Oral conversations between hearing-impaired children and their normally hearing peers and teachers*

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ABSTRACT

Twelve hearing-impaired children (mean age 8;8 years) were videotaped as they each constructed Lego models with two partners: a normally hearing peer and a teacher. A comparison was made between their utterances and spoken turns with peers and teachers. The frequency of these did not differ between the two, although they took more total turns (verbal and nonverbal) with teachers than peers. With peers their turns contained more utterances and their contribution to the conversations was proportionally greater in relation to length of turns and utterances. Teachers talked more than peers and used longer turns and utterances. These differences are examined through a qualitative analysis. The educational implications and directions for future research are discussed.

INTRODUCTION

Over 20 years of research has emphasized that language is acquired in the context of natural conversations (Gallaway & Richards 1994, Snow & Ferguson 1977). From this perspective, factors that encourage
hearing-impaired (HI) children to participate in classroom conversations with teachers have been investigated (e.g., Huntington & Watton 1986, Wood, Wood, Griffiths & Howarth 1986). Interaction with teachers, however, is only part of the school experience. Peers also play an important role in children's social and communicative development (Lederberg 1993, Stinson & Foster 2000). To date, relatively little research has focused on communication between HI and normally hearing (NH) children, especially beyond the preschool years (Gregory & Knight 1998, Lloyd 1999a). This paper compares conversations between HI children and their NH peers and teachers to evaluate the extent to which NH peers and teachers facilitate oral communication from the HI children.

Oralism and the mainstreaming of hearing-impaired children

Two factors underlie the present research: the need for a greater understanding of the oral environments of HI children and an increasing trend towards the integration of HI children. The question concerning which is the best mode of communication for HI students has generated considerable debate in the literature (for recent debates, see Gregory, Knight, McCracken, Powers & Watson 1998). There is still much discussion about whether HI students should be taught orally (Watson 1998); through Total Communication, the simultaneous use of speech and sign (Baker & Knight 1998); or through bilingualism, where English and Sign Language are treated as separate (Pickersgill 1998). Nevertheless, 90% of HI children are born to NH parents, and despite trends towards signing many parents still want their HI children to communicate through speech if possible (Gregory & Knight 1998). It is difficult to calculate how many HI children use speech as their main mode of communication. A 1994 survey by the British Association of Teachers of the Deaf suggested that approximately 67% were taught through the 'natural aural approach' (Eatough 1995a, 1995b, 1995c, 1996). The natural aural approach aims to make the best use of children's residual hearing through amplification and aims to facilitate language acquisition through replicating the features of parent-child interaction that research suggests are important in the language acquisition process. Its proponents argue that HI children go through the same stages of language acquisition as NH children, though their progress might be delayed as a result of their hearing loss (Lewis & Richards 1988). The extent to which HI children have to use speech as their main mode of communication obligates the need for a greater understanding of their oral environments.

The second factor pertains to mainstream integration. The Warnock
Report (DES 1978) has led to an increasing trend towards integration in the education of children with special needs in Britain. It was estimated that about 85% of HI children are now taught in mainstream schools (Lynas, Lewis & Hopwood 1997, Watson & Parsons 1998). In addition, more HI children are now being offered in-class support rather than withdrawal. These trends mean that more HI children are now being taught alongside their NH peers than was the case just a short time ago (Watson & Parsons 1998). Despite this situation, relatively little research has focused on communication between HI and NH children.

Teacher-child conversations

Previous research on conversations between HI children and teachers has shown that high levels of conversational control by teachers, characterized by frequent questioning, elicitation of language forms, and speech corrections, tends to inhibit HI children’s participation in classroom conversations. Lower levels of conversational control, characterized by the increased use of declaratives (i.e., comments and statements) and phatics (i.e., devices used to keep the conversation flowing, such as ‘Hm’, ‘Okay’ and ‘Right’), tend to result in HI children taking a more active role in classroom conversations. When teacher talk is less controlling, children are more likely to take the initiative in conversations, and their speaking turns tend to be longer (Wood et al. 1986, Wood, Wood, Griffiths, Howarth & Howarth 1982; see also Huntington & Watton 1986). This appears to be a robust finding. Subsequent research demonstrated a causal relationship between lower levels of conversational control by teachers and HI children’s increased participation in conversations (Wood & Wood 1984). Similar findings were also reported in classrooms where Signed English and cued speech was used (Power, Wood & Wood 1990, Wood and Wood 1991, Wood & Wood 1992a, Wood & Wood 1992b, Wood, Wood & Kingsmill 1992).

