NONVERBAL COMMUNICATION BETWEEN DEAF AND HEARING INFANTS AND THEIR PARENTS: A DECADE OF RESEARCH

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UDK: 376.36

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This paper presents results of two analyses conducted as part of a study of the early social and communicative development of deaf and hearing infants, with either deaf or hearing parents. The first topic relates to patterns of eye gaze among deaf and hearing parent-infant dyads; the second describes these same infants in terms of their emerging awareness of self at age 18 months.

Infants establish the basic structures for later social interaction and communication through early exchanges with social partners. One essential component of this early communication is maintaining face-to-face interaction, usually involving mutual eye contact. The importance of the visual world is heightened for deaf parents and their children, all of whom must pay a great deal of attention to non-vocal cues in their social environment. Results of this study indicate that deaf and hearing parents use different strategies (i.e., emphasize different sensory channels) to re-engage an infant who has looked away during social interaction.

Communication, attention, and language acquisition may also play a role in the infant's gradual understanding of distinctions between "self" and "other". It is assumed that this emerging skill results in part from a growing sense of self-efficacy, or an awareness of the self as an agent causing things and people in the environment to respond in predictable ways. This is turn might depend upon a caregiving relationship which is both contingent upon and sensitive to the infant's nonvocal signals. Infants who share their parents' hearing status (e.g., both are deaf or both are hearing) appear to develop an image of the self as separate from "other" somewhat earlier than those in mis-matched dyads.

Key words: **nonverbal communication, deaf children, face-to-face interaction, self-recognition, eye gase behavior**

This paper is based on results first reported in the following two sources:

1) Koester, L.S., Karkowski, A.M., & Traci, M.A. (1998). How do deaf and hearing mothers regain eye contact when their infants look away? American Annals of the Deaf, 143 (1), 5-13.

2) Koester, L.S., & Forest, D.S. (1998, April). Self-recognition responses among deaf and hearing 18-month-old infants

Poster presented at the Biennial Meetings of the International Conference on Infant Studies, Atlanta GA.

Theoretical and Methodological Background

Several years ago, a German movie entitled "Jenseits der Stille" was produced, depicting the dilemmas and realities of a *hearing* child growing up in a d*eaf* family. Although this film did not address all of the possible combinations of hearing/deaf parents and children, it nevertheless drew attention to some of the important but subtle differences in the ways people communicate with each other in families where deafness is involved. It also conveyed an awareness that deaf people clearly do not simply live in a world of silence – that there is much, much more in the rich forms of interactions taking place between these

parents and children if one takes the time to stop and observe them carefully.

This belief, as well as the theory of *Intuitive Parenting*, formulated by Hanuš and Mechthild Papoušek (see Papoušek & Papoušek, 1987, for review), provides the background for the research undertaken at Gallaudet University, Washington DC (USA) for over a decade. The Papoušeks' concepts draw attention to the many nonconscious ways in which parents support the early development of their children, such as the strategies they use to elicit eye contact, to determine infant state and readiness for interaction, and the speech variations parents incorporate into communication with a prelingual child. Many of their concepts are applicable to "atypical" children as well, and have been shown to be helpful explanatory tools for interpreting observations of deaf and hearing families (Koester, 1992; Koester, Papoušek, & Smith-Gray, 2000).

The research reported here was part of a longitudinal study investigating the impact of early deafness on the cognitive, social, and communicative development of deaf and hearing infants with deaf or hearing mothers in the first eighteen months of the child's life (MacTurk, Meadow-Orlans, Koester & Spencer, 1993). Begun in 1987 at the only liberal arts college for the Deaf B Gallaudet University in Washington, DC B this research was an effort to generate much-needed information about the development of infants whose hearing losses had been diagnosed very early in life.

Until recently, few studies have examined deaf infants' early interactions and communicative development within the context of both deaf and hearing families (Meadow-Orlans, 1987; Spencer, Bodner-Johnson & Gutfreund, 1992; Spencer & Gutfreund, 1990; Wedell-Monnig & Lumley, 1980). The goal was therefore to provide professionals who offer training and intervention for deaf children with current, research-based strategies that might optimize the outcomes for these children over the long run.

The multidisciplinary research team consisted of developmental psychologists, a sociologist, and a specialist in speech and communication disorders, plus numerous deaf and hearing research assistants, technicians, data processors, and so forth. The project has received funding from various public agencies and private foundations since that time; although the original research team no longer exists, several of its members still continue to analyze data and collaborate on making these results available. Two specific aspects of these investigations will now be described in more detail.

Methodology of Study in General

Recruitment. Families with deaf infants were identified through pediatricians, early intervention programs, and audiologists — primarily in the Washington, DC area in the United States.

Procedures at each age. Every three months, infants were either brought to the laboratory for observations and assessments, or were visited in their homes for extensive interviews with their parents regarding medical and family history, knowledge of or prior experience with deafness, decisions about mode of communication, and sources of stress or support for the family, as follows:

6 Months:	Face-to-Face Interaction
	Mastery Motivation
	Background Information
9 Months:	Face-to-Face Interaction
	Mastery Motivation
	Free Play
12 Months:	Mastery Motivation
	Free Play
	Attachment (AStrange Situation@)
15 Months:	Home Visit/Interview
18 Months:	Free Play
	Attachment (AStrange Situation@)
	Teaching Task
	Self-Recognition Task
	Language Sample

Locations. Observations took place in university laboratory facilities specially designed for videotaping of activities such as dyadic interactions, free play, and attachment relationships between infants and their parents.

Participants. Participants were predominantly from Caucasian, middle class American families, with both parents present in the home. The deaf infants included in this study represent a small minority of the deaf population due to the fact that their hearing losses were suspected and diagnosed very early in life (prior to age 6 or 9 months). Most of the deaf mothers in this study were affiliated in some way with Gallaudet University, and therefore tended to identify with the Deaf Culture and to use American Sign Language with their infants; all of their husbands/partners were also deaf.

By age 9 months, each group contained 20 infant/mother dyads, grouped according to hearing status as follows:

Group 1) Deaf Infants/Deaf Mothers (DIDP)
Group 2) Deaf Infants/Hearing Mothers (DIHP)
Group 3) Hearing Infants/Deaf Mothers (HIDP)
Group 4) Hearing Infants/Hearing Mothers (HIHP)

Special characteristics of the deaf infants. Degree of hearing loss for the deaf infants was determined by an audiologist using the following threshold criteria: mild (25-40 dB); moderate (41-55 dB); moderate-severe (56-70 dB); severe (71-90 dB); and profound (91 and above dB).

