swedish Government Official Report (SOU, 1996:102). For these groups, on the micro- and meso-levels, the investigation resulted in

sign language support offered by the state. These decisions meant that, on the micro-level, deaf children grew up with SSL in their environments at home as well as in preschool. In school, SSL and written Swedish formed the concept of bilingual education (Roos, 2006; Svartholm, 2010).

On the macro-level, the Deaf-cultural organizations' struggle, for many years, to achieve acknowledgment of SSL was in the late seventies supported by scientific research. Also in the 1970's and on the meso-level, SSL became familiar to hearing children thanks to children's programs on television, which increased knowledge and interest in SSL. Such an extension, according to Bronfenbrenner (1979), becomes possible due to the culture "reflected in the vision of society's political leaders, social planners, philosophers, and social scientists engaging in critical analysis and experimental alteration of a prevailing social system" (Bronfenbrenner, 1979, p. 26).

In this study the scientific position concerns interactional perspectives viewed in relation to a cultural context.

Sociocultural Perspective

Vygotsky is prominent in sociocultural theory. He was an active researcher within the field of learning and education until 1934, when he died only 37 years old (Kozulin, Gindis, Ageyev, & Miller, 2003). For Vygotsky, all development emanates from collaborative social interactions (Stetsenko, 2004). The socio-cultural-historical theory emphasizes *mediated* human cultural tools, of which language is the most important (Van Lier, 2004). Mediation by a more mature person (Vygotsky, 1934/1962) or an equal individual concerning status, power or knowledge (Van Lier, 2004) provides an environment consisting of intersubjective interactions.

The historical perspectives inherent in culture like artifacts and language are the social mediating link in constructing the mind (Van Lier, 2004; Vygotsky, 1934/1962). "In this view the development of mind is the interweaving of biological development of the human body and the appropriation of the cultural, ideal and material heritage which exists in the present to coordinate people with each other and the physical world" (Cole & Wertsch, 1996, p. 3). This sociocultural theory involves a communicative-relational perspective, which in special education can be studied on individual, group, organization and society levels (Ahlberg, 2007b). A student can temporarily, for shorter or longer periods and in different environments, be *in* difficulties but is *not* categorized as a student *with* difficulties. Thus, Ahlberg (2007a) claims that the former needs to include a holistic perspective of communicative interaction with the environment on all levels.

Farrell and Ainscow (2002) argue that "the way forward must be to reform schools and improve pedagogy in ways that will lead them to respond

positively to pupil diversity, seeing individual differences not as problems to be fixed but as opportunities for enriching learning” (p. 6).

Reconstructing Mead’s theoretical work on subjectivism, Von Wright (2002) discusses the concept of ‘relational perspective’ concerning social interaction which she refers to as “the intersubjective turn” (p. 12). In this, the meeting between persons is the starting point of understanding oneself and others. The relational perspective switches between the interlocutors and one’s own perspective, through a dialectic process, but not taking over the other’s role. The responsibility thus becomes shared and the outcome is not predicted in advance. In asymmetric relations, as between adult and child, the adult, however, is responsible for the consequences.

Identity is another construct which can be seen as a project as well as a projection of placing oneself and acting in this world. A person can have several identities and become part of a collective identity (Van Lier, 2004). One identity could be a parent, or a child, a deaf child or a hearing child in a Deaf family, while a collective identity could be, for example, Deaf culture. This is not generally seen to be in opposition to other collective identities like a national culture. There are many ways of being Deaf around the world that include, for example, hearing children of deaf adults, hard-of-hearing people and hearing people who become part of the community (Monaghan, Schmalig, Nakamura & Turner, 2003). One way of expressing cultural identity is by spelling Deaf with a capital D and ‘Kid Of Deaf Adult’ (KODA) relating to communities, history and a socially shared sign language (Monaghan et al., 2003).

In cultures using visibility to communicate, it is natural to have ‘different sociocultural’ types depending on the communicative needs (Freeman, 2010) that differ from those normally used in aural communication, for example showing the face for speech-reading, sign-supported speech and physical contact. Thus, in Deaf families with deaf and hearing siblings it is reasonable to expect the development of communicative types that might not be generally known. Such knowledge of increased competence can therefore contribute to education with the purpose of ‘meeting all children’ (SOU, 1999:63).

Concerning ‘all’ deaf children during the last few decades the use of cochlear implants (CI) has increased globally. CI is a high-technological hearing aid device implanted in the inner ear. In Sweden the majority, approximately 90 percent, deaf children receive CI and most of them bilateral CI, that is, one for each ear (Svartholm, 2010). Some of these children have Deaf parents who naturally form a socio cultural sign language communicative environment with the deaf child. By means of interaction hearing parents also have utilized sign language with their deaf children. For children

with CI, all Swedish studies concerning both spoken and signed language report that children (of hearing parents) with a good command of sign language also had well-functioning speech. Thus it may be concluded, that sign language can promote rather than inhibit speech development (Nelfelt & Nordquist Palviainen, 2004; Cramér-Wolrath, submitted B; Preisler, Tvingstedt & Ahlström, 2002; Preisler, 2009; Uhlén, Bergman, Hägg & Eriksson, 2005). Studying interactions between Deaf parents and deaf children with CI might increase knowledge that is useful in educational and bilingual situations.

Bilingualism

Simultaneous bilingual acquisition in early childhood is usually defined as taking place from birth to between three and six years of age. Kessler (1984) states exposure before the age of three years of age as the first language (L1), whereas Meisel (2004) describes the first of three types as being from birth until the age of three to four years of age (L1+L1): The second type that Meisel presents is sequential or successive second language acquisition (L2), which starts during late childhood, between five and ten years of age. Finally, the third bilingual development starts after the age of ten and can be compared to adult learning. Other researchers, for example Abrahamsson and Hyltenstam (2008), draw the boundary to adult learning at around twelve years. Here, the learner has been observed to use competences from the first language together with generalizations of the target language to acquire L2. De Houwer (2009) schedules both Monolingual (MFLA) and Bilingual First Language Acquisition (BFLA) as taking place from birth to six years of age. Early Second Language Acquisition (ESLA) takes place before literacy programs and with regular input of L2 between one and a half to four years of age (De Houwer, 2009). Both Meisel and De Houwer claim that early separation, as early as in the one-word phase, is the rule in simultaneous language acquisition. A prerequisite for distinguishing bilingual first language acquisition is grammatical differentiation (Meisel, 2004). This seems due to the difficulty of simultaneous expression in mono-modal languages. However, Cummins (1996) claims an underlying bilingual proficiency, that is, content and skills can be transferred between languages.

In this case study bilingualism concerns Swedish Sign Language and spoken Swedish, that is, language in two modalities. Both languages were used between the Deaf family members and their hearing child; thus from birth he acquired bimodal bilingualism in a parallel process, Parallel Bimodal Bilingual First Language Acquisition (III). In the same family, the deaf child first acquired sign language and with a CI as a tool she eventually acquired spoken Swedish in a sequential process, Sequential Bimodal Bilingual Acquisi-

tion (IV). This coincides with the study of Hassanzadeh (2012) in which matched groups of children using CI were compared concerning the upbringing of Deaf or hearing parents. The second-generation deaf children exceeded the first-generation in the assessments. The conclusion is that having a first language skill supported the acquisition of the second language, which is in line with the spoken bilingual research directed in this subsection. However, bilingualism in different modalities uses different language structures, which is extended in the next section.

Language Structure

Irrespective of modality, languages can be seen in two perspectives: as structural with rules of syntax and grammar or as contextual communication with meaning and function (Linell, 1998). In language development, both perspectives are of interest. Concerning modality, vocal-aural languages have a linear, sequential character consisting of sound following sound, word following word and so on. Signed languages also convey symbols *sequentially* though *simultaneousness* is a more evident distinguishing feature (Ahlgren & Bergman, 2006). Thus, manual *spatial* expressions can with the two hands be positioned simultaneously and directed differently in signing space. At the same time the hands are simultaneously organized with essential non-manual markers in face, gaze and body. However, in gestural modality, face and gaze are used for structural purposes, so an utterance can be charged with excitement of rhythm and facial expressions (Bergman, 2012; Reilly & Bellugi, 1996) as in vocal mode. Facial expressions, for example eyebrows, indicate the type of phrase, where furrowed eyebrows stand for WHAT-question and topic eyebrows indicate a YES/NO-question. However with young children topic eyebrows are also used, ungrammatically, for WHAT-questions (Bergman, 2012; Reilly & Bellugi, 1996).

Concerning the conventional use of gaze in American Sign Language (ASL), this is described as multi-structured for grammatical and turn-taking purposes, the basis of which is developed during the first four years of life (Richmond-Welty & Siple, 1999). The *blank face* that Reilly (2006) suggested expresses the phase when the child, around the age of two years, distinguishes between the emotional and structural multiple purposes used in signed languages. In SSL, mouthing is commonly used for nouns. The mouth movement of a noun loanword from spoken Swedish (Ahlgren & Bergman, 2006) gives information about the visual parts of the vocal word. However, for a deaf child who does not know spoken language, both mouth movements accompanied by the manual and facial components are abstract (Bergman, 2012). In signed languages, the hands are the primary perceptual linguistic articulators (Takkinen, 2002), which means that the manual

symbols produced by the hands develop before the facial linguistic components (Reilly, McIntire, & Bellugi, 1991; Sutton-Spence, 2001).

In this study, the twins' longitudinal developments of bilingualism proceed in different ways. The hearing twin's development was parallel from birth (III) and the deaf twin's sequential after receiving a CI as a tool (IV). It was clear that spoken Swedish and Swedish Sign Language were performed in different modalities that used different kinds of expressions to construct the same meaning. Thus a question about quantifying was raised. However, sign language phrases include manual and non-manual components, the former of path, pace and reduplication movements synchronized with the latter component. This consists of structural facial expressions of gaze, eyebrows, mouth and cheeks. It is a difficult matter to transcribe the acquisition of sign language components, a question which has been raised (Baker & Van den Bogaerde, 2010; Hoiting, 2006; Hoiting & Slobin, 2002). Additionally, we need more knowledge about these components' corresponding morphology before they can be quantified or compared to a language in a different mode. For these reasons only some basic quantification of lexicon is presented in the current study. Episodes of mediated acquisition are presented descriptively also for reasons of transparency. These Episodes, within the existing cultural heritage (Cole & Wertsch, 1996), consist of joint attentional interactions.

Interaction and Joint Attention

Interaction is an encounter between at least two actors in action. This can be between people as well as between a person and an object, thereby socially also including tools historically developed. One such tool is language, which is learned in social *interaction* and is closely connected to consciousness (Van Lier & Corson, 1998). In these aspects of social and cognitive activity, consciousness is a socially constructed process of knowledge (Van Lier, 2004), a construct which is described by other constructs as interaction between selves used in *joint attentional* interchanges with another self (Trevarthen, 1993). In such intersubjective interaction or interchange, the partners have mutual joint attention. From initialization and continuance the interchange is constantly *negotiated* between the partners.

a communicating subject is trying to make an effective complementary replay; to enter into and jointly regulate a dyad of expressive 'conversational' exchange with the other. . . human intersubjectivity has certain extra specializations for intense mutual regulation of motives states and joint action in the shared world (Trevarthen, 1993 p. 128).

In *Sharing makes sense* Trevarthen (1987) presented “developmental phases in infancy: communication and self-regulation” (p. 197). This contains matched developmental phases from 0-3, 4-6, 7-9, 10-15, 16-21 and beyond 22 months of age. As the current study focused on the time from 10 months this is addressed further on. From 10 months, domains of relatedness and of self-awareness by sense of subjective self were shown (Stern, 1985). Secondary intersubjectivity was displayed by seeking co-operation and task-sharing; vocalization and gestures share experience in response to requests and instructions (Trevarthen, 1987). Regarding language, between 10 and 15 months acts of meaning is characterized by proto-language, followed by elementary lexicon in proto-dialogue (Halliday, 1978). A sense of verbal self was shown from 16 months (Stern, 1985). Children learn words, conventional uses of objects and pretend-play with mother (Trevarthen, 1987). The self-regulation with mother conserves the self as active organizer at 18 months (Sander, 1986). From the age of 22 months, narrative is transformed into dialogue (Halliday, 1978), which also includes play with peers, fantasy and metaphoric thought (Trevarthen, 1987). This compilation also largely coincides with an intergenerational transmission, which Hart and Risely (1999) described as the ‘social dance’ between parent and child, thus becoming partners (11-19 months), staying and playing (20-28 months) and practicing (beyond 29 months).

In attracting and maintaining interaction with young children, adults use a variety of tools such as voice, gestures, objects and touching that, according to modalities, can be structured into language. Contact by eye is common, but Carpenter, Nagell and Tomasello (1998) emphasized that gaze alternation per se is not an automatic indicator of joint engagement. In joint attention, an infant can visually focus on an object while attending aurally to another individual.

Spencer, Swisher and Waxman (2004) reported in comparing coordinated joint attention, in speaking-hearing mothers with hearing or deaf children and signing-Deaf mothers with deaf or hearing children, that their development of attention was due to shared meaning:

First, the similar trajectories of development of attention states by all four groups of infants indicate significant maturational effects beyond effects of communication experience and hearing status. Second, audition does not seem to play an obligatory role in acquisition of increasingly complex states of visual attention nor in the time engaged in Coordinated Joint Attention (CJA) during the infant-toddler period (Spencer et al., 2004, p. 186).

The study indicated that the quality of interaction was higher when mother and child had the same hearing status. The hearing dyad needed less time for visual contact; instead, *supported joint* was displayed attending to the object (Spencer et al., 2004). Sharing is performed through talking about

what the child is focusing on (Carpenter et al., 1998; Estigarribia & Clark, 2007).

Research regarding sign language emphasizes the visual mode with focus on form and language structure. Studies have explored visual contact in different settings, the linguistic content of that interaction and how deaf people have established the necessary conditions in order to obtain visual contact in educational settings (Erting, 2001; Mather, 1990), as well as in caregiver – child dyads (Ahlgren, 1980; Benedict & Sass-Lehrer, 2007; Cramér-Wolrath, 2011; Erting, Prezioso & O'Grady Hynes, 1994; Malmström & Preisler 1991; Mather, 1994; Mather, Rodriguez-Fraticelli, Andrews & Rodriguez, 2006; Spencer & Meadow-Orlans 2004; Swisher, 2000; Van den Bogaerde, 2000). These studies underscore the importance of caregivers adjusting their initial attentional expressions to produce visible communication and language for the child. Deaf parents establishing a *sight triangle* was reported (Mather et al., 2006), which connected the toddler's field of vision with the parent's signing and the object. Deaf mothers used visual-tactile strategy, waving and tapping, to redirect their deaf and hearing child's attention (Gale & Schick, 2008; Harris & Mohay, 1997; Koester, Traci, Brooks, Karowski & Smith-Gray, 2004; Loots & Devicé, 2003a, Loots, Devicé & Jacquet, 2005; Van den Bogaerde, 2000; Waxman & Spencer, 1997). Displaced signing in the child's line or peripheral field of vision and on the child was reported (Bailes, C. Erting, L. Erting & Thumann-Prezioso, 2009; Malmström & Preisler, 1991; Mather, 1994). Thorén (2002) concludes, from studying interaction between young blind children and their sighted parents, that vision was not a prerequisite for positive development when parents supported the child to make sense of the child's experiences. Consequently, tactile modality of sign language is used with deaf-blind children. This involves systematic and continuous tactile signing on a deaf infant's body as well as signing in the child's field of vision as if the child was the signer (Cramér-Wolrath, 2011; Cramér-Wolrath, submitted B). This was observed in joint attention storytime situations during a few months around the deaf twin's age of one year.

Parenting Twins

Parents of twins try to divide their time between the children and according to each twin's needs, personality and requirements (Bishop & Bishop, 1998; Lytton & Gallagher, 2002), the former reference had a mean age of 9.57 years and the latter at age 2, followed up at 9 years. Tomasello, Mannle and Kruger (1986) reported, at ages 15 and 21 months, less directed speech but more directives, reduced time in joint attention and shorter conversational episodes with each twin compared to singletons. Due to environmental aspects like doubling, in most concrete activities and interacting with indi-

viduals of the same age a slight delay was found (Bishop & Bishop, 1998; Thorpe, Rutter & Greenwood, 2003; Tomasello et al., 1986). Seung, Holmes and Colburn (2004) studied a twin-pair, from age 20 to 41 months, with different hearing statuses and hearing parents. One of their conclusions was that focus on the deaf twin might put the hearing twin at risk of language delay. However, balance can be provided by mediating factors and an older sibling's higher linguistic level (Thorpe et al., 2003). In the present study, the twin situation is the opposite; the parents and the elder sister are deaf. How the older sibling contributed to the twins' language acquisition was not in focus; however, there were no concerns about language delay in either the hearing twin or the deaf twin (I, II & III).