Peer conversations

Much of the previous work on peer interaction has focused on general measures of interaction (e.g., initiations, frequency and duration of interactions) rather than looking at communication in any detail (Gallaway & Woll 1994, Lederberg 1993, Lloyd 1999a). A number of studies have examined the effects of hearing status, familiarity and language competence on interactions between HI and NH children. The evidence suggests that both HI and NH children prefer to interact with children of the same hearing status (Antia 1982, Minnett, Clark & Wilson 1994, Spencer, Koester & Meadow-Orlans 1994, Vandell & George 1981). Both groups of children also appear to be more successful at
interacting with children with whom they are familiar (Lederberg, Ryan & Robins 1986, Rodriguez & Lana 1996). It has also been reported that HI children with better linguistic skills are more likely to interact with NH children than are those with less linguistic ability (Brackett & Henniges 1976, Lederberg 1991).

Recently, Niver & Schery (1994) investigated the extent to which HI children talked to their NH peers. They compared the amount of speech they used when interacting with either a familiar NH peer or their NH mother. Contrary to their hypothesis they found that mothers facilitated more speech than peers. Unfortunately, only the frequency and intelligibility of utterances was reported. No information on the length or type of utterances was presented. A qualitative analysis might have revealed some important differences between the two sets of conversations.

In sum, the data on peer interaction are fairly limited, especially beyond the preschool stage. The analyses used in earlier studies have provided information about some of the preferences HI and NH children have for interacting with each other. There is, however, a lack of in-depth studies of communication between HI and NH children. As stated previously, approximately 85% of HI children in British schools are now integrated into mainstream to some extent (Lynas et al. 1997, Watson 1998). A better understanding of communication between HI and NH children is therefore greatly needed.

Peers and the acquisition of communicative competence

What role do peers play in the acquisition of communicative competence? Their role has not been investigated fully (Romaine 1984). It appears, however, that it is complementary to that of adults. Communication, and particularly unstructured, spontaneous, informal communication, is fundamental to interaction between peers and the development of peer relationships (Stinson & Foster 2000). Interaction with peers provides input about aspects of communication that is not provided through adult-child interaction (Ostrosky, Kaiser & Odom 1993). In Western cultures adults tend to be the main source of language input during the early stages of syntactic development. During the school years, however, children continue to restructure and refine their grammars and develop their conversation and discourse skills. They become better able to maintain conversational topics, repair breakdowns in conversation, take listeners’ perspectives, and tell narratives (Pan & Snow 1999). Peers are a major source of input during the school years and become more important than adults as communication models as children get older (Romaine 1984). The reciprocity of peer interaction provides an
opportunity for children to practise and generalize their communicative devices (Antia 1994). Interaction with others of a similar social status is important in the development of many aspects of communicative competence, such as the ability to argue, boast, tease or tell jokes (Pan & Snow 1999).

A number of sociolinguistic studies have studied speech style in peer groups. It has been suggested that children's desire to adopt the speech style of their peer group, and the continuous monitoring of their speech style from other peer group members, both play a major role in the acquisition of communicative competence. Speech style is an important feature of group identity and conformity, and often some aspects of the speech style of a particular peer group are at odds with those of their school or families. For example, it might contain ungrammatical idiosyncrasies (see Romaine 1984). Kretschmer (1997: 380) describes discourse patterns amongst peer groups as the 'unwritten classroom curricula'. These are often derived from sources of which most adults have little knowledge, or might consider unsuitable as language models, such as the characters from the South Park cartoon.

Most children develop the social and communicative skills necessary for successful interaction with peers with few problems (Ostrosky et al. 1993). For children with poor language and communication skills, however, peer relations can be more problematic. Rice (1993) demonstrated a relationship between poor conversational skill and low social status in children of primary school age who were developing normally, learning English as a second language, or had specific language impairment. Those rated with low social status were less likely to initiate interaction with peers, and were less likely to be sought after as conversational partners by peers. She describes the 'negative social spiral' (p. 147) in which children with communication problems can find themselves. From as early as the preschool years, they might realize that they have difficulty in communicating with peers through being ignored or excluded from peer interaction. Consequently, this might lead them to develop compensatory strategies, such as a reliance on adults to mediate peer interaction, or minimizing the length of their responses when interacting with peers. These strategies may do little to improve communication skills or peer relations.

Many children with severe and profound hearing loss are still in the process of acquiring language when they start school (Wood et al. 1986) and therefore may find themselves in a negative social spiral as Rice (1993) describes. This may explain why Antia (1982) found that, in comparison to NH peers, some HI children tend to interact more with teachers than peers, and more with HI rather than NH peers.
Unfortunately communication strategies developed through interaction with teachers might not generalize to interactions with peers (Antia 1994, Kretschmer 1997, Messenheimer-Young & Kretschmer 1994). Furthermore, a lack of common experiences with their NH peers might make it even more difficult for HI children to access the discourse patterns of their peer group (Kretschmer 1997).

The present study examined quantitative and qualitative differences in the oral conversations between HI children and their NH peers and teachers. Following Niver & Schery's (1994) findings that a group of HI children talked more to their mothers than to peers, this study investigated whether a group of HI children talked more to teachers than to peers. Building on the work of Wood and his colleagues (1982, 1984, 1986), the study also described the structure of oral conversations between HI and NH children and compared it to teacher-child conversations in a similar context.

