Input and interaction in deaf families

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4.1 Subjects

As described in section 2.1, approximately 5-10% of deaf children have deaf parents. This means in the context of the Netherlands that less than 500 deaf people have deaf parents. In the Netherlands there is also no registration of deafness except within the medical consultancy offices. These two facts made it difficult to trace subjects that were suitable for our longitudinal research project, which covered approximately 10 years. In 1988, when the project started, we were looking for subjects that met the following conditions (see also Mills and Coerts 1989:26).

1. The mothers must be prelingually deaf. A prelingually deaf person is defined as someone who is born deaf, or became deaf before spoken language was acquired, so that language could not be acquired on the basis of auditory information.
2. The mothers have to be members of the deaf community.
3. The mothers must be fluent in SLN and SLN should be the primary language used in the family.
4. The children must be in the prelinguistic stage, that is to say a considerable time before the first word (or sign) or one-word stage (or one-sign stage). The description of the input and language development needs to begin as early as possible in order to show any possible influence of input and interaction on the language acquisition of the child.
5. The children must have no known cognitive, motor or visual impairment.

Thanks to the help of the Dutch Foundation for the Deaf and Hard of Hearing Child (NSDSK) and the Dutch Foundation for the Deaf (Stichting Nederlandse Dovenraad, now Dovenschap) we initially found three families with deaf parents and hearing children who met these criteria, and who were willing to participate in our study. In 1988 we began filming in these families when the (hearing) children were 1;0 (Jonas), 0;6 (Alex) and 0;3 (Sander) respectively. We still had not found deaf families with deaf children at this time. In 1989 twins were born into Jonas' family, and at 0;11 both children (Laura and Mark) were diagnosed to be severely hearing impaired. Graciously the parents granted us permission to include the deaf twins in our project. Approximately 6 months later we found a deaf mother and father with two deaf children who were willing to participate with their youngest child (Carla) who was 1;6 at the time and not prelingual.

For the longitudinal study we initially filmed the children and their mothers every month for about one hour. As the children grew older and language development
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slowed down (around age 4;0) we filmed them once every 4 months. After age 6;0, we filmed them twice a year until they reached the age of 8;0. For this study we used the session at ages 1;0, 1;6, 2;0, 2;6 and 3;0 (see Table 4.1 in section 4.3 for an overview of the exact ages of the children).

The mothers participating in this study are all prelingually deaf (see section 2.1). Two of the fathers are deaf, one is severely hearing impaired and one father is a CODA and a native signer. The three deaf children are Carla, Laura and Mark and the three hearing children Jonas, Sander and Alex. More relevant information on each child, mother and its family is given below.

4.1.1 The deaf children

Carla
Carla was diagnosed deaf at the age of 0;9 and at 1;1 showed no reaction in hearing tests (see Appendix to Chapter 4 for further audimetric information). She was 1;6 when she started participating in the longitudinal study. Around the age of 2;6 she started attending the pre-school (voorschool) at Effatha, the Christian Institute for the Deaf in Voorburg.
Carla's mother usually wears a hearing aid, with the help of which she can pick up some sounds; her degree of hearing loss is unknown. It is also unknown whether her hearing impairment was present from birth, although she suffered from no illness known to cause deafness in her youth. Her parents are deaf, and there are no known deaf relatives. She has used Sign Supported Dutch and SLN since the age of 3;0 when she came into contact with other deaf children at the school for the deaf. She works at home, and at the time of the study is not very active in the deaf community since in the town where the family lives there is no club for the deaf.
Carla's father is a deaf (cause unknown) child of hearing parents and he works outside the home.
Carla has one deaf brother (hearing loss unknown), who is nearly two years older than Carla.