Of the 20 deaf infants participating in the first study, 12 were profoundly deaf, four were moderate-severely or severely deaf, and four were mild to moderately deaf. All were developing normally according to scores on the Physical and Self-Help Scales of the Alpern-Boll Developmental Profile II.

Hearing aids. For the deaf infants with hearing mothers, use of hearing aids had begun quite early (average age 6.95 months for initial fitting). The deaf infants whose parents were also deaf had typically *not* been fitted with hearing aids at the time of this study.

Early intervention. By age 9 months, virtually all of the deaf infants with hearing parents were participating in some kind of early intervention program; the one exception was an infant who was on a waiting list but entered a program soon after. Services represented a broad array of educational philosophies, including auditory-verbal, oral, and total communication training.

Study 1: Infant Eye Gaze Behaviors

Infant gaze behavior has been shown to make an important contribution to the maintenance of early face-to-face interactions (Blehar, Lieberman, & Ainsworth, 1977), and can also signal emotional responses to social experiences (Messer & Vietze, 1988). Recently, studies have also investigated how caregivers re-gain eye contact with an infant who has turned away (Harris & Mohay, 1997; Waxman & Spencer, 1997). For deaf infants, eye contact would seem to be a necessary (or very important) condition for prolonged interaction, therefore this was thought to be an important phenomenon to explore in the observations collected through this project.

Gaze *aversion* (when the infant looks away from the social partner) is sometimes thought to assist the infant in regulating incoming stimulation. Visual fixation, visual following, closing the eyes or looking away, are all among the earliest behaviors which an infant can control voluntarily. The infant quickly learns that by avoiding visual contact with a stimulus that is too intense or confusing, physiological arousal can be effectively reduced (Gable & Isabella, 1992; Gusella, Muir, Tronick, 1988; Stifter & Moyer, 1991). Even during positive or playful social interactions, infants have been shown to utilize this mechanism so as to maintain a comfortable level of arousal (Stifter & Moyer, 1991).

The visual world is of heightened importance for deaf parents and deaf children, for they must both be particularly attentive to the many *non-vocal* cues in their social environment (Swisher, 1992). For deaf individuals, facial expression itself can communicate both affective *and* grammatical information, which for a hearing person is available through spoken language (Reilly & Bellugi, 1996). Visual contact with a social partner also facilitates the develop-

ment of turn-taking skills which allow conversations to flow smoothly and with participation by two or more people. These visual components of affect and communication are essentially blocked when the deaf infant's gaze is averted from the caregiver. Parents of deaf infants then have the additional burden of finding ways to bridge this gap when it occurs, and of incorporating effective means of re-establishing eye contact when it is needed for further communication.

According to Schilling and DeJesus (1993) a deterioration occurring in the communication between an infant and caregiver can adversely affect the infant's intellectual, language, and emotional development. Therefore, the caregiver's skill in regaining and maintaining a deaf infant's visual attention may have important implications for other aspects of the child's subsequent development as well.

Regardless of whether the deaf child communicates by sign language or lipreading, his or her language acquisition will rely greatly on the visual modality. Nevertheless, the conflict between observing the object of interest and observing the communicative partner presents a very real challenge for the deaf infant. Thus, among the most difficult and important tasks for the parent with a deaf infant are the coordination, timing and sequencing of infant looking behavior with parental visual input (Swisher, 1992; Waxman & Spencer, 1997; Wood, Wood, Griffiths & Howarth, 1986).

The present analyses were undertaken to examine ways in which deaf and hearing mothers regain an infant's visual attention, after eye contact has been broken by the child. The effectiveness of using active strategies by the mothers (in various modalities, such as vocal, visual, tactile), or of simply waiting for the infant to return gaze, was also compared. That is, following the mother's effort to get the infant's attention, does the infant continue to look away, or simply change the direction of its gaze? Or does the infant in fact look back toward the mother and resume their previous interaction?

Methods

Observational procedure. For this particular part of the study, 9-month-old infants were videotaped in face-to-face interactions with their mothers. Each group contained 10 infant/mother dyads, grouped according to hearing status as indicated earlier. The baby was placed in an infant seat on a table directly in front of and facing the mother. No toys or other objects were used during this procedure. The face-to-face interaction segments were structured according to the standard infancy research procedures for such observations, as follows:

Episode I, Normal Interaction: The mother was instructed to interact with her infant just as she would normally do at (3 minutes).

Episode II, Still-Face: The mother was asked to face her infant again, but not to touch, speak, smile, communicate (for example, with sign language), or respond to him or her in any way (2 minutes).

Episode III, Resumed Normal Interaction: The mother was told to resume normal interactions, as in the first episode (2 minutes).

(The analysis reported here relate only to behaviors occurring during the first mother-infant interaction episode, for two reasons: 1) almost no Group differences were found for maternal behaviors during the second play episode; and 2) infants tended to reduce their gaze avert behavior following the Still-Face, so that there were fewer opportunities to code maternal attention-getting strategies. Frequently the third episode involves many maternal soothing efforts in response to infant fussiness.)

Coding procedures. The first coding identified all instances of the infant looking away from the mother (including looking at the infant's own clothing, feet, hands, etc.) to determine the onset time of each gaze aversion. The next phase of coding involved

observing the *mother's response* when her infant looked away, and included maternal behaviors such as: 1) observing/waiting; 2) vocal response; 3)tactile/vibratory response; and 4)visual response.

The final phase of coding involved documenting the following possible infant behaviors subsequent to the maternal response: looking back or resuming eye contact with the mother, continuing to look away, or changing focus of attention but still not looking back at the mother. (Looking back or resuming eye contact with the mother indicated the *end* of a gaze avert episode.)

Reliability. Inter-coder reliability, based on the ratio of agreements divided by agreements plus disagreements, was 90% for the total number of infant gaze avert episodes. Reliabilities for active maternal behaviors in response to the infant's looking away were as follows: vocalization (71%); tactile/vibratory (80%); visual strategy (78%). Coder agreements for the infants' behaviors following mothers' attention-getting efforts were 71% for continuing to look away, and 80% for returning eye gaze to the mother. Interrater reliability for coding of durations of maternal observing/waiting was also calculated. Based on eight dyads, raters agreed on 90% of coded maternal waiting events and on 85% of the video frames (onset/offset times) coded to determine durations of these events.

Results

Amount of Infant Gaze Avert by Group

As can be seen in Figure 1, there were no significant differences in the overall frequency with which infants in each group interrupted eye contact with their mothers. However, in each episode it was the deaf infants with hearing mothers who looked away from their mothers least often.