Guidance

In the case of parents' interchanges with their young child, it is well known that the parents adjust to the child, which is known as 'motherese' (Gogate, Bahrack, & Watson, 2000; Hayes & Ahrens, 1988; Reilly & Bellugi, 1996). Bailes et al. (2009) express this as 'child-directed speech' and for signed languages as 'child-directed signing'. As Vygotsky (1987) emphasized, productive mediation occurs in interaction and within persons' *zone of proximal development* (ZPD). This ranges the potential of what the individual cannot yet do by determining the individual's lowest and highest thresholds. The optimal period, only between these thresholds, is the zone of proximal development. In this, encouragement is a part of the process (Bailes et al., 2009; Tomasello & Ferrar, 1986; Trevarthen, 1993). Hence, ZPD can constitute a useful concept within the family as well as in fields of pedagogy, special education and habilitation (Vygotsky, 1934/1962).

Mediation is dynamic, both guiding and evolving through the social interaction that occurs during meaningful joint activity. In this dialectic process and according to the context, the more experienced person uses knowledge in action as a cultural tool (Kozulin, 2003; Karpov, 2003). In this, the ZPD structure contains formats with *scaffolding* performance (Bruner, 1983) that backs up the transitional processes. Thus scaffolding temporarily supports the individual's transition towards the goal. Scaffolding is often embedded within structures of culturally-historical constructed *formats* (Bruner, 1983) like, for example, with infants, the peek-a-boo game. In this the adult scaffolds the game and the child eventually takes over actions, the sensitive mediator's scaffolding de-rigs and the roles shift. Thus scaffolding takes place within the format and new meanings occur, or, as Van Lier (2004) express it: "improvisation is the fuel of autonomy in learning" (p. 148).

Cultural tools are founded in mediated meaningful, social interactions with more mature individuals and peers (Bruner, 2004). With these cultural tools the child can also mediate its own actions and with the use of language develop higher mental functions (Vygotsky, 1987). Thus, the environment establishes important parameters of cultural and social collaboration but it is the child's own activity that constitutes the development. In the following quote Stetsenko (2004) condenses the processes of socially cultural mediated acquisition.

The process of development goes beyond training and intellectual discovery and instead involves sequential changes in, and reorganization of, the process of practical activity, giving rise to new forms of it. In other words, it is the flow of activity itself, and the contradictions in activities that arise in life, that engender transformations of activity and constitute the development of its new forms, including 'mental activities' (p. 509).

During the 1920s and 1930s Vygotsky worked together with Luria and Leont'ev. During this time Vygotsky introduced the idea of *transformation* (Leontyev, 1981), which was a result of necessary mental processes interacting with the socio-historical environment. These three researchers developed the first generation of the cultural-historical theory of activity (Smidt, 2009). In this and in the sociocultural theory *mediated activity* is in focus (Cole, 1996; Vygotsky 1978). Text in this triangular mediating model (Cole, 1996, p. 119; Smidt, 2009, p. 91; Vygotsky, 1978, p. 40) was modified in the current study (Figure 1.). This model consists of a subject/learner who creates the formation of object/phenomenon in the world, by activity, utilizing artifacts. Artifacts are historically created by humans, and when used with young children primarily another human, for example a parent, who provides cultural tools to mediate the world. Challenging the child, in the assumed ZPD, means continually changing and decreasing type and degree of scaffolding as the child manages on its own.

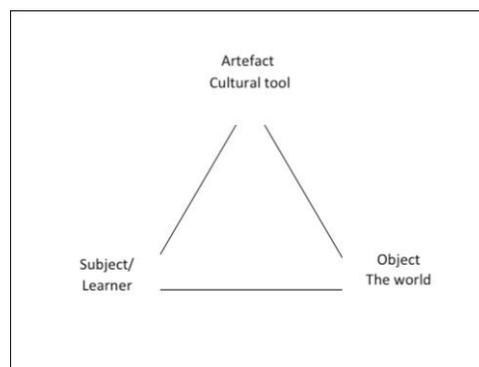


Figure 1. Mediating activity model (modified)

With the baby, the parent tune-in to the child's emotional state; that is not a matter of language but of sharing meaning. In proto-conversations, approximately at the age of 8 weeks, the infant's communicative ability grows by entering into synchronic dialogues with rhythm and turn-taking (Trevarthen, 1993). Thus eventually, at about the age of 9 months, the infant demonstrates secondary intersubjectivity with awareness of other people's purposes in relation to objects. Sharing attention in a triadic focus, the caregiver uses 'child-directed language', as speech or signs (Bailes et al., 2009).

As the child acquires language, it is also used to direct or self-scaffold (Jamieson, 1995; Wertsch, 1985) its own actions by private speech, also referred to as "speech for oneself" (Vygotsky, 1934/1962, ch 7, p.7). This later seemingly fades out, thus transforms and instead becoming the individual's inner speech or verbal thought (Jamieson, 1995; Vygotsky, 1934/1962; Wertsch, 1985).

Our experimental results indicate that the function of egocentric speech is similar to that of inner speech: It does not merely accompany the child's activity; it serves mental orientation, conscious understanding; it helps in overcoming difficulties; it is speech for oneself, intimately and usefully connected with the child's thinking. Its fate is very different from that described by Piaget. Egocentric speech develops along a rising not a declining, curve; it goes through an evolution, not an involution. In the end, it becomes inner speech (Vygotsky, 1934/1962, chapter 7, p. 7).

In this way, language automaticity works as a tool for further acquisitions and expression of thoughts (Ladberg, 2006). However, thought is always something whole and not, like speech, sequentially expressed word by word. The connection between thought and symbolic language is meaning (Vygotsky, 1987).

Methodological Choices

Initiating interaction and communication was the first obvious factor observed. This was performed in different ways between the deaf caregivers and the deaf and the hearing twin respectively (I). The intersubjective triadic interchanges displayed different ways in which the children developed and the caregivers guided their bimodal bilingual acquisition (II, III & IV).

This section consists of data collection, analysis, transcription, attentional expressions within shared interchanges associated with Article I, while Articles II, III and IV focused on interactions containing critical changes in actions and language structure with each twin. The ethical consideration and the descriptive key are the final subsections.

Data Collection

In this thesis, triangulation of data collection was used in all four studies. Video-observations, brief field notes and a semi-structured interview with the parents were assembled. Additionally, in Article IV information from the CI-team records were collected.

Video-observations

In this project, five aspects were considered regarding the video-observations. Firstly, in order to observe spontaneous interactions between family members, a known and informal setting was considered important. The home of the family was chosen, also suggested by Baker, Van den Bogaerde, Coerts and Woll (2000). Secondly, observations were conducted on a more frequent basis at the beginning of the study as more rapid changes in interaction and language were presumed to occur at the younger ages (Table 1., column B). Thirdly, while interacting in the family, the researcher only used SSL with the exception of the 67-month session. Fourthly, at each session, in order to gain the children's trust as fast as possible, their spontaneous eagerness to help with unpacking and putting on the camera was found to be an asset. It was possible to turn the display-screen on the Handicam round and the children could see themselves simultaneously moving in front of the camera. This motivated them to show things to the camera, that is, to themselves, and these objects turned into the activity, for example, children's books. At the 13-month session the researcher in-

roduced the book *The Frog and the Pig* (Velthuijs, 1999). This book was brought to every session throughout the study in order to follow one story over time.

Finally, the video-observations were made with a Handicam. When the camera was activated, it ran continuously for one hour, this thesis include 18 sessions (Table 1, column A). Usually these consisted of storytime (column D, F & G) and playtime (column E, F & G). The researcher moved cautiously around the room, trying to focus simultaneously on all the participants' interactions. Depending of the number of participants (column C) several activities were going on simultaneously in different parts of the room. On these occasions, the ongoing interaction was followed to completion, and then the focus was turned to the less observed child's interaction. At the beginning of the study, the parents tried to place the infants so that they faced the camera. At times, the children, more often Hugo, initiated interaction with the researcher.

Table 1. Information regarding video-recordings, *Time stated in minutes

A	B	C	D	E	F	G
No	Twin's age in months	Participants in the recorded observation	Length of Story-time*	Length of Play-time*	Hugo Active-time*	Diana Active-time*
1	10	Diana, Hugo & Mother	-	24	18 play	20 play
2	11	Hugo, Diana, Nicolía & Mother	-	38	19 play	8 play
3	12	Diana, Hugo & Mother	19	8	17 story 8 play	19 story 0 play
4	13	Diana, Hugo & Mother	22		17 story	21 story
5	15	Diana, Hugo & Mother	33	10	23 story 10 play	33 story 4 play
6	17	Diana, Hugo, Nicolía & Mother	8	-	4 story	5 story
7	22	Diana, Hugo, Nicolía, Mother & Father	8 Diana & Mother	38	0 story 15 play	8 story 13 play
8	24	Diana, Hugo, Nicolía, Mother & Father	-	16	13 play	10 play
9	28	Diana, Hugo & Mother	13	-	10 story	12 story
10	32	Diana, Hugo, Nicolía & Mother	8	-	4 story	8 story
11	36	Diana, Hugo, Nicolía & Father	14	-	6 story	10 story
12	40	Diana, Hugo, Nicolía & Mother	23	12	13 story 12 play	23 story 3 play
13	44	Diana, Hugo, Nicolía, Mother & Father in different constellations	15 SSL 19spoken Swedish	17	1 story 12 play 19 Hugo & Mother	15 story 8 play 4:50 story
14	49	Diana, Hugo, Nicolía & Mother	10	12	0 story 11 play	10 story 8 play
15	54	Diana, Hugo, Nicolía & Mother	9	41	3 story	9 story
16	61	Diana, Hugo & Mother	14	42	14 story	14 story
17	67	Diana, Hugo, Nicolía, Mother & Observer	12	11	12 story	12 story
18	81	Diana, Nicolía & Mother Hugo & Mother	11 7	13	7 story	11 story

After the recordings there was often time left for playing with the children and chatting with the parents. However, discussions concerning language and child development were consciously avoided due to a risk of changed behavior or 'pleasing' bias in the data collecting process (Goldfarb, 2007).

Field notes

Immediately after each video-observation, the researcher made brief field notes. Its main purpose was initially to remember certain changes in behavior or characters, which at the time seemed necessary for further attention. These contained observations, reflections and parental comments related to the participants and their interactions. One such observation was the change in Diana's face from being lively at 22 months to become almost blank at 24 months.

Cochlear implant and assessments

At the age of 35 months Diana was given a unilateral cochlear implant (IV). A cochlear implant (CI) is a high-technological hearing aid device. An outer part receives sounds and transmits them to the inner part, which is placed by surgery inside the inner ear. The transmitted signals stimulate the hearing nerve and are received as sounds by the brain. Due to individual conditions this process varies between individuals. In order to acquire spoken language from hearing it is crucial that the sound signals are processed and interpretable to the brain. This is necessary for a child that has never had residual hearing and therefore does not know the sounds of spoken language. Children in Sweden often get bilateral CI between 8 and 12 months of age (Anmyr & Lundin, 2006). In this respect Diana received her CI late (at 35 months, IV).

After receiving a signed agreement from the parents, the CI records were collected from the CI team. The assessment results of *receptive* and *expressive* tests from Diana's age of two and a half to eight years were considered relevant (IV). These tests consist of sets of pictures or objects and the child is assessed for adequate responses. In the receptive tests, the child, on the tester's utterance, for example, should look at the right picture. In the expressive tests, the child is presented with a picture and is asked to respond by an utterance.

In Article IV, analyses were compared with the CI records. The receptive assessments conducted by the CI team were Reynell for sign language (Eriksson, 2003), Reynell for speech (Reynell & Huntly, 1985) Swedish version (Eriksson & Grundström, 2000) and Peabody Picture Vocabulary Test 3rd Edition Swedish version (PPVT3), (Dunn & Dunn, 1997). In IV, the researcher compiled the data from the CI records with the receptive assessment, which resulted in a diagram, (IV, Figure 1). The expressive develop-

ment described in the CI records included assessments of Renfrew (1997). Data used from the CI records have been translated into English by the researcher.

Parental interview

At the offset of the study, the twins were eight years old. The researcher conducted a semi-structured, video-recorded interview in SSL with the parents in their home. Using a less structured 'group' interview has its advantages as it can reveal similar and different experiences (Cohen, Manion & Morrison 2007). In this interview the camera was on a tripod and ran continuously for one hour. The parents were initially asked to share their views on their children's bimodal and bilingual language acquisitions, and the parents' role in relation to these acquisitions. Spontaneously they commented on their interactional style as intuitive, which conform to the study of Hart and Risely (1999). However, with one exception this concerned their decision to omit vocal attentional expressions with Hugo until he showed visual awareness (III). The researcher further asked probe questions in order to clarify their statements.

Data Analyses

As a whole, the data analysis process was characterized by iteration (Srivastava & Hopwood, 2009) that is, continuously comparing the findings in a reflective process. Thus, this inductive perspective was based on the researcher's knowledge of native spoken Swedish, homemade gesturing from early age, SSL from the age of seven years, and three different educational trainings including teaching experiences in pre-school, Montessori and special education for deaf and hard-of-hearing children.

In all four articles, the main approach was inductively explorative with analyses of each participant's interactions, cross-activity and cross-participants. However, comparisons between interchanges were made initially in the study with the purpose of exploring activity differences (Baker et al., 2000), which resulted in focusing mainly on the storytime transcriptions. The inductive research processes were characterized by, in-depth data analyses (Creswell, 2007) of each participant's interactions, which were described chronologically (Yin, 2009) and in detail (Creswell, 2007). These analyses and the descriptions were continuously compared with primarily the transcriptions between participants and by checking viewings of the video-observations. In this process new results and arrays were discovered, which were compared with the previous results and the field notes.

In order to confirm, disconfirm and find new patterns in the study, an abductive procedure between the results of the analyses and literature was

adopted (I, II, III & IV). Such abductive loops might reveal qualitative leaps between theory and empiri (Guvå & Hylander, 2003). This procedure initiated further analyses of the data, giving additional information about phenomena found in the studies and highlighting those not previously emphasized. With the purpose of transparency of longitudinally illustrating the various qualities studied, the same descriptive *episodes* were chosen. Finally, each study was abductively compared with the semi-structured parental interview.

In Article I, attentional initiation was first explored inductively, then deductively inspired by Ninio and Wheeler (1987). Changes in the participants' interactions were explored inductively in II, III and IV. Article IV was additionally triangulated to assessment results from the CI team records. Brief quantifications were made of attentional expressions (I), of language lexicon (II & III) and in Article IV of the CI records as well.

The analyses consisted of six iterative phases:

1. transcription (inductive method)
2. reverse procedures between analyses and descriptions (inductive method)
3. comparison between activities, participants and brief field notes (inductive and abductive methods)
4. additional methodological analyses (deductive and quantitative methods)
5. comparisons with previous literature, resulting in abductive loops, back to phase 3 (abductive method)
6. parental interview (abductive method)

Finally, in the framework of this thesis a sociocultural perspective was adopted.

In the following subsections the transcriptional process, quantifications, the concept of attentional expression and critical changes are extended, followed by ethical considerations and the presentation key.

Transcriptional process

Performing in-depth analyses of communicative interactions requires a documentation form by which the utterances can be studied. Concerning sign languages, video-recordings provide a useful scientific tool. The data of each participant as well as that between participants can be repeatedly viewed back and forth, at different speeds, and also over time. This information can be provided to one researcher or simultaneously to a research team with the purpose of making various analyses and checks on translations, analyses and trustworthiness. At first, the interactions were described as observations including surrounded details, which shadowed the interchanges. A transcript in which the participants' interactions could easi-

ly be surveyed was needed. A linguistic program, ELAN (Max Planck), was tried out and found useful for very detailed analyses. For transcribing video-observations and surveying and exploring a large longitudinal collection rich in data, an ordinary Excel file proved useful. Running interactions were found to be initiated, continued with turn-taking and completed, thus forming an episode. To distinguish between the participants' turns and utterances, a transcription key was constructed, which was also used in the description of episodes.

However, the process of transcribing observations is a time-consuming process. Since there is no written form of sign language, all the utterances in the gestural mode have been translated and transcribed, first into Swedish written words and then in the Episodes into English written words. Slobin (2006) problematized this procedure concerning: "cross-linguistic comparisons - between spoken and signed languages or between the acquisitions of different languages - it is necessary to work within a linguistic framework that is not biased toward languages of a particular type" (p. 41). One way to solve this problem in linguistic studies of sign language is to transcribe the exact features of the gesture and the non-manual components (Hoiting & Slobin, 2002). The transcriptional work in this study started in this vein, but in the process it became apparent that the problems of making such analyses and transcripts were immense and not within the scope of the thesis.

