

MOTHER-CHILD INTERACTION IN TWO YEAR OLD DEAF AND HEARING CHILDREN

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Abstract

The ten mother-child pairs in this investigation participate in a longitudinal study, from 2.5 to 24 months reported on before, in order to establish in which respect the sound productions of deaf children are influenced by lack of auditory perception. Previously, differences in vocalizations between deaf and hearing children were found with regard to number of spoken utterances and type of articulation and phonation. The missing auditory perception may seem the most obvious factor in explaining the differences, but various patterns in visual and vocal mother-infant-toddler interaction must not be neglected. Here we report on a verbal as well as a non-verbal evaluation of mother-child interaction at the age of two in five deaf and five hearing children. We used and adapted Kaye and Charney's method (1980). A video recording was made in free play and instructed situations at home. This study focusses on verbal and non-verbal pragmatic aspects in mother-child interaction. It gives suggestions for further research with regard to the linguistic level of communicative turns.

1 Introduction

Already very early in the child's development there are differences in the interaction between hearing mothers with hearing children and hearing mothers with deaf children. The interaction between hearing mothers and deaf children probably proceeds less smoothly than with hearing children (Gallaway & Woll, 1994). The problems in the communication between hearing parents and deaf children have their influence on more aspects than only the child's language development. Also the coordination and timing of interactions is influenced by the deafness of the child (Koester, 1994).

Research of Nicholas & Geers (1997) focused on the communicative behavior of 18 deaf and hearing 36-months-old children. They used videorecordings of mother-child interaction and coded it for modality and communicative function. They distinguished 10 types of intentionally communicative acts and 3 types of modality use. Results showed that hearing children used significantly more speech than deaf children did and that they used speech significantly more than the other modalities and for most communicative function types. Deaf children showed no significant difference in their use of the different modalities and they also had no uniform method

of communication and no equal distribution of the use of the different modalities across the communicative function types.

Research of Kaye & Charney (1980) focused on the conversational asymmetry in mother-child dialogues at 26 and 30 months of age. In their opinion the asymmetry exists because of the leadership role of the mother in creating and maintaining the interaction. They looked at the behavior of mothers and children in general and also searched for variables in the early mother-child communication that will predict the individual child's progress as a language learner and conversation partner. They found that mothers used mostly TurnAbouts (a combination of a response and a command or question) to maintain the conversation. The children used mostly Mands (sort command or question) and Responses (a certain reaction) and less TurnAbouts. Mothers use TurnAbouts since the child's birth as a way to communicate with the child. On one hand, the TurnAbouts are a basic part of adult language too. Mothers treat their child as if they were a full communication partner and at the same time they model a role for them. On the other hand, TurnAbouts are a basic aspect of (non-) verbal mother-child interaction as well.

In this study we focus on verbal and non-verbal pragmatic aspects in mother-child interaction of five deaf and five hearing children at two years of age. We have chosen the method described by Kaye and Charney (1980), and adapted and extended the categories for this study according to a paper of Helle (1997). There were three purposes for this study which will be described in the next paragraphs.

1.1 Modality use

The first purpose for this study was about modality use in the communication. The following research questions were addressed. First, is there a difference in modality use in the utterances of two year old deaf and hearing children? It is to be expected that deaf children use more nonverbal utterances (and thus less verbal utterances) in their communication while hearing children use more verbal (and thus less nonverbal utterances). Second, is there an effect of the language method the deaf children are raised with? It might be possible that the children who are raised with the oral method use a communication strategy that resembles more that of the hearing children, while the sign language raised children use more nonverbal utterances in their communication. The third research question concerns the utterances of the mothers of the deaf and hearing children. Is there a difference in the communication between the mothers of deaf and hearing children because of the use of a certain language method with their children? In that case we would expect that mothers of deaf children who are raised with the oral language method use more verbal communication like mothers of hearing children. Mothers of deaf children who are raised with sign language would be expected to use more nonverbal communication.

