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ABSTRACT

As part of an effort to help preschool classroom teachers of the hearing impaired identify those children at risk in developing positive peer relationships, information was collected on 100 children with hearing impairments and 82 children with normal hearing. For hearing impaired subjects, data were collected on age, gender, age of onset of hearing loss, severity of loss, length of enrollment in current program, number of other group experiences, communicative program philosophy, time spent mainstreamed, and time spent freely interacting with other children. Hearing subjects were examined in terms of age, gender, number of group experiences, and number of older and younger siblings. In addition, for the hearing children, a language age was computed, using a combined auditory comprehension and verbal ability scale from the Preschool Language Scale. Peer social behavior was randomly sampled, with recordings made of frequency and level of social interactions, and frequency and levels of communicative initiations and responses. The observed frequencies and levels of social interactions of hearing impaired children were lower than the observed frequencies and levels of interactions of hearing subjects in all four age groups. Although hearing impaired subjects had lower levels of communicative initiations and responses, by age five or six, they had higher frequencies in both initiation and response categories than hearing subjects. Results suggested that the major differences between hearing and hearing impaired subjects were in communicative behavior rather than in social behavior. (CL)

PEER SOCIAL BEHAVIOR IN PRESCHOOL HEARING IMPAIRED CHILDREN: COMPARISONS AND MODELS

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Peer Social Behavior in Preschool Hearing Impaired Children: Comparisons and Models

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Hearing impaired children have been found to interact less frequently (Gorrell, 1971; Hus, 1970; Kennedy, Northcutt, McCauley, & Williams, 1976) and at lower levels of sophistication than do children with normal hearing (Van Lieshout, 1973; Vandell, 1977; Vandell & George, 1981). Hummel & Schirmer (1984) argued that comparisons with normally hearing children are misleading, however, since certain interactive behaviors (or lack of interactive behaviors) may be the direct result of a hearing loss. Hoben, Lindstrom, Gish, Shapiro, & Chalberg (1979) cautioned against sweeping generalizations regarding social behavior in the hearing impaired, however: Some of these children behave "normally" and some do not. Meadow (1984) suggested that "It may be that deafness is not as great a detriment to social development as clinicians, researchers, and educators have assumed" (p. 38).

Denzin (1977) suggested that the acquisition of language is central to the socialization process. Meadow (1980) suggested that "social development and language acquisition are intertwined" (p. 82). Certainly the two are highly related. Darbyshire (1977) found that those deaf children who had the greatest communicative impairments were the ones less likely to play in organized group structures or to exhibit dramatic play. It may be that for most hearing impaired children language acquisition is the problem, not deficits in social behavior per se.

Brackett & Henniges (1976) found that when they were in an integrated setting the hearing impaired children who were more linguistically proficient interacted more often with hearing children while those with more limited verbal skills showed a preference for other hearing impaired children as playmates. Breslaw, Griffiths, Wood, & Howarth (1981) found that when deaf children were familiar with the language they needed to perform a task, their communicative competence was commensurate with that of hearing children of similar age. The problem, however, is that many of these children do not have the language they need to go with the tasks in which they are involved.

Gottman, Gonso, & Rasmussen (1975) suggested that access strategies used by children to enter into social play involve primitive intentions similar to the ones behind speech acts--greetings, providing information, requesting information, and invitations. Corsaro (1979) found that many of the access strategies used by nursery school children to enter into interactions with other children were nonverbal, but many more were verbal. A hearing impaired child might be delayed not only in actual verbal skills but also in some of the pragmatic communicative skills that underlie the interactions.

While they may not be as proficient, hearing impaired children may attempt peer interactions just as frequently as do hearing children, at least for a while. Vandell & George (1981) found that hearing impaired children exhibited interest

and skill in interacting even though they lacked the communicative skills necessary to effectively maintain the contact. There were similarities in the types of initiating acts used by hearing and deaf children but the deaf experienced more rejection and often were the recipients of inappropriate initiations (such as an initiation spoken behind the child, which he or she could not hear). They concluded that the deaf children were persistent initiators who often combined social acts, but they admitted that the children experienced many difficulties.

The purpose of the investigation described in this paper was to examine the peer social behavior of preschool hearing impaired children in order to establish preliminary norms; to compare hearing and hearing impaired children in six different aspects of peer social behavior; and to examine subject and program factors believed to be related to peer social behavior in the two groups. The overall goal of this project was to delineate recommendations for preschool classroom teachers of the hearing impaired so that they could identify atypical children who might be "at risk" in developing positive peer relationships.

Method

Subjects for this study were 100 children enrolled in 27 different classrooms from 8 preschool programs for the hearing impaired in Texas and New Mexico, and 82 middle class children with normal hearing enrolled in preschool and kindergarten programs in Lubbock, Texas.

The hearing impaired children ranged in age from 24-95 months, but the majority of these children (91 out of 100) were in the three to six year old age categories. Each age group was defined as the six-month interval above and below the chronological age (e.g., three year olds were between 31-42 months, four year olds between 43-54 months, etc.). In the hearing impaired group, there was one child below 31 months; there were 15 three year olds (31-42 months), 22 four year olds (43-54 months), 26 five year olds (55-66 months), and 28 six year olds (67-78 months). There also were 8 hearing impaired children between 79-95 months. The age makeup of this entire sample of 100 children seems to accurately reflect the typical preschool hearing impaired population, as there are often children enrolled in these programs who are beyond the usual preschool age range.

In the hearing group, there were 18 three year olds , 19 four year olds, 21 five year olds, and 23 six year olds. There were approximately an equal number of males and females in each group.

For the hearing impaired children, the following information was gathered: chronological age, gender, age of onset of the hearing loss, severity of the loss (all of the children were tested by an ASHA certified audiologist), length of time they had been enrolled in the current program, number of other group experiences in which they had participated, communicative program philosophy, amount of time during the school day they spent

mainstreamed (or reverse mainstreamed) with hearing peers, and the amount of time during the school day they were allowed to freely interact with other children.

The hearing losses of these children ranged from mild to profound, with most of them being in the severe to profound categories. All were considered by their classroom teachers to be of average or above average intelligence, to exhibit no other handicapping conditions, and to have language ability that did not deviate significantly from that of their classmates. Thus, the subjects were "typical" hearing impaired preschoolers with no other apparent or diagnosed problems.