Transcription is problematic in at least three respects concerning the translation of gestural modality from representational, simplified and sign utterances, which are then translated into descriptive text in Swedish and then additionally into a written foreign language. Firstly, representational utterances and simplified language are under construction and change day by day. The content can consist of both homemade expressions, which are more or less stable, and conventional symbols of words or signs. This required intense investigations of the material to get as agreeable transcriptions as possible. Simplified spoken words can be performed with non-conventional sounds, rhythm or combinations, and simplified signs by an alternative hand-shape, location, movement or non-manual components. In order to make sense without access to the observations (I, II, III & IV), these descriptions needed to be organized consistently, which was especially time- and text demanding. Here the transcription key was inspired from sign language research.

Secondly, the children's gestural communication was labeled with the author's choice of simplified Swedish words (for example BIRDIE) and written words. In this way the face-to-face interaction in gestural-visual modali-

ty was transformed into another language in addition to its written form, which transformed the utterance through three modalities.

Such a translation inevitably involves *interpretations* of the interaction. These were built on the basis of the researcher's internalized experiences from birth, including homemade signing. From age five increasingly, conventional SSL was learnt from a deaf sibling. Later knowledge from sign language interpreting and university SSL courses involving translations and transcriptions was acquired. Observations of the context, adult - young child interaction and communicative interchanges were conducted on the basis of professional experiences. Thus, the transcriptions in this study has a string of an interpretive method whose research goal is understanding through description and interpretation or as Ferguson and Ferguson (1995) wrote "Moreover, the understanding sought is a kind of empathic process whereby one tries to approximate the perspective of others (although not uncritically)" (p. 112).

Thirdly, the written translations in the descriptions were translated into English, thus translating the translated gestural simplified-sign communication into yet another written language. Concerning the infant's vocalizations, baby-talk or simplified words, these do not include the same interpretational ingredients since the utterances themselves can indicate the word (doggie) [Sw: *vovve*]. This last translation required external expertise in English infant expressions. Stable simplified words performed with other sounds and structures than those conventionally used were also translated into English, for example, "mom ring" [Sw: *ma(mma) (r)inga*]; the Swedish word "ringa" can be used to mean: the telephone is 'ringing', or I'm going to 'ring', that is, make a call, or as exemplified in Article III, when Hugo indicated that Mother was going away because the phone rang, that is, to answer the ringing phone. In the studies, however, a few speech sounds are accompanied by *italicized* Swedish expressions because the English translation might carry other and irrelevant, speech sounds, as in the finite form 'the' doggie [Sw: *vovven*].

Hugo made cross-cultural utterances, calling himself by his sign-name, in this study translated as HG. Thus Hugo has a sign-name that is finger-spelled with a similar level of hand-shape difficulty and yet trustworthy according to the rules that cover sign-names (Hedberg, 1989). Finger-spelled Swedish sign-names often contain only one letter, but Hugo's real sign-name contains two consonant letters, while the vowels carry meaning through mouthing to be speech-read.

This kind of work required serious concern when translating the children's utterances into English. Seven of the twelve video-observations, from 10 to 40 months, were fully transcribed. In comparisons between storytime, playtime and mealtime, differences over time related to initiations,

amount of language and action between participants were found in storytime and playtime. The further analyses therefore concentrated on those two activities and mainly on storytime, which was followed by one and the same book over the entire study.

Attentional expression

Initiating interaction involves negotiating a coming intersubjective and shared moment that carries specific moves (Ninio & Snow, 1996). First, a request for joint attention is responded to by an agreement or a refusal to contribute. As the interaction goes on, new negotiations can appear, thus becoming an interpersonal agreement between the interacting parties about what the communication is about.

Negotiations are distinguished according to the state or event that is being decided on. Choices about the future of the interaction are made on various levels, from the most general decision about whether the interactants will remain in each other's presence to minute details of an ongoing activity, for example, who is to perform the next move (Ninio & Snow, 1996, p. 31).

In Article I, attentional expressions could be referred to five types of negotiating communicative interchanges. The first four were inspired by the taxonomy of Ninio and Wheeler (1987, p. 3) and the last was found in the data:

1. Getting attention: Accidentally or intentionally you get someone's attention either towards you or towards the thing you are manipulating.
2. Maintaining attention: You want someone to maintain attention on target.
3. Directing attention: You direct someone's attention towards or by target.
4. Redirecting attention: You want to turn someone's attention towards you.
5. Checking attention: You plug in quick gaze checks to ensure the interlocutor's attention.

Negotiations consist of directives to hearer to bring about some future state of affairs, of commitments by which speaker undertakes to bring about some state of affairs, and of declarations that some state obtains (Ninio & Wheeler, 1987, p. 3).

Critical changes

Actions and language changes over time, such transforms in a child's language acquisition and corresponding with mediated communicative actions. In Articles II, III and IV these are defined as *Critical changes* and 'errors' are considered not to be faults but possible transforms within the acquisitions or mediations. This definition was later found to fit in with the sociocultural theory of child development. In contrast to a predicted theory

of exact development in language, Chaiklin (2003) claims that Vygotsky's idea of ZPD has two analytic purposes: identifying maturing psychological functions, including the social-associated interactions needed for transition from one period to the next, and in relation to that identifying the child's current state. The zone of a period can be defined as historically formed in particular traditions of practice (Chaiklin, 2003). The hypothesis of critical period refers to the growth period when certain functions develop (Meisel, 2004). In contrast, Vygotsky's concept of critical period refers to abrupt turns in personality, including the transition based on maturing functions, a feature that is a qualitatively different mental form and often leads to crises for the child (Mahn, 2003). Learning and development through social interaction in the zone of proximal development rely on the critical periods as the child's meaning-making changes the relationship to the environment (Mahn, 2003).

In this study changes were found both as abrupt changes and transformations in-between. Abrupt differences were displayed by the different interactional styles reported in the segments. However, within the segments scaffolding of temporary processes was observed from being directed to eventually being internalized and appropriated. One example of parental scaffolding is the development of gaze (I, II & III) and another is Diana's self-scaffolding of her spoken language (IV).

Ethical Considerations

The ethical procedure was approved by the Ethical Committee of the Stockholm Institute of Education. Due to the longitudinal design, special importance was given to the confidentiality of the participants, in particular because the hereditary deaf population in Sweden is small and individuals are therefore easily identifiable. Sweden has no official statistics of deaf children born into Deaf families. However, this was investigated by Roos (2009) and the number found was 10 children born in 2007 and 2008. These numbers can fluctuate over the years but give an approximate picture.

First, in regard to enrolment, an invitation concerning Deaf parents' participation was sent to the special preschools in Sweden. This contained information about the project on sign-language acquisition. Parents who were interested in the project were provided with information from the researcher. Information was in SSL and also included the four ethical principles of participants' rights to information, consent, confidentiality and utilization used at that time (HSFR, 1999; Vetenskapsrådet, 2011). Parents were given a compilation of the information in writing as well as an address where they could sign up for participation. Five families wanted additional information and two families consented to participate. However, in one of

these families the parents found themselves too busy and without the time to be video-observed.

A three-year research agreement was signed with a family consisting of Mother, Father and their three children. Thus after gaining entry longitudinally to a young family, it was considered important to make adjustments in order to maintain trust and further access (Ball, 1990). Therefore, for example, in joint agreement with the family, a rough schedule was decided on for the observation occasions. Days and times were chosen that suited the family best, and in a few instances the meeting location was changed. On a few occasions friends of the children visited the family. In these cases, the friends' parents were informed about and also approved their child's participation in the video-observations.

When the agreed three years had almost come to an end, the situation changed. The deaf twin received a cochlear implant and the family wished to prolong the study. This bonus in the project may further weaken the family's ability to remain anonymous, especially in the Deaf community and in the special schools for the deaf. This was discussed with the parents, who made a conscious decision to continue the project. Thus the confidentiality aspect in particular means that minimal background information on participants is provided; the names have been altered and Figures 2 and 3 as well as the cover are unidentified.

The usefulness of this study is expected to lie in its longitudinal authenticity and the lack of research in bimodal bilingualism. Therefore, in the choice of the presentation, special attention has been made to rendering language development as transparently as possible, that is, in a detailed descriptive form.

All the observational material has been stored in a locked cabinet and has not been spread outside the research team. The parents have continually taken part in the project and been up-dated about the progress of presentations; they have had access to and been provided with articles within the project. The video-observations will be compiled and given to the family when the project is completed.

Key to the descriptions

The articles present descriptive short examples and longer episodes of interaction. In order to describe the structure of the bimodal bilingual communication, different forms of letters represent different types of information. As an example the form used in Article III is presented here.

The key to the structure (Table 1) shows how lower-case letters illustrate information while sign is in CAPITAL LETTERS. Vocal words are italicized and in combination with simultaneous communicated gestural mode, CAPITAL

ITALIC LETTERS are used. A slash is used for simultaneousness, for example DOG/*doggie* or *there*/point. Hyphens are used for different purposes. Between two capitalizations they indicate that one sign is translated into more than one word. Capitals followed by a hyphen and lower-case letters give structural information. Squared brackets round Swedish are inserted when considered important, as in translations concerning language morphology.

Table 1. Key to the episodic structure

Key	Episodic example
Colons: indicate someone's utterance	e.g. Hugo: or Hu:
Lower-case letters: Information and also language structure	Hugo: points at the top of the shelf
<i>Italic: Spoken and/or simplified word</i>	Hu: <i>my pens</i>
CAPITALS: SIGN or SIMPLIFIED SIGN	Hu: MINE
<i>ITALIC CAPITAL: SIMULTANEOUS SIGN AND SPOKEN LANGUAGE</i> slash indicate simultaneous bimodal blending, also with simplified words	Hu: <i>PENS up-there</i> /point <i>doggie</i> /DOG
CAPITAL hyphen CAPITAL: one sign translated into more than one word	Father: NO HAVE-NOT PEN
CAPITALS hyphen lower-case: SIGN-structure	Fa: BRING-down-pen-can
Round brackets: initiating or reestablishing code* followed by initiatee and partner	(rD: Hu → Fa)

(Table 2. III) *Round brackets contain initial letter according to five attentional types (Getting, Directing, Redirecting, Maintaining and Checking); re-establishing holds an 'r' before the attentional type. The code continues with the initiatee and the partner. The interchange follows on the next line (I).

A distinction is made between continuous and partly simultaneous 'code-blend' (Van den Bogaerde & Baker, 2005). 1) Bimodal continuous simultaneous blending in gestural and vocal utterances is referred to as 'SimBlend' (Cramér-Wolrath, accepted; Cramér-Wolrath, submitted B). 2) Simultaneous insertions of elements from gestural mode or vocal mode on the basis of the other language structure are referred to as 'blending-in'. 3) A 'code switch' is an alteration to the other language (Emmorey, Borinstein, Thomson & Golan, 2008).

1. Example of SimBlend: *WHAT's that* looks at and points at the ball.
2. Example of blending-in simultaneous insertion: *Hugo look there*/point BALL.
3. Example of code switch: Hugo *look there*/point BALL FOOTBALL.

The "descriptive terminological framework for vocal and gestural modalities" (p. 301) proposed by Volterra and Erting (1994) has been used. The concepts 'simplified word form' or 'simplified sign form' were added to

elucidate the symbolic utterances of a young child using symbolic vocalization or symbolic gesture as well as uttered sign/s or spoken word/s not (yet) performed conventionally (e.g. doggie [Swedish: *vovve*]).

Displaced signs are performed outside of the conventional placement, that is, in the interlocutor's visual line, visual field or peripheral field of vision and tactilely on or with parts of the interlocutor's body.

Results

In the Results section of this thesis the four articles are composed into a synthesis. Thus, the different ways in which the acquisition and mediation were displayed, with the deaf (I, II & IV) and the hearing child (I, III) in the Deaf family, are compared and extended. This includes the complex and simultaneous interactional processes of attentional expressions and bimodal bilingualism.

During interactions the parents mediated bimodal bilingualism, with the deaf and with the hearing twin. Often these activities were between three or more family members, and within them interactions were also regularly between two of them (I-IV). Consequently, at times one of the twins turned away to do something else or additional family members accompanied the activities. The twins were each other's peers, and their elder sister, Nicolía, functioned as a role model. She adjusted her language to the twins, especially during the first years of the study.

The first three studies span the twins' ages from 10 months to 40 months while the fourth one overlaps from 31 months and runs up to the time the twins were eight years old. This longitudinal design was chosen in order to observe and compare the twins' transformations in bimodal and bilingual acquisition over time. Both acquired bimodal bilingualism spontaneously but at different times within this study. Hugo's acquisition was parallel from birth while Diana's was sequential, using from the age of three a cochlear implant as a tool.

This section will present the results of the differences in the twins' developmental processes. It is arranged according to action and language structure, showing specific mediated patterns and differences, the latter corresponding with changes in the twins' acquisitions. The connected transformations in the participants' 'critical changes' partly differed in Diana's and Hugo's language acquisitions respectively (Appendix 2). This refers to Hugo's bilingualism in gestural and vocal modality, which was acquired from birth. There were also differences in personality. Diana was engaged in storytime activities whereas Hugo was more motor-active, tending to engage in physical and playtime activities.

The initial overview contains the *interactional style* that changed over time and consisted of three clear segments: the first from the twins' age of 10 to 13 months, the second from 15 to 24 months and the third from 28 to 40 months. The first patterns are then presented, that is, *inclusion* and *fol-*

low-in, which are described over time. This is followed by the triadic setting, *simultaneous-tactile-looking*, a type of mediated communication that is characterized during storytime at the 12- and 13-month sessions. Thirdly, different ways of mediation are presented: the *gaze-altering development* and the *what-format*. Finally, *differences in the twins' acquisitions* are highlighted, ending with an overview of the *communicative types* used by the participants. In the thesis the model of Mediated activity, presented in the background Sociocultural subsection, has been used to elaborate the possibility of using the model in bimodal bilingualism.

Introducing the Interactional Styles

The *first segment*, from the 10-month until the 13-month session contained mediated encouragement of 'eye-contact' like smiles, nods and exaggerated expressions (I). However, with Diana (II), various types of displaced signing that scaffolded labeling, such as tactile-visual signing, were observed primarily at storytime. With Hugo, displaced signing was rather restricted to signing close to the object or picture as vocal mode was used when he was not in contact by vision (III). The twins communicated with gestures, representational gestures, simplified signs and a few signs in 'one-sign-phrases' that were eventually combined with pointing. Hugo, however, simultaneously also used simplified vocal words and combined some words. With the twins, Nicolìa used single-sign phrases expressed clearly.

In the *second segment*, from the 15-month until the 24-month session the twins' communicative initiations increased and surpassed those of the parents, which decreased in comparison with the 10 to 13-month segment. Mother was observed to guide the twins' 'gaze-contact' to alter also towards the face as used in gestural-visual mode. Utterances were expanded by verbs and narrative structure. In comparison, mediated changes in sign language structure were first observed with Diana. Nicolìa, in interchange with the twins, was observed to increase the length of her utterances and displace initial signs into the child's line of vision.

The twins' two-sign-phrase utterances turned into multi-phrases. Gaze-altering between object, sign and face turned into perceiving signing, mainly by looking towards the partner's face, thus perceiving the manual signs from the visual field. Diana was looking for information in visual-gestural mode and looked for the interlocutor's visual attention in play from 17 months. At 22 months, Diana was observed to use narrative structure⁴ and

⁴ Narrative structure in sign languages contains three parts. In the first during eye-contact the story teller gives the interlocutor information about the coming story. The second and

classifiers⁵, with 'errors' however; when representing a previously mentioned object, for example with a BIRD she used a classifier normally used for a person. The lively facial expressions she used were replaced at the 24-month session by a blank face (II), which is seen as characterizing an analytic phase.

With Hugo, the parents' attentional vocal and simultaneous-expressions decreased from the 15-month session and were omitted from the 17-month session. In contrast, Hugo's multi-expressions were maximized and diminished as his re-directing gestural expressions increased. This corresponds with the time, 22 months, when Hugo showed gestural-visual modality awareness by looking for and paying visual attention to at 24 months require visual attention from his partner (III).

In the *third segment*, from the 28-month until the 40-month session, initiations tended to be more equal; thus the parents' initiations increased and the twins' initiations decreased but were still higher than the parents'. The communicative content turned into a conversational interchange in which the parents expanded conversation beyond the concrete object or picture. While they were doing this, they used 'visual-contact', that is, they used gaze grammatically in accordance with gestural-visual modality including gaze-checks for the partner's attention. Diana was observed to use gaze-checks at the age of 32 months, and in her previously blank face various facial grammatical components eventually appeared (II).

During the 28 and 32-month sessions Hugo primarily used vocal utterances but he initiated interaction by gestural-visual expressions during the entire segment. However, at 36 months Hugo was observed to make gaze-checks. This was also the age when the parents' vocal initiations were re-observed with Hugo. At the 40-month session, Hugo told a story including narrative structure and classifiers, made referential locations and referred to the location. When not in visual contact with Hugo, the parents separated the languages and a few SimBlend utterances were observed (III). Actually, the latter type increased over time and the interactional style continued throughout the entire study.