Active Bids by Mothers

An Analysis of Variance was also conducted on the frequencies of active attention-getting bids (visual, vocal, and tactile-vibratory responses) observed in these mothers (see Figure 2).

Visual Strategies. There was a significant Group difference in the number of visual attempts used to regain infant attention [$F(3, 36) = 2.92$, $p < .05$]. *Deaf mothers of both deaf and hearing infants* were more likely to use a visual strategy (this might include signing within the child's line of vision) than were *hearing mothers of either deaf or hearing infants.*

Vocal Strategies. Analysis of the vocal efforts used by mothers to re-establish eye contact with the infant also revealed a significant difference according to Group, [$F(3, 36) = 8.24$, $p \leq .001$]. As expected, post hoc analyses (Tukey's HSD) confirmed that hearing mothers (particularly those with hearing babies) were more likely than deaf mothers to vocalize even when their infant was looking elsewhere.

Tactile-Vibratory Strategies. There were no significant Group differences for this variable.

Observing/Waiting Time by Mothers

Thus far, results have been reported only for frequencies of *active* maternal behaviors. However, the literature indicates a potential importance of allowing a deaf infant more time to visually explore the surroundings before language input is provided. Therefore, an additional analysis was performed to assess the amount of "waiting time" as part of the mothers' repertoire in response to an infant's looking away. Since waiting also allows the infant an opportunity to re-initiate the interaction, it was felt that this should be considered a relevant aspect of the maternal behavioral repertoire. Onset and offset times of maternal observing/waiting were therefore coded during episodes when the infant was looking away.

Mean durations of infant gaze avert were also calculated for each group. A One-Way Analysis of Variance revealed no significant differences between groups of infants for time spent in gaze avert. The average amount of time these babies spent looking

away from their mothers in the first episode was 39.95 secs., with a range of 31.89 secs (DIDP group) to 53.15 secs (HIHP group). In all groups that included at least one deaf partner, the infants looked away for less of the interaction time than was the case in the hearing/hearing dyads.

The amount of time mothers spent observing the infant who has looked away, or waiting for the infant to resume eye contact, is also shown in Figure 3. The group which spent the least amount of time waiting for the infant was that of hearing mothers with deaf infants, although Group differences only approached significance [F (3,36) = 2.58, p. <.07].

Successfulness of Maternal Strategies

As described earlier, the mothers' strategies could be followed by various infant behaviors, one of which was looking back at the mother. Thus, an overall success ratio was calculated for each mother by dividing her successes by her number of total attempts, regardless of modality; these were then subjected to Analyses of Variance. This was broken down according to the modalities of response used in previous analyses.

Figure 4 provides a summary of average success rates by Group and by Episode, for each modality.

Analysis of the overall successfulness of active attention-getting strategies by the mothers revealed significant main effects for Group. It was found that deaf mothers of deaf or hearing infants were generally more successful than hearing mothers in regaining their infant's attention following a break in eye contact [F (3, 36) = 2.87, $p \leq .05$].

Visual strategies. As shown in Figure 4, deaf mothers (of both deaf and hearing infants) were more successful than hearing mothers in regaining infant eye contact by using a visual strategy [F (3, 36) = 2.99, $p \leq .05$].

Vocal strategies. Analysis of successful vocal responses also revealed group differences [F (3, 36) = 15.50, $p \leq .00001$]. Tukey's post hoc analyses indicate, as would be expected, that hearing mothers with hearing infants were significantly more successful in regaining their infant's attention by using this modality. Interestingly, however, hearing mothers with *deaf* infants were also more successful when responding vocally than were deaf mothers with deaf infants.

Tactile-vibratory responses. The analysis of successful tactile-vibratory responses revealed no significant Group differences, although a significant Episode effect was found [F (1,3) = 18.32, $p < .0001$].

Instances of maternal waiting were also identified as being either successful or unsuccessful, depending on whether the infant looked back at the mother, or continued to look away. The mean number of "successful waits" was then calculated for each group. Analysis of Variance revealed a marginally significant Group effect [F (3,36) = 2.51, p. < .07]. However, post hoc analysis indicated that deaf mothers were significantly more likely to be successful in regaining a deaf infant's attention by waiting than were the hearing mothers. In fact, no mothers in the DIHP group were found to use this strategy successfully.

Discussion

Clearly, advances in audiological technology are now making earlier diagnosis possible and therefore increasing the availability of deaf research participants at a much younger age than previously. Nonetheless, research on this population is still sparse. The potential for earlier diagnosis also makes it incumbent upon researchers to provide more detailed information about effective early interactions and the development of mutual dialogue strategies with deaf infants (Downs & Yoshinaga-Itano, 1999; Yoshinaga-Itano, Sedey, Coulter & Mehl, 1998). Indeed, recent studies have begun to show some important differences in both interactive behaviors and developmental outcomes when a deaf infant is born to either deaf or hearing parents (Harris & Mohay, 1997; Koester, 1992, 1995; Meadow-Orlans, 1990, 1997; Spencer &

Gutfreund, 1990; Swisher, 1992; Waxman & Spencer, 1997).

Results presented here point to some important ways in which mothers re-elicit their infant's attention, particularly with the use of visual strategies, compared to hearing mothers. On the other hand, our data also show that hearing mothers can be surprisingly successful in regaining infant attention by vocalizing, even when the infant is deaf (as will be elaborated upon later).

According to Swisher (1992), several behaviors used by deaf mothers have been shown to maximize visual attention by their infants during communication:

1) locating signed communication on or near the object of reference;
2) re-locating the referent object by bringing it into the dyadic space during sign communication;
3) reaching into the visual field of the deaf child when signing; and
4) waiting for visual attention from the child before signing.

Regarding the latter strategy, Spencer et al. (1992) report that deaf mothers of 12-month-olds waited approximately 70% of the time when their child looked away, whereas hearing mothers of deaf babies at this age waited only 16% of the time. (These results were from the same sample as reported here.) It is important to be aware of the deaf child's need to explore the environment as well as to engage in face-to-face interaction. It is quite possible that the subtle features which contribute to synchrony and mutuality between social partners – such as contingency responding and joint attention – are simply more difficult to establish when one partner is deaf and the other hearing (Spencer, et al., 1992).