For the hearing children, the following information was collected: age, gender, number of group experiences, and number of older and younger siblings. In addition, a language age (LA) was computed for the hearing children using a combined auditory comprehension and verbal ability scale from the Preschool Language Scale (PLS) (Zimmerman, Steiner, & Evatt, 1969). All of the hearing children in the study scored from 1 to 22 months above their chronological age on the PLS.

The peer social behavior of each child was randomly sampled by means of a time-sampling procedure in which 10-second observation periods were followed by 5-second recording periods. Each child was observed during free-play for one minute at a time for a total of 20 minutes' data.

Observed and recorded were frequency and level of social interactions (solitary, proximity, and parallel were "non-interactive"

categories and sharing materials, playing together, and rule-governed play were "interactive" categories); and frequency and levels of communicative initiations and responses (the levels of these behaviors were no communication, eye contact, touching, pointing, gesturing, vocalizing, sign language, and speech). Descriptions of these behavioral categories and a sample coding sheet can be found in the Appendices.

Interobserver reliability was done periodically using a technique of simultaneously coding randomly chosen children and then comparing results interval by interval and category by category. Kappas were computed for interobserver reliability and all Kappas were well within the range of acceptability ($p < .01$ to $p < .0001$) for all behavioral categories, suggesting that the data were reliable.

Results

The first set of analyses were done to ascertain whether or not there were differences between the hearing and hearing impaired children in the six social behavior categories (frequency and level of interactions and frequency and level of communicative initiations and responses). Means were computed for the hearing and hearing impaired three, four, five, and six year olds in each of the six categories. For these age comparisons with hearing children, the 9 hearing impaired children who were younger than three and older than six were excluded. The means for the two groups by age are presented in Table 1.

Table 1: Means of social behaviors for hearing (H) and hearing impaired (HI) children by age group

Age Group (in months)	Social Behavior					
	FIACT[a]	LIACT	FINIT	LCI	FRESP	LCR
31-42 (3 year olds)						
H (n = 18)	.52	2.19	.08	6.97	.03	3.84
HI (n = 15)	.22	1.49	.07	3.01	.05	2.59
43-54 (4 year olds)						
H (n = 19)	.74	3.19	.22	6.54	.11	6.00
HI (n = 22)	.37	1.92	.20	3.55	.07	3.15
55-66 (5 year olds)						
H (n = 21)	.63	2.96	.07	6.26	.04	4.59
HI (n = 26)	.38	1.94	.24	4.03	.10	2.84
67-78 (6 year olds)						
H (n = 23)	.69	2.89	.07	5.79	.03	4.06
HI (n = 28)	.51	2.34	.30	4.80	.14	3.83

[a]FIACT = Frequency of Interactions
LIACT = Level of Interactions
FINIT = Frequency of Initiations
LCI = Level of Initiations
FRESP = Frequency of Responses
LCR = Level of Responses

Multivariate analyses of variance (MANOVAs) between the hearing and hearing impaired groups at each age level were done for each of the six social behavior categories. Three year olds differed in frequency of interactions $F(1,31) = 20.99$, $p < .0001$; level of interactions $F(1,31) = 8.84$, $p < .006$; and level of initiations $F(1,31) = 76.78$, $p < .0001$, but did not differ in frequency of initiations $F(1,31) = .15$, ns; frequency of responses $F(1,31) = 1.51$, ns; or level of responses $F(1,31) = 1.44$, ns. All of the MANOVA test criteria (Hotelling-Lawley Trace, Pillai's Trace, and Wilks' Criterion) were highly significant ($p < .0001$).

Four year olds differed in frequency of interactions $F(1,39) = 35.15$, $p < .0001$; level of interactions $F(1,39) = 51.33$, $p < .0001$; level of initiations $F(1,39) = 44.52$, $p < .0001$; frequency of responses $F(1,39) = 4.60$, $p < .04$; and level of responses $F(1,39) = 32.90$, $p < .0001$; but not in frequency of initiations $F(1,39) = 0.13$, ns. Again, all of the MANOVA test criteria were highly significant ($p < .0001$).

Five year olds differed in frequency of interactions $F(1,45) = 17.02$, $p < .0002$; level of interactions $F(1,45) = 33.60$, $p < .0001$; frequency of initiations $F(1,45) = 15.88$, $p < .0002$; level of initiations $F(1,45) = 45.51$, $p < .0001$; frequency of responses $F(1,45) = 11.67$, $p < .001$; and level of responses $F(1,45) = 8.70$, $p < .005$. All three MANOVA test criteria were highly significantly ($p < .0001$).

Six year olds differed in frequency of interactions $F(1,49) = 9.76$, $p < .003$; level of interactions $F(1,49) = 9.30$, $p < .004$; frequency of initiations $F(1,49) = 20.50$, $p < .0001$; level of initiations $F(1,49) = 4.95$, $p < .03$; and frequency of responses $F(1,49) = 16.93$, $p < .0001$; but did not differ in level of responses $F(1,49) = 0.14$, ns. All three MANOVA test criteria were significant ($p < .0001$).

Table 2 presents a summary of the results of these multivariate analyses of variance. It is interesting to note that the hearing impaired children were lower in both frequency and level of interactions (truly "social" behaviors) in all four age categories, but in the initiation and response categories they were sometimes higher, sometimes lower, and sometimes no different.

Table 2: A comparison of hearing impaired children with hearing agemates in six social behavior categories (a summary of findings from a series of MANOVA tables)

Behavior	3 year olds	4 year olds	5 year olds	6 year olds
FIACT[a]	lower	lower	lower	lower
LIACT	lower	lower	lower	lower
FINIT	no different	no different	higher	higher
LCI	lower	lower	lower	lower
FRESP	no different	lower	higher	higher
LCR	no different	lower	lower	no different

[a]FIACT = Frequency of interactions
LIACT = Level of interactions
FINIT = Frequency of initiations
LCI = Level of initiations
FRESP = Frequency of responses
LCR = Level of responses

In order to ascertain whether or not any of the subject and program variables were predictive of the social behaviors, a series of stepwise regression analyses was done for each group, hearing and hearing impaired. For these analyses, the entire sample of 100 hearing impaired children was used since it was believed that this group was more representative of the population enrolled in preschool programs for the hearing impaired and thus this group offered more generalizability than did the more restricted age range of three to six year olds. Hearing impaired children enrolled in preschool programs just do not fit neatly into those age ranges.