METHOD

Participants

Twenty-four children (12 HI and 12 NH) and 12 teachers from five primary schools with HI units participated. Four schools taught orally with no use of sign. The fifth used Total Communication (TC), which combines speech, British Sign Language and finger spelling (Baker & Knight 1998). Since the study involved each HI child in the sample interacting with his/her own teacher, teacher-pupil ratios were the most important factor in determining the size of the sample; the number of teachers available determined the number of HI children who could participate. Wherever possible it was the child with the greatest hearing loss who was selected.

Twelve HI children participated (6 boys and 6 girls) with ages ranging from 6;2 to 11;0 years (M = 8;8, SD = 1;4). Ten had prelinguistic hearing losses (defined as congenital hearing losses or those acquired before two years of age) and two acquired their hearing loss at 3 years of age. Eleven were from the oral schools and one from the school that used TC. The latter child appeared to have a positive attitude towards communicating through speech and did not sign in either of the recorded sessions. Eleven wore bilateral hearing aids and one had a cochlear implant. For each child an unaided pure tone better ear average hearing loss (BEA HL) was calculated across five frequencies between 250 and 4000 Hz. The mean BEA HL was 91.33 dB (SD = 14.49, range = 64–105).

For practical reasons teachers included qualified teachers of the HI and other support teachers and classroom assistants. Ten were female
and 2 male; seven were qualified as teachers of the HI. Each HI child selected a NH friend from one of his or her mainstream classes. The peers were all the same sex and from the same age group as the HI child who selected them.

**Design and procedure**

The methodology was influenced by research on pragmatics that focused on NH children (Mannle, Barton & Tomasello 1991, Tomasello, Conti-Ramsden & Ewert 1990) and children with specific language impairment (Conti-Ramsden & Dykins 1991, Conti-Ramsden, Hutcheson & Grove 1995). A standardized play activity, sets from the Lego System series, was chosen as the context of interaction. These featured topics such as pirates and a horse and cart (LEGO Group 1996).

Data collection took place in the HI units or spare classrooms. The sessions were recorded with a video camera mounted on a tripod, and an audio recorder. The two participants were seated side-by-side at a table and asked to make the Lego model together, talking about it as they did so. Teachers were asked to behave as they would normally do when interacting on a one-to-one basis with that child. Data were collected during the normal school day, so for practical reasons it was not possible to counter for ordering effects. More teachers acted as the first communication partner than did peers. A different model was used in each condition to avoid boredom. The investigator sat away from the video camera to avoid drawing attention to it. Recordings lasted between 10 and 25 minutes. Ten-minute samples were then transcribed and analysed. When recordings were longer, the first 10 minutes of the recording was used.

The video recordings were transcribed first, using the audio recordings as an alternative source if necessary. The audio recordings were then examined separately to verify the transcription from the videotapes. The transcripts were entered into a computerized database using the CHAT system from the CHILDES project (MacWhinney 1991, MacWhinney & Snow 1985, 1990). Details of speech, gestures, and other nonverbal and contextual information were recorded on the transcripts. Another complete check of the audio recordings was made later to check the reliability of the transcripts.

**Analysis**

The units of analysis were *utterance* and *turn*. Grammatical clauses, pauses and intonation were all used to determine utterance boundaries (Conti-Ramsden & Dykins 1991, Conti-Ramsden *et al.* 1995). Turns
were defined as one or more utterances or nonverbal communicative acts preceded, and followed by, a change of speaker or a pause exceeding 2 seconds (Caissie & Rockwell 1993). The data were analysed quantitatively and qualitatively.

Quantitative analysis The quantitative analysis incorporated measures that have been used previously (e.g., Mannle et al. 1991): mean length of utterance (MLU) in morphemes and words, and mean length of turn (MLT) in utterances and words. These were calculated using the MLU and MLT programs of CLAN, the package of analytical programs from the CHILDES project (MacWhinney 1991). Retracing, self-repetitions, counting, singing, humming, vocalizations that appeared to have no communicative intent, and speech addressed to the investigator were excluded from the analysis.

Unintelligible utterances As the speech of HI children is sometimes unintelligible, a system for quantifying unintelligibility was included based on that used by Niver & Schery (1994). All utterances that contained unintelligible speech were so coded on the transcripts (i.e., utterances containing both intelligible and unintelligible words were categorized as unintelligible).

Nonverbal turns Nonverbal turns, such as pointing, nodding or shaking of the head, miming, and other gestures without accompanying speech, were also coded. The frequency of unintelligible utterances and nonverbal turns was calculated using the FREQ program of CLAN (MacWhinney 1991).