It is also important to recognize ways in which the infant's own behaviors influence the synchrony and flow of early interactive dialogues. In the current study, it has been shown that infants in the three dyadic groups involving deafness spent *less time* looking away and more time looking at their mothers when compared to infants in the hearing/hearing group. This finding may indicate the greater salience of visual attention when deafness is a factor. Furthermore, it is especially interesting that it is the deaf infants of hearing mothers in this sample who are the least likely to look away from their mothers during face-to-face interactions. Since this difference is already apparent at infant age nine months, it appears that these deaf babies have already learned some important lessons during their early months of becoming social and communicative partners.

As shown in these analyses, deaf mothers tend to rely more on visual strategies when an infant looks away; these may include such behaviors as reaching around to sign within the child's visual field. Hearing mothers rely more on vocalizations to call their infant's attention back to them, even when the infant is deaf. In either case, the mother may or may not be specifically attempting to regain the infant's visual attention; rather, she may simply be commenting on the child's current focus of attention by using either the auditory or visual-gestural channel.

Hearing parents' natural tendency to respond vocally is not necessarily inappropriate when interacting with a deaf child; as these results indicate, hearing mothers often seem to use vocalizations quite effectively to regain eye contact with their infant. As we have stated elsewhere (Koester, Karkowski & Traci, 1998), it may be that a deaf infant perceives maternal vocalizations as another instance of her "observing/waiting"; if so, then from the infant's perspective this might have quite a different meaning than the mother intends or is aware of herself.

Of course, vocalizations often co-occur with head movements, gestures, and changes in facial expression; therefore, sounds are accompanied by an array of nonvocal behaviors which may be peripherally visible to the infant, even when not in direct eye contact with the mother. If this is the case, then the hearing mothers' seemingly high

success rate when vocalizing may result more from these co-occurring behaviors than from the audiological features themselves.

Deaf parents may be important models of effective parenting with a deaf child, providing insights for hearing parents as well as for early intervention specialists. The enhancement of communication by relying on various non-auditory modalities, has important implications for early intervention specialists: these are behaviors which are already part of the hearing parent's communicative repertoire as well, and need only to be expanded, emphasized, and incorporated more systematically into their interactions with a deaf child. These findings offer a challenge to researchers engaged in the study of early parent-infant interactions, for to date little has been done to document the communication and interaction strategies of parents who have themselves grown up without hearing.

Study 2: Self-Recognition

The second aspect of this investigation to be reported here pertains to the infants' ability to recognize themselves in a mirror image at age 18 months. In the past two decades, research has indicated that an infant's ability to recognize himself/herself usually emerges during the second year, and is normally well established by the end of toddlerhood. Emde (1983) notes that this coincides with the onset of personal pronoun usage by hearing children when shown pictures of themselves, and may therefore be related to the child's developing language comprehension.

The "rouge test" (described by Lewis and Brooks-Gunn, 1979; Papoušek and Papoušek, 1974; and many others since) provides a reliable method for assessing this emerging sense of self. This is accomplished by observing the infant's response to seeing his/her own mirror image after a red spot has been placed on the infant's nose. The observer then notes whether or not the infant shows recognition by touching his/her own nose, as opposed to simply touching or pointing to the mirror image. The latter response is thought not to indicate awareness that the self is the same as what is seen in the reflection.

Furthermore, it is assumed that this emerging skill results in part from a growing sense of self-efficacy, or an awareness of the self as an agent causing things and people in the environment to respond in predictable ways. This is turn might depend upon a caregiving relationship which is both contingent upon and sensitive to the infant's particular signals and communicative style. For example, the phenomenon of "parental mirroring" of a baby's actions, as well as "parental echoing" of their baby's vocalizations, may serve important functions in assisting the child's developing awareness of his or her own behaviors and effects on others.

As Lewis and Brooks-Gunn (1979) asserted some time ago, social knowledge in the early years revolves around discriminations among three components: 1) knowledge about self; 2) knowledge about others; and 3) knowledge about the self in *relation* to others. In other words, "I cannot know another unless I have knowledge of myself, just as I cannot know myself without knowing others" (Lewis et al., 1979, p. 2). Surely these various levels of self-other understanding must derive largely from the infant's experiences in the social world, frequently in the context of parent-infant interactions and early communication.

In addition, the same authors found a significant relationship between earlier mirror recognition and greater attentional capacities on the part of the infant; this is a point that may have particular relevance for the present study. That is, parents who share their infant's hearing status (e.g., both are deaf or both are hearing) are likely to be more effective in eliciting and maintaining the infant's attention by using visual, tactile, or auditory modes of communication. They may also be more adept at reading their infant's behavioral cues in these various modalities.

Methods and Procedures

The current analyses utilized the "rouge test" to assess self-recognition in the four groups of 18-month-olds (n=57) who were participating in the longitudinal investigation described earlier. The standard mirror recognition procedure was used, in which the infant's attention was first directed to a large mirror in an observational laboratory room; video cameras recorded the child's behavior from behind this mirror. After a brief period, the child was turned away from the mirror by the mother, while an experimenter unobtrusively applied a spot of red rouge (face powder) to the infant's nose. The infant was again placed before the mirror and his/her behavior noted. (In some cases, infant response was ambiguous or not clearly visible on the videotape, hence the reduction in sample size for this analysis.)

Successful self-recognition was coded if infants showed behaviors such as pointing to, touching, or trying to rub off the red spot on their own nose, within 30 seconds of visual attention to their mirror image. "Mirror-directed behaviors" (i.e., infant points to or swipes at the mirror image baby, but not at self) were not considered to be indicative of self-recognition. It is important to acknowledge that the age at which these infants were tested (18 months) is at the younger end of the range during which one would normally expect self-recognition to occur; therefore, there is no reason to believe that those infants who did not yet indicate this awareness were experiencing delays of any particular significance.

Results

Effects of Dyadic Hearing Status

Groups of deaf and hearing infants, with either deaf or hearing mothers were first observed for onset of self-recognition at 18 months. As seen in Figure 5, rates of self-recognition are 84.6% in Group 1 (DIDP), 52.9% in Group 2 (DIHP), 36.6% in Group 3 (HIDP), and 62.5% in Group 4 (HIHP); these differences failed to reach statistical significance.

Matched vs. Non-Matched Hearing Status

Further analyses indicated that those infants whose mothers *share* their hearing status (i.e., deaf/deaf or hearing/hearing dyads) were significantly more likely to show self-recognition on this task than were those from the "*mis-matched*" dyads (see Figure 6). Chi-square analysis of matched and non-matched dyads who were successful in the rouge test (72.4 % and 46.4%, respectively) revealed a significant difference [Chi-Square (1) = 3.99, $p < .05$]. This indicates that infants whose mothers were of the same hearing status as their child were significantly *more likely* to have achieved self-recognition by the age of 18 months than those whose mothers were of the opposite hearing status.