For the hearing impaired group, each of the six social behavior categories was regressed against age, age^2, gender, hearing status, age of onset, number of group experiences, length of intervention, program philosophy, time with hearing peers, peer interaction time, and four interaction effect combinations: gender with age; age and length of intervention with hearing status; hearing status with age of onset; and program philosophy with peer interaction time. From these analyses, it was determined that age alone was the best predictor of frequency of interactions $F(1,98) = 21.42$, $p < .0001$. Interestingly, for the hearing impaired subjects, age was a linear predictor of frequency of interactions.

In the hearing group, the six social behaviors were regressed against age, age^2, language age, group experiences, and number of older and younger siblings. In this group, frequency of

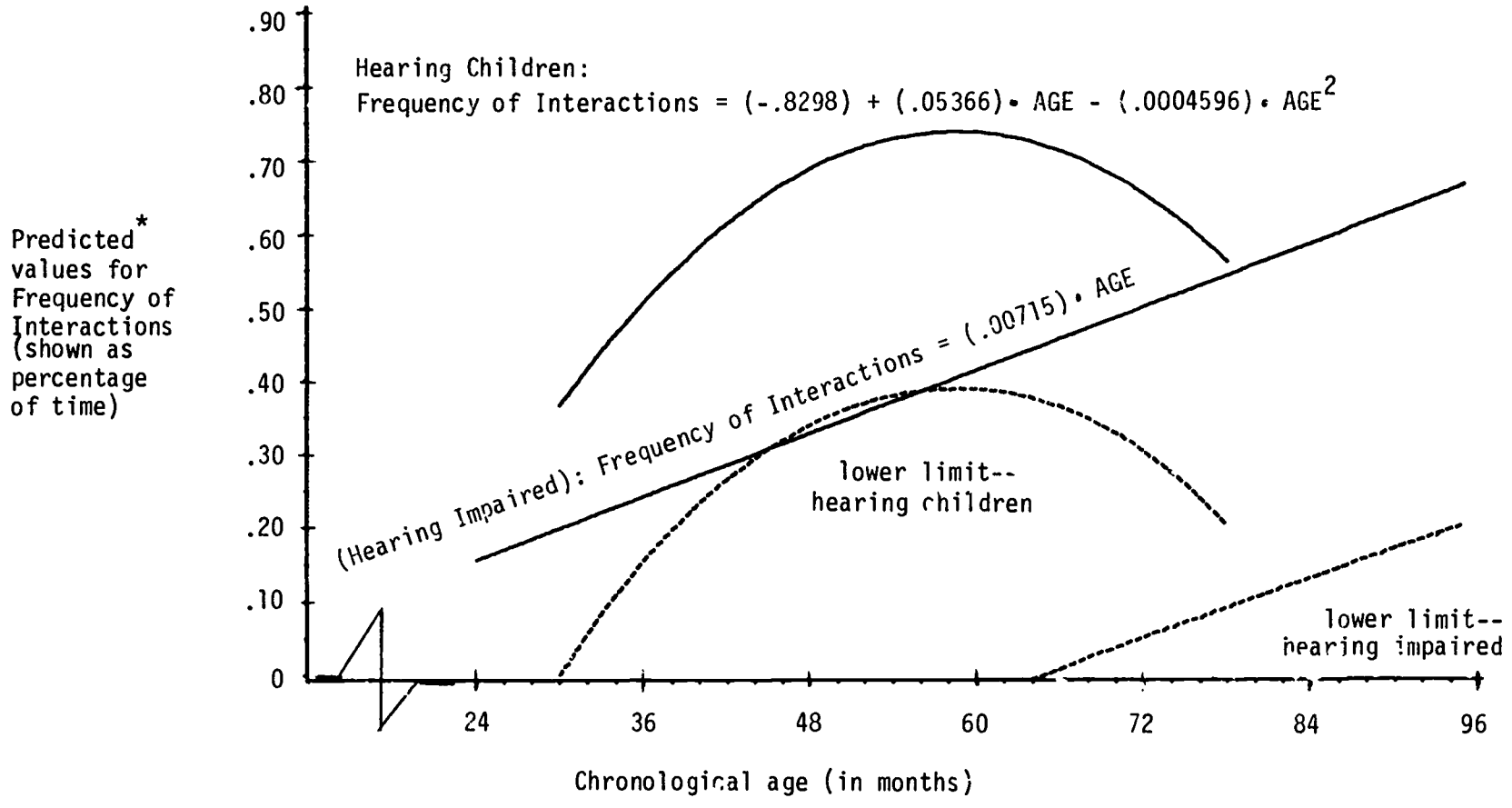
interactions was best predicted by language age $F(1,80) = 6.07$, $p < .02$ and no other variable entered the model. A linear equation that was the best fitting model was found: [Frequency of Interactions = .425234 + (.0032397) • Language Age]. Using this equation, predictive levels for frequency of interactions can be computed from an assessed language age. The interesting thing about this finding is that for hearing children, language age was a linear predictor. For every six months' increase in estimated language (on the PLS), the predicted frequency of interactions steadily increased by .02.

While it is most interesting to discover that language age was related to frequency of interactions in hearing children, several additional analyses (regression of all possible subsets of variables and a closer examination of the R^2 and Mallow's $C(P)$ values for these analyses) suggested that language age by itself might not really be the best predictor. Two things seemed important: finding a more powerful predictor and further examining chronological age in hearing children to see how they compared to hearing impaired children. It was possible that if a language age variable had been entered for the hearing impaired group, that variable might have had similar predictive power; unfortunately this information was not available (and it would be very difficult to easily gather meaningful language age data on young hearing impaired children).

A second stepwise regression was done for the hearing subjects omitting language age in the list of variables. When language age was excluded, both age $\underline{F}(1,80) = 4.61$, $\underline{p} < .03$ and age^2 $\underline{F}(1,79) = 15.96$, $\underline{p} < .0001$ were found to be significant predictors of frequency of interactions for hearing children. Using age and age^2 together, an equation was generated that was the best fitting regression model.