1.2 Types of communicative turns

The second purpose concerned the type of communicative turns that were used. Here the following research questions were addressed. First, is there a difference in the use of certain types of turns in the communication of two-years-old deaf and hearing children? Second, is there also a difference in this aspect between the mothers of the deaf and hearing children? According to Kaye & Charney mothers of hearing children

use mostly TurnAbouts to maintain the conversation and hearing children use mostly Mands and Response in their communication. Is this the same for deaf children and their mothers or is this influenced by hearing status? And third, is there a difference within the deaf and hearing groups, e.g. because of regional differences in language use? It could be possible that pairs from a certain geographical region have another way of communicating than pairs from another region.

1.3 Distribution of modality across types of turns

The third purpose concerned the distribution of modality across the different types of communicative turns. This concerned the following research questions. First, is there a difference in distribution of modality across the communicative turns between two years old deaf and hearing children? This means, are some communicative turns expressed more by a certain modality than others and does this preference differ between deaf and hearing children? And second, how is this aspect represented in the communication of the mothers? The third research question concerns the language method the deaf children are raised with. Is there a difference in the above-mentioned aspect between the children who are raised with a different language method?

2 Method

2.1 Subjects

Ten mother-child pairs participated in this study: five children (all boys) in the profoundly hearing impaired group (group HI) and five matched children (all boys) in the normally hearing group (group NH). Specific information of the hearing status of the deaf children is shown in table 1. The NH children were matched with the HI children on several criteria e.g. sexe, birth order, living in and originating from the same geographical region (see Clement & Koopmans-van Beinum, 1995). Video recordings were made of the hearing children at 24 months of age and of the deaf children at 24, 30 and 36 months of age.

Table 1. Characteristics of the hearing impaired children (see also Clement & Koopmans-van Beinum, 1995).

Subject	Hearing loss best ear (dB)	Loss with hearing aids (dB)	Age at diagnosis (months)	Hearing aids from age (months)	Language method *
HI-1	97	55	1.5	2.0	Oral
HI-2	93	55	3.0	3.5	TC
HI-3	110	65	4.0	4.5	Oral/TC
HI-4	>120	not tested	0.5	-	NGT
HI-5	120	not tested	3.0	6.5	NGT

* Oral = Oral language method, TC = Total Communication, NGT = Dutch Sign Language

2.2 Data collection

Video recordings of 30 minutes mother-child interaction were made at the homes of the children to create a situation as natural as possible. A recording session was divided into two episodes. In the first episode, lasting for 15 minutes, the mothers were asked to elicit the best communication level the child can perform by naming pictures, reading books, etc. In the following episode of 15 minutes they were asked to play with their child as they naturally do when they have time to spend together. The only restriction was that they had to play in the field of the camera and that they should use silent toys as much as possible. For this study we only used the video recordings made at 24 months of age. From these 30-minutes-recordings a 6 minutes period was selected in which there was a good observable verbal and non-verbal interaction. This means that mother and child had to be clearly visible during these 6 minutes.

We used work of Helle and trained students in speech communication extensively into the transcription and coding system adapted from Helle (1997) and Kaye & Charney (1980). After this training each student transcribed 6 minutes mother-child interaction in which verbal as well as nonverbal actions were transcribed. After the transcription every communicative turn (verbal and nonverbal) was classified along the coding system (see paragraph 2.3). Finally, the students two-by-two controlled each other's transcript and classification of the turns. If there was disagreement, they deliberated with the video recording standing by until agreement was reached.

2.3 Coding

The different communicative turns were adapted from Kay and Charney (1980) and extended with some verbal and non-verbal aspects necessary for this study.

A communicative *Turn* (verbal or non-verbal) consist of a:

- single utterance with accompanying gestures, or
- two or more utterances strung together without a definite full stop between them, or
- a certain well-defined nonverbal act (e.g. 'nods').

The acts or utterances that form a Turn could have verbal as well as non-verbal components as long as these had a communicative intention.

Four types of communicative Turns were distinguished, namely Mands, Responses, TurnAbouts, and Unlinked Turns. Each turn was classified into one of these four types. The different types of turns were defined as described below.

A turn is considered as a *Mand* (M) if it met one of the following criteria:

- question syntax or intonation (except blatantly to oneself);
- explicit or implicit command or request, verbal or by manipulation (e.g. turning the other's attention into some direction);
- pointing or calling to something which is not already the topic;
- offering an object;
- a very expectant look.