With Diana the parents used visual-gestural mode; however, at the time when it was possible to speech-read Diana's spoken Swedish, a year and a half after the cochlear implantation, Mother used a few SimBlend utterances. At storytime, Mother separated the languages after Diana had had the

episodic part is performed without eye-contact. The final is performed in mutual eye-contact (Emmorey, 2002).

⁵ Classifier is a handshape representing an object (Emmorey, 2002), for example a falling bird by a flat-handshape. Classifier can also represent multiple states like a bird sitting on a wire, that is, poly synthetic (Wallin, 1994).

CI for two years. Hugo, however, soon after they were four years old, used SimBlend with Diana (IV). The participants' critical changes are compiled longitudinally in a table (Appendix 2).

Inclusive Actions

Inclusive actions in the family were conducted by using the common language, SSL. From the onset of this study the participants were observed to explain the others' actions to those who had not shared the environmental visual information. Examples of this were at 10 months when Hugo informed the Observer "mom left the room because the phone rang". Mother, at the same session, told Diana why she would leave the room, to change Hugo's diaper.

Father primarily used SSL but with Hugo he inserted vocal words until the 22-month session. Including family members during the first three years of the study, whenever Hugo was close by but visually busy elsewhere, Mother inserted single vocal words in her signed communication. In vocal communication with Hugo she inserted single signs instead, which from the 44-month session tended towards using SimBlend on some occasions.

Follow-in

The parents, in interactions primarily between the twins and Mother, were observed to follow-in throughout the entire project; in this way the child's interests were discovered and Mother extended on the interests.

During the first months, Mother followed-in and extended on the objects and actions the twins were engaged in. From 15 months, Mother extended on how the twins responded to her questions about what was happening, for example in a picture. Finally, the twins' statements and reasoning were extended with discussions and explanations.

Simultaneous-tactile-looking

At the 12 and 13-month storytime sessions, Diana typically sat on Mother's lap, with her back towards Mother and turned towards Hugo. Mother arranged a triangular setting by placing the book so that all of them could see and share the pictures (Figure 2). The Figure shows joint attention while the participants' gazes are maintained and focused on the picture. From Mother's position she could simultaneously perceive all Diana's gestural-performed utterances by looking over her shoulder. Hugo's gestural utterances were perceived from the slightly opposite position where his vocal utterances could also be visually perceived. Mother used several modali-

ties, gestural, vocal and tactile. In Figure 2, Mother signs 'FLOWER' tactilely on Diana and simultaneously says *flower*.



Figure 2. Reading positions at Storytime, *simultaneous-tactile-looking* during the 12 and 13-month sessions.

Mother's attentional expressions were used according to the context; thus when reading, this was done differently but often simultaneously with Diana and Hugo (Figure 1). Firstly, there is the positioning triangle setting with Hugo sitting slightly opposite Mother, who had Diana on her lap with the book at the third angle. Secondly, Mother with her arms around Diana mainly signed all signs conventionally performed on one's own body displaced tactilely on Diana's body. Diana perceived these kinesthetically, for example, CAP (I, Episode 3) and Hugo visually. Thirdly, when accompanied by a vocative, Hugo might have perceived the word by aural mode or additionally by simultaneous visual mode, for example, *doggie*/DOG (I, Episode 4). Fourthly, presumably Diana could kinesthetically perceive vibrations of vocal utterances in terms of length and intensity when in close physical contact with the speaker. (When positioned slightly opposite someone speaking, Diana could possibly also notice such utterances visually.) Fifthly, signing conventionally performed in the space in front of the signer Mother instead signed with the arms around Diana as if Diana was the signer (Figure 2). Mother scaffolded a situation in which Diana could perceive as if she herself was maintaining or directing the signing, whereas Hugo's perspective was possibly the receiver's. Thus Diana and Hugo might have been scaffolded to conceptualize Diana as a signing person. This setting constituted an environment of joint attention by *simultaneous-tactile-looking* for all three of them. At the same time, Diana did not need to break the link

between object and information by sequential looking, that is, switching her gaze between object, Hugo or Mother. Additionally, Mother might in this way have established Diana as a signer by mediating *the signer's perspective*. As for Hugo, he seemed to be mediated by establishing and performing bimodal communication.

Gaze-altering Development

The episodes that the analyses and the descriptions are based on consist of interchanges of joint attention. In these a pattern of gaze mediation was revealed over time, which also differed between the deaf and the hearing twin.

During the two first months of this study, Mother encouraged *eye-contact*, which when in contact was more or less fixed. With Diana, Mother displaced her signing in Diana's line of vision, which got Diana to look at Mother. Another way was waiting for Diana to look at her, which Mother rewarded with a smile or a nod. Mother, when not in eye-contact with Hugo, rather used vocal mode, often accompanied by a sign performed in Hugo's peripheral visual field. In many cases this made Hugo look at Mother, which mostly resulted in her continuing in gestural mode using the same encouragement as with Diana. Mother used the linguistic system in different ways. With Diana, she clearly scaffolded a cultural, gestural-visual modality, while with Hugo, she initially often used vocal-aural mode that changed into gestural mode after obtaining eye-contact. However, Mother also simultaneously combined the two modalities, which might relate to bridging interactions between family members and/or to Hugo's intersubjective feedback on vocal-aural mode.

Children's books were for the first time observed at the 12-month session in which Mother did not encourage gaze-switches from the shared picture; nor was mutual gaze encouraged. Mother communicated bimodally, as already described; with Diana on her lap, Mother signed as if Diana was the signer. This made it possible for Diana to focus attention on the picture while at the same time getting visual and kinesthetic information about it. Mother's bimodal communication gave Hugo the same possibility to perceive information visually or simultaneously aurally while focusing on the target.

Mother, sparsely at the 13-month session and then frequently until the 24-month session, mediated *gaze-altering*. This was done with Diana first by Mother gently scaffolding by a slow and clear manual movement between object, signing and Mother's facial expression (II, Episode 4). With Hugo, Mother often initiated bimodally when mutual gaze was established, continuing in gestural-visual modality. A pointing referring back to the pic-

ture finished the scaffolding of twin's gaze (II Episode 5; III, Episode 2). In this way twin's gaze altered between object, signing and Mother's face. Mediating differences concerning use of language culture and its timing are exemplified in the last paragraph.

At the 15-month session and onwards, Mother also used gaze as a marker of narrative structure, having mutual contact by eye at the moments of information. During the narrative-episode she used gaze for grammatical purposes⁶. Later, Mother only initially displaced her sign, continuing into her conventional signing space.

At 22 months, Diana occasionally initiated by a displaced sign and finished by pointing that referred back to the picture (II, Episode 6). She switched gaze flexibly between object and partner's face, perceiving signing from the peripheral visual field and using narrative gaze-structure.

The parents' initial stage of mutual gaze got shorter and shorter until the sign came almost at the same time or just before the contact. That made the gaze-contact function more like a gaze-check for the listener's *visual-contact*. This contact did not need to be mutual contact by eye when the focus was on a joint target; it was rather a check that the partner was attentive to the signs performed in the partner's field or line of vision. The initial signs were sometimes performed with a larger movement into the partner's peripheral field of vision and then attention was checked. Mutual gaze was used when turning over or finishing a turn in the exchanges, whereby gaze was expected in the family interaction. This kind of dynamic gaze in visual-contact was observed in Diana's signing at 32 months and in Hugo's signing at 36 months. The gaze-checks seemed to be used as reassurance of the partner's maintained visual attention.

What-format

Over time, many formats were used that from the 10-month session, for example, consisted in giving and taking in 'the thank you game' promoting turn-taking. The scaffolding changed as the twins transformed their use of symbols. The basic formats, irrespective of the mode, were: point-name, point-name-point, point-what-question rhetorically responded to and point-what-question (II & III).

The procedure changed, over time, from point-name to point-name-point a month later, which then transformed into WHAT-questions. Mother used more WHAT-questions with Hugo than with Diana and they were ob-

⁶ In signed languages gaze is used grammatically as a non-manual part of a sign and also for referencing (Baker & Cokely, 1981; Emmorey, 2002).

served with both children from 12 months. After intentionally moving an object or after the child had looked up, questions were put to encourage a response, with eyebrows up and nodding, which is ungrammatical but used with infants in gestural mode. After a short interlude, Mother rhetorically responded to these questions by labeling. The twins did some pointing at objects, followed by eye-contact that Mother responded to by naming. Diana's requests primarily concerned explanations of what her siblings were doing, often in situations when they did something bold.

At 13 months, Diana uttered sign phrases consisting of a deictic point 'complementary' combined with a noun as in "There's ...". Interactions between the three of them consisted, for example, of Hugo pointing at the picture, sees Diana's sign-utterance (Figure 3a) and Mother confirms first by blending-in (Figure 3b), that is, by single insertion of vocal mode in her signing.



Figure 3a. WHAT-format at 13 months. Diana: "point SHOE" Hugo "points" at the shoe picture.



Figure 3b. Mother: "Y-E-S SHOE SHOE point Y-E-S SHOE".

Mother expanded her phrases with point-WHAT-questions rhetorically responded to, 'VERbalizations' and reference pointing at the noun, whose label was now left out (II).

Hugo asked WHAT-questions from 13 months "there WHAT" and got labeling as responses. He also initiated and commented in vocal mode, which was not received by the caregivers. They responded with a WHAT-question to which Hugo mostly repeated a shorter utterance (III).

At 15 months, the twins responded to WHAT-questions by pointing at or naming, which in the following sessions were transformed into a combination of deictic gesture and labeling. However, in gestural mode WHAT-

questions were used ungrammatically with an encouraging facial expression until the 17-month session.

During the end of the second segment Mother extended the questions into phrases. From the responses Mother found out the child's focus and extended from there.

Hugo's vocal *what*-questions vanished from 24 months when he kept gaze-contact and gestural communication (III). After the 28-month session, parents used what-questions to expand on the content regarding what was in focus. At the end of the third segment, the what-question became a call for the children to extend their discussions with reasoning. Hugo's interest in objects and their functions was probably the reason why, during the first 30 months of the study, Hugo got more what-questions than Diana.

Highlighting Differences Involving the Twins

Displaced signing

With Diana (II)

In both initiating and communicating, the parents signed displaced in Diana's visual line, in her peripheral field of vision, or tactilely (12 and 13-months sessions) on her body and they waited for Diana to make mutual contact by eye. Re-directing expressions were observed with Diana from 17 months.

With Hugo (III)

The parents seldom used displaced signing and pointing was used with pictures or objects. When Hugo was looking at the picture, pointing was performed in his line of vision. The parents used one language as a base, on which symbols from the other language were inserted. When mutual contact by gaze was established, the parents used gestural mode. Overall when comforting without mutual gaze, vocal modality was used. They also used vocal mode and multi-attentional expressions (using his first name or making sounds with, for example, a visible object) primarily at the 15-month session.

From the 17-month session, the parents started using only attentional expressions in gestural mode with Hugo, thus with both twins. However, the parents continued to insert vocal word or sign into the other language base.

From the 22-month session, the parents' signing tended to be less displaced and re-directing initiations were frequently used, that is, in gestural mode.

Language cultural difference in gaze-altering

Hugo made gaze-altering at 12 months by vocal and gestural guidance, for example:

“Hugo! He turns towards Mother who signs TELEPHONE then looks towards the object while saying *look there*/pointing at the object.”

Here, Mother used vocal modality to initiate interchange. When having eye-contact, she used gestural mode, which continued into the pointing. The directive (*look*) and the deictic (*there*) vocal words together with a deictic pointing were commonly used in spoken mode and at this age to alter gaze towards her or towards the target.

Mediating performance that Hugo did not repeat

The parents’ single simultaneous insertions, into the vocal or the gestural linguistic base, were not repeated by Hugo. Instead, he simultaneously blended the whole utterances or primarily used vocal mode (III). This made the parents decide (from the field notes and interview) not to attract Hugo’s attention in vocal mode from the time Hugo was 17 months old (I). However, when Hugo showed modality recognition, this coincided with the parents’ increased use of vocal initiations, observed at 36 months.

Tactile signing

At the 12 and 13-month sessions, Mother, with Diana on her lap and her arms around her, continuously signed displaced with Diana having the ‘signer’s perspective’, as if Diana was the signer. A sign like DOG, which is conventionally performed with one hand on one’s own thigh, was signed by Mother either conventionally on her own thigh or displaced and tactilely on Diana’s leg; but with Hugo, Mother signed conventionally. Diana was never observed to repeat these tactile displaced signs. Although Mother rarely made tactile signs on Hugo, at 12 months he performed one on Mother (III). She then took him by the wrist and referred his displaced hand back to his own thigh; still holding his wrist, she then performed the sign on him. Mother’s behavior could be interpreted as a direction to Hugo to sign from his own perspective.

Language components that were not observed as mediated

Hugo made crossover, at the 24-month session, by using DAD when signing to his father and by using his own sign name, HG, which was not observed in the other family members’ signing.

Diana used THEN when telling about what she had experienced, which is not conventionally used in adult Swedish Sign Language.

Time difference

As Hugo was bilingual from birth and Diana's acquisition was sequential, differences in time were expected concerning their vocal mode. However, from the 10-month session Hugo was also expressing gesture, simplified signs and simplified vocal words simultaneously whereas Diana used gestures. What-questions were also posed earlier to Hugo. The mediated gestural gaze-altering observed earlier with Diana was probably because it was possible to alter Hugo's gaze by using vocatives.

To scaffold Diana's gaze-altering between object, sign and face Mother brought the sign towards her face and expressed the facial component, as exemplified at the 13-month session (II, Episode 4).

"Mother pointing at a picture signing YOGHURT VERbalizing: handform-SPOON-TAKE-UP-from-picture moving SPOON-BRING-towards Mother's mouth while Diana gaze-follows Mother's hand moving. As Mother's hand reaches Mother's mouth they get mutual contact by gaze. Mother: opens and closes her mouth while mouthing NAM NAM, USE-TO pointing at Diana as for you."

This kind of gaze guidance was observed with Hugo at the 15-month session.

Components like classifiers and non-manual facial expressions were scaffolded with Diana at the 22-month session. This was not observed with Hugo; however, at 40 months, besides the above-mentioned, he also controlled locating reference in space and referencing to it.

In Diana's second language acquisition, after the age of 35 months and with the CI, none of the formats used in the twins' first language acquisition were used. Instead, Diana eventually added spoken language simultaneously with the signed communication until the languages were used separately when Diana was 61 months old. Mother's first comment on Diana's spoken utterance was at the 54-month session. This was also when Mother positioned herself opposite Diana probably to speech-read her.

Mediating theoretically

By elaborating the Activity model in mediation of bimodal bilingualism an abductive process emerged in which the model developed.

Mother arranged the triangular position, which can be interpreted as a cultural action of establishing mutual joint attention and sharing in signed languages. In Figure 1 the action theoretical triangle consists of the subject, the object of interest and the cultural tool that is used to elaborate the

focus. However, in this study there were two subjects Diana and Hugo, with whom the *Mediator*, mainly the Mother, interacted. During the first segment of observation, Diana was sitting on her Mother's lap, described above as simultaneous-tactile-looking (Figure 2). She used SSL and spoken Swedish as parallel mediating cultural tools (Figure 3). The mediator (Mother) scaffolded first language acquisition (with Diana) as well as parallel bimodal bilingual first language acquisition (with Hugo). Hence, neither one theoretical two-dimensional action triangle nor a pair of triangles cover the simultaneous mediating complexity displayed in this study. However, by having two lines drawn between the angles of subjects (Figure 4), indicating the dual mediating cultural tool and a third line referring to the object, three *Mediating* lines meet, forming a three-dimensional model. Thus, the bimodal bilingual setting in this study consists of an additional mediating dimension in comparison to using one language, at the time, as the mediating cultural tool.

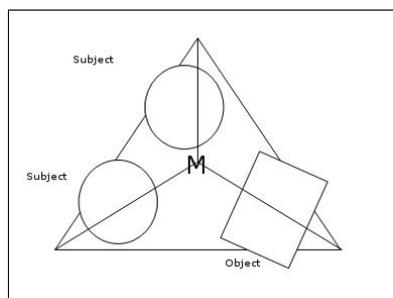


Figure 4. Mediating bimodal triadic interactions

Diana built her spoken Swedish second language acquisition simultaneously with her SSL utterances, by increasingly blending-in vocalizations and eventually words (vocal mode) (IV). Thus, when reading the book Diana used spoken Swedish as a cultural tool and SSL to mediate the activity. This theoretical model will now be used to elaborate Diana's spoken Swedish. Figure 5 contains Diana (subject), in actions directed towards the object (reading) in which she used spoken Swedish as the cultural tool. Here, Diana simultaneously self-scaffolded the spoken Swedish (vocal mode) by SSL (gestural mode) a cultural mediating tool in which she was skilled.