Figure 1 presents the linear equation that was the best fitting regression model for the hearing impaired children and depicts an estimated lower limit prediction interval for picking out atypical children: hearing impaired children 64 months and over whose mean interactive frequencies fall below this line should be considered to be significantly below the norm and probably warrant further observation.

Figure 1 also presents the equation that was the best fitting model for the hearing children, as well as an estimated lower limit prediction interval for identifying atypical hearing children. It is interesting to note that for hearing children, chronological age is a curvilinear (or quadratic) predictor. The negative direction of the relationship between age^2 and frequency of interactions defines a concave curvilinear relationship (an inverted U-shaped curve).



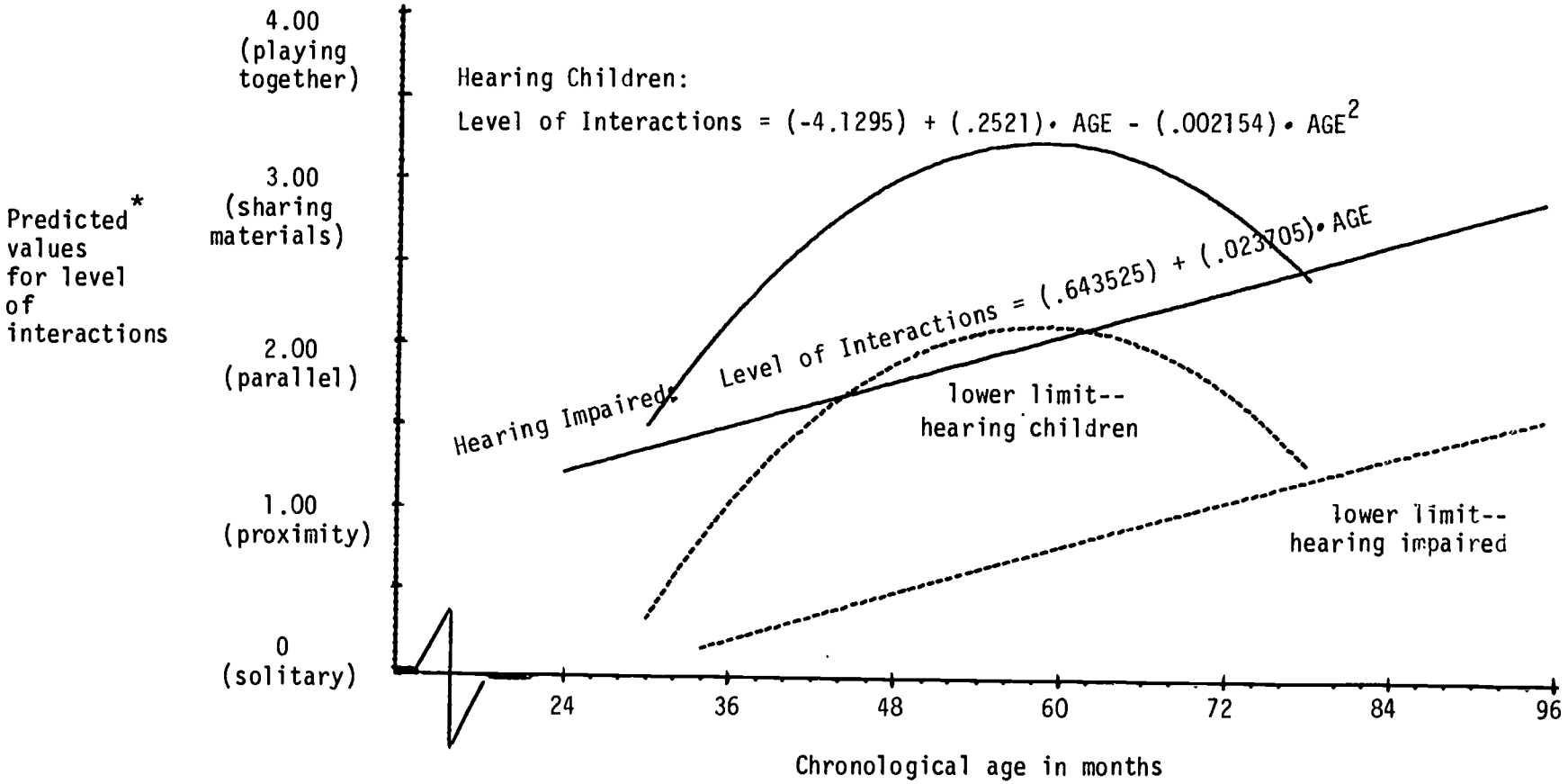
*Note that these predictions are applicable only to hearing impaired children between 24 and 95 months of age and hearing children between 30 and 78 months of age

Figure 1: Frequency of Interactions in hearing impaired (straight lines) and hearing children (curved lines) by chronological age

While frequency of interactions steadily increased with chronological age in hearing impaired children even up to 95 months of age, in hearing children there is an increase up to about age five then there is a slow decrease. Atypical children for each group can be identified using the appropriate equation. It has been established through the age means and MANOVA comparisons that hearing impaired children were significantly lower than hearing children in frequency of interactions at all age levels, but Figure 1 shows that not only do the two groups differ, they also are following different developmental trends.

Level of interactions was examined similarly. For the hearing impaired group, level of interactions was found to be best predicted by age $F(1,98) = 28.52$, $p < .0001$ and program philosophy $F(1,97) = 10.90$, $p < .001$. Since program philosophy was not a very well defined variable (it is unknown what most teachers meant when they described their philosophy as "total communication"), that variable was dropped. An equation that was the best fitting regression model for level of interactions and age for the hearing impaired group was found. This equation is given and depicted in Figure 2. From Figure 2 it is apparent that chronological age is a linear predictor of level of interactions in hearing impaired children.

Age $F(1,80) = 8.87$, $p < .004$ and age^2 $F(1,79) = 34.00$, $p < .0001$ were the only significant variables predictive of level of interactions in hearing children. Figure 2 presents the quadratic equation that is the best fitting model. Again, the



*Note that these predictions are applicable only to hearing impaired children between 24 and 95 months of age and hearing children between 30 and 78 months of age

Figure 2: Predicting mean level of interactions in hearing (curved lines) and hearing impaired children (straight lines) by chronological age

relationship was an inverted U-shaped curve. And, again, hearing and hearing impaired children differed in their developmental trends as well as in their mean levels.