Discourse participation Evaluation of discourse participation was made through two sets of ratios: the HI children’s MLT (in words) and MLU (in words) to that of their peer or teacher. For each measure, a ratio of 1.0 suggests that both participants have contributed equally to the conversation. A ratio less than 1.0 suggests that the teacher or peer has dominated the conversation. A ratio greater than 1.0 suggests that the HI child has dominated the conversation (Caissie & Rockwell 1993).

Qualitative analysis The qualitative analysis involved a system based on that used by Wood and his colleagues. Briefly, conversational moves were coded in terms of levels of control and response types. The unit of analysis was the turn. When turns contained more than one move, the final move (or turn ending) was coded because this is the one to which a response is usually given (Wood, McMahon & Cranstoun 1980, Wood et al. 1982).
A temporal measure was used for determining whether turns should be counted as part of the same 'conversation'. Turns were considered to be part of the same conversation until there was a pause exceeding five seconds. This measure has been used previously as an indicator of communication breakdown and is considered more objective than decisions based on conversational topic (Tomasello et al. 1990). Turn endings were categorized according to the coding scheme shown in Table 1.

### TABLE 1. Conversational categories for coding turn endings

**Questions**
- Closed (two-choice) and open (wh-type) questions
  - ‘Have you got one like this at home?’; ‘What’re you going to do next?’

**Personal contributions**
- Declaratives such as comments and statements
  - ‘I like Lego’, ‘I think you need to put it there’

**Conversational devices**
- Phatics
  - ‘Right’, ‘Okay’, ‘Hmm’, ‘Oh’
- Attention-getters
  - ‘Jason!’, ‘Now then’
- Filled pauses
  - ‘Er-’

**Minimal answers**
- Answers a question without contributing further
- Elicited responses
  - T: ‘Say saddle’, C: ‘Saddle’

**Extended answers**
- Answers question and makes a further contribution
  - ‘Yes, those are seats they are’

**Directives**
- ‘Put it there’, ‘Find the people things’, ‘Wait!’, ‘Stop it!’

**Tagged contributions**
- ‘This is good, isn’t it?’
After the transcripts were coded, frequency counts for each category were made using the FREQ program of CLAN (MacWhinney 1991).

Reliability
An independent observer coded 20% of the data. A 2-minute extract was taken for each child: 6 from the child-teacher data and 6 from the child-peer data. This was the portion from between the fifth and seventh minute. Inter-rater reliability – agreements/(agreements + disagreements) – was 94.5% (overall), 95.4% (child-teacher) and 93.3% (child-peer). Cohen’s kappa coefficients were 0.93, 0.94 and 0.91, respectively.

RESULTS
Quantitative measures
Measures of the HI children’s communication in the child-peer and child-teacher conversations were compared first. Then teachers and peers were compared as communication partners of the HI children. For the former comparisons, t-tests for related samples were used and, for the latter, t-tests for independent samples.

Table 2 compares the HI children’s communication in the child-teacher and child-peer conversations. The frequency of spoken utterances and turns was higher with teachers than peers, but these differences
TABLE 2. Quantitative measures of the hearing-impaired children's communication in the child-teacher and child-peer conversations

<table>
<thead>
<tr>
<th></th>
<th>Child-teacher</th>
<th></th>
<th>Child-peer</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Range</td>
<td>Mean</td>
</tr>
<tr>
<td>Number of total turns*</td>
<td>85.33</td>
<td>29.69</td>
<td>42-148</td>
<td>62.58</td>
</tr>
<tr>
<td>Number of spoken turns</td>
<td>81.92</td>
<td>31.31</td>
<td>41-148</td>
<td>60.67</td>
</tr>
<tr>
<td>Number of utterances</td>
<td>103.5</td>
<td>48.08</td>
<td>41-190</td>
<td>96.5</td>
</tr>
<tr>
<td>MLT (in utterances)**</td>
<td>1.22</td>
<td>0.18</td>
<td>1-1.55</td>
<td>1.52</td>
</tr>
<tr>
<td>MLT (in words)</td>
<td>2.97</td>
<td>1.46</td>
<td>1.08-6.08</td>
<td>3.92</td>
</tr>
<tr>
<td>MLU (in words)</td>
<td>2.38</td>
<td>1.0</td>
<td>1.08-3.92</td>
<td>2.49</td>
</tr>
<tr>
<td>MLU (in morphemes)</td>
<td>2.64</td>
<td>1.17</td>
<td>1.10-4.28</td>
<td>2.86</td>
</tr>
<tr>
<td>Unintelligible utterances (%)</td>
<td>15.36</td>
<td>13.74</td>
<td>2.48-50</td>
<td>17.39</td>
</tr>
<tr>
<td>Nonverbal turns (%)</td>
<td>4.67</td>
<td>7.51</td>
<td>0-27.78</td>
<td>6.06</td>
</tr>
</tbody>
</table>

* Child-teacher higher than child-peer, p < 0.05
** Child-peer higher than child-teacher, p < 0.05

were not significant. The frequency of total turns (verbal and nonverbal) was significantly higher with teachers than peers (t(11) = 2.22, p < 0.05). The HI children's MLTs and MLUs were higher in the child-peer conversation, but this difference was only significant for MLT in utterances (t(11) = 2.79, p < 0.05). The proportion of unintelligible utterances and nonverbal turns was also higher in the child-peer conversations but these differences were not significant.