A turn is considered as a *Response* (R) when it met one of the following criteria:

- answering a question (correctly or incorrectly);
- self-repetition elicited by the other person;

- repetition or paraphrase of the other's most recent turn;
- substantive continuation of the topic, e.g. naming an object pointed to by the other;
- agreement or disagreement;
- certain intrinsically responsive expressions (e.g. "oh oh", "mmm") and gestures (e.g. looking where other the has pointed, accepting an offered object);
- any act or utterance continuing a cadence (e.g. naming pictures for one another in rhythmic alternation).

A *TurnAbout* (TA) is a turn that consists of two components in random order: a Response to the other and a Mand expecting a Response from the other person. Thus a TurnAbout has the characteristic of being both Response and Mand. The following types of TurnAbouts can be distinguished:

- TurnAbouts which consist of two parts of a turn in which the Response component is separated from the Mand component (e.g. "Yes (Response), what is that (Mand)?");
- requests for clarification or verification (e.g. "What did you say");
- paraphrase: Response and Mand at the same time (e.g. "I heard you, but what ...");
- follow-up TurnAbouts which are a direct follow-up of the other's remark or behavior. These turns give the clearest impression of attempts to sustain the conversation (e.g. "What does the other dog say?", "Can I have one too?"). Also corrections of the other's utterance or behavior belong to this category.

A turn is considered to be an *Unlinked Turn* (UT) when it has no connection with the preceding behavior of the communication partner. The utterance comes from nowhere or is clearly unrelated to any aspect of the previous turn.

The above described four types of communicative turns could be used in the following three types of modality:

1. combination of non-verbal and verbal utterances (NV+V)
2. only non-verbal utterances (NV)
3. only verbal utterances (V)

An example of a coded transcript is shown in figure 1. It describes the interaction between a deaf child (C) and his mother (M). Child and mother are sitting near the table with books; C. sits on the short side of the table and M. sits besides him, so that she can see his face and he her's.

M (NV)	<p><i>M. and C. look at same page of a book. M. points.</i></p> <p><i>M. sits backwards, nods and pulls her hand away. M. looks shortly to C.'s face, than to his hand en back to his face.</i></p>	<p><i>C. stares at the page in the book and produces a whiping sign across the page.</i></p> <p><i>C. continues turning pages in the book and pointing whiping.</i></p>	TA (NV)
	<p><i>M. sees the action of C. and watches his face.</i></p>		

		<i>C. puts his hand on his cheek and makes a sleeping sign. C. looks at his M.</i>	
		<i>M. sees the action of C. and says whispering [sleeping], imitates C.'s sign immediately and laughing. There is eye contact.</i>	
R (NV+V)		<i>M. looks laughing to C.'s face. Her sign is fainting.</i>	
		<i>C. turns to the camera to see if ... and makes sound [uh].</i>	UT (NV+V)
		<i>C. looks at the camera while his sleeping sign faints, hand on the book, C. frowns and breaks eye contact with camera. Keeps his hands on the book, says [ung].</i>	M (NV+V)
R (NV)		<i>M. is manipulating the book, sees C.'s hands on the book.</i>	
		<i>C. points frowns to the camera, hands off the book.</i>	UT (NV)
TA (NV)		<i>M. takes page were hands are off en follows pointing sign, then holds page up.</i>	
		<i>C. stops pointing, turns to the book, watches the vertical page.</i>	
TA (NV+V)		<i>M. holds page up, looks at C.'s face, makes with the right hand the sign of filming (to see peripheral for C.) and says [yes]. Keeps looking at C. en let him take over the manipulation of the book.</i>	R (NV)
		<i>M. pulls her hands back and crosses them in rest, looks at C.'s face.</i>	
		<i>C. looks at the down going page.</i>	

Figure 1. Example of a coded transcript of the interaction between a deaf child (C.) and his hearing mother (M.).

3 Results

In this paragraph the results of the evaluation of the mother-child interaction will be presented in graphs and some statistics will be given. Because the total number of turns differs for deaf and hearing children and also for the mothers the results in the graphs are presented in percentage. Statistics are performed on the real numbers with a Chi-square test for equality of distributions. A chance of $p < .05$ was considered to be significant.