The next analyses were done to ascertain which of the subject and program variables for the hearing and hearing impaired groups best predicted the four communicative behaviors: frequency and level of initiations, and frequency and level of responses. The variables entered into these stepwise regressior analyses were the same ones entered for frequency and level of interactions for both groups, with one exception: Language age was not included in the list of variables for the hearing children.

In the hearing impaired group, frequency of initiations was significantly related to number of group experiences $F(1,98) = 22.27$, $p < .0001$; age $F(1,97) = 15.96$, $p < .0001$; and amount of peer interaction time $F(1,96) = 7.79$, $p < .006$ (a negative relationship). Frequency of communicative responses was significantly related to age $F(1,98) = 21.43$, $p < .0001$; peer interaction time $F(1,97) = 9.90$, $p < .002$ (a negative relationship); and age of onset $F(1,96) = 4.12$, $p < .04$ (a negative relationship). Level of communicative initiations was related to age $F(1,98) = 16.04$, $p < .0001$ and time with hearing peers $F(1,97) = 5.24$, $p < .02$ (a negative relationship). Level of communicative responses was related to number of group experiences $F(1,97) = 4.17$, $p < .04$; time with hearing peers $F(1,98) = 11.51$, $p < .001$ (a negative relationship);

and hearing status and age of onset taken together $F(1,98) = 7.14$, $p < .009$. Figure 3 depicts these relationships in a communicative initiation-response model for hearing impaired children.

These findings suggest that

1) Hearing impaired children initiate peer interactions more frequently the older they get and they do seem to learn something about initiating through repeated exposure to new groups of children. However, having a lot of interactive time during the school day seems to be counterproductive to the ability (or tendency) to initiate play with peers.

2) Hearing impaired children given the most peer interaction time responded to their peers the least. Also, those hearing impaired children who had normal hearing even for a brief time (the ones with the later age of onset) were less responsive to the communicative attempts of peers than were those who presumably never had normal hearing.

3) Hearing impaired children progressively use higher level communicative behaviors in initiations with peers the older they get. Interestingly, spending time with hearing peers resulted in the hearing impaired children's using lower level communicative behaviors when they initiated to others.

4) Age was not related to the level of responses in hearing impaired children. However, group experience was related, suggesting that the more experience these children have with

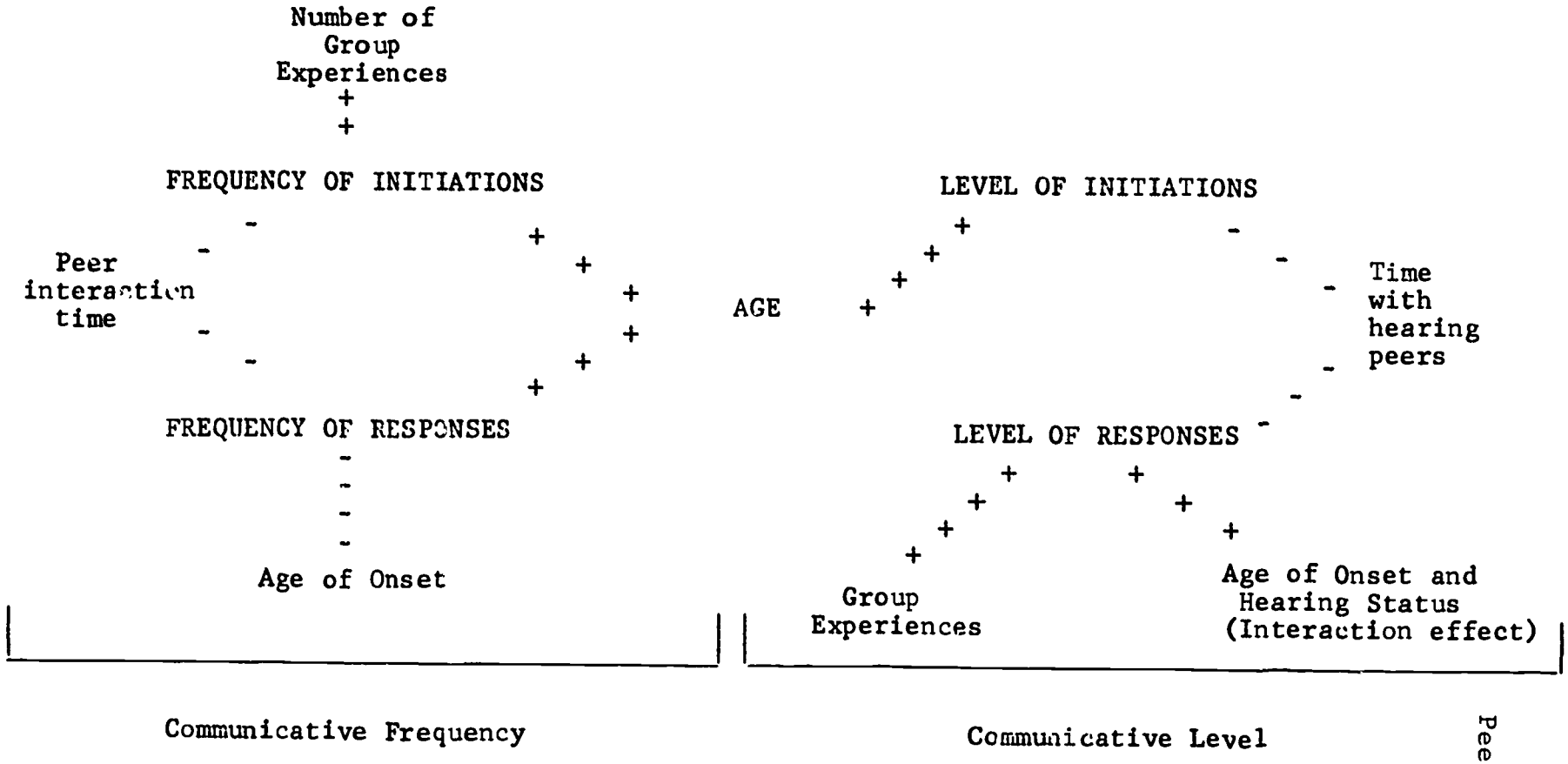


Figure 3: Communicative initiation-response model for hearing impaired children. Depicts positive (+) and negative (-) relationships between communicative behaviors and subject characteristics

hearing children the less likely they are to respond with higher level communicative behaviors. Finally, the more residual hearing the child has and the later the hearing loss occurred, the higher the level of responses the child will use.