Laura
Laura was probably born deaf, and at 0;11 was diagnosed to be profoundly hearing impaired (≥ 80 dB hearing loss in her best ear). Over the years however it appeared that she showed only little reaction to the standard hearing tests, so her loss of hearing may be greater. Laura was 11 months old when she started participating in this study, and in the prelingual stage. When she was 2;6, she started attending the pre-school in Voorburg twice a week, together with her twin brother Mark (see below).
Laura's mother has a hearing loss of ≥70 dB in the best ear, and usually wears a hearing aid, which enables her to pick up some sounds, for instance a passing motorcycle. However, she cannot hear spoken language. She was born deaf, and she has hearing parents and one deaf sister. Before the children were born she
worked as a psychological assistant at the Christian Institute for the Deaf Effatha in Voorburg. She considers herself to be a member of the deaf community and has many contacts with other deaf people.

Laura's hearing father has deaf parents and is a native signer (CODA). He is an active member of the deaf community, and he has been working with deaf and hearing parents of deaf children, but he also develops sign language courses and is an interpreter.

Laura has one deaf twin brother, Mark and a hearing brother Jonas who is 14 months older than the twins. Mark and Jonas also participate in our study (see below).

**Mark**

Mark was born profoundly hearing impaired (≥ 90 dB hearing loss in best ear). He also joined the study at age 0;11. Mark is the twin brother of Laura and younger brother of Jonas.

The three deaf children Carla, Laura and Mark started going to kindergarten at the Christian Institute for the Deaf Effatha in Voorburg when they were approximately 2;6. At the time the teachers in this school were using Sign Supported Dutch with the children (see Knoors 1992; 1994). The children were in a class of 5 to 7 children once or twice a week. More details on their hearing status and results of audimetric tests of the deaf children can be found in the Appendix to Chapter 4.

The three deaf children do not form a homogeneous group, even though the twins Laura and Mark of course share the same mother. Carla's parents were not much involved with the deaf community at the time of the filming, and this may have its influence on the way they interact with their children (see section 2.2.1).

**4.1.2 The hearing children**

**Jonas**

He is the hearing older brother of Mark and Laura (see Laura for family details). He joined the project at age 0;11 and attended regular pre-school from approximately age 2;6.

**Sander**

Sander is the hearing child of two deaf parents. He joined the project at age 0;3. He has two hearing brothers (twins), who are six years older. Sander's mother is born deaf of deaf parents and does not wear a hearing aid. Her hearing loss is unknown. She worked part-time as an assistant at a bookbinder's at the time of the filming. She considers herself an active member of the deaf community.

The father of Sander is deaf of deaf parents, with deaf brothers and sisters. He is an active member of the Dutch deaf community, and works as a representative of the deaf community. Sander also went to pre-school from about age 2;6.
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Alex
He has a deaf mother and a severely hearing impaired father (exact hearing loss unknown for both). He has one hearing sister, who is eight years older, and one hearing brother six years his senior. His mother became deaf after meningitis at the age of 2;6; she has a hearing aid, which she wears inconsistently. There are no other deaf members in her family. She worked at home during the early stages of the study, and later worked in an administrative function. The father always wears an hearing aid and works outside the home. Alex attended pre-school from age 2;6.

The hearing children all three started attending 'peuterspeelzaal' (pre-kindergarten) once or twice a week for a couple of hours at the age of approximately 2;6, in the neighborhood of their home.
The hearing children form a homogeneous group, in that their parents share characteristics related to the deaf community. In two respects the children differ. Jonas is the oldest child in his family, and Alex and Sander both are the youngest of three. Jonas has two deaf siblings, while Alex and Sander have hearing siblings. These two factors can influence the input and interaction between parents and children.

In Figure 4.1 the different mother-child relations are presented.

4.2 Data collection
The mothers and their children were filmed at home monthly in a free play situation, with toys and books of their own choice. Usually the (hearing) author

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1 We are aware of reservations amongst sign linguists of deaf people being filmed by hearing researchers for a language study. However, we feel that very soon, even during the initial stages of the study, a relaxed atmosphere was established with the deaf families. This was a result of the high frequency of the filming sessions. We feel that the language used by the mothers was representative of their everyday communication. This was supported by the mothers who judged the video tapes at a later point.
together\(^2\) with a colleague or a student made the video-recordings. Most recordings were made with only the mother and one child present, together with the person behind the camera. The first two sessions of the deaf twins Laura and Mark were an exception. They were both present while the mother was filmed playing with one of them.