3.1 Modality use

Results about the modality use in the communication are shown in figure 2. This figure shows for each group (HI-children, HI-mothers, NH-children and NH-mothers) the percentage non-verbal + verbal (NV+V), only non-verbal (NV), and only verbal (V) turns in their communication. It can be seen that deaf children and their mothers as well as hearing children and their mothers have about the same distribution of modality use in their communication. The mothers of both groups of children use significantly more verbal (V) turns than their children. The hearing children use significantly more non-verbal (NV) turns than their mothers do.

When comparing deaf children with hearing children then deaf children used significantly more non-verbal turns (NV) and hearing children used significantly more verbal (V) turns. The same results were found when comparing the mothers of the children.

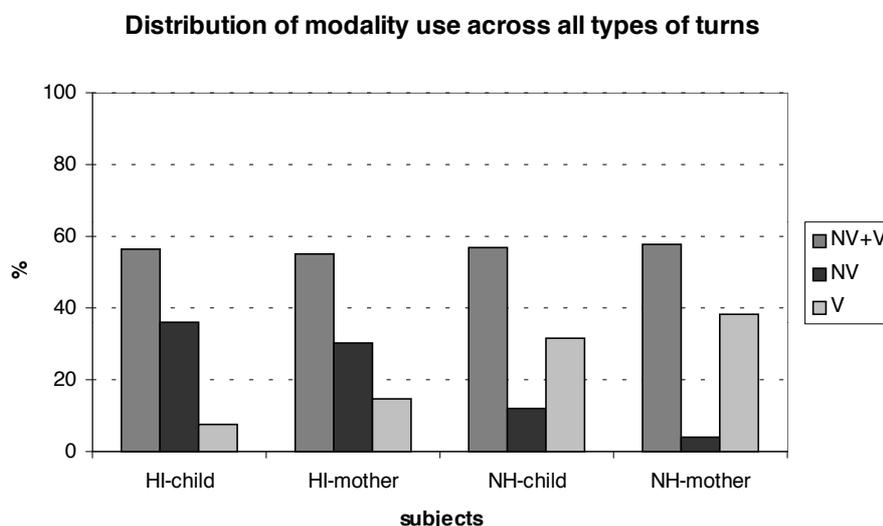
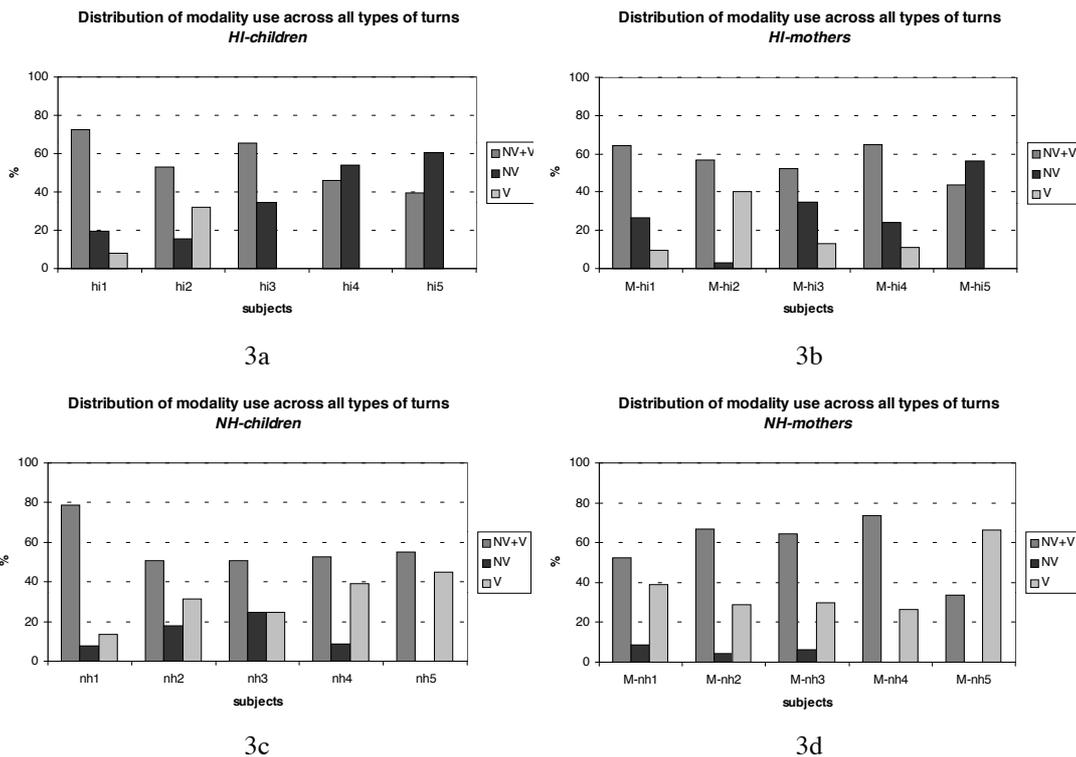