In the hearing group, frequency of initiations was significantly related to age $\underline{F}(1,79) = 19.86$, $\underline{p} < .0001$ and that relationship was curvilinear (age^2 was a negative predictor) $\underline{F}(1,80) = 5.68$, $\underline{p} < .02$. Frequency of responses was related to age $\underline{F}(1,79) = 19.35$, $\underline{p} < .0001$ and age^2 $\underline{F}(1,80) = 4.32$, $\underline{p} < .04$, again a curvilinear relationship (negative). Level of initiations was related to age^2 $\underline{F}(1,80) = 13.61$, $\underline{p} < .0004$ (a negative relationship) and number of younger siblings $\underline{F}(1,79) = 5.39$, $\underline{p} < .02$ (negative). Level of responses was not related to any of the subject variables included in these analyses (age, age^2, number of group experiences, or number of older and younger siblings). Figure 4 depicts these relationships in a communicative initiation-response model for hearing children.

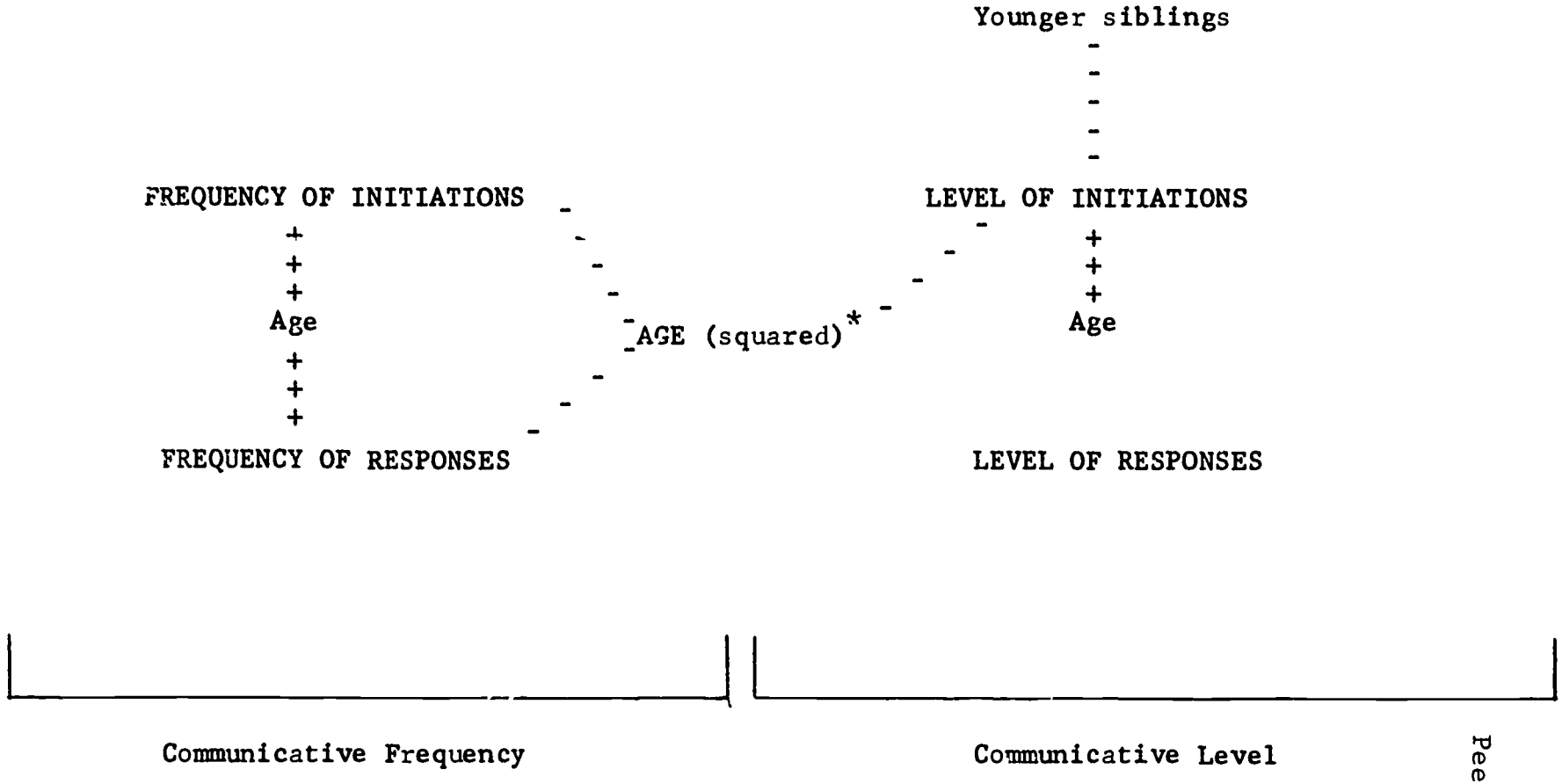
These findings suggest that

1) In hearing children, frequency of initiations increases with age up to a certain point and then levels off and begins to decrease slightly.

2) In hearing children. frequency of responses also increases up to a certain age and then levels off and begins to decrease.

3) In hearing children, level of initiations increases up to a certain age and then levels off and begins to decrease, and having younger siblings leads to higher level communicative initiations.

4) In hearing children, level of responses seems to be solely a matter of individual preference.



*This represents a curvilinear relationship (negative) with age with an increase up to a certain point and then a decrease

Figure 4: Communicative initiation-response model for hearing children. Depicts positive (+) and negative (-) relationships between communicative behaviors and subject characteristics

One final set of analyses was done to examine differences between the hearing and hearing impaired children. The coding sheets of individual children were examined to determine the proportion of the coded intervals in which they were found to be "solitary" in contrast to any one of the other categories; then the intervals in which they were anything other than solitary (or at least in proximity to peers) were examined to determine in what proportion of these intervals either sign language or speech (symbolic language) was used.