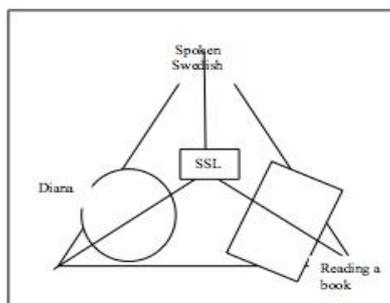


Figure 5. Mediated self-scaffolding of sequential bimodal bilingualism

In communicative situations Diana also scaffolded her second language (spoken language) first by blending-in vocalizations and later by using SimBlend. Thus she was understood both by SSL-signers and a bimodal environment. In this, her first language worked as a mediating cultural tool for a continued developmental path while her L2 increasingly came to be understood by an extended environment. This self-scaffolding and scaffolding mediation was revealed owing to the different modality features of the two languages.

Analytical separation of the linguistic channels

Both Diana and Hugo showed traits of disrupted language processes that turned out differently.

Diana's expressive face became almost blank at the age of 24 months (II). Her mouth was still moving with her signing but not yet consistently with nouns and infinitive verbs, which is quite common in SSL. From 28 months of age and forward, the SSL morphology developed and facial expressions were eventually frequently used. This changed at the age of 4;6 years (IV), when Diana used SSL syntax but with few morphological changes, that is, inflections. Her face was blank while adding vocalizations to most of her utterances. At the age of 5;1 years, the SSL facial morphology was re-established and in vocal mode she used some morphological changes. At the age of 5;7 years, she interacted in spoken conversation, discriminating speech without speech-reading in an environment with talking children.

Hugo, however, preferred vocal mode during the 28-month and 32-month sessions, and then at 36 months and onwards he increasingly showed a variety of SSL morphological changes including non-manual components (III, Episode 6).

Taken together, these bilingual traits, followed by increased morphological inflections in both Diana's and Hugo's acquisitions, seem to be more than coincidental.

Communicative types

The family language was sign language, which included all the family members. Thus, six different types of communication, gestural-visual, vocal-aural, tactile-kinesthetic/visual (12- and 13-month sessions), blend-in, code-switch and SimBlend were used in the interactions (Table 2). From the onset of the study Mother used one language base, gestural-visual or vocal-aural, at a time. Into this, she blended-in by inserting a symbol, word or sign from the other modality. In vocal-aural mode (Table 2), this was done, in dyadic and triadic interaction, when not in face-to-face contact with Hugo. When Hugo was 10 months old, Mother vocally tuned-in to his vocalizations (III). A single vocal word was also inserted to attract or include Hugo when Mother interacted in gestural-visual mode with Diana and Nicolía. From the 17 to the 36-month session the parents established attention in gestural mode with Hugo. During the entire study when not having mutual gaze with Hugo the parents used vocal-aural mode in cases of comforting and fostering.

Gestural-visual mode (Table 2) was the one mostly used. With Diana, clear signing was displaced in her line or field of vision. The tactile-kinesthetic/visual mode was mainly used at the 12 and 13-month sessions, also accompanied by simultaneous insertion of blending-in vocal mode. With Hugo, displaced signing was not as frequent and when used it was primarily in his field of vision.

Signing that scaffolded gaze-alteration to perceive facial expressions was observed when Diana was 13 months and Hugo 15 months old. Narratives were performed in gestural-visual mode.

From the onset Hugo communicated the two modalities simultaneously (Table 2, column: SimBlend). In private speech he separated the languages at 15 months. Hugo showed awareness of being visual attentive at the age of 22 months and required visual attention from his partner at 24 months. However, during the 28 and 32-month sessions he hardly signed at all. Thereafter, the modality Hugo used was according to his partner's visual attention.

Diana received sounds through a CI at the age of 35 months. However, already at the age of 15 months and 32 months she had accompanied her signing with vocalizations, which increased after the implantation. Diana with Hugo used a few simultaneously blended utterances at 40-month session and with others family members at 49 months. While, Hugo was observed to use some SimBlend (Table 2, column: SimBlend) with Diana from

their age of 44 months. The parents used SimBlend when hearing persons not skilled in SSL were present. It was not until the 44-month session that primarily Mother used SimBlend with Hugo. This coincides with the time when Hugo had separated and showed language recognition. From the 61-month session Mother, was observed and from then on she used SimBlend with both twins.

Hugo increased his vocal modality and also made comments on Diana’s phonetic and grammatical expressions that probably challenged her to develop her spoken utterances. During the seventh year of the twins’ life they primarily spoke to each other. With others, they adapted their communication according to the partner and the visibility as well as to disturbing sounds.

Table 2. Modality communicative types used in this study

Gestural-visual Simultaneous in space and face	Vocal-aural Sequential and linear	Tactile-kinesthetic/visual Simultaneous	Blend-in Simultaneous	Code-switch Sequential	SimBlend Simultaneous utterances
Most used throughout this study. From the onset; Clear Displaced signing Development of gaze Facial Expressions From 15 months Used in narratives.	Clear with infant Tone Volym	Adult displaced signing on and in front of child. Simultaneous insertion of vocal mode v.v. Mainly used during the 12- and 13-month sessions.	Single sign or word simultaneously inserted into the used language base.	One mode at the time often first vocal for stable face-to-face contact.	Used, in variable range, by Hugo during the entire study. Diana with Hugo from 40 months, with others from 49 months. Parents with hearing persons present, with Hugo from age 44 months and with both twins from 61. Not used in narratives possibly due to the simultaneous presentation in space compared to the vocal sequential.

As described above, the parents scaffolded Hugo’s and Diana’s bilingualism differently. The critical changes in action and language structure that transformed over time are compiled in Appendix 2.

Discussion

The overall purpose of this longitudinal interactional case study was to explore, analyze and describe phenomena in early communication and language. This concerns acquisition of Swedish Sign Language and spoken Swedish, as well as the guidance or mediation of this bimodal bilingualism. This study has longitudinally explored the mediation of bimodal bilingual acquisitions in a pair of fraternal twins, one deaf and one hearing, in a Deaf family. Observations of interactions were conducted from the time the twins were 10 months until they were 81 months old. In Article I attentional expressions are in focus while the other articles are dedicated to *critical changes* in the twins' language development. Both acquisitions and mediations were performed in different ways since Hugo's were parallel (III) from birth while Diana's (IV) were sequential. However, even Diana perceived sounds and vocatives from birth through tactile and visual input. Another factor is personality and interests. Diana was more engaged in the storytime activity whereas Hugo was more motorically active and engaged in play.

A contribution to early child research relative to special education as well as to education in general is provided by the longitudinal set of descriptive episodes (I - IV). These display critical changes in language acquisition as well as their relation to mediation (compiled in Appendix 2). The episodes also contain the two types of bimodal bilingualism, including interaction patterns, which seem to be lacking in previous literature. An additional contribution to research is the longitudinal description of spoken Swedish built on Swedish Sign Language (IV). These findings (IV & III) can be useful when applied pedagogically in various practices and purposes, like in for example inclusive actions.

The findings from the abductive comparisons corroborate with sociocultural theory (Van Lier, 2004; Van Lier & Corson, 1998; Vygotsky, 1934/1962), which emphasizes language as man's primary tool and bearer of cultural heritage through social interactions. Vygotsky (1934/1962) claims that this heritage is carried on from generation to generation by mediated actions promoting acquisition. In this study, the cultural heritage is bimodal and bilingual. Further, in sociocultural theory the child's poten-

tial, 'the zone of proximal development' (Vygotsky, 1934/1962), can be challenged by adjusting learning situations to the child thus enhancing future development. If the child has already acquired proficiency within an area, and the challenge is below that level or is too far advanced, no development will occur. The mediation in patterns and the scaffolding in this study continuously provide examples associated with the zone of proximal development. Such studies of parentally mediated bimodal bilingualism have not been found previously reported.

The abductive comparisons with previous literature on sign language acquisition, primarily ASL and Sign Language of the Netherlands, are in line with the findings noted in this study. However, the manual symbols, hand-shapes, movements and, which is quite common in SSL, mouthing noun loanwords from spoken Swedish (Ahlgren & Bergman, 2006) are different.

In the following discussion, comparisons with phases of development will be first in focus. This is followed by discussions concerning critical change, simultaneous-tactile-looking, development of gaze, linguistic channels, blending, inclusion and peers. Finally, this study's findings are placed in an ecological perspective.

Comparison of interactional segments

The interactional segments in this study primarily refer to interactional style, development of language and gaze related to language structure. Overall the parents followed-in (Tomasello & Farrar, 1986) the twins' respective focuses and expanded on them.

The interactions were divided into three segments: from the onset of the study at the 10-month session until the 13-month session, from the 15-month until the 24-month session and from the 28-month until the 40-month session. These segments coincide with the "developmental phases in infancy: communication and self-regulation" presented in *Sharing make sense* (Trevarthen, 1987, p. 197). Trevarthen presents matched developmental phases (hearing children of hearing parents) in accordance with language (Halliday, 1978), self-regulation with Mother (Sander, 1986), domains of relatedness of self-awareness (Stern, 1985), and subjective and intersubjective motives (Trevarthen, 1982). Trevarthen's (1987) compilation also largely coincides with the 'social dance' intergenerational transmission (Hart & Risely, 1999). It has to be made explicit, however, that the shift Trevarthen made at 22 months contains narrative and dialogue (Halliday, 1978), language expressing thought (Sander, 1986) and play with peers (Trevarthen, 1982), which are also reported in this study from 22 months. However, the mediated interactional style in this study during the second segment, 15 to 24-month session, characterized attentive guidance of the twins' language structure (Appendix 2).

At the 28-month session, the style had changed again. The parents did not visually attentively watch the twins' actions. They seemed to expect the twins to be capable of pragmatic actions like waiting for their turn, making adequate initiations and bringing up different topics that the parents extended with information. Once the children's utterances were equal, in number, to those of their parents, Hart and Risely (1999) reported less attentiveness. This is a sign of the parents' giving the floor to the child's explaining and elaborating while their parents listened and answered cooperatively, constructing both meaning and language in the dialogue, which is also emphasized by Bruner (1983). The latter style of interaction continued throughout the study, and the interactions between the children increased over time (IV).

Formats used in critical changes

As mentioned above "*critical changes* were defined as transforms in the child's language acquisition, which over time, correspond with mediated communicative actions and language structure. 'Errors' were not considered to be faults but possible transforms within the acquisitions or mediations". This provides connections between mediation and language acquisition that have been followed throughout this study. From the mediation long-term pattern of follow-in, a format was used in which concrete scaffolding was imbedded (Bruner, 1983). Mother looked for and asked for the child's interests, thereby finding out where to start or maintain the interchange.

A format frequently used, in the first segment, was the What-question, with which milestones in the children's acquisitions were transformed from pointing gesture to language structure through 'point-name, point-name-point, point-what-question rhetorically responded to and point-what-question responded to by the child. From the end of the second segment Mother used the children's response to find out their focuses and expand the interaction from there. These formats or games, as Bruner (1983) called them, first achieve joint attention and later achievement of reference that depends upon the child's "mastery of discourse and dialogue" (p. 88). These formats were used irrespective of modality.

Further, pointing in signed languages is used for various references (Ahlgren, 1990; Hatzopoulou, 2008). In this case study, the parents changed from naming to referring by pointing at a subject (II, Episode 4, 15 months), and towards an object (III, Episode 4, 22 months). In Hugo's dialogue at 40 months (III, Episode 6) he first located the reference, petrol station, in his signing space and then referred towards it by pointing. In the dialogue, he

used not only the referencing but also other linguistic rules in a meaningful narrative discourse from the one-person perspective.

Another format that scaffolds linguistic structure, discourse and gaze alteration seems to be VERbalizing in which a noun converts into a verb. This catches the child's gaze that follows to where the interlocutor intends it to be, which could be towards the face where non-manual expressions are performed, or towards a sign transforming into a classifier like a FOOTBALL FLY-AWAY-FAST-SLIGHTLY-UPWARD. These verbs or predicates indicate both the type of object and the action, containing more explicit referential information than verbs in the standard sequential spoken comparison language (Hoiting, 2006). This cultural possibility, to express multi-informational content simultaneously seems to be the convincing reason why the parents in this study used sign language in their narratives.

Simultaneous-tactile-looking

Simultaneous looking (Loots & Devisé, 2003a) is emphasized for hearing children in triadic joint attention (Estigarribia & Clark, 2007). In this, an infant visually focus on an object and at the same time attends aurally to another individual. The sharing effect scaffolds the infant's early linguistic interaction and learning (Carpenter et al., 1998). A much-discussed issue concerning deaf children is restricted sharing effects due to the switch of attention from the previous focus (Loots & Devisé, 2003a; 2003b) referred to as 'sequential looking' (Loots & Devisé, 2003a; Spencer et al., 2004). However in this study, during the 12 and 13-month sessions, Mother made the continuing interaction possible for all to share by arranging a multi-modal triangular seating position (Figure 2), sharing focus in *Simultaneous-tactile-looking*. Here, the deaf infant simultaneously got information kinesi-therically and visually close to the object. With the hearing infant the simultaneous visual information was combined with aural insertions. This is a highlighted finding; thus simultaneous-tactile-looking seemed to have the same sharing effect as Carpenter et al. (1998) described.

In this study, simultaneous-tactile-looking solved the issue of sequential-looking, additionally, with two children having different hearing statuses. Consequently, only a few redirecting expressions (physical tapping) by the parent were observed during these months. Such expressions were previously reported as the visual-tactile strategy used by Deaf mothers with their deaf and hearing child (Gale & Schick, 2008; Harris & Mohay, 1997; Loots & Devisé, 2003a; 2003b; Loots et al., 2005; Koester et al., 2004; Van den Boegarde, 2000; Waxman & Spencer, 1997).

In the present study, various modalities were used to make the interactional complexity meaningful. This approach, Knox and Stevens (1993) claim, according to Vygotsky, organizes and shapes the available world. The

parents managed this by following-in (Tomasello & Farrar 1986) the twins' focuses, often by simultaneously inserting a symbol from the other modality. This is a considerably more complex situation compared to the (hearing) twin interactions that Thorpe et al. (2003) emphasize as complex twin interactions.

The ways in which various conditions work were revealed by visual-gestural, kinesthetic-tactile and aural-vocal modalities. Mother (Father was not present at the 12 and 13-month sessions) gave both twins the opportunity to perceive at the same time as an interchange was going on with the other twin. In this way, the parent both divided and engaged interchanges with both twins according to their personality and need (Lytton & Gallagher, 2002). This additionally indicates Mother's trust in the twins' ability to perceive information (Vygotsky, 1934/1962). Possibly the divided communication with infants at the same age and in the context of storytime or playtime meant that the tactile mode was used more often than has been found in previous studies. This again indicates the importance of simultaneous-tactile-looking and its scaffolding function. In addition, simultaneous-tactile-looking supports different communicative types, which can vary according to condition and situation. This finding does not seem to have been studied earlier.

Bi-cultural development of gaze

The parents seem to have constantly scaffolded the twins' development of gaze; Hugo's differed from Diana's in their production. The parents accordingly increased their challenges according to gaze. These changes over time not only coincide with Diana's and Hugo's acquisition but also show how the development of gaze was mediated in gestural-visual and vocal-aural mode, thus acquiring bi-cultural competence of gaze.

As described above, gaze is culturally used in triadic joint attention with hearing children (Spencer et al., 2004), that is, simultaneous listening while looking at the target (Harris & Mohay, 1997; Loots & Devisé, 2003a; 2003b; Spencer et al., 2004). However, hearing children do frequently look at the interlocutor while interacting, as in the point-name format reported, for example, by Bruner (1983). Simultaneous looking was also the way the parents communicated with Hugo when not in contact by vision. When mutual gaze was established, the parents switched to gestural mode. Consequently, during the first segment, the parent did not wait for Hugo to establish eye-contact before communicating, which was done with Diana, in addition to the already discussed simultaneous-tactile-looking.

Something not previously highlighted is the scaffolding of gaze-altering between object, sign and partner's face, which is important in signed lan-

guages due to the simultaneous structural information (Ahlgren & Bergman, 2006; Bergman, 2012). At the end of the first segment, a sign scaffolded Diana's gaze-altering from the object to Mother's face. This was observed with Hugo in the first session in the second segment. During the second segment, gaze-altering was refined to a flexible gaze-contact that in the end primarily focused on the interlocutor's face, perceiving the signs from the visual peripheral field. Finally, in the third segment, in their communications with the twins the parents used gaze in accordance with grammatical constraints in sign language. As the gaze is concerned with language structure, gaze-checks for visual attention are included in the communication. This kind of visual-contact was observed in mid-segment and first in Diana's signing. This was not surprising as Hugo was full-time in preschool, where he used spoken language.

Separating the linguistic channels

In Diana's signing, her facial expressions were lively at the age of 22 months but almost blank a couple of months later. This coincides with Reilly's (2006) suggestion that the analytic phase demonstrated by a *blank face* takes place after the age of two years. For Hugo, a blank face was not observed, but as he preferred vocal mode, only a few signs were observed during the 28- and 32-month sessions. Hugo's behavior might, however, be connected with a separation of the linguistic channels. The months of less signing were followed by SSL-structure including a variety of non-manual components (III; Episode 6).