The mother and child would most often sit at a low table, or on a couch next to each other or on the floor. The toys chosen were balls, books, puzzles, plastic tea cups, tennis rackets, the suitcase of the camera, wooden or plastic construction blocks, square boxes in different sizes, dolls and Duplo or Lego. Bacchini, Kuiken and Schoonen (1995) discuss the generalizability of spontaneous speech data collected at home and in a clinic. They studied four children aged about 3;8. They concluded that the difference in time, place and toys result in the use of different morphosyntactic structures. For our study this means that variation in the data could be partly attributed to the use of different toys or books.

Usually we filmed the interaction of mother and child for about 20 to 30 minutes; sometimes, however, the children were irritable or not feeling well and filming had to be stopped early. This was the case in one of the samples that was chosen for this study, where filming was terminated after approximately six minutes (Mother and Mark at 3;0).

The filming was done with a Panasonic Camcorder M7 CCD with a JVC monitor. The tapes were transcribed using a JVC monitor (TM 150 PSN) and a Panasonic (AG-6200) video recorder.

### 4.3 Data Selection

Five recordings were selected per mother-child dyad over a two-year period so that development could be studied. The exact ages of the children for the recordings between 1;0 and 3;0 are presented in Table 4.1. The number of the session is given between brackets after the age.

\[^2\text{At this point I would like to thank Lies Alons, Anne Baker, Hellen van Berlo, Claudia Blankenstijn, Heleen Bos, Jane Coerts, Sonja Jansma and Machiel de Zoete. Over the years they either helped me film the children or were willing to take care of other children in the family while filming was taking place.}\]
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Table 4.1 Exact ages of the children at the different filming sessions grouped per age as referred to in this study. Number of sessions in brackets

<table>
<thead>
<tr>
<th>Children</th>
<th>1;0</th>
<th>1;6</th>
<th>2;0</th>
<th>2;6</th>
<th>3;0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carta (D)</td>
<td>-</td>
<td>1;06:16 (1)</td>
<td>1;11:27 (6)</td>
<td>2;06:29 (13)</td>
<td>2;10:29 (15)</td>
</tr>
<tr>
<td>Laura (D)</td>
<td>1;00:11 (2)</td>
<td>1;05:22 (8)</td>
<td>2;00:02 (14)</td>
<td>2;06:15 (19)</td>
<td>2;11:11 (22)</td>
</tr>
<tr>
<td>Mark (D)</td>
<td>1;00:11 (2)</td>
<td>1;05:22 (8)</td>
<td>2;00:02 (14)</td>
<td>2;06:15 (19)</td>
<td>2;11:11 (22)*</td>
</tr>
<tr>
<td>Jonas (H)</td>
<td>1;00:03 (1)</td>
<td>1;05:30 (7)</td>
<td>2;00:10 (13)</td>
<td>2;06:05 (19)</td>
<td>2;11:25 (25)</td>
</tr>
<tr>
<td>Alex (H)</td>
<td>0;11:12 (4)</td>
<td>1;05:29 (10)</td>
<td>1;11:19 (16)</td>
<td>2;05:20 (22)</td>
<td>3;00:04 (29)</td>
</tr>
<tr>
<td>Sander (H)</td>
<td>0;11:14 (8)</td>
<td>1;06:03 (14)</td>
<td>2;00:05 (19)</td>
<td>2;06:09 (25)</td>
<td>2;11:12 (29)</td>
</tr>
</tbody>
</table>

* This session lasted 6 minutes and 6 seconds.

Ten minutes of interaction from each session were selected and transcribed. Each transcript starts 5 minutes after the start of a particular session on a videotape, except when this was not possible due to a session lasting shorter than 15 minutes (as in the case of session 3;0 for Mark and his mother). This session was cut short when Mark proved to be very uncooperative and mainly cried. Whenever the mother or the child is out of range of the camera, transcription is continued for another 10 seconds; transcription is then stopped until that person reappears on the screen. The interaction should always be between two persons (mother and child), except for the above mentioned incidental periods of 10 seconds.