In the child-peer conversations, a significant negative Pearson's correlation was found between BEA HL and the HI children's MLT in utterances (r = -0.595, p < 0.05) and words (r = -0.712, p < 0.01) and MLU in words (r = -0.604, p < 0.05) and morphemes (r = -0.604, p < 0.05).

When teachers and peers were compared as communication partners of HI children (see Table 3), it was found that the frequency of total turns (t(22)=5.88, p < 0.01), spoken turns (t(22)=5.93, p < 0.01) and utterances (t(22)=6.43, p < 0.01) was significantly higher for teachers than peers. Teachers' MLU in words (t(22)=4.07, p<0.01) and MLT in utterances (t(22)=2.88, p < 0.01) and words (t(22)=4.36, p < 0.01) were also significantly higher. Peers used a higher proportion of nonverbal turns than teachers did, but this difference was not significant.
TABLE 3. Quantitative measures of teacher and peer communication

<table>
<thead>
<tr>
<th></th>
<th>Teacher</th>
<th>Peer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of total turns*</td>
<td>103.67</td>
<td>48.42</td>
</tr>
<tr>
<td>Number of spoken turns*</td>
<td>103.17</td>
<td>46.08</td>
</tr>
<tr>
<td>Number of utterances*</td>
<td>168.92</td>
<td>65.17</td>
</tr>
<tr>
<td>MLT (in utterances)*</td>
<td>1.66</td>
<td>1.34</td>
</tr>
<tr>
<td>MLT (in words)*</td>
<td>7.26</td>
<td>4.08</td>
</tr>
<tr>
<td>MLU (in words)*</td>
<td>4.37</td>
<td>2.98</td>
</tr>
<tr>
<td>Nonverbal turns (%)</td>
<td>0.38</td>
<td>0.31</td>
</tr>
</tbody>
</table>

* Teacher higher than peer, $p < 0.01$

TABLE 4. MLT and MLU ratios for the child-teacher and child-peer dyads

<table>
<thead>
<tr>
<th></th>
<th>Child-teacher</th>
<th>Child-peer</th>
</tr>
</thead>
<tbody>
<tr>
<td>MLT in words*</td>
<td>0.45</td>
<td>1.16</td>
</tr>
<tr>
<td>MLU in words*</td>
<td>0.55</td>
<td>0.9</td>
</tr>
</tbody>
</table>

* Child-peer higher than child-teacher, $p < 0.05$

(although it was approaching significance at the 5% level: $t(22) = 2.02$, critical value of $t = 2.07$). A significant negative Pearson's correlation was found between BEA HL and teacher MLT in words ($r = -0.613$, $p < 0.05$) and MLU in words ($r = -0.649$, $p < 0.05$).

Discourse participation
Table 4 shows the two sets of ratios that were used to evaluate discourse participation. Comparisons were made using paired $t$-tests. MLT in words ratios ($t(11) = 2.45$, $p < 0.05$) and MLU in words ratios ($t(11) = 2.71$, $p < 0.05$) were significantly higher in the child-peer conversations.

Qualitative analysis
The frequency of each category was calculated and expressed as a
TABLE 5. Frequency of 'no responses' in the child-teacher and child-peer conversations

<table>
<thead>
<tr>
<th>Situation</th>
<th>HI child</th>
<th>Partner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child-teacher</td>
<td>270</td>
<td>64</td>
</tr>
<tr>
<td>Child-peer</td>
<td>120</td>
<td>266</td>
</tr>
</tbody>
</table>

TABLE 6. Child-teacher conversations: percentage distribution of conversational categories

<table>
<thead>
<tr>
<th>Category</th>
<th>HI children</th>
<th>Teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questions</td>
<td>3</td>
<td>36</td>
</tr>
<tr>
<td>Personal contributions</td>
<td>30</td>
<td>24</td>
</tr>
<tr>
<td>Conversational devices</td>
<td>13</td>
<td>17</td>
</tr>
<tr>
<td>Tagged contributions</td>
<td>0.1</td>
<td>6.6</td>
</tr>
<tr>
<td>Minimal answers</td>
<td>22</td>
<td>1</td>
</tr>
<tr>
<td>Extended answers</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>Directives</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Uncodable</td>
<td>12</td>
<td>2</td>
</tr>
<tr>
<td>Other</td>
<td>5</td>
<td>2</td>
</tr>
</tbody>
</table>

percentage of the total number of coded turns. Attention is drawn to the 'no response' category. No response was defined in temporal terms; it was coded when the 'listener' did not make a communicative response to a turn within five seconds, or the 'speaker' resumed speaking after a pause of between two and five seconds. The frequency of no responses is shown in Table 5.