Figure 2. Percentage non-verbal + verbal (NV+V), only non-verbal (NV), and only verbal (V) turns in the communication of each group (deaf children, mothers of deaf children, hearing children, mothers of hearing children).

Figures 3a-d show the results of the modality use for the individual children and their mothers. In figure 3a it can be seen that the pattern of child hi2 resembles very well to that of hearing children nh2 and nh4 (figure 3c). The deaf children hi4 and hi5 have the same pattern yet quite different from that of the other hi-children. The language method the children are raised with is clear: child hi2 is raised with Total Communication (TC) and children hi4 and hi5 with Dutch Sign Language (NGT). Figure 3b gives the results of the mothers of the deaf children. Here the mothers of children hi2 and hi5 show patterns that are different from the other mothers. The pattern of M-hi2 resembles most to that of the hearing mothers. Language method used is very clear in M-hi2 (TC) and in M-hi5 (NGT). Results for hearing children are shown in figure 3c. In this figure there is not much difference between the children, except child nh5 who seems to be a very verbal child. Results for the hearing mothers (figure 3d) also show not much difference between the mothers. Except mother M-nh5 who produces more verbal (V) and less NV+V turns than the other mothers.



Figures 3a-d. Percentage non-verbal + verbal (NV+V), only non-verbal (NV) and only verbal (V) turns in the communication of the individual deaf children (3a), mothers of the deaf children (3b), hearing children (3c) and mothers of the hearing children (3d).

3.2 Types of communicative turns

Figure 4 shows the results with regard to the use of the different types of communicative turns in the communication of mother and child. This figure shows for each group the percentages of Mand (M), of Responses (R), of TurnAbouts (TA), and of Unlinked Turns (UT) in their communication. The mothers of both groups of children used more TurnAbouts than their children and this difference was found to be significant. Deaf children used significantly more Mand and Unlinked Turns than their mothers and hearing children used significantly more Mand and Responses than their mothers.

Comparison of deaf and hearing children showed significantly more use of TurnAbouts and Unlinked Turns by deaf children and significantly more Responses by hearing children. There was no significant difference between the mothers of the children.

Results of the use of the different types of communicative turns of the individual mothers and children are shown in figures 5a-d. The deaf children (fig. 5a) show a rather diverse view. Children hi1 and hi4 use mostly Mand, while child hi5 uses mostly TurnAbouts and child hi3 uses Responses and Turnabouts mostly. The mothers of the deaf children (fig. 5b) show a more consistent view. The mothers M-hi1, M-hi2, M-hi4 and M-hi5 use mostly TurnAbouts in their communication and also Responses occur a lot. Mother M-hi3 uses mostly Responses. In contrast with the deaf children the hearing children (fig. 5c) use mostly Responses, except child nh1 who uses mostly Mand. The mothers of the hearing children (fig. 5d) use like the

mothers of the deaf children mostly TurnAbouts, except mother M-hi5 who uses mostly Responses.

Comparing the individual deaf children with the individual hearing children shows the same pattern of the use of communicative turns between children hi1 and nh1 and the children hi2 and nh2, except for the Mand. This is also true for the mothers of these children.