4.4 Transcription

4.4.1 The transcription form

A transcription form was designed for this project, the following features are noted on each separate sheet: the project number, name of the researcher, the session number, which copy of the session-tape is used, the name and the age of the child, the page-number and the time (of the time code) with which that page starts (see for an example of the transcription form the Appendix to Chapter 4). The page is divided in two: the upper part for the transcription of the deaf mothers' language (with 8 rows); the lower part for the children (8 rows). Below we will give an explanation of the rows in the transcription form relevant for this study.

MOTHER and CHILD Fields:

**row** transcription of:

1 time each session has a time-code on the videotape, which states hour, minute, second and 1/4 second or frame (24). In this row the time-code indicated on the tape is noted, so far as this is
needed as a reference point for non-linguistic and linguistic behavior.

2 nvb non-verbal behavior of the mother that is not a gesture, a movement, a vocalization, a sign or word is written down here (see below). Vegetative sounds (e.g. mother coughs) and body-movements are registered in this row (see below for definitions)

NB: also contextual information like 'mother turns page', 'taps child' or 'moves toy to attract attention' is noted in this row.

3 morph in this row relevant phono-morphological aspects of signs that deviate from the usual 'adult' sign are written.

4 gest all movements or gestures that carry non-linguistic, communicative meaning are listed here. A plus (+) or minus (-) next to the gesture indicates whether or not it is seen or not seen by the partner (see below for definitions).

5 expr eye-gaze direction and facial expression (see below)

6 gloss all signs produced by the mother are glossed in Dutch. In a second viewing, every sign-gloss is coded with (+) or (-), to indicate whether the Addressee has seen or not seen the sign. Also noted in this row are those movements that can be considered 'proto-signs' - these were glossed as 'MOV' (see below).

7 oral in this row all spoken (with voice) or mouthed (without voice) words or oral components are noted as such, as well as all vocalizations, which were written down as 'voc' (see below Row 7).

Non-verbal behavior (nvb, row 2)
Vegetative sounds and body-movements that are not communicative and not linguistic are written down when relevant. Vegetative sounds are usually ignored unless they give rise to interaction, for instance when a mother coughs and a hearing child looks up and asks whether or not she said anything. Other vegetative sounds are for example burping, exhalations due to bodily exertion, but also sounds like brr e.g. while imitating driving a car. Body-movements are transcribed if they are relevant for the context or if they give rise to interaction, for example when a mother scratches her nose and her child, perceiving the motion, looks up possibly expecting a sign.

Gesticulations (gest, row 4)
All movements of the subjects that have a (non-linguistic) communicative function are written down in row 4. These gesticulations are used by signing and non-signing people in the Netherlands as 'cultural' or 'natural' communicative gestures (see Bos 1989 for definitions).
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Index), since their linguistic status is not always clear (see section 2.3.1). The following gestures occurred:

- **head nod**
  head moves up and down, once or several times. General meaning is 'affirmative'. Can occur by itself or co-occur with signs and words

- **head shake**
  head moves from side to side, once or more. General meaning is 'negation'. Can occur by itself or co-occur with lexical realization of negation (signs and words)

NB: Both for head nods (nod) and head shakes (neg) a line indicates the period during which those signals are present (Coerts 1992:13):

```
_nod
TAK E E (yes, take it)
```

```
_ne g
TAK E E (don't take it)
```

- **Point**
  main characteristics are: stretched/bowed arm with index finger extended, other fingers/thumb are closed (1-handform), with or without touching the person/object the finger is pointing at. A second form occurred, with the thumb extended and the other fingers curled inward (A handform).

- **give-to-me**
  one or two-handed movement towards the person speaking or signing or gesticulating. Distinct from the sign GIVE by its more relaxed movements and no clearly marked beginning or end point.

- **come-to-me**
  one-handed movement towards the person speaking or signing or gesticulating produced farther away from the body and usually higher than give-to-me. Distinct from the sign COME by its more relaxed movements, no distinct beginning or end point, and more repetitions of the shorter movement.

- **surprise/fear**
  eyes are opened wide, eyebrows are up, mouth is open, sometimes shoulders are raised. Without accompaniment of 'hand before mouth', which is glossed as OH and counts as a sign.