Conclusions

It appears that infants in *matched dyads* are able to develop an image of the self as separate from "other" somewhat earlier than those in mis-matched dyads. Evidence from other aspects of this longitudinal study (e.g., Koester, 1995; Spencer & Meadow-Orlans, 1996) has indicated a variety of ways in which early parent-child communication may be more difficult in a dyad in which one partner is deaf and the other is hearing. Vocalizations (particularly imitations of the infant's own vocal behaviors) typically play an important role in helping the infant develop a sense of self-efficacy; however, it is clear from these results that the visual-gestural communication used within deaf/deaf pairs may also be highly effective in facilitating this process.

Perhaps the key here lies in the parent's ability to establish joint attention when the infant explores the environment visually, using such opportunities to label objects and persons of interest to the child and thus leading to self-other discriminations. However, when a deaf infant looks away from a

hearing mother, communication is often disrupted despite the parent's tendency to continue vocalizing (Koester, et al., 1998). The opportunity to provide language input as well as to foster the infant's awareness of the self as a causal agent in social interactions is therefore frequently missed or lost in these deaf/hearing dyads.

It is somewhat more difficult to explain these findings of later self-recognition in relation to the hearing infants with deaf mothers. Further observations of these dyads, however, give the impression that the mothers tend to incorporate so many modalities of interaction at once, (including a much higher rate of vocalization than heard in deaf/deaf dyads) that their hearing babies often turn away in an apparent effort to control or reduce the incoming stimulation. In this case, it would appear that there are again many missed opportunities for labeling those things in which the child expresses interest, or for establishing the joint attention which may facilitate self-other discriminations.

In an earlier report of results based on face-to-face interactions with this same sample of deaf and hearing infants, it was found that dyads matched for hearing status had higher levels of "maternal responsiveness" than did the non-matched dyads (Koester, Brooks & Traci, 1996). This, in combination with findings from the current study, leads to the conclusion that parental sensitivity to the child's communication and sensory input needs may in fact *facilitate* self-recognition in the early years.

The ability of parents and caregivers to establish a mutual focus of attention during language input appears to be particularly crucial in the case of deaf infants, and at the earlier stages of infancy is clearly easier when the mother and child share a means of communication B be it spoken or signed. This has implications for the use of the *visual modality*, as reported earlier, when interacting with a deaf child, and it also has implications for the child's *social-emotional* development as shown in the results regarding self-identification.

Final Remarks

The title of this paper refers to "a decade of research"; in some ways, ten years (or somewhat more in this case) of research is both a very short time and a very long time. This seems to be quite a short period of time when we consider that previously there had been almost no studies (with more than 1 or 2 participants) which included infants diagnosed with hearing loss as early as those described here. And sadly, although the technology is now available, early detection of deafness is far from universal; many children in every country are still not recognized as having a hearing loss until perhaps the preschool years, or at such a time when someone close to them realizes that the child is not developing language as expected. It is well known that missing the first several years of language input can be devastating in terms of the child's need for a means of communicating with other human beings, and a means for developing appropriate social and emotional outcomes.

At the same time, a decade also seems very long: those who work with deaf children know how critical the need is for more knowledge, more scientifically-based information, to help guide early intervention efforts with these youngsters. Researchers need to provide better information to the parents and educators who are with deaf children on a daily basis, and the children themselves need improved educational opportunities that support their perceptual, cognitive, and social-emotional needs.

In order to do this, we certainly need more systematic observations and research which will provide both the *community of scholars* and the *community of families* with a better foundation to guide their efforts in this important task.