The HI children were over four times more likely to make 'no response' than the teachers in the child-teacher conversations. In the child-peer conversations the peers were over twice as likely to make 'no response' than the HI children.

The proportional distribution of the conversational categories for the child-teacher dyads is shown in Table 6. The child-teacher conversations contained a fairly high proportion of question-answer sequences; over a third of teacher turns were questions. In response to questions the HI children tended to respond with minimal answers and rarely contributed
further to the conversations. Nevertheless, during this play activity the teachers were less controlling than has been described in other contexts (e.g., Wood et al. 1982) with 41% of their turns being contributions or conversational devices; 43% of the HI children's turns were contributions or conversational devices.

The results for the child-peer dyads are shown in Table 7. In these conversations over a half of the turns were contributions or conversational devices. Question-answer sequences were fairly rare; only 8% of the children's turns were questions. The HI children were more directive and more likely to ask questions with peers than teachers. The child-peer conversations also contained a higher proportion of contributions and conversational devices than the child-teacher conversations. The main difference between the two situations was that the child-teacher conversations contained a much higher proportion of question-answer sequences than the child-peer conversations. There was little difference in the proportion of the HI children's turns that were nonverbal, uncodable, or categorized as 'other' between the two situations.

In comparison with peers, teachers asked considerably more questions and were more directive. Peers used a higher proportion of contributions, however, and a higher proportion of their turns was uncodable.

Conversational performance
The conversational performance of both sets of dyads was examined further. Table 8 compares the HI children in the two situations using paired t-tests. These children used a significantly higher proportion of directives \( t(11) = 3.86, p < 0.01 \) and questions \( t(11) = 2.36, p < 0.05 \)
TABLE 8. Mean proportions of the HI children’s conversational categories in the child-teacher and child-peer conversations

<table>
<thead>
<tr>
<th></th>
<th>Child-teacher</th>
<th></th>
<th>Child-peer</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Range</td>
<td>Mean</td>
</tr>
<tr>
<td>Directives*</td>
<td>0.93</td>
<td>1.37</td>
<td>0–3.74</td>
<td>5.41</td>
</tr>
<tr>
<td>Questions**</td>
<td>2.93</td>
<td>2.74</td>
<td>0–7.35</td>
<td>7.92</td>
</tr>
<tr>
<td>Personal contributions</td>
<td>29.35</td>
<td>12.47</td>
<td>1.25–51.52</td>
<td>34.9</td>
</tr>
<tr>
<td>Conversational devices</td>
<td>11.91</td>
<td>5.81</td>
<td>4.29–22.22</td>
<td>20.01</td>
</tr>
<tr>
<td>Minimal answers***</td>
<td>22.63</td>
<td>10.89</td>
<td>11.21–52.27</td>
<td>0.59</td>
</tr>
<tr>
<td>Extended answers***</td>
<td>6.28</td>
<td>6.52</td>
<td>0–21.65</td>
<td>1.03</td>
</tr>
</tbody>
</table>

* Child-peer higher than child-teacher, p < 0.01  
** Child-peer higher than child-teacher, p < 0.05  
*** Child-teacher higher than child-peer, p < 0.01

with peers than with teachers. They used a significantly higher proportion of minimal answers ($t(11) = 6.74, p < 0.01$) and extended answers ($t(11) = 3.41, p < 0.01$) with teachers than with peers. No other differences were significant.

Table 9 compares teachers and peers using independent t-tests. Teachers used a significantly higher proportion of directives ($t(22) = 2.13, p < 0.05$) and questions ($t(22)=7.74, p < 0.01$) than peers did. Peers
used a significantly higher proportion of contributions ($t(22) = 2.09$, $p < 0.05$) and minimal answers ($t(22) = 3.22$, $p < 0.01$) than teachers did. No other differences were significant. A significant Pearson’s correlation was found between the proportion of peer directives and BEA HL ($r = 0.603, p < 0.05$).

Teacher questions were examined further. The frequency of questions and questions plus tags (which included contributions and phatics with a tag question) was calculated and correlated with the children’s number of total turns, spoken turns, and MLT in utterances and words. The mean number of teacher questions was 37.83 ($\text{SD} = 13.42$, range 19–64) and questions plus tags was 47.25 ($\text{SD} = 14.3$, range 29–75). Moderate positive but statistically non-significant relationships were found between teacher questions and child total turns ($r = 0.5$, n.s.) and spoken turns ($r = 0.39$, n.s.), and between teacher questions plus tags and child total turns ($r = 0.47$, n.s.) and spoken turns ($r = 0.38$, n.s.).