- **clap hands**
  to attract attention, or to express admiration.

**Expression (expr, row 5)**
The eye gaze direction of the deaf mother (DM) or the child is noted in the following manner:

- DM looks at face of child, (e.g. A=Alex) A
- DM looks towards child →A
- DM looks at toy toy
- DM looks in the direction of the toy
- DM looks at nothing in particular, stares
- DM looks away, focus unclear

Movements/signs and vocalizations/words (gloss, row 6 and oral, row 7 respectively)

Movements (MOV) and vocalizations (VOC) are defined as those movements or sounds of the mother or child that are (possibly) intended as a word or sign, but to which no meaning could be attached. Movements are distinguished from 'gesticulations' (see row 4) by the fact that they are not accepted cultural or natural gestures.

Although our categories are largely based on Volterra and Caselli (1985; 1990) there are some differences. We consider a sound or a movement of a child to have linguistic status (i.e. it is a word or a sign) if meaning can be attached to that sound or movement, either because the mother repeats it in the adult form, or if she does not because the sound or movement is consistently made within the same context. By this we mean that if a certain sound is always uttered simultaneously with the same sign which is (approaching) the adult form, or a movement is consistently made with a recognizable word, we consider the sound or the movement to be a word or a sign. Since we are not studying phonological development, we do not make a distinction between unsystematic (i.e. sounds, cries etc.) and systematic (i.e. babbling) vocalizing or moving (Petitto and Marentette 1991; see also Meier and Willerman 1995). Because, in the interaction of the child with the deaf mother, intelligibility of words or signs is relevant for the negotiation of meaning, intelligibility was one of the main criteria in case of doubtful forms (see section 4.4.3).

All SLN signs are given a Dutch translation (gloss) written in capital letters e.g. the sign for paard 'horse' is written as PAARD 'HORSE'. This gloss gives only information about the meaning of a particular sign and says nothing about its form. Morpho-phonological information (when relevant) is given in row 3 (morph, see above).

The transcription of inflected verbs follows sign linguistics conventions. For example the sentence 'I give you a book', where the direction of the movement of the verb GIVE is from the signer to the addressee, is transcribed as: 'BOOK 1GIVE2'. If a classifier is incorporated into the verb, this is glossed as follows: '1GIVE(Q5-CL)2', where Q5-CL specifies the classifier handform.

All Dutch words are written down in row 7, including vocalizations. If a spoken Dutch word had a different or deviant pronunciation, a phonetic rendition was given as well as the target word. Unintelligible words were written down as 'onverstaanbaar' 'unintelligible'.
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If a sign and a word are uttered simultaneously this can be seen immediately on the transcript, because that particular sign and word are written parallel to each other as in example (1).

(1) 

\[
\begin{align*}
\text{WIE} & \quad \text{PAP--} \quad \text{OP}---
\end{align*}
\]

\text{wie heeft \ de \ pap \ opgegeten}

\[
\begin{align*}
\text{WHO---} \quad \text{PORRIDGE GONE PU}
\end{align*}
\]

\text{who has \ the \ porridge \ eaten}

(Who has eaten the porridge?)

explanation of example (1):

row 5  the line indicates the scope of a particular facial marker, \(q\) stands for 'question': raised eyebrows, lift of chin etc.
row 6  glosses of SLN signs; the dotted line (\(--\)) indicates which signs go together with which word(s)
row 7  the words that are spoken or mouthed while the signs are made. NB: in the example above, under the sign PU (Palm Up) there is no spoken/mouthed word, this indicates that this sign was produced by itself.

As in example (1) all examples in this text will be translated into English in the linguistic structure and as an idiomatic translation.

4.4.2 Segmentation

Vocalizations and movements are units of analysis, but are not linguistic. Signs and words have conventionalized meaning. A string of signs and/or words that form a unit on a syntactic, semantic and pragmatic level is considered an utterance. For signed utterances the utterance boundary was further established by noting when the hands went to a rest-position, for instance the lap, or in front of the body on an object or on a person (see also Bos et al. 1988). For spoken utterances pause-length and (rarely) intonation were further indicators. For complex utterances we followed the definition of Hunt (1970:4) one main clause plus any subordinate clause or nonclausal structure that is attached to or embedded in it.