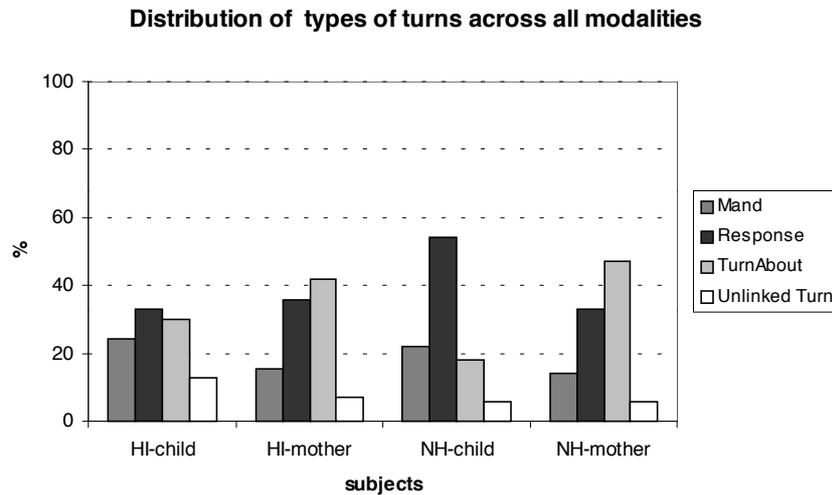
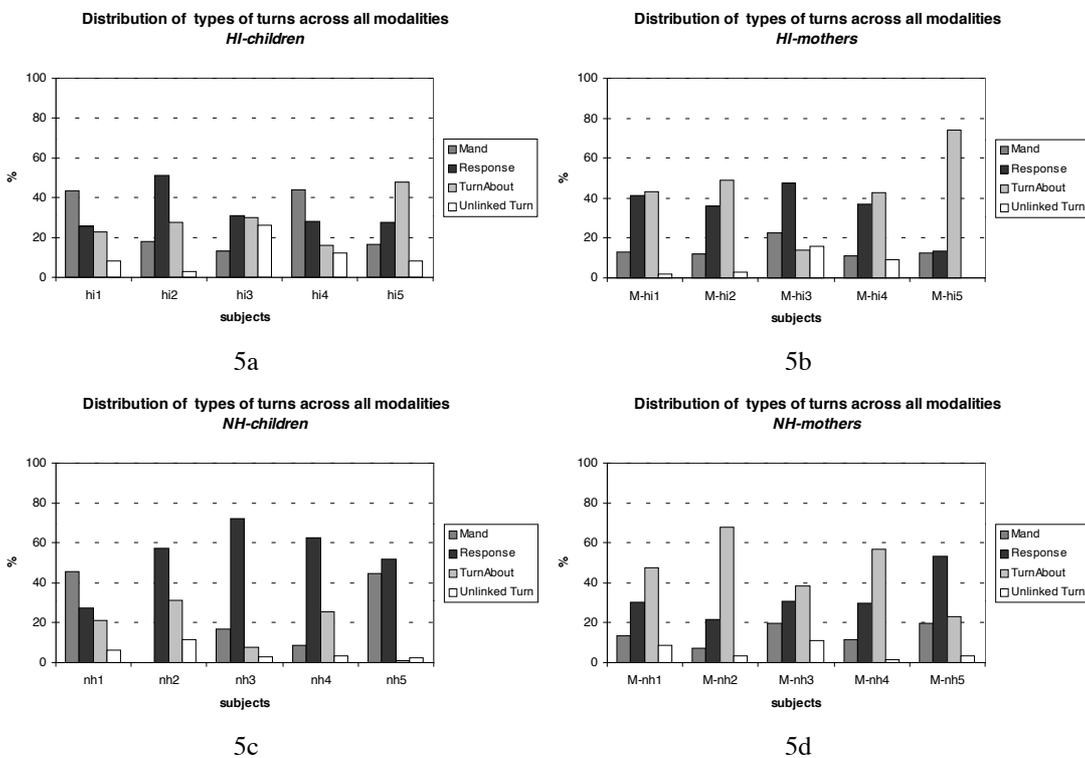


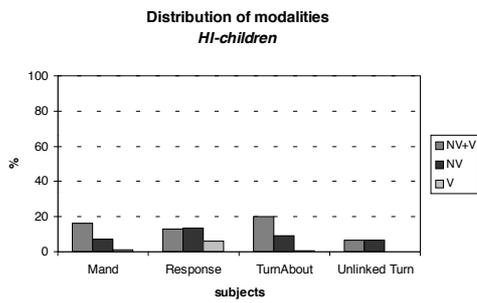
Figure 4. Percentage of the use of the different communicative turns in the communication of each group (deaf children, mothers of deaf children, hearing children, mothers of hearing children).