Diana's spoken Swedish was built on her first and signed language, simultaneously inserting elements by blending the two modalities. After 1;6 years with CI, she was not yet making any morphological changes in spoken Swedish, but her previously lively SSL structure had almost disappeared for the second time. With a blank face she used SSL syntax but few SSL morphological changes while adding vocalizations to most of her utterances. Diana's vocal structure seemed to clash with the gestural structure. The following session, the SSL morphology was re-established, whereas in vocal mode Diana's morphological changes eventually increased. Likewise, an increased morphology applied to SSL was observed after the first time Diana showed a blank face. Even the second time it seems reasonable that the hands remained as the primary perceptual linguistic articulators (Reilly, McIntire, & Bellugi, 1991), whereas the later acquired, non-manual and facial linguistic components constituting morphology were held back during the time Diana separated the linguistic channels. Thus, blank face appeared twice in Diana's sequential bilingualism. More research is needed to confirm if this is a general phenomenon.

Blending and SimBlend

The use of blending differed between the children and the parents. This is unlike Van den Bogaerde's (2000) study in which the mothers simultaneously code-blended from the infants' early ages (Van den Bogaerde & Baker, 2005). The parents in this study might have acted differently when not observed. However, this is not likely, considering their consistent behavior with both twins over such a long time.

As already mentioned, from the onset of this study, the parents instead blended-in, that is, inserted single symbols into the language base used at the time. However, this decreased between the 15 and 36-month sessions.

Hugo on the other hand, from the onset of this study until the 22-month session often simultaneously combined his utterances bimodally irrespective of contact by vision. Hugo used vocal private speech at the 24-month, from the 40-month session often SimBlend with Mother and from 44 months also with Diana. This and Hugo's use of SSL with Father and the researcher reveal bilingual awareness according to the partner.

Diana's bimodal utterances coincided with increased vocalizations in her signed utterances from the 40-month session with Hugo. In face-to-face episodes, Diana with Mother increasingly blended vocal mode from the 49-month session, but it was not until the 61-month session that Mother was observed to use SimBlend with her. Thus, Diana's increasing use of adding vocal mode to her gestural utterances, also in private-speech, seemed to have functioned as self-scaffolding of the second and spoken language (Figure 5). Diana's simultaneous blending probably also scaffolded her utterances to the persons around her. Such self-scaffolding and scaffolding in two uni-modal languages is not possible. This way not only confirms an underlying proficiency (Cummins, 1996) but also shows it explicitly by the bimodal use. Cummins also claim an inverse relation between achievement and exposure. This bridging is not a maximum exposure to the second language but a continued intellectual level by the first language. Such an approach seems similarly have been an asset in Diana's case.

SimBlend with the children was observed with Hugo from the 44-month session and with Diana from the 61-month session. Hence, the children blended before the parents, who seemed not to use SimBlend with them until the child showed recognition in both languages. This might be a consequence of the parents being bilingually schooled in both modalities.

It is clear that the children and their parents used the possibilities of simultaneous bimodal utterances differently. However, more studies of these processes are needed regarding the use of SimBlend with the purpose of mediating language acquisition.

Inclusive actions

To make inclusion possible might be the most crucial issue in contemporary educational settings. Inclusive actions in the family studied were conducted by using a common majority language, SSL, which all could share. From the onset of this study, the participants actively informed each other about what might not have been visually evident. The pattern of simultaneous-tactile-looking and the parents' insertion of symbols into the language base included all family members. Hence Mother, in vocal mode, with Hugo (from the 44-month session) or with other hearing persons added gestural mode and used SimBlend, which included all participants. The studying of inclusive learning activities within the family provides information on aspects and activities transferrable to educational settings.

From a sociocultural point of view, the inherited culture includes language use as a social tool, making meaning of one's interactions. In this perspective, speech is an instrument for developing communication and thought. Vygotsky's position was that it is "not the tools or signs, in and of themselves, which are important for thought development but the *meaning* encoded in them" (Knox & Stevens, 1993, p. 15). This position might be the reason why Vygotsky in his later work changed his view and postulated that sign language was important for developing deaf children's interpersonal communication and inner thought (Zaitseva, Pursglove & Gregory, 1999).

In the family studied, several interactional styles appeared over time, as shown in the segments, as well as different communicative types (Table 2). The children were encouraged to interact irrespective of mode as long as mutual understanding was reached. "Theoretically, then, the type of symbolic system should not matter, as long as meaning is retained" (Knox & Stevens, 1993, p. 15). Both the parents and the children actively gave each other information, from the onset of this study. This and the possibility of bimodal blending, in the pattern of simultaneous-tactile-looking, and by inserting single word or sign into the language base used at the particular time also resulted in avoiding exclusion.

At the end of the study, the language chosen depended on the participants and on factors in the physical environment like sound, light and acoustics. Dynamic interchanges of multiple communication types were used. Thus this case has shown multiple ways in which bimodality can promote bilingualism among children with different hearing statuses.

Gestural modality in preschool settings with hearing children has also been seen as an asset for development. In one such setting, with diverse languages, the purpose of implementing the sign language approach was to improve inclusion (Brereton, 2008). After a year, the gestural modality was evaluated as a powerful option. This worked as an asset against language barriers and for an increasing appreciation of language diversity among

children. Thus, the children were encouraged, by their experiences, to consider their partner when using language.

These results show the capacity of bimodality in interactional meaning-making. Taken together with studies of children using CI (Cramér-Wolrath, submitted B; Hassanzadeh, 2012; Nelfelt & Nordquist Palviainen, 2004; Preisler, 2009; Preisler, Tvingstedt & Ahlström, 2002; Uhlén, Bergman, Hägg & Eriksson, 2005) it appears that gestural mode promotes speech development.

Peers

In the observations for this study, the siblings were almost always in interaction, with or without their parents. As such, they were each other's role models in everyday life, which for this study concerns actions and language structure. In young children's development, the importance of peers' equal and more mature interchanges is emphasized in the sociocultural theory (Bruner, 1983; Van Lier, 2004; Vygotsky, 1934/1962). Throughout this study, when interacting with Hugo or Diana, Nicolia adjusted to a language level connected to the segments used by the parents. At times, Nicolia made comments on the twins' language use and organized their activities.

About a year after Diana received her CI, Hugo used SimBlend in interchanges with her and he also made comments concerning Diana's spoken utterances (61-month session). It is reasonable to believe that Hugo, as a model of bimodal bilingualism and as a 'critical' sibling, both scaffolded and challenged Diana's potential of spoken language acquisition.

Findings in an ecological perspective

Problematizing the utilization of findings in a case study to the needs of special education requires an interactive model where the *ecologic system* proposed by Bronfenbrenner (1979) seemed useful. In all the articles, I-IV, and in this framework's 'Results section', the focus was on interactions from both the mediation and the acquisition perspectives, referring to individuals on the *micro-level*. However, interactions on the *micro-level* can be further divided into *group* and *individual levels* (Ahlberg, 2007a). In these perspectives the initiation (I), and actions and language structure (II, III & IV) are actions of *cultural* mediation (Results section) (Vygotsky, 1934/1962). These actions, adjusted or abridged for inclusion by simultaneous-tactile-looking and single insertions of vocal or gestural mode, allow all family members to participate on the group level. On the individual interactional level, meaningful communication by follow-in (Tomasello & Farrar, 1986) mediated the acquisition of communicative production. In this study, expectations of expanding development were also manifested, as described

in the three segments. The latter finding can be generalized and may prove useful for parents, family members, teachers, special educators and other professionals.

The situations differ for a hearing child of deaf parents and a deaf child, irrespective of the parents' hearing statuses. A deaf child is offered various kinds of support on the *meso-level*. In Sweden, a deaf child is offered habilitation and educational support that includes medical and technological service as well as special needs education based on the diagnosis, while the parents are offered psychological, social and language support (Hörseldövforum, 2012-05-14). Hassanzadeh's (2012) study of Deaf parents and deaf children with cochlear implant throws light on the cognitive function of gestural-visual modality. This reported sign language, as first language, is the success factor in acquiring spoken language for deaf children with CI. The results from this study clearly support Hassanzadeh's findings. Such a result clearly points towards offering hearing parents plenty of knowledge, not only about the ways language/s are acquired but also about the promoting properties the languages achieve.

For a hearing child of deaf adults (KODA), like Hugo, the situation is different. A hearing child, on the *exo-level*, seems to be considered 'normal', thus, for example, not needing any special action of habilitation or information to the preschool personnel on the *meso-level*. Depending on the cultural situations, KODAs have different conditions concerning the availability of sign language as a first-language. In order to understand the situation of KODAs, especially during language acquisition and in preschool, the acknowledgment by society of the need for sign language might be crucial. These concerns, for example, support for sign language as a first-language, and informed knowledge about Deaf culture and bimodal bilingualism. In Sweden, such support is not regulated and thus preschools are not obligated to offer sign language to hearing children of Deaf parents during the preschool years. On the *micro-level*, using spoken language during the full day in a preschool might distance KODAs from sign language and thus from the parents and the family identity culture. That is, decisions made on the *macro-level* might have an effect on child development. However, concerning Swedish school students, all KODAs are offered state grants that provide SSL-teaching equal to one week in each of the school year's two semesters. This teaching can be carried out in the Special schools for the deaf or in their local school (Language Act, 2009:600). The same offer is made to hearing siblings of deaf children.

A paradox is that the referred Language Act or any other law concerning SSL does not apply to children with a hearing disability, like Diana, if they are being educated in the ordinary majority schools. However, one conclusion of this study is that efforts should be made to promote the provision of

implementing cultural and SSL support to KODAs and personnel in preschool as well as to those in schools for children with a hearing disability including CI (Roos & Fischbein, 2006).

A spontaneous acquisition of language by a deaf child is provided by sign language (Preisler, 1983). In this study a second vocal language was built on SSL from the age of three years suggesting that the previous acquired knowledge of the function, pragmatics and structure facilitated vocal language despite a late CI. Also self-scaffolding of second language acquisition by the use of first language becomes a mediating cultural tool (Figure 5; IV).

As pointed out in sociocultural theory, children are driven by their own activity to construct knowledge (Stetsenko, 2004). Hence, sign language support is crucial even for families with children that for various reasons cannot use their voice. In general, gestural mode is acknowledged as an asset in communication with babies and infants by using 'baby signs' (Acredolo & Goodwyn, 1988; Goodwyn, Acredolo, & Brown, 2000; Thomson, Cotnoir-Bichelman, McKerchar, Tate & Dancho, 2007) as well as in preschools.

Regarding diverse language environments in preschool, Brereton (2008) concluded that gestural mode is a powerful option against language barriers as well as through experience, considering the partner's language.

Meaningful interactions in the modality and modalities that the child can acquire spontaneously are also essential for children with a hearing disability. Being bilingual is an asset (van Lier, 2004) but if time passes with restricted language acquisition the child's language potential might be delayed (Abrahamsson & Hyltenstam, 2008), harming the acquisition of literacy. Thus it is of great importance that children obtain adequate support during the sensitive years of language acquisition.

Consequently, this study highlight issues on the decision-making macro- and exo-levels as well as consequences in proximal levels on the meso- and microsystem-levels.

Conclusions of this case study

- Irrespective of the type of mode mediation includes: following-in the child's initiation and focus, encouraging attitude towards communication and use of e.g. the what-format to be intersubjectively meaningful, all of which appear to promote the acquisition of languages.
- Simultaneous-tactile-looking in joint attention with a deaf child indicates its immediate shared focus without gaze-shift and the scaffolding function of the signer's perspective. It also enables divided communication with infants at the same age and in the same context but with different hearing statuses.

- Patterns that avoid exclusion are information about various parallel activities and why they occurred, parent's simultaneous-tactile-looking, and word or sign insertion into the language used at the particular time. Unlike the children, the parents used SimBlend with them when they had separated the different language structures.
- Gaze-development, eye-contact, gaze-contact and visual-contact appear to be mediated in sign language.
- The use of attentional expressions in sign language acquisition appears to change over time in accordance with both gaze and language awareness.
- The choice of narrating in sign language to children regardless of their hearing statuses seems to be due to culturally structured possibilities. Signed languages provide multi-informational content by explicit simultaneous information, compared to the standard sequential spoken mode.
- Gestural mode seems to promote the acquisition of vocal sounds even when commenced as late as at the age of three years.
- Signed first language can be used for simultaneous self-scaffolding of the spoken language. A child's bimodal bilingual utterances also scaffold the content to persons in the environment.
- The overall conclusion is that there are differences on the mediated action surface level related to modality and its language structure, while mediation on the ground level characterizes similarities irrespective of modality. Thus, studying interactions between Deaf parents, their hearing and their deaf children, including those with CI, increases knowledge that could be useful in a broad range of situations and research.

Further research

During the work on this study some questions have been accentuated in order to gain more knowledge. For example, in preschools using gestural modality, why and how is it used? Why do the children use SimBlend whereas the caregivers blended-in insertions until the child used appropriate language morphology? Finally, an interdisciplinary question concerns blended bimodal bilingual performance. Bilingual simultaneous utterances in one and the same mode are physically impossible. However, simultaneous bimodal bilingual self-scaffolding was used in this study up to where the morphological language structural level clashed. Hence, there seems to be a great need for research concerning the bimodal bilingual cognitive development and brain capacity with regard to language acquisition in young children.

Swedish Summary

Deltagarna i den här fallstudien består av en Döv familj med tre barn, där flickorna Nicolía och Diana var döva medan Dianás tvillingbror, Hugo, var hörande. När studien påbörjades var Nicolía tre år gammal medan tvillingarna Diana och Hugo var 10 månader gamla. Interaktioner i familjen har videoobserverats under sex år (Table 1). Utifrån en interaktionistisk ram var syftet med studien att över tid undersöka tillägnande av språk. Detta undersöktes så förutsättningslöst som möjligt. En koppling mellan guidande det vill säga mediering och barnens språktillägnande syntes tidigt i studien vilket kom att benämnas "kritiska förändringar".

Transkriptioner och analyser har kontinuerligt jämförts mellan deltagarna. Därefter har fynden, i en upprepande process, jämförts med tillgänglig litteratur och forskning för att slutligen anta ett sociokulturellt perspektiv i ramberättelsen.

Språken som studerades var svenskt teckenspråk det vill säga i gestuell-visuell modalitet och talad svenska i en vokal-auditiv modalitet. De två språken uttrycks genom två olika kommunikativa kanaler och benämns som bimodal bilingualitet.

Det visade sig att språktillägnet hos tvillingarna förändrades mycket under studiens tre första år. Av den anledningen fokuserar den här studien framförallt på interaktionen mellan föräldrarna och tvillingarna. Hugo var hörande och hans parallellt tvåspråkiga tillägnande följdes medan Diana först tillägnade sig teckenspråk. När Diana var 35 månader gammal fick hon ett högteknologiskt hörhjälpmedel, ett cochlea implantat (CI). Med det som verktyg tillägnade sig Diana även efter hand talad svenska, det vill säga en sekventiell bimodal bilingualitet.

Avhandlingen består av fyra delstudier (I-IV) som har inriktats mot de sätt som uppmärksamhetsuttryck, ageranden och språklig struktur har förändrats över tid. Samtliga studier bygger på videoobservationer, fältanteckningar och en intervju med föräldrarna. Den fjärde studien bygger också på information från det behandlande CI-teamets journalanteckningar. För att i interaktionerna kunna följa en händelse över tid har en bok, Grodan och Grisen, tagits med och använts vid observationerna.

Delstudierna behandlar: Uppmärksamhetsuttryck under sagostunder (I), Medierat första språk i gestuell modalitet (II), Parallell bimodal bilingualitet (III) och Sekventiell bimodal bilingualitet, med CI som verktyg (IV). Dessa delar har sedan sammanfogats i avhandlingens ramberättelse. Här åskådliggörs likheter och skillnader mellan dels medieringen av den tvåspråkiga interaktionen och dels mellan tillägnandet i Dianas respektive i Hugos tvåspråkighet. Utöver att tvillingarnas bimodala bilingualitet tillägnades under olika tider i studien (Appendix 2) visar resultaten på både generella och specifika likheter och skillnader.