DISCUSSION

Quantitative analysis

The results demonstrated that the teachers were more successful at eliciting communication from the HI children than were the NH peers. The frequency of the HI children’s total turns (verbal and nonverbal) was significantly higher with teachers. The frequency of the HI children’s spoken turns and utterances was also higher with teachers, but these differences were not significant. The results also suggested, however, that NH peers could be playing a complementary role to that of teachers in the communicative development of HI children. Though there was a tendency for the HI children to talk more to teachers than peers, with peers their turns and utterances tended to be longer. With peers they made significantly more utterances per turn, and their turns and utterances tended to be longer in relation to words and morphemes.

No difference was found in the proportion of the HI children’s turns that were nonverbal between the child-peer and child-teacher conversations. Although the mean was lower in the child-teacher conversations, more of the HI children made nonverbal turns with teachers than peers: 83% compared with 67%. This may explain why the frequency of the HI children’s total turns was higher with teachers than peers. The teachers probably placed more linguistic demands on the HI children than did their peers. Teachers, for example, frequently asked them to name parts of the model, or to specify what a piece of the model was used for. Sometimes the children provided nonverbal responses to these questions, for example, miming a rowing action.
when asked what an oar was used for. This particular kind of non-verbal exchange was rare in the child-peer conversations.

It was not surprising that teachers talked more than peers and used longer turns and utterances. Teachers are obviously more skilled communicators than children in this age range. These results would also be expected due to the nature of the teacher-child relationship. The general power structure in classroom discourse is teacher-directed (Wood et al. 1982). The mean proportion of nonverbal turns was higher for peers than for teachers, and this difference approached significance. However, a point should be made about the distribution of nonverbal turns across the two groups. Only 25% of the teachers made nonverbal turns compared with 75% by peers. As might be expected, some of the peers with the highest proportion of nonverbal turns were also partners of children with the highest BEA HLs (although there was no significant correlation between proportion of nonverbal turns in peers and BEA HL).

The negative correlation between teacher MLT and MLU and BEA HL suggested that some teachers may have been modifying their speech in accordance with the children’s level of hearing loss. These teachers may have been producing shorter utterances because shorter utterances are easier for pupils with higher degrees of hearing loss to process. Alternatively, as there is generally a negative relationship between degree of hearing loss and linguistic ability (Elfenbein, Hardin-Jones & Davis 1994), they may have been fine-tuning their speech to the linguistic ability of the child with whom they were interacting (Wood et al. 1986). As no measure of the children’s linguistic ability was made, however, further longitudinal research is necessary to evaluate this proposal (see also Wood & Wood 1991, for a detailed discussion of the limitations of correlational studies in making this type of inference).

Another finding that suggests a positive role for peers in HI children’s communicative development is the results of the analysis of discourse participation. In relation to the length of turns and utterances, the HI children contributed a significantly higher proportion of the conversation with peers than teachers. However, a note of caution is necessary here. Some of the peers may have been more affected by the research situation than their HI partners. The peers were probably less used to being observed than their HI partners and were also less used to the investigator’s presence. The data may be more representative of the HI children’s natural behaviour than that of their peers.

Another noteworthy point is that there was variation in the extent to which the HI children were integrated into mainstream schooling.
Some were integrated more than others, usually those with the lesser hearing losses. The HI children in this sample were asked to select a ‘friend’ from one of their mainstream classes, but it is possible that the nature of the friendships differed between the dyads. Children who are less integrated will obviously have less opportunity to develop relations with their NH peers. Some dyads may therefore have been better friends than others. Obviously, this variable is difficult to control. Nevertheless, Lederberg et al. (1986) suggested familiarity is an important factor in interactions between HI and NH children. The NH children in their sample were more responsive to a familiar rather than an unfamiliar HI child, but they were no more successful at interacting with an unfamiliar HI child than were NH children who had had no previous experience with HI children. Their findings suggested that some NH children might find it difficult to communicate with unfamiliar HI children, or to generalize the communication strategies they use with familiar HI children to interactions with unfamiliar HI children. This has obvious implications for integration or intervention programmes (Lloyd 1999a).

The results suggested that degree of hearing loss had an effect on the HI children’s performance in the child-peer conversations. The negative correlation between BEA HL and the HI children’s MLT and MLU suggests that the children with the higher levels of hearing loss used shorter turns and utterances with peers than did those with the lower levels of hearing loss. It is difficult to make inferences from these results because peer factors may have influenced the HI children’s performance. However, the results could be explained in terms of Rice’s (1993) negative social spiral, where children with poor communication skills develop compensatory strategies as a consequence of their negative experiences of peer interaction. The shorter contributions from the children with higher levels of hearing loss could reflect such a compensatory strategy. Alternatively, the shorter contributions by the children with higher BEA HLs could also be explained in terms of linguistic ability. The children with lower BEA HLs might have had more linguistic ability than the children with higher BEA HLs. The results could also indicate that some of the friendships were stronger in the dyads that contained the children with the lower BEA HLs. Further research is needed to evaluate these proposals.