In the three year old groups, hearing impaired children were solitary 16% of the time and hearing children were solitary 36% of the time, a significant difference ($z = 11.86$, $p < .0001$). The hearing impaired children used speech or sign language in only 6% of the intervals that were not coded "solitary," whereas the hearing children used speech just about half of the time (48%) they were not coded solitary, again, a highly significant difference ($z = 20.45$, $p < .0001$).

In the four year old groups, the hearing impaired children were solitary 22% of the time and the hearing children were solitary 3% of the time, a significant difference ($z = -15.40$, $p < .0001$). The hearing impaired children used symbolic language in 10% of the intervals not coded "solitary," whereas the hearing children again used speech about half of the time (54%). This too was a highly significant difference ($z = 24.84$, $p < .0001$).

In the five year old groups, the hearing impaired children were solitary 23% of the time and the hearing children were

solitary 2% of the time, a significant difference (z = -17.82, $p < .0001$). The hearing impaired children used symbolic language in 13% of the remaining intervals, but the hearing children again were significantly higher at 43% (z = 19.01, $p < .0001$).

In the six year olds, the hearing impaired children were solitary 16% of the time and the hearing children were solitary 19% of the time, a significant difference (z = 3.09, $p < .002$). Again, the difference between the use of symbolic language was significant for the two groups (hearing impaired children used sign or speech 26% of the time, while hearing children used speech 51% of the time (z = 14.93, $p < .0001$).

These data suggest that at ages four and five the hearing impaired children tended to be more solitary than their hearing agemates (which is to be expected given the fact that the hearing four and five year old child is a very "social" animal and the four and five year old hearing impaired child simply cannot compete), but at ages three and six, the hearing children were more likely to be solitary than were the hearing impaired children. This is probably due to the fact that the three year old hearing child has not really learned the necessary skills to play with other children and so remains solitary much of the time, maintaining contact with those around him or her through the use of auditory information. The hearing impaired child, on the other hand, also lacks the necessary interactive skill, but he or she is unable to maintain auditory contact and therefore uses physical proximity to

feel "in touch" with others. By age six, most of the social behaviors have "peaked" in the hearing children and their interests have turned to more cognitively demanding and more solitary activities. In contrast, the hearing impaired six year old is still actively developing in all areas of social behavior.

The hearing impaired children differed significantly (note the extremely high z-scores for the comparisons) in the use of symbolic language and showed little evidence of verbal communication with peers, but they did use many of the other communicative behaviors including eye contact, touching, vocalizing, and gesturing. They seemed to want to communicate with other children but did not do well at either task. Formal language assessment or the analysis of a spontaneous language sample when interacting with adults or teachers would most likely show that these children had measurable language ability, but they did not as yet transfer whatever theoretical language "skill" they had into the context of peer relations.

Discussion and Conclusions

The observed frequencies and levels of social interactions of hearing impaired children were lower than the observed frequencies and levels of interactions of hearing children in all four age groups. Using these data alone, one could conclude that hearing impaired preschool children are "less social" than their hearing peers. Such a statement is somewhat misleading, however, when one considers the observations of communicative initiations and

responses and the comparisons between hearing and hearing impaired children in these behaviors.

Although hearing impaired children were observed to be lower than hearing children in the level of their communicative initiations and responses (which might be expected given the impact of hearing impairment on communicative development), by the time they were five or six years old, hearing impaired children had higher frequencies in both initiation and response categories than did hearing children. These data suggest that these children were trying to interact with their peers but were experiencing difficulty in both getting an interaction started and in maintaining it. The implication here is that these children probably would be just "as social" as their hearing agemates if they had the interactive and communicative skills to do so.

The predictive models (Figures 1 and 2) provide evidence that the hearing impaired children were steadily developing in both frequency and level of peer interactions across all of the preschool age levels. The hearing children, however, increased in frequency and level of interactions up to about age four and a half, reached a plateau, and then began to decrease slightly.

It appears that the major differences between hearing and hearing impaired children are in the area of communicative behavior, rather than in some sort of anti-social tendency on the part of the hearing impaired child. A vivid example of this difference is exhibited in the fact that the hearing children across all of the

age levels used symbolic language in about 50% of the intervals in which they were at least in proximity to other children, whereas the hearing impaired children used symbolic language in only 6%, 10%, 13%, and 26% of similar situations.

Since there is a steady increase over all interaction categories with increasing chronological age, peer social interaction per se does not appear to warrant intervention, at least for most hearing impaired children. Most hearing impaired children do exhibit considerable problems in the development of language, however, and peer social interactions are consequently affected. These children simply do not have the language necessary to progress to higher levels in their social behavior. It can be assumed that only when they can compete linguistically with hearing children will their social behavior be really comparable to that of hearing children. Until then, the social behavior of deaf children will appear to be immature or deficient in comparison to "normal" children, even though it may actually be considered adequate relative to the children's present level of linguistic functioning.

The most obvious implication of this study is that social behavior in hearing impaired children is highly dependent upon language ability. If language develops as normally as possible, social interactions in hearing impaired children should not differ from those in hearing children. Conversely, if language is delayed, social interactions will progress at a slower rate. The focus of intervention, therefore, should be on using language in social contexts, not on social skills training per se.