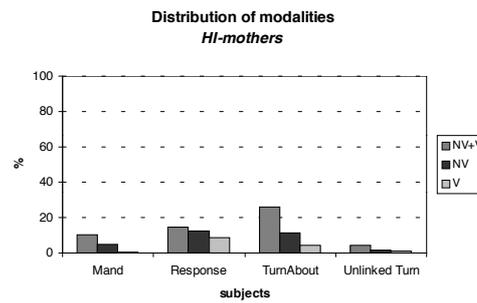
Figures 5a-d. Percentage of the use of the different communicative turns in the communication of the individual deaf children (5a), mothers of the deaf children (5b), hearing children (5c) and mothers of the hearing children (5d).

3.3 Distribution of modality across types of turns

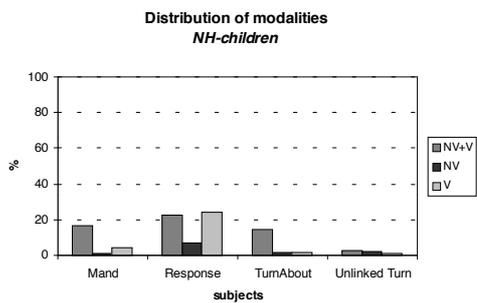
Results of the distribution of modality across the different types of communicative turns for each group are shown in figures 6a-d. These figures show for each communicative turn the percentage of occurrence in a certain modality in the interaction. Deaf and hearing children used significantly more Mand in the NV+V modality than their mothers. Hearing children also used significantly more Responses in all three modalities than their mothers. As was mentioned in the paragraph 3.2, mothers of both groups of children used significantly more TurnAbouts than their children. For the mothers of the deaf children this concerned significantly more TurnAbouts in the verbal (V) modality and for the mothers of the hearing children it concerned significantly more TurnAbouts in the NV+V and V modalities. Comparison of the deaf and hearing children showed significant differences in the production of Mands, Responses and TurnAbouts. Deaf children produced these utterances types significantly more in the non-verbal (NV) modality, while hearing children produced significantly more Mands in the verbal (V) modality and Responses in the NV+V and V modalities. Comparison of the mothers of the children showed a significantly higher production of Mands, Responses and TurnAbouts in the non-verbal (NV) modality for the mothers of the deaf children and for the mothers of the hearing children a significantly higher production of Mands and Responses in the verbal (V) modality and TurnAbouts in the NV+V and V modalities.



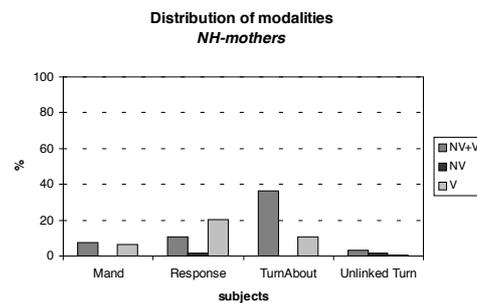
6a



6b



6c



6d

Figures 6a-d. Percentage of occurrence of the different communicative turns in a certain modality in the communication of each group (deaf children, mothers of deaf children, hearing children, mothers of hearing children).

For the deaf children the results are shown in figure 6a. They use Mands and TurnAbouts mostly in the NV+V modality. The Responses were mostly produced in the NV and NV+V modality. The same pattern of distribution was found for the mothers of the deaf children (figure 6b). They only show a slight difference in the modality use of the Responses. The hearing children (figure 6c) use most NV+V modality for Mands and TurnAbouts. For the Responses they use most V and NV+V modalities. Again, the same pattern of modality use was found for the mothers of the hearing children (figure 6d).

In general, all groups (deaf children and their mothers and hearing children and their mothers) use very often the NV+V modality for all types of communicative turns. The Responses were most sensitive to the auditive status; deaf children and their mothers use more the nonverbal modality and hearing children and their mothers use more the verbal modality.

4 Discussion and conclusion

As a conclusion we will summarize the obtained results per research purpose and discuss them.