Exempel på likheter som tycks vara generella för ett gynnsamt språktillägnande är att mediering görs i barnets förmodade proximala utvecklingszon (Vygotsky, 1934/1962). Det innebär att lärandet sker i relation till den kunskap och det intresse barnet förutsätts ha, och med strävan att i interaktionen utgå från en nivå som ligger strax utanför detta. Exempel på sådan medierad aktivitet i den här studien var när interaktionspartnern iakttog och *följde med in* i barnets intresse och fokus, (s.k. follow-in Tomasello & Ferrar, 1986). Ett annat exempel var att använda ett för barnet känt *format* (Bruner, 1983) som successivt utökas av att barnet, vartefter, tar över aktiviteten. *Vad-frågan* var i den här studien ett tydligt exempel på något som vid 10- och 11-månaders inspelningar inte användes, istället pekade föräldern ut ett visst föremål som sedan direkt benämndes. Därefter introducerades *vad-frågan* som besvarades av föräldern, för att ytterligare några månader senare benämnas av barnen. Från 22 månaders ålder användes *Vad-frågan* också för att få reda på hur barnen uppfattade vissa saker till exempel vad som utspelades på bilder i boken. Härigenom fick föräldern omedelbar återkoppling på hur och var ett meningsfullt (Halliday, 1978) samspel kunde utvecklas. En annan övergripande parameter som förekom i medieringen var den uppmuntrande attityden till kommunikation oavsett typ (Tabell 2), så länge förståelsen var ömsesidig.

Inkluderande ageranden

Då studien startade var tvillingarna 10 månader gamla och ett etablerat sätt för att delge varandra information observerades. Till exempel berättade föräldern för Diana varför hon och Hugo skulle gå för att byta blöja. När telefonen ringde och de optiska signalerna blinkade vände sig Hugo till observatören och informerade; att mamma gick för att svara. I familjen användes teckenspråk, det vill säga det språk som alla kunde ta del av. Framförallt inflikade föräldern *enstaka* ord eller tecken till det språk som hon för tillfället använde. Det gjorde att Hugo trots att han inte var visuellt uppmärksam på föräldern fick information om vad som hände med till exempel Diana. Det omvända inträffade i de fall då föräldrarna använde vokal modalitet med Hugo och i den flikade in *enstaka* tecken. Vid de få tillfällen då

samtal med hörande personer förekom observerades att den vokala modaliteten *simultant blandades* med tecken, så kallat SimBlend.

Interaktionsstilar inkluderar utveckling av blicken

Specifikt för tilläggande av gestuell-visuell modalitet är blickens och uppmärksamhetsuttryckens utveckling. I den här studien framkom tre segment med interaktiva stilar, och ett samband mellan dem och blickens utveckling.

I det första segmentet (10 – 13 månader) kännetecknades stilen av att föräldern väntade på att, i Dianas fall, dottern ser på föräldern. Ofta utökade föräldern då aktiviteten. *Ögon-kontakt* uppmuntrades och det gemensamma utbytet med blicken var intensiv. Hugos uppmärksamhet fångades även med ljud eller vokalt. Föräldern använde tecken för att få Dianas blick att följa från föremålet till förälderns ansikte där non-manuella uttryck tillfördes. På det sättet medierades Dianas *blick-kontakt* att alternera mellan föremål, tecken och samtalspartners ansikte.

När det gäller det andra segmentet (15-24 månader) förändrades interaktionen och det var barnen som tog flest initiativ. Föräldern medierade Hugos blick att följa från ett visst föremål till förälderns ansikte där non-manuella komponenter lades till. Medieringen utfördes allt eftersom med mindre och mindre utförliga rörelser då barnens *blick-kontakt* alternerade allt snabbare mellan föremål, tecken och samtalspartners ansikte. Därefter började föräldrarna också använda viftningar och vippande (lätt fysisk beröring s.k. tapping) uppmärksamhetsuttryck som omdirigera barnens visuella fokus. Mot slutet av segmentet visade Hugo kulturellt språklig medvetenhet genom aktiv visuell uppmärksamhet på andras gestuella kommunikation, och därefter också på att andra måste vara visuellt uppmärksamma på hans gestuella yttranden.

I det tredje segmentet (28-40 månader) förändrades interaktionen till att barnens och de vuxnas initieringar var ungefär lika många och bestod av konversationer. Nu använde föräldrarna blicken även för grammatiska ändamål. Det innebär till exempel ett kontinuerligt *blickkontrollerande* av att samtalspartnern fortfarande är visuellt uppmärksam. Denna *visuella-kontakt* observerades hos Diana vid 32 månaders ålder och hos Hugo vid 36 månader.

Ytterligare skillnader i medieringen

Skillnader i medieringen av språktillägnet var Hugos parallella respektive Dianas sekventiella processer.

Med Diana modifierades placering av tecknen mycket under det första segmentet. Tecknen placerades nära de objekt som Diana fokuserade på, i hennes visuella fokus, eller strax utanför det vill säga i hennes visuellt peri-

fera synfält. Under observationerna vid 12 och 13 månaders ålder användes simultan-taktil-uppmärksamhet som har beskrivits ovan. Dianas blick alternerade varefter allt snabbare och de modifierade placeringarna minskade successivt under det andra segmentet. I slutet av det andra segmentet observerades mediering av så kallad klassifikator, det vill säga en handform som representerar ett objekt.

Under det första segmentet påkallades Hugos uppmärksamhet frekvent med vokala ord. I dialoger med Hugo använde föräldrarna en gestuell eller vokal språklig bas det vill säga teckenspråk eller talad svenska. Till dessa baser inflikades enstaka vokala ord respektive tecken, främst substantiv. Detta fick till följd att Hugo tidigt alternerade sin blick triadiskt, från objekt, mot föräldern och tillbaka som i vokala språk. Hugo blandade ofta språken simultant även under andra segmentet.

Föräldrarna observerades minska de vokala uppmärksamhetsuttrycken drastiskt från det att Hugo var 15 månader. I intervjun berättade föräldrarna att det var en medveten handling. De hade upptäckt att de inte uppfattade när Hugo påkallade deras uppmärksamhet med rösten. De menade att ett mer renodlat kulturellt teckenspråkigt beteende från deras sida skulle påverka Hugo att differentiera sitt sätt att påkalla uppmärksamhet. Med Hugo varierades lägesmodifierade tecken i stort sett inte, men att teckna nära objekt användes frekvent under det första segmentet. Endast vid något tillfälle observerades enstaka taktila tecken. Mediering för gestuell-visuell alternans av Hugos blick observerades vid 15 månader.

Vid 22 månaders ålder observerades Hugo vara medveten om att visuellt fokusera sin samtalspartner. Vid 24 månader visade han medvetenhet om att samtalspartnern skulle fokusera visuellt på honom.

Den talade svenskan medierades olika för Hugo respektive för Diana. Vid studiens start inflikades enstaka vokala ord eller tecken i det andra språket men efter att Hugo, vid 36 månader, själv separerade de båda språken observerades främst Mamman göra detsamma. För att efter observationen vid 40-månader i ökande utsträckning använda den simultana blandformen SimBlend. Med Diana tog det ett och ett halvt år efter att hon fått CI tills förälder observerades använda enstaka talade fraser. Detta sammanföll också med att förälder placerade sig mittemot Diana troligen för att kunna tal-avläsa hennes vokala yttranden. Förälder väntade, liksom tidigare med Hugo, med att använda SimBlend tills de båda språken separerats. Detta observerades då Diana var 61 månader gammal och framåt.

Simultan-taktil-uppmärksamhet

I tecknade språk används synen både för att få kommunikativ information och i undersökandet av till exempel föremål. Just denna splittrade uppmärksamhet har diskuterats som en risk jämfört med den delade uppmärk-

samhet där barn får information samtidigt som de visuellt fokuserar det relaterade, simultaneous-looking (Loots & Devisé, 2003a). I den här studien löste föräldern detta genom att förflytta all gestuell kommunikation till Dianas perspektiv, som att *tecknarens perspektiv* var Dianas. Detta blev särskilt tydligt vid sagostunden genom en triangulär positionering. Boken på golvet utgjorde en vinkel i triangeln, den andra utgjordes av Hugo som satt snett mittemot föräldern som hade Diana i knä. Från Hugos position kunde föräldern samtidigt se både hans tecken och avläsa hans vokala uttryck. Alla tecken som konventionellt tecknas taktilt på tecknaren tecknade föräldern istället taktilt på Diana och alla tecken som konventionellt tecknas i utrymmet framför tecknaren, tecknade föräldern istället framför Diana (Figure 2). Det Diana tecknade kunde föräldern se över hennes axel (Figure 3a). Hugo kunde visuellt se föräldrarnas tecken som också förstärktes genom inflikade vokala benämningar (Figure 3b). Sammantaget gjorde det att Hugo kunde, när han var visuellt aktiv, uppfatta teckenspråket men också simultant och auditivt uppfatta i de fall då han visuellt fokuserade något annat.

Den här typen av interaktion har jag i avhandlingen kallat *simultan-taktil-uppmärksamhet* (simultaneous-tactile-looking).

Förändring av språklig struktur

Under det första segmentet, som på flera sätt beskrivits ovan, låg huvudpunkten på utpekande benämningar. När tvillingarna var 15 månader observerades föräldern berätta korta episoder kring händelser som utspelade sig på bilderna i boken. I de berättelserna använde föräldern en traditionell berättarram. Först ges information inför det som ska berättas i episoden och sist en avslutning. I teckenspråk har berättaren i den första och sista fasen ögonkontakt med lyssnaren. Episoden utan ögonkontakt kan innehålla livliga beskrivningar vilket inkluderar icke-manuella uttryck i ansikte och kropp.

Vid 22 månaders ålder använde sig Diana av den traditionella berättarramen och var i episoden mycket uttrycksfull. Men bara två månader senare hade hennes ansiktsuttryck förändrats till att vara i stort sett blankt och uttryckslost. Därefter återkom successivt under de närmaste åren olika uttryck. I litteraturen har detta fenomen uppmärksammats som 'blank face'. Reilly (2006) menar att det innebär att barnet inte längre bara uttrycker sig utan kommit till en analyseringsfas av språkets strukturer.

Efter att Diana vid knappt tre års ålder fått ett CI blandade hon snart in vokalisationer, därefter under de närmaste åren, fler och fler språkljud och vokala ord i sitt teckenspråk. På detta sätt använde Diana teckenspråket för att simultant själv stötta (self-scaffolding: Wertsch, 1985) den vokala modaliteten (Figure 5). Det var möjligt, till en viss gräns, eftersom de båda språk-

ken uttrycks med olika modaliteter. Då Diana i sitt tillägnande av talad svenska började tillföra ändelser, hade hon också separerat språken och använde dem var för sig. Vid observationstillfället före denna separering uppvisade Diana återigen ett blank face. Skillnaden denna gång var att, vid nästkommande observation, hade samtliga teckenspråkiga grammatiska strukturer återkommit. De morfologiska förändringarna i den talade svenskan observerades däremot ske successivt. Diana tycks därmed ha två analytiska faser i sin tvåspråkighet.

Vad gäller Hugo har blank face inte observerats. Till 24 månaders ålder använde han någon enstaka klassifikatorer och icke-manuella uttryck. Därefter, vid observationerna då han var 28 och 32 månader gammal, använde han i stort sett bara talad svenska. Vid 36 månader använde han återigen teckenspråk bland annat med blickkontroll för att vid 40 månader också använda en bred teckenspråkig repertoar. Den bestod bland annat av klassifikatorer och morfologiska förändringar i verb. Han använde också referens i teckenområdet framför sig som han lokaliserade ut samt refererade till (Appendix 2). Perioden från 24 till 36 månader förefaller ha utgjort en analytisk fas av teckenspråkets struktur för Hugo. Härmed tycks en sådan period av 'tystnad' kunna vara jämförbar med blank face.

Kommunikativa typer som användes och ageranden som inte var medierade I den här studien har sex olika kommunikativa typer observerats (Table 2). De är: gestuell-visuell, vokal-auditiv, taktil-kinestetisk/visuell, blanda-in, byta-språkkod och SimBlend. Dessa har också i varierande utsträckning blandats och varierats över tid. Samtliga typer utom den taktil-kinestetiska/visuella har använts av barnen.

Hugo försökte vid något tillfälle teckna HUND taktilt på föräldern. Men hon tog hans handled och förde tillbaka den till hans eget lår där hans hand, med hennes grepp om handleden, utförde tecknet. I övrigt har föräldrarna bara vid ytterligare ett tillfälle observerats använda 'molding' det vill säga format tecken med barnens händer och vid detta tillfälle på uppmaning av barnet självt.

Med Hugo observerades föräldrarna, som har beskrivits ovan, simultant flika in enstaka vokala ord eller tecken. Hugo däremot blandade ofta de båda språken simultant särskilt mellan 10-17 månader samt i ökande utsträckning efter 40 månader. Ett exempel på kulturell överföring, mellan språken, var att Hugo vid 24 månaders ålder använde sitt eget teckennamn, 'HG'. Han använde också tecknet PAPP. Sådana personbenämningar använda som tilltal är ovanligt åtminstone i svenskt teckenspråk.

Diana observerades vid 36 månader att använda SEN (sedan) för att beskriva händelser i ett kontinuum. Eftersom det i konventionellt teckenspråk finns andra konstruktioner för att beskriva kontinuum skulle detta kunna vara en

så kallad kreativ lösning på en språklig konstruktion som hon ännu inte lärt sig (Emmorey, 2002).

Slutsatser från fallstudien

- Oavsett typ eller antal använda modaliteter karaktäriseras den medierade interaktionen av att: interaktionspartnern uppmuntrar kommunikation, iakttar och följer med in i barnets initieringar, intresse och focus samt att t.ex. vad-frågan görs intersubjektivt meningsfull vid språkandet.
- *Simultan-taktil-uppmärksamhet* med ett dövt barn ger barnet möjlighet att i stunden dela ett visuellt gemensamt fokus. Detta kan ske utan att barnet vänder blicken mot interaktionspartnerns gestuella kommunikation. Härmed indikeras den taktill-visuella modalitets stöttande funktion samtidigt som den för ett hörande barn, i samma ålder och kontext, också ger utrymme för simultan-uppmärksamhet genom inflikande av vokal modalitet.
- Inkluderande mönster är information om och varför olika företeelser inträffar, Simultan-taktil-uppmärksamhet och inflikande av enstaka vokala ord eller tecken i respektive språk. Till skillnad från barnen använder föräldrarna SimBlend först när respektive barn har separerat de olika språkens strukturer.
- Utveckling av blicken: ögon-kontakt, blick-kontakt och visuell-kontakt förefaller vara medierad i teckenspråk.
- Användandet av uppmärksamhetsuttryck i teckenspråk förändras över tid och tycks förknippad med både blick- och språkmedvetenhet.
- Valet att använda teckenspråk vid berättande oberoende av barnens hörselstatus tycks förklaras av dess kulturellt strukturella möjligheter. Tecknade språk erbjuder ett multiinformativt innehåll genom den explicit simultana informationen jämfört med den i talade standardspråk sekventiella framställningen.
- Gestuell modalitet tycks främja tillägnande av vokala ljud även när det påbörjats så sent som vid tre års ålder.
- Med ett tecknat första språk kan simultan själv-stöttning göras för tillägnande av talat språk. Ett barns bimodala yttranden stöttar även omgivningens möjlighet att uppfatta innehållet vilket gör att barnets lärande inte hindras på grund av kommunikativa svårigheter.
- Den övergripande slutsatsen är att: det på ytnivå finns skillnader i medierade ageranden relaterade till modalitet och dess språkliga struktur medan mediering på grundnivå karaktäriseras av likheter oavsett modalitet. Följaktligen ger studier av interaktion mellan Döva föräldrar och deras hörande eller döva barn, inklusive CI, ökad kunskap som kan vara användbar i ett brett fält av situationer och forskning.

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Appendix 1. Glossary

Abductive method uses an iterative procedure continuously comparing and reflecting on the findings, in this case comparisons with previous reported findings on the subject.

Acquisition, in this study, refers to a child acquiring language.

Attentional expressions are used to get someone's attention.

Bilingualism is knowing two or more languages.

Bimodal is two or more channels (see modality) used in communication. A person shifting between these modes is bimodal.

Bimodal bilingual is a person knowing and using different language modality codes.

Blending of the modalities is more or less possible due to the different channels. This occurs for various reasons in interactions between individuals e.g. to include individuals not skilled in a language.

Classifier is a handshape representing an object (Emmorey, 2002), for example a falling bird by a flat-handshape. Classifier can also represent multiple states like a bird sitting on a wire, that is, poly-synthetic (Wallin, 1994).

Cochlear Implant (CI) is a high-technological hearing aid device. The external part includes a *microphone* and a *speech processor* that selects and sends sound to the *transmitter*, which codes and sends signals across the skin to the, internal array *receiver* installed by surgery. The electronic signals stimulate the hearing nerve, which are perceived by the brain as sounds.

Communication can be between two or more individuals and also one trying to reach another.

Deductive method uses a given theory for analyzing data.

Education includes pedagogical or educational work on all levels from intervention (habilitation, preschool, school and adults) that is, parents.

Gaze in signed languages is used grammatically as a non-manual part of a sign and also for referencing (Baker & Cokely, 1981; Emmorey, 2002).

Inductive method observes phenomenon. Data are explored by iterative continuous comparison, analyses indicates further choices and construct hypotheses.

Joint attention occurs when individuals have intersubjective mutual focus.

Interaction takes place between individuals.

Interchanges of communicative contents are shared between individuals.