The linguistic utterances are subdivided into four types:

a) Point(s) alone

A 'Point alone' is an indicative gesture uttered without an accompanying sign and/or word. All utterances consisting of only one or more Points are coded as

\(\text{AV}^3\)

\(\text{AV}^3\) stands for 'Algemeen Vraaggebaar' (general questionsign, usually transcribed as 'palms up')
such. We decided to make 'Points alone' a special category, as it is as yet uncertain at what point in acquisition indicative gestures, also used in hearing mother-hearing child interaction with a spoken language, become integrated in the grammatical system of Sign Language of the Netherlands and thus gain linguistic status. We will discuss this aspect further in sections 7.1 and 9.7.

b) Minors
Minors are described as follows by Bol and Kuiken (1988): With regard to minors no productive morphosyntactic structure can be presumed and therefore they are to be considered unanalysable. Minors are utterances like *yes, no, hallo, bye bye, daddy, thank you,* or phrases used in a ritual such as *peekaboo.*

c) Unintelligible / incomprehensible utterances
Utterances are considered unintelligible when
1) the sign(s) cannot be perceived by the camera (e.g. because a child is standing in front of the mother's signing)
2) the word(s) cannot be heard, e.g. because of background noise, or not be registered by the camera if produced facing away from the camera and without voice
3) the camera cannot pick up both signs and words. Incomprehensible utterances of which the meaning is not clear are also included in this category, as well as utterances that are a false start.

d) Analyzable utterances
This category is formed by all linguistic utterances not falling within categories a, b or c. These utterances can consist of one or more lexical signs and/or words, possibly in combination with one or more Points.

Figure 4.II shows a schematic presentation of the different categories of communicative units.

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4 "Met betrekking tot Minors kan geen produktieve morfosyntactische structuur verondersteld worden en daarom worden ze als niet te analyseren beschouwd." (Bol and Kuiken 1988:26)
4.4.3 Interrater reliability for transcription and segmentation

The author made the original transcripts, with the invaluable help of our deaf co-researcher Wim Emmerik for the transcription of the SLN utterances. To establish consistency of transcription and segmentation, about 8% of all 29 transcriptions of the mother-child dyads which were done by the author were again transcribed by a second transcriber\(^5\), and segmented into utterances. For the following transcription categories percentages of agreement were calculated: nonverbal-behavior, gestures, signs (glosses) and movements, words and vocalizations and (segmentation into) utterances. Over all points in time the following percentages of agreement were found for the deaf mothers and for the children (see Table 4.2).

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\(^5\) I would like to express my gratitude to Carola Rooijmans for her time and effort in establishing the interrater reliability.
For the segmentation into linguistic utterances the general inter-rater reliability on the whole was satisfactory. The percentage of agreement for gestures made by the children however was very low (56%); 29 out of 52 gestures were interpreted differently by the two transcribers. Since gestures were not further analyzed in this study, this low percentage has no effects on the data that will be examined and discussed.

However, we also had some problems with establishing utterance boundaries. Especially the repetitive use of Points at the end of sentences appeared to give rise to mismatches between the two transcribers. For instance, in labeling sequences like POINT CHURCH POINT [pause] CHURCH the two transcribers were often not in agreement whether the utterance boundary was after the second Point or after the second CHURCH.

In the end it was decided that utterances such as these would be taken very literally according to our semantic cohesion criteria (see section 4.3.2) and thus segmented into two utterances, segmentation point being between the first lexical sign and the second Point. The more complex utterances proved to pose few problems. There was almost no disagreement in establishing utterance boundaries for Dutch utterances.

Within the categories 'signs' and 'words' we also looked at the inter-rater reliability for the content of the glosses and the words, i.e. the intelligibility of the linguistic items. This was only calculated for uttered signs which both transcribers glossed. The cases where one transcriber glossed a sign and the other transcriber interpreted this particular movement as for instance non-verbal behavior, thus in another category, were already calculated in the data presented in Table 4.2.