Figure 1: Mean Frequencies of Infant Gaze Averts by Group

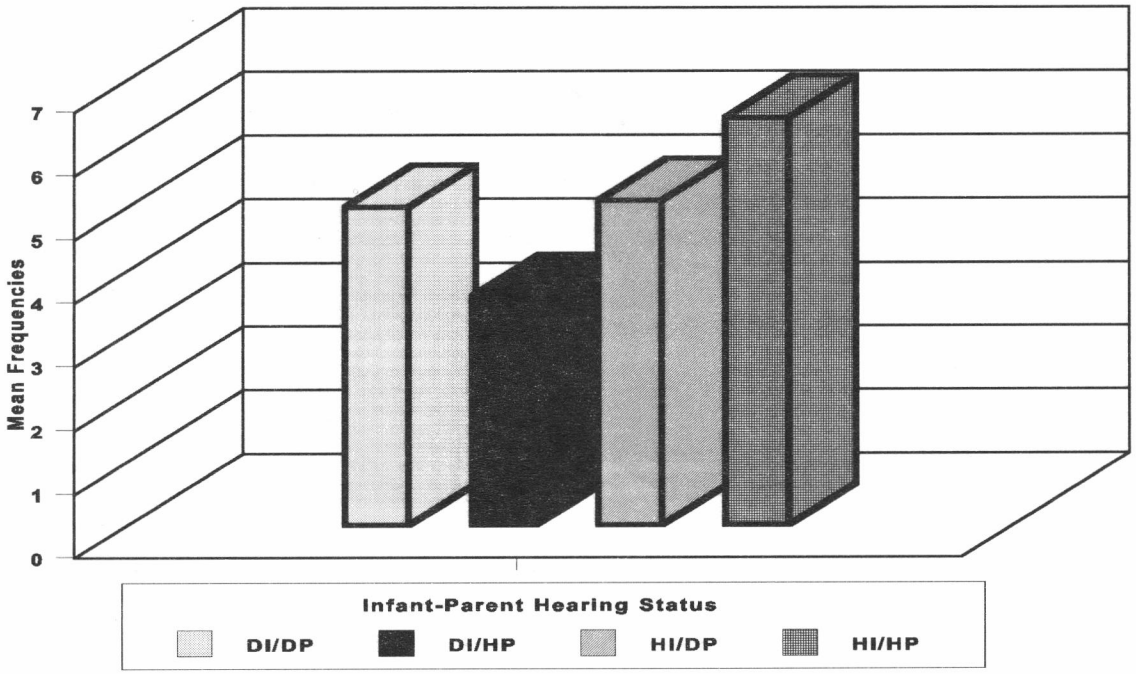


Figure 2: Mothers' Responses to Infant Gaze Averts by Groups

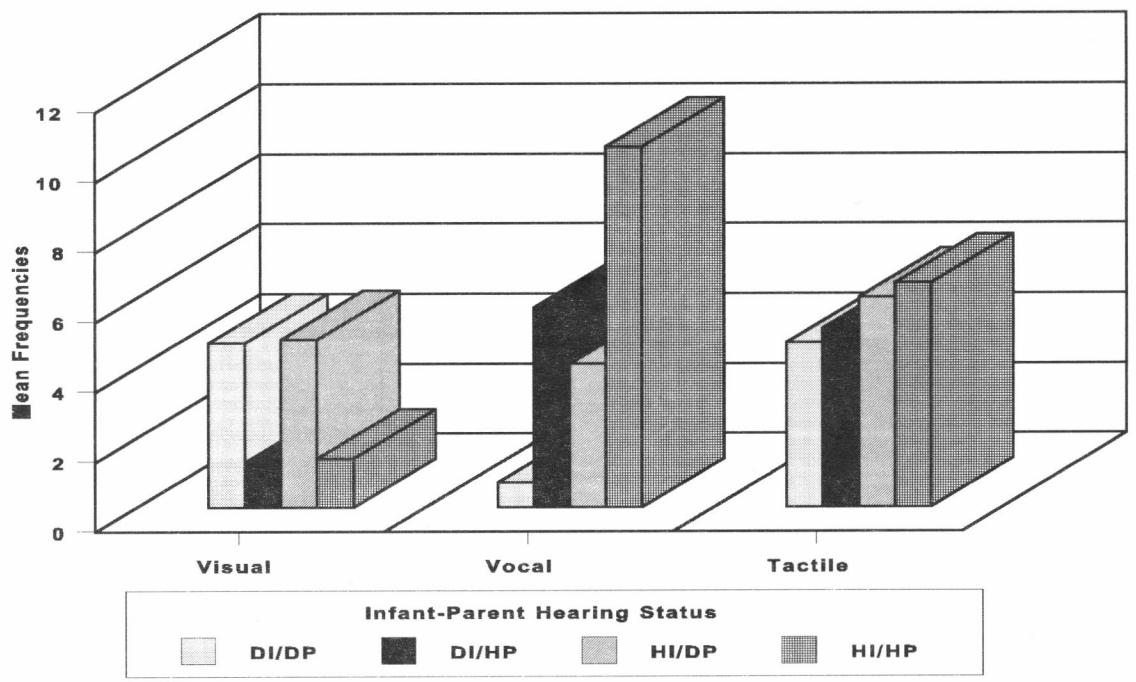


Figure 3: Durations of Infant Gaze Averts and Maternal Waiting

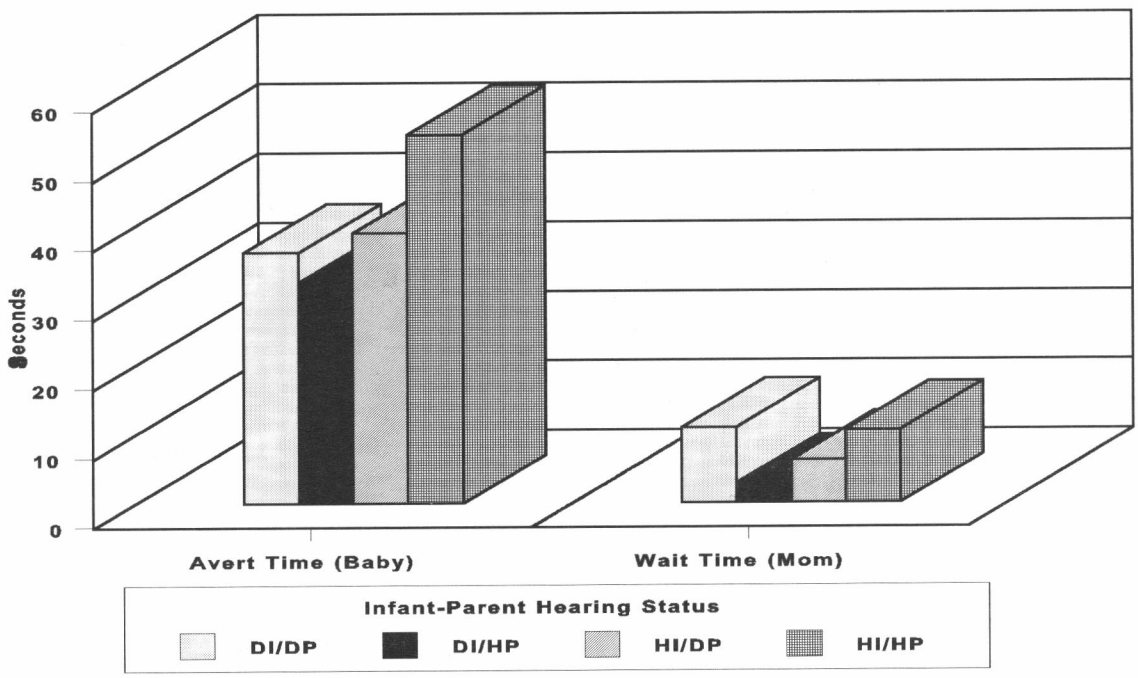


Figure 4: Successfulness of Deaf & Hearing Mothers' Strategies for Regaining Eye Contact