Appendix A

Sample Coding Sheet

School _____ Child's code _____ date _____ observer _____

time:	s pr pa sm t rg 0 1 2 3 4 5 target child: I R no ec t p v g si sp 0 1 2 3 4 5 6 7	s pr pa sm t rg 0 1 2 3 4 5 target child: I R no ec t p v g si sp 0 1 2 3 4 5 6 7	s pr pa sm t rg 0 1 2 3 4 5 target child: I R no ec t p v g si sp 0 1 2 3 4 5 6 7	s pr pa sm t rg 0 1 2 3 4 5 target child: I R no ec t p v g si sp 0 1 2 3 4 5 6 7
time:	s pr pa sm t rg 0 1 2 3 4 5 target child: I R no ec t p v g si sp 0 1 2 3 4 5 6 7	s pr pa sm t rg 0 1 2 3 4 5 target child: I R no ec t p v g si sp 0 1 2 3 4 5 6 7	s pr pa sm t rg 0 1 2 3 4 5 target child: I R no ec t p v g si sp 0 1 2 3 4 5 6 7	s pr pa sm t rg 0 1 2 3 4 5 target child: I R no ec t p v g si sp 0 1 2 3 4 5 6 7
time:	s pr pa sm t rg 0 1 2 3 4 5 target cbild: I R no ec t p v g si sp 0 1 2 3 4 5 6 7	s pr pa sm t rg 0 1 2 3 4 5 target child: I R no ec t p v g si sp 0 1 2 3 4 5 6 7	s pr pa sm t rg 0 1 2 3 4 5 target child: I R no ec t p v g si sp 0 1 2 3 4 5 6 7	s pr pa sm t rg 0 1 2 3 4 5 target :hild: I R no ec t p v g si sp 0 1 2 3 4 5 6 7
time:	s pr pa sm t rg 0 1 2 3 4 5 target child: I R no ec t p v g si sp 0 1 2 3 4 5 6 7	s pr pa sm t rg 0 1 2 3 4 5 target child: I R no ec t p v g si sp 0 1 2 3 4 5 6 7	s pr pa sm t rg 0 1 2 3 4 5 target child: I R no ec t p v g si sp 0 1 2 3 4 5 6 7	s pr pa sm t rg 0 1 2 3 4 5 target child: I R no ec t p v g si sp 0 1 2 3 4 5 6 7
time:	s pr pa sm t rg 0 1 2 3 4 5 target child: I R no ec t p v g si sp 0 1 2 3 4 5 6 7	s pr pa sm t rg 0 1 2 3 4 5 target child: I R no ec t p v g si sp 0 1 2 3 4 5 6 7	s pr pa sm t rg 0 1 2 3 4 5 target child: I R no ec t p v g si sp 0 1 2 3 4 5 6 7	s pr pa sm t rg 0 1 2 3 4 5 target child: I R no ec t p v g si sp 0 1 2 3 4 5 6 7

Appendix B
Behavior Categories

Interaction Categories:

- s = Solitary play--the child is socially removed from other children, either physically or by having his or her back turned to others, and makes no communicative effort to establish eye contact, touch another, etc.
- pr = Proximity play--child is playing near one or more peers (i.e., around a table, in a group on the floor, or in a cluster standing), but he/she is not interacting with another.
- pa = Parallel play--child is playing near one or more peers, doing the same activity as the others, but is not interacting with them in any way
- sm = Sharing materials--child is sharing one set of materials with another child--each is building or playing alone except for sharing or turn-taking
- t = Playing together--child plays with one or more others
- rg = Rule-governed play--child participates in a rule-governed activity or game with one or more other children.

Initiator and Responder Categories:

- I = child was clearly observed to be the initiator of this communicative exchange
- R = child was clearly observed to be the responder in this communicative exchange

Communicative Categories:

- no = No communication--child ignores, or makes no attempt to gain another's attention or to communicate with anyone
- ec = Eye contact--the child visually scans another's face, usually with animated facial expression, or puts his or her face directly in another child's field of vision
- t = Touching--the child physically touches another child either to get attention or to express information or affect
- p = Pointing--pointing to or referencing an object
- v = Vocalizing--makes an unintelligible sound to get another's attention
- g = Natural Gesture--more descriptive than merely pointing; using facial expression, posture, and/or creative movement to communicate a thought or idea
- si = Sign language--use of any standard sign language system
- sp = Speech--use of intelligible spoken language

Appendix C
Interactive Variables

Frequency of Interactions: from the four coding sheete collect on each child, all of the coded intervals marked either sm, t, or rg for this child were counted and then divided by the total number of intervals (80). This gave the percentage of time during observation that the child spent interacting with other children.

Level of Interactions: on the coding sheets, all of the child's interactions were coded on a scale of 0-5 by the observer. The mean of the coded responses for the 80 intervals on each child was computed and entered as the mean level of interactions for this child.

Frequency of Initiations: the number of intervals in which the target child initiated the communicative interaction was tallied and then the percentage of intervals was computed by dividing the number of initiations by the total number of intervals (80).

Level of Communicative Initiations: for each of the intervals in which the child was the initiator, the highest level of the child's communicative behavior (coded from 0-7) was listed and a mean level computed (the sum was divided by the number of intervals). This provides the child's mean level of communicative initiating behavior. If a child never initiated, the mean would be 0 (no communication)

Frequency of Responses: this was computed the same way as frequency of initiations, counting responses rather than initiations. Again, if a child never responded, the mean would be 0.

Level of Communicative Responses: this was computed the same way as level of initiations, counting responses rather than initiations. The child who never responded would have a mean of 0.

Appendix D
Subject Characteristics

AGE: Recorded in months

GENDER: Male = 0, Female = 1

HEARING STATUS: Using the reported Pure-tone Average, each child was classified 0 to 5 according to the following scale: 0 = 90 dB or greater hearing loss; 1 = 70-90 dB loss; 2 = 50-70 dB loss; 3 = 30-50 dB loss; 4 = less than a 30 dB loss but in a hearing impaired program; 5 = normal hearing child

AGE OF ONSET: from the parent's report of suspected age onset of the hearing loss, the number of months the child was believed to have had normal hearing was determined (0 means congenital deafness or age of onset unknown)

LENGTH OF INTERVENTION: from teacher's enrollment dates, the number of months a child has been enrolled in the current program.

GROUP EXPERIENCES: from the parent questionnaire, the number of group experiences besides the current preschool program in which the child has participated (includes play groups, Sunday School, Mothers' Day Out, swim lessons, etc.)

PROGRAM PHILOSOPHY: for the hearing impaired groups, from the teacher questionnaire, the commun' ative philosophy of the program coded as manual only = 0; total communication = 1; and auditory/oral = 2

TIME WITH HEARING PEERS: from the teacher questionnaire, the percentage of the school day in which the hearing impaired children reportedly had access to interactions with normal hearing children (mainstreaming)

PEER INTERACTION TIME: from the teacher questionnaire, the percentage of the school day in which the hearing impaired children are reportedly free to interact with other children

LANGUAGE AGE: For the hearing children, a combined auditory comprehension and verbal ability score from the Preschool Language Scale.

OLDER AND YOUNGER SIBLINGS: for the hearing children, the number of older and younger siblings.

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