If the meaning of a sign fell into the same semantic category the two glosses would be considered to be in agreement. For instance a mother used a sign which was glossed as 'HOUSE' by the author and by the second transcriber as 'BUILDING'. The same procedure was followed for spoken and moutheed words. If a sign/word was glossed within the same semantic field, but in a different syntactic category, for instance by one transcriber as a verb ('AIRPLANE-FLY') and by the other as a noun ('AIRPLANE') (see also section 7.2.1) the two glosses were scored for non-
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agreement (e.g. Carla (D) at 2;0). Table 4.3 gives the percentages of agreement for intelligibility of signs and words.

<table>
<thead>
<tr>
<th></th>
<th>1;0</th>
<th>1;6</th>
<th>2;0</th>
<th>2;6</th>
<th>3;0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>mothers</td>
<td>100</td>
<td>96</td>
<td>95</td>
<td>95</td>
<td>98</td>
</tr>
<tr>
<td>children</td>
<td>100</td>
<td>69</td>
<td>80</td>
<td>93</td>
<td>89</td>
</tr>
<tr>
<td>Words</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>mothers</td>
<td>95</td>
<td>88</td>
<td>97</td>
<td>90</td>
<td>97</td>
</tr>
<tr>
<td>children</td>
<td>100</td>
<td>94</td>
<td>84</td>
<td>91</td>
<td>93</td>
</tr>
</tbody>
</table>

The one score that is not satisfactory (signs for children at 1;6: 69%) is caused by the second transcriber's not recognizing a sign made by Jonas (VIS 'FISH') as 'fish', but transcribing it as the verb 'ZAGEN' (SAW). This is how his deaf mother also incorrectly interpreted the sign. Jonas co-articulated dis in stead of vis 'fish' with the sign, which was not seen by the mother and misinterpreted by the second transcriber; however, the context indicated that Jonas meant vis 'fish' and in the end it was decided that the gloss for the sign should be 'VIS' 'FISH'. As he repeated this particular sign/word combinations about 11 times this had quite an influence on our score.

The liberal Kappa was calculated for agreement on transcription for signs seen or not seen, words seen or not seen, and words voiced or not voiced (see Tables 4.4, 4.5 and 4.6).

<table>
<thead>
<tr>
<th></th>
<th>1;0</th>
<th>1;6</th>
<th>2;0</th>
<th>2;6</th>
<th>3;0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sign seen</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>by children</td>
<td>.56</td>
<td>.86</td>
<td>.77</td>
<td>.62</td>
<td>.88</td>
</tr>
<tr>
<td>by mothers</td>
<td>1.</td>
<td>.94</td>
<td>.96</td>
<td>.86</td>
<td>1.</td>
</tr>
</tbody>
</table>

At age 1;0 the score for signs seen/not seen by the children was not satisfactory and at age 2;6 very low. We will have to bear this in mind when we interpret the results in Chapter 6.

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6 I would like to gratefully acknowledge here the help of Sonja Jansma, in establishing working definitions for when a sign or a word could be considered seen or not. It was greatly appreciated.
Across time the transcription of whether words were seen or not was reasonably dependable.

The interrater reliability for the use of voice was quite high, even though some uncertainties occurred in the occasion of whispered words. In the end we decided to score these as unvoiced.

4.5 Handling the data

Due to the small number of subjects we decided to not use statistic measures other than Chi-square (Hatch and Farhady 1982) for the analyses in Chapters 5 through 9. Most data will be presented in numbers and percentages or proportions. In general we will present individual results, or per mother-child dyad. In some analyses, when the amount of item(s) under analysis was very small per person, results are grouped. For instance the mothers of the deaf children together are compared to the mothers of the hearing children, or the deaf children are compared to the hearing children for developmental aspects. Whenever results are grouped, this will be indicated. The emphasis of the discussion of the data will firstly lay on development, where if possible statistics will be used, or results will be inspected. Secondly, the relation between input and output will be explored by description. And thirdly, we will examine the effect of hearing status of the child either by statistical analysis or by inspection.