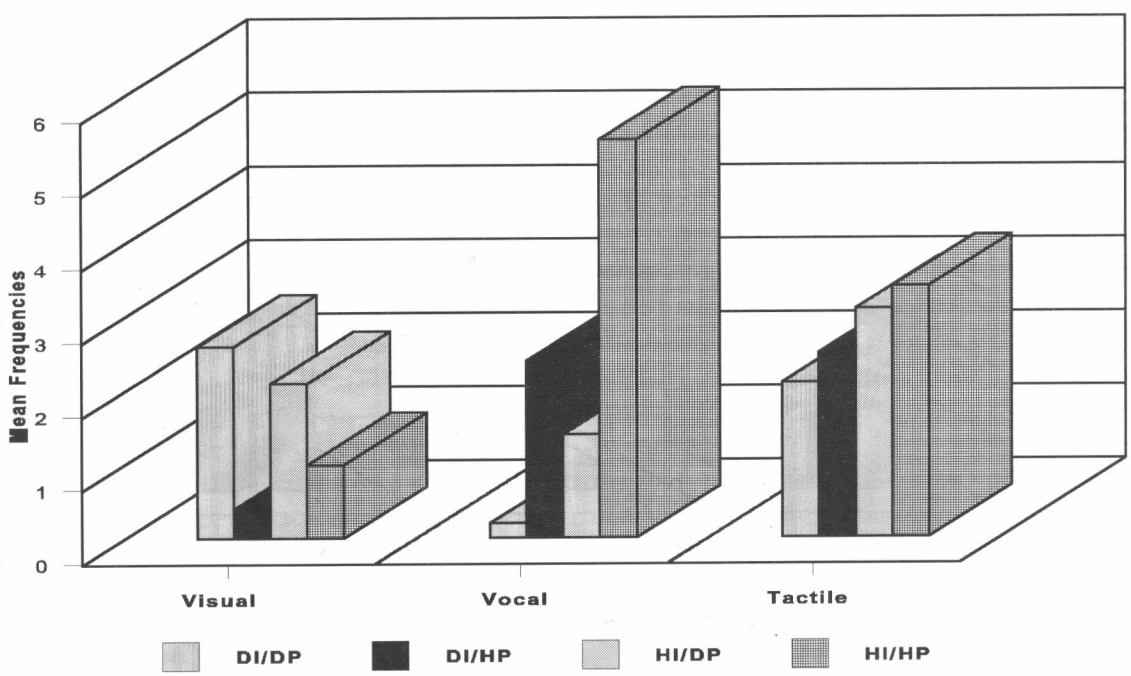


Figure 5: Self-Recognition by Deaf and Hearing Infants at 18 Months

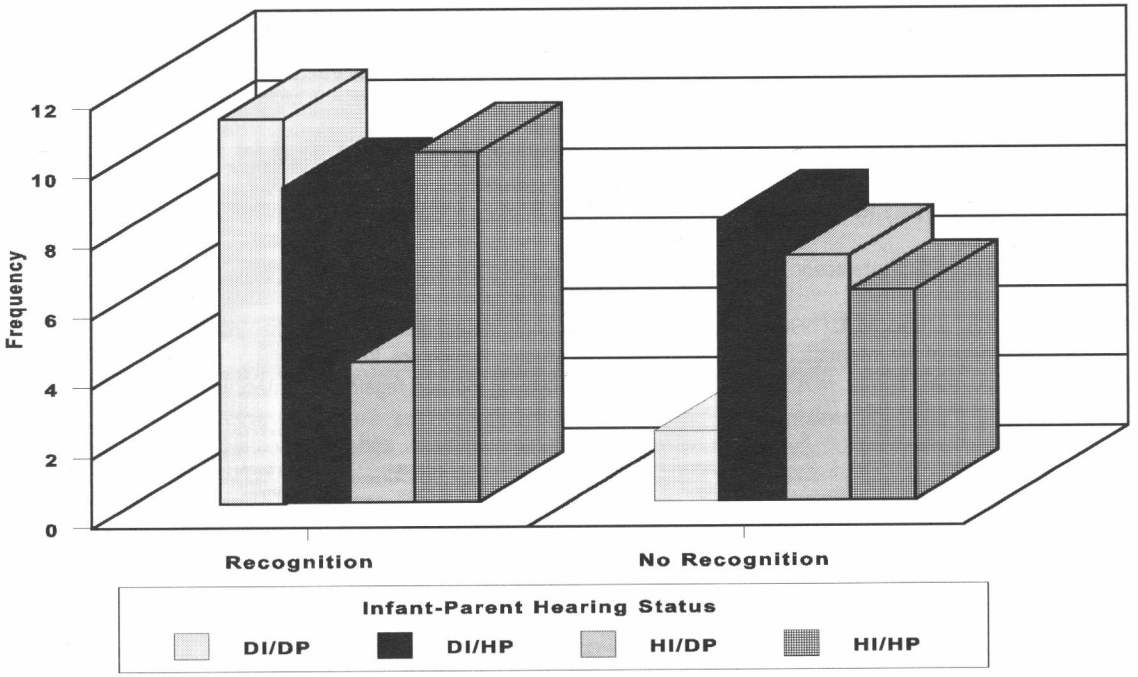
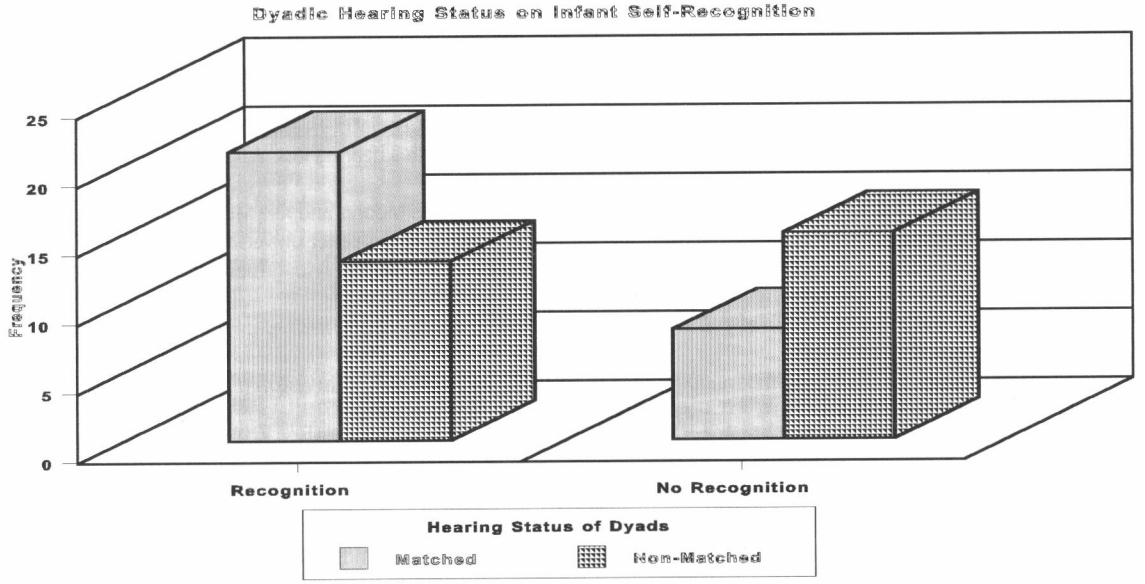


Figure 6: Effect of Matched and Non-Matched Dyadic Hearing Status on Infant Self-Recognition



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Acknowledgments

This research was supported by grants awarded from: the Bureau of Maternal and Child Health and Resources Development, USA (Grant MCJ-110563); the U.S. Office of Special Education and Rehabilitation Services; the March of Dimes Birth Defects Foundation,

USA (Grant # 12-FY91-268); and the Alexander von Humboldt Foundation (Germany).
Additional participants who contributed valuable advice, assistance, and support include Drs. Kathryn Meadow-Orlans, Robert MacTurk, Patricia Spencer, Hanuš & Mechthild Papoušek, Carol Erting, and Sue Forest.
The assistance of Kathy Chapple, Barbara Gleicher, Natalie Grindstaff, Chapman Hom, Andrea Karkowski, Arlene Kelly, Cathie Metz, Linda Stamper, Melissae Stiles, Meg Traci, and Carlene Thumann-Prezioso is greatly appreciated, as are the faithful and enthusiastic participation of the infants and their mothers, and the help of the off-site personnel involved in recruitment and data collection.