1. Modality use in the communication

Both deaf and hearing mother-child pairs use much the NV+V modality in their communication. As expected, deaf pairs use more non-verbal turns and hearing pairs use more verbal turns. There was no clear effect of language method the deaf children were raised with except for the children hi2 (TC) and hi5 (NGT). Mother-child pair hi2 uses NV+V and V modalities in their communication much alike hearing couples. Mother-child pair hi5 uses much NV+V and NV modalities, while they never produce only verbal (V) turns in their communication.

2. Type of communicative turns

Deaf children use mostly Responses and TurnAbouts in their communication, respectively. Mothers of deaf children use mostly TurnAbouts and Responses in theirs, respectively. It seems that deaf mothers take care of the continuation of the communication with their TurnAbouts, but otherwise they follow their child in the communication with their Responses. The communication seems to be rather balanced. Hearing children use mostly Responses in their communication and their mothers use mostly TurnAbouts and Responses. In the hearing pairs it seems that the mothers maintains the communication with the TurnAbouts and have dominantly the initiative. The children follow their mother with their Responses.

In general, it seems that mothers (from deaf and from hearing children) use more TurnAbouts in the communication than their children and in this way try to maintain the communication. Kaye & Charney (1980) also found this for hearing mothers of hearing children. The results for the children do not resemble completely those of Kaye & Charney. Like them, we also found that hearing and deaf children used mostly Responses. But the percentage of Mands differed not so much from that of TurnAbouts. Hearing children used slightly more Mands than TurnAbouts, while deaf children used slightly more TurnAbouts than Mands.

In their use of communicative turns children hi1 and hi2 and their mothers resemble very much to children nh1 and nh2 and their mothers. This was not the case for the other pairs. In these cases may be the hearing loss influenced the interaction

style of mother and child. All hearing and deaf couples were geographically matched. One must be very careful to contribute the resemblance between mother-child pairs 1 and 2 to regional effects because other aspects of the families lives, for instance, cultural aspects, ideas about raising up children, religion etc., might have more influence on the interaction style than geographical matching. It might be better to make a matching on the interactional level if the intention is to compare interaction styles in deaf and hearing couples.

3. Distribution of modality across types of communicative turns

The TurnAbouts and Mands were mostly produced in the NV+V modality for deaf as well as hearing mother-child pairs. The large proportion of NV+V modality could be explained by the young age of the children. On this early age children (and mothers) often use both modalities to communicate because the speech- and language development of the children is not developed well enough yet for communication in one modality only. This might become very clear in cases of a request which could explain the large proportion of NV+V in the TurnAbouts and Mands.

The Responses might be more depended on the auditive status. Because deaf children and their mothers use Responses more in the NV modality, while hearing couples use them more in the verbal modality. Again, the Responses were also used much in the NV+V modality, so all modalities were used. The Mands were also produced mostly in the NV+V modality as if they use all modalities to make themselves clear.

As mentioned earlier there was not much effect found of the language method the deaf children were raised with except mother-child pair hi2 (TC) and hi5 (NGT). For the other children language method was less clear. Mothers M-hi2 and M-hi5 seem to work out their language method most consequently, the other mothers probably are less consequent in their use of one language method.

Another aspect found much was that mother-child pair hi2 show a communication pattern that resembles very much to that of hearing mother-child pairs. It should be mentioned that this child hi2 started babbling at a normal age (about 8 months old) and also developed a very good spoken language. Probably this child could use his hearing residues very well. This could explain why the interaction style of this pair resembles so much to that of hearing children.

About the number of turns, it should be mentioned that there were almost a similar number of turns in each person of a pair. This means that according to the number of turns the communication between mother and child was in balance.

Finally, in this study we made no analyses of the linguistic content of the utterances of mother and child. We only focussed on the interaction level and not on the content of the interaction. The researchers did not interpret the interactions semantically. But also without interpreting the content of these interactions this method of describing and analyzing the interaction style between deaf and hearing children and their mothers seems to give a good indication of the communication.

We think this study can be used as a pilot study for further research. It could be interesting then to make analysis both at the linguistic and the interaction level. When using matched pairs it might be useful to contribute interactional aspects in the matching criteria.

5 Acknowledgments

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