Intersubjective comprises the sense of togetherness (Ninio & Snow, 1996), (growing) awareness of others' intentionality and shared focus (Trevarthen, 1987) and understanding (Wertsch, 1985).

Mediation is dynamic both guiding and evolving through the social interaction that occurs during meaningful joint activity. In this dialectic process and according to the context, the more experienced person uses knowledge in action as a cultural tool (Karpov, 2003; Kozulin, 2003; Vygotsky, 1934/1962).

Modality, Spoken language uses the vocal and aural channel while sign language uses the visual-gestural channel. The tactile-kinesthetic channel is used in touch with or on another individual's body and is perceived kinesthetically through the body.

Narrative structure in sign languages contains three parts. In the first during eye-contact the story teller gives the interlocutor information about the coming story. The second and episodic part is performed without eye-contact. The final part is performed in mutual eye-contact (Emmorey, 2002).

Scaffolding in a learning process is a temporary support towards a goal. This contain interpretations, complete word or activity, strategies etc., which can be made by another individual or by self-scaffolding.

Speech-reading is visually focusing on the interlocutor's mouth with the purpose of perceiving what is said.

Synthesis is used for displaying the thesis by bridging, the comparison and analyses between the results from the different articles.

Appendix 2. Critical Changes

Interactions from the 10- to 81-month sessions

Appendix 2. Critical Changes in interactions from the 10-month to the 81-month session

Age months, Activity, mediation	Parents' changes	Twins' changes	Diana's changes	Hugo's changes
10 months Playtime Eye-contact Mediating: naming Cultural: Gestural-mode, eye-contact with D and H or in visual-line with D. Not in eye-c-vocal-m with H.	Follow-in and point-naming object and verb action with eye-contact in visual-line or moves object, also tactile with D. With H also by vocatives in aural field or by vocal and gestural simultaneous insertions. T one-in affection without eye-contact, simultaneously inserting HAAARD, comment: GOOOD! Vocal second person pronoun you used and onwards. DH: Finger-spelling used as a sign.	Focus on an object visually or/and physically, use eye-contact to get information or request for help by gesture.	Makes social reference. Turns back towards interlocutor – not to be disturbed.	Uses some simplified words: <i>is that? /e de /, no, look!, nonsense: vrr r v v uh, repeat: nam nam</i> . Responds by e.g. walking towards the toy bucket. Involves the observer socially by eye-contact and simultaneous blending holding his fist to his ear saying (no/m) (c/ai/) commenting on Mother's behavior: giving information to Observer.
11 Playtime With H: WHAT-q or WHAT-q simultaneous insertion blending-in	Point-name-point, eye contact or signs displaced in visual-field or tactile mode. With H points before or after ungrammatical WHAT-blending-in (Hugo perceived aurally), when in eye-contact signs, e.g.: WHAT-point: HORSE.	Focus on an object and seek eye-contact.		Utters a word inserting the sign at the end: Ba/G. Responds by repeating in representational body sign: HORSE or sign: BAG.
12 Storytime Simultaneous-tactile-looking With D: tactile m, ungram. rhetoric WHAT-q, verbalizes With H: WHAT-q?	Responds by naming. Point-name-verbalizing, towards familiar objects, unfamiliar objects named twice. With D ungrammatical WHAT-questions rhetorical naming. Displaced visual or tactile modes: signers perspective involving parts of D body SHOE. With H "Thank-you game" format: THANKS/NO, NOD/thanks: Commenting action: "HEAVY, HELP MOM CLEANING, WHAT-point? Some fostering: <i>Not Enough!</i> " Responds by expanding into action (SPOON-TAKE-UP) adding non-manual, facial expressions, mediating altering gaze. Points as for you. Multi-sign phrases. With H: WHAT-questions, asks for explanations, names unfamiliar GOAT, points GOAT and vocally goat. Verbalizes noun into verb: HAMMER-HAMMER SCREW/EVER-SCREW, TYPEMACHINE TYPE. Mediating altering gaze by point/there BALL (in Hugo's line of vision, he looks at) BALL, point-picture-finger point out an imaginative curve of the ball. Point-ball (Hugo gaze-follow to) BALL, BALL EAGER BALL, points at the subject". Points as for "you". Multi-sign phrases.	Focus on pictures, some points followed by eye-contact. Some naming, often in the interlocutor's peripheral vision.		Responds in game: NOD/NOD/thanksthanks. Responds to WHAT-questions. Tries to take things from Diana...
13 Storytime With D: non-manual expressions and altering gaze	Responds by expanding into narrative structure with gaze constrains. Second person possessive pronoun (YOUR) and reference without gaze to object (IT) and to the third person (HIM, THOSE-TWO). Intensity in verbalizing body movements and facial expressions, as for normal behavior (e.g. WALK DOG) and force. With H: (e.g. FROG JUMP). Responds by expanding into narrative action (KICK BALL-classifier FLY-AWAY) adding non-manual facial expression. Decreases vocal and uses no simultaneous bi- or multi-modal initiations. Few pure spoken phrases (<i>Where is the panda?</i>)	Respond to WHAT-questions with naming and by gaze-following, sign to face (gaze altering)	Points at object/picture, names peripherally and with mutual gaze.	Points at object/picture: <i>br/point, look-point, loo loo look /he(re), name peripherally That's a cat!</i> , BANANA, WHAT etc. and with equivalent meaning: COW/oo, DOG/hu hu, TELEPHONE/ooo, with mutual gaze. Responds to WHAT-questions with also verbalizing (BALL-UP). Focuses on difficult signs: BUTTERFLY, tries to sign tactfully on Mother who moves his hand back to H leg, using his hand to sign DOG.
15 Storytime Altering gaze-contact Narrative structure and intensity in verbalizing. With H: non-manual expressions, decrease vocal initiations and mode.	Responds by expanding into narrative structure with gaze constrains. Second person possessive pronoun (YOUR) and reference without gaze to object (IT) and to the third person (HIM, THOSE-TWO). Intensity in verbalizing body movements and facial expressions, as for normal behavior (e.g. WALK DOG) and force. With H: (e.g. FROG JUMP). Responds by expanding into narrative action (KICK BALL-classifier FLY-AWAY) adding non-manual facial expression. Decreases vocal and uses no simultaneous bi- or multi-modal initiations. Few pure spoken phrases (<i>Where is the panda?</i>)	Point-name-verbalizing in the interlocutor's periphery. Private speech and symbolic play.	Point - gazes (mutual with) interlocutor – naming. Perceives by altering gaze. Many vocalizations simultaneously with signs (exclusively at 15 months). Lexicon in 33 minutes included different types of signs (37) additionally: symbolic representational signs (15) and representational gestures (16). Combinations of sign and representational sign: FAGEL FLYGA.	One and two sign-phrases with nouns, verbs and WHAT-questions. Uses two or more vocal-phrases and differentials: <i>point/there, -that, -up, -another, -where is it?, -what is that?</i> Equivalent one and two bimodal symbols (e.g. LOOK WHAT/look on-what?). Supplementary (JUMP birdy?). Some spoken multi-phrases with vocal words and representational vocalizations in combination. Pronoun (I, you, me, mine and my) and private speech. Lexicon in 33 minutes contained representational signs (12) which were also used separately with the same meaning in representational words (19). Of the 18 words and 16 signs, 13 had equivalent meaning. Of the 18 words, 5 were also used simultaneously with a sign i.e. not as separate signs. Hugo made some combinations of words and one combination of simultaneous blending: LOOK WHAT-pointing.

17 Storytime Gaze-contact	Redirection initiations, wave with D and tap with H. With H: Few vocal initiations.	Focus face and mouth. Gaze-contact Redirecting initial expressions. verbalize and narrate to self/expect attention. Facial expressions (non-analyzed)	As earlier	Maximizes simultaneous initiations. Few pure vocal initiations. Seems aware of initial mutual gaze before utterances but not the continuance. Increases spoken utterances: <i>point-there car there</i> . Mainly spoken words blending in sign and deictic gesture: <i>my pens, draw, pens up there, PENS up there/point MINE gazing and pointing at pens</i> . Adequate second person possessive pronoun in both modes. Rarely uses word and sign simultaneously. Point-reference as for you. Aware of paying visual attention in gestural mode with Father. Tries to tell Mother the telephone is ringing [Sw: <i>teföön</i>] pointing at the door [iron], point-optical signal <i>there's</i> looks at observer [TELEFON/iron]. Mother: [TELEFON?]. Code-switch in private speech: TOY MINE, coos! Observed lexicon during 15 minutes was, since 15 months, increased with 13 signs, 10 deictic words and 25 words. Conducts more multi-phrases in words and 2 simultaneous above.
22 Storytime Point to reference not naming. Expands on language structure. With H: language separation. Enlarge with explanations.	WH-question with neutral face expression. With D: redirecting tap. Responds by confirming while giving alternative classifiers. Extends on non-manual components: eyes, cheeks, mouth, and movement intensity. Point-reference to pictured objects. With H: redirecting wave but no vocal initiations. Father responds by confirming, enlarges by discussing and giving explanations in gestural mode. Mother when having gaze-contact now also uses vocal mode and simultaneously inserts gestural, also including other family members			
24 Playtime	Gives explanations and fostering in SSL. H: In cases of warning without mutual gaze using vocal mode.		"Blank face"	Aware of interlocutor's visual attention and insists on mutual gaze before and during utterances but turns away before finishing interchange. Verb inflection (as in swinging) and cross-cultural use of name (DAD). Much vocal private speech commenting on his activities e.g.: <i>Hammer! can hammer</i> (looks at his shoes) <i>hammer, hammer, hammer</i> . He looks embarrassed when looking towards the camera as if he is caught revealing a secret. Comparative vocal morphological changes [Sw: <i>mera</i>]. Some code-switch and repeated movements (<i>football football, FOOTBALL, FOOTBALL, FOOTBALL, PLAY FOOTBALL x6 football</i>) interchange with Nicolola turns into private speech. Mostly vocal mode and third person reference to concrete subject (<i>Watch out brude, vipoints</i> (at the subject/picture) <i>mus! jump over</i>). Contributing primarily with vocal comments into the conversation. "Analyzing phase"?
28 Storytime Visual-contact With D and H: SSL-structure with gaze-checks With H: simultaneous insertion to maintain attention.	Not as visually attentive as previously. Makes gaze checks for attention while communicating. Enlarges with information in the conversational interchange. The third person possessive as in HERS. With H: M uses SSL and insert vocal mode with words like LOOK and WHAT to maintain attention.		Some mouthing and prolonged movements (BAKE BAKE) as for a long time. Personal possessive pronouns by using MY and MINE. Contributing comments to the conversation.	Almost only spoken utterances a few simultaneous blend-in of single signs. Shows a level of consciousness to Deaf communicative conditions by deliberately not giving visual attention, also while talking. "Analyzing phase"?
32 Storytime	With H: Mother uses SSL, positions herself opposite Hugo (to speech-read). In cases of fostering mostly vocal mode throughout the study.		Makes gaze-checks for attention, visual-contact Many mouth vocalizations to signing possibly related to coming CI.	Hugo uses SSL with Father: the exception is finger-spelling that he first repeats vocally followed by the sign [BRD to Father's spelling the type of bird]. Hugo enlarges the Pig story by talking about pigs in the park and expands the theme (THINK CAN LOOK-AT BEAR IN ZOO) LOOK-AT morphologic change. Gaze-check, visual contact. SimBlend with constrained gaze in prepositions UP, IN, AT and adding plurals in spoken Swedish.
36 Storytime	Father refers to the past by YESTERDAY. Father supports story-telling by confirming and With D: F. on D requests, suggests signs in order for her to continue the story. And with H: F extends by e.g. finger-spelling the type of bird in the book. Vocal mode accompanied fingerspelling only.		CI-on-set at 35 months. Plus the phrase into the past tense, repeatedly uses the sign THEN to continue her story from the visit at the CI learn. Diana shows how to perform different vocal sounds and tells about the toy tools used to visually demonstrate vocal speech positions.	Positions himself opposite Mother, using SimBlend or vocal mode. Uses primarily SSL in the family. Using narrative structure, gaze checks for attention, referentially locates objects in space, referential pointing to location, verb inflection toward location: DRIVE-TO-the station, classifier: DRIVE-REMOVE-CONTROL (C-hand with thumb moving) CAR; CAR MOVE-AROUND (flat hand-form).
40 Storytime With H: also Playtime	Mother asks Diana to tell the story TO ME, a first person object pronoun. Sitting opposite Hugo face-to-face Mother uses SSL to discuss and enlarge on subjects and uses past tense HAVE. Mother with Hugo uses some SimBlend.	Use SSL, past tense of HAVE.	Narrative acting Bird-perspective. Future tense (SHALL) and sign referring to the past. Differentiates between deaf and hearing persons by inserting a few spoken syllables to the signing e.g. with H: direction (<i>the re</i>) noun (BRUDE) and verb (FLY).	

44 Storytime Refer between text and fingerspelling. Corrects content. With H, SimBlend	Mother refers to written key words, asks what they say and finger-spells (D-R-A-G-O-N). She asks for clarification and corrects e.g. throwing a ball to kicking the football. Mother vocally calls Diana by name but uses SSL. Mother mostly uses SimBlend with Hugo.		Narrates the story in SSL with non-manual components, facial adverbs. With Mother, adds a few spoken Swedish words with emotional facial expressions in her signing.	Uses some SimBlend with Diana and most often with Mother.
49 Storytime and Playtime Meta-discussion between text, fingerspelling and sign. Cultural disc. About name.	Mother uses some SimBlend with hearing persons present. Only SSL at storytime. Responds by finger-spelling the definite form: T-H-E F-R-O-G, T-H-E P-I-G and discusses really having a name like Frog.		Uses some simultaneous blending e.g. wants to know 'the NAMES of the FROG and the PIG' characters in the book. Responds in SSL by doubling an animal label also being a name and repeats M's finger-spelling. Uses some spoken Swedish words and phrases with hearing persons and repeats some in signs for private speech.	Uses Swedish words and phrases with hearing persons and tells Diana in SimBlend how to behave in play outside with hearing peers.
54 Storytime Position to speech-read and comment on vocal mode.	Mother positions herself opposite Diana probably to be able to speech-read her. Comments on/corrects Diana's use of vocal words by inserting a more appropriate word e.g. to FILM instead of Diana's PHOTO.		Diana tells the story in sign, not using constrained gaze, only a few non-manual components and mouthing simultaneously, adding many vocal Swedish infinitives. A second "blank face"? Uses SimBlend. Creates combinations e.g. 'to FILM' blending-in the noun photo. Seems used to get an alternative expression.	Uses vocal mode with Diana, after having established visual attention often repeating in SimBlend.
61 Storytime And Playtime From one language base insert sign or vocal word. Give back words on D's signs. SimBlend	Interacts in SSL. Position both twins opposite her probably with the purpose of mutual speech-reading. From pages in the book Mother reads in and speaks Swedish or narrates in SSL. Mother simultaneously blends some signs or vocal words into Swedish or SSL. Mother responds in SimBlend to the word preceding and emphasizes in vocal words what Diana signs.	At storytime translate from the language Mother uses into the other.	In SSL narrating with two perspectives: her own as the narrator and another's when telling an episode. Discusses the function of A-N-D, signs and finger-spells it and other words in the text. In vocal mode uses SimBlend (to scaffold the communication with Mother?) and a few vocal attempts of morphological changes. Not knowing a word, Diana uses the sign. Recognizes some words in the book. Offers to help Hugo to read. SSL in other activities. With Hugo: calls him vocally for attention and uses spoken utterances.	In SSL using perspective shift e.g. asking Father to lift him up to the ceiling. Comments that Diana pronounces some words wrong. Later when asked to read he accepts Diana's offer to help. Calls and speaks vocally with Diana if not received repeating in SimBlend.
67 Storytime With D: Morphology in both SSL and spoken Swedish.	Mother uses SimBlend with non-manual components and morphological changes in both SSL and Swedish. Narratives in SSL or spoken Swedish.		Uses spoken Swedish morphological inflections and past tense but not consistently. Begins to spell out letters in the text to make words. Perceives talk from voices not previously heard, without looking. Discriminate individual utterances when in a group of chattering children.	With Diana: uses spoken Swedish adding SimBlend with other Family members present.
81 Storytime Encourages translations between SSL and spoken Swedish. With D: explain unknown words.	Negotiates use of language at storytime. Helps out with small 'unknown' words with signs (Sw: någonting), non-manual meaning and finger-spelling of a small, quite unusual word (Sw: välj). Overall code-switches depending on context, people present and Mother's visual perception.	Look at Mother when speaking conscious of showing the face.	Separates the languages or uses SimBlend according to the interlocutor. Diana translates the Swedish text into SSL including morphological changes. A second time she reads the Swedish text out aloud, asking what small and uncommon words (Sw: någonting and välj) mean. When upset, uses SSL.	Hugo translates the Swedish text that Mother reads into SSL, including finger-spelling, references pointing and third person possessive pronoun.