NEVERBALNA KOMUNIKACIJA GLUHE I ČUJUĆE DJECE I NJIHOVIH RODITELJA: DESET GODINA ISTRAŽIVANJA

SAŽETAK

Obrasci pogleda koje izmjenjuju parovi roditelja i djece u kojima je jedna osoba gluha, a druga čuje

Djeca uspostavljaju temeljne strukture kasnijih društvenih interakcija i komunikacije upravo kroz svoje prve društvene kontakte. Bitna komponenta ove rane komunikacije jest održavanje interakcije licem u lice, koja obično uključuje gledanje u oči. Vizualna fiksacija i praćenje, kao i zatvaranje očiju ili odvraćanje pogleda pripadaju u najranije oblike ponašanja kojima dijete upravlja svojom voljom. Stoga dijete već od najranije dobi uči služiti se tim oblicima ponašanja kako bi smanjilo fiziološku uzbuđenost izbjegavajući vizualni kontakt kod podražaja koji je prejak ili ga previše zbunjuje.
Važnost vizualnog svijeta veća je za gluhe roditelje i njihovu djecu. Svi oni moraju veliku pažnju posvećivati negovornim znakovima u svojem društvenom okruženju (Swisher, 1992). Gluhim osobama izraz lica prenosi i afektivne i gramatičke informacije koje čujuće osobe obično dobivaju preko govornog jezika (Reilly i Bellugi, 1993). Te vizualne komponente čuvstvenog stanja i komunikacije blokirane su kad dijete odvrati pogled od roditelja. Dakle, tijekom interakcije s gluhim djetetom roditelj će često biti taj koji će morati uspješno premostiti jaz tako što će primijeniti strategije u različitim modalitetima kako bi ponovno uspostavio očni kontakt. Kao što su to opisali Papousekovi, u normalnim okolnostima roditelji intuitivno mijenjaju svoje ponašanje kako bi se prilagodili djetetovim ograničenim senzornim i kognitivnim sposobnostima. U slučaju djeteta s oštećenjem, te prilagodbe mogu zahtijevati svjesnije podešavanje ukoliko žele biti uspješni. Zbog važnosti očnog kontakta u komunikaciji gluhih osoba, prvi rezultati koje ćemo ovdje iznijeti odnosit će se na sljedeća pitanja postavljena u istraživanju: 1) Kojim se strategijama služe gluhe i čujuće majke kad njihova djeca prekinu očni kontakt te razlikuju li se te majke u tim svojim nastojanjima ovisno o tome je li njihovo dijete također gluho ili čujuće? 2) U kojoj su mjeri te dvije skupine majki uspješne u ponovnom uspostavljaju očnog kontakta se djetetom nakon što je ono odvratilo pogled?

Samoprepoznavanje kod gluhe i čujuće 18-mjesečne djece

Komunikacija, pažnja i usvajanje jezika također može igrati ulogu u djetetovu postupnom razumijevanju razlika između "ja" i "drugi". Podaci dobiveni istraživanjima dovode do zaključka da bi se djetetova sposobnost prepoznavanja sebe već trebala posve razviti prije nego što dijete prohoda, što se poklapa s početkom upotrebe osobih zamjenica kod čujuće djece. Primjenom "Testa s crvenom točkom" (Papoušek i Papoušek, 1974) na pouzdan se način može sebe doživjeti tako da se promatra kako dijete odgovara na svoju sliku u ogledalu nakon što mu se na nos nacrta crvena točka. Promatrač zatim bilježi dotiče li dijete svoj nos u znak samoprepoznavanja ili ono samo dotiče ili prstom pokazuje na sliku u ogledalu.
Pretpostavlja se da ova nova vještina djelomice proizlazi iz sve većeg osjećaja vlastite uspješnosti ili svijesti o sebi, zbog kojeg čega stvari i ljudi u djetetovoj okolini odgovaraju na predvidljive načine. To bi pak moglo ovisiti o odnosu roditelja koji je istovremeno uvjetovan i osjetljiv na djetetove neverbalne signale. Primjerice, "roditeljsko zrcalno odražavanje" djetetovih radnji, kao i "roditeljsko ponavljanje" glasanja njihove djece moglo bi imati važno mjesto u nastojanju da se djetetu pomogne razviti svijest o vlastitom ponašanju i utjecaju koje ono ima na druge.
Roditelji koji ima slušni status jednak svojem djetetu (npr. i roditelj i dijete su gluhi ili čujući) vjerojatno će biti uspješniji u pridobivanju i održavanju djetetove pažnje primjenjujući vizualne, taktilne ili auditivne oblike komunikacije. Možda će i bolje iščitavati djetetovo ponašanje u ovim raznim modalitetima. U drugom se istraživanju primjenjivao "test s crvenom točkom" kako bi se procijenilo samoprepoznavanje u četiri skupine osamnaestomjesečne djece koja su sudjelovala u istom istraživanju ranog razvoja gluhe i čujuće djece - polovica djece imala je gluhe majke. Podaci dobiveni u ovom longitudinalnom istraživanju ukazali su na niz različitih

razloga zbog kojih je rana komunikacija između roditelja i djeteta možda teža u paru u kojem je jedan od partnera gluh, a drugi čujući (Koester, 1995, Spencer i Meadow-Orlans, 1996). Čini se da djeca čiji roditelji imaju isti slušni status mogu razviti sliku o sebi kao zasebnom pojedincu nešto ranije od djece čiji roditelji imaju različit slušni status.

U jednom ranijem izvještaju, u kojem su se podaci temeljili na interakcijama lice u lice s istim uzorkom gluhe i čujuće djece, došlo se do zaključka da je kod parova u kojima roditelj i dijete imaju jednak slušni status veće "majčino razumijevanje" nego li kod parova kod kojih to nije slučaj (Koester, Brooks i Traci, 1996). To, zajedno s rezultatima nove studije navodi na zaključak da roditeljska osjetljivost na djetetovu neverbalnu komunikaciju i osjetilni ulaz zapravo može *olakšati* samoprepoznavanje i druge vidove socio-emocionalnog razvoja u prvim godinama života.