**Qualitative analysis**

The main differences between the child-peer and child-teacher conversations were that the child-teacher conversations contained a much higher proportion of question-answer sequences than the child-peer
conversations, which in turn contained a higher proportion of contributions and conversational devices than did the child-teacher conversations. Teachers exerted more control over the conversations than did peers, using significantly more questions and directives, whereas peers made significantly more contributions than teachers. A relationship was also found between proportion of peer directives and BEA HL. Peers tended to be more directive towards the children with higher BEA HLs. This might be due to the fact that some of the peers who interacted with the children with higher BEA HLs adopted a didactic style. The HI children used significantly more questions and directives with peers than teachers. This might be predicted on the basis that social status and power were more equal in the child-peer than in the child-teacher conversations.

These results give some indication as to why the teachers elicited more communication (total turns) from the HI children than their peers did. Teachers provided more opportunities for the HI children to contribute to the conversations than peers did, particularly through questions. However, most of the children’s responses to teacher questions were minimal answers, but with peers a higher proportion of turns were contributions. This may explain why their turns and utterances tended to be longer with peers than with teachers.

The relatively high proportion of teacher questions found in these data warrants further discussion. Although question-answer sequences are a major feature of classroom discourse, some of the questioning in these data may not reflect what actually happens in the classroom and may have been a product of the research situation. Plapinger & Kretschmer (1991) used the term ‘performance mode’ to refer to the style of interaction that some mothers use when being observed in interaction with their HI child. They adopt a style of interaction that demonstrates the language capabilities of their child to the researcher (e.g., they prompt the child to provide ‘labels’ through questions). Some of the teachers in this sample appeared to adopt a similar style of interaction. Some of the questions were being used to elicit examples of the children’s language. This type of question might be used less frequently during lessons.

These results also suggested that questions are useful devices for encouraging some HI children to participate in conversations. Moderate correlation was found between teacher questions and the frequency of HI child total turns and spoken turns. Though the HI children’s responses to questions tended to be minimal, it might be argued that short contributions to a conversation are better than no contributions at all.
The qualitative analysis showed that the child-teacher and child-peer conversations had a different structure. These differences again suggest that NH peers could be providing a complementary role to teachers in the communicative development of HI children. Differences in the pattern of use of contributions, phatics and questions suggested that the child-peer conversations were generally more reciprocal than the child-teacher conversations, and therefore represent a different kind of communicative experience to that with teachers. What kind of input is provided by peers and how does it differ from that provided by teachers? These questions are difficult to answer from the present analysis. However, one example in the data, where an HI boy describes the Lego model as ‘cool’ to his peer, suggested that some of these children were able to access aspects of the ‘unwritten classroom curricula’ (Kretschmer 1997: 380). It is unlikely that this sub-cultural expression came from teacher input. Further investigations of communication between HI and NH children outside the context of lessons are necessary to evaluate the extent to which HI children can adopt the discourse patterns and speech styles of their peer groups.

CONCLUSIONS AND DIRECTIONS

Relatively little is known about the effects that different communication partners and contexts have on HI children’s oral communication skills, especially at school age (Plapinger & Kretschmer 1991). The role of peers in the acquisition of communicative competence needs investigating more fully in general, and with respect to HI children in particular.

The present study has suggested that it might be beneficial to make better use of NH peers in the assessment and development of HI children’s oral communication skills. What role might peers play in intervention programmes? When peers are used as communication partners a context of interaction is provided that is different from that when professionals or parents are used. This context might have more relevance to the child’s everyday interactions, and consequently communication skills gained through intervention programmes that utilize peer interaction might be more easily generalized to everyday situations (Bricker 1993). The development of intervention programmes in which NH peers are trained to interact positively with HI children could also be a very promising approach (for discussions of peer-mediated interventions with other special populations, see Ostrosky et al. 1993). However, as Antia (1994) pointed out, little research had focused on peer-mediation with HI children, and little appears to have changed.
since then. Finally, with regard to the patterns of discourse between peers at school, the children themselves could be consulted about the communication rules that apply. These might be quite different from what teachers believe them to be on the basis of their own observations (Kretschmer 1997).

The issue of context also requires further consideration. These results showed that HI children used longer turns and utterances with peers than with teachers, but the Lego task used did not necessarily require communication between the participants. Different situations might lead to different patterns of results. Contextual differences in communication between HI and NH children should now be examined using structured tasks that permit the measurement of communicative performance (Lloyd 1999b). It is necessary to go beyond general measures (e.g., MLT, MLU, etc.) and classifications (e.g., questions, comments, etc.) to consider issues relevant to social and academic contexts (Wood & Wood 1991), such as negotiation and the exchange of information, or the ways in which communication breakdowns are managed (Lloyd 1999b).

It is difficult to draw any direct educational implications from data that were collected during play sessions. Therefore, future work should examine communication between HI and NH children during co-operative learning activities in the classroom. The use of peer tutoring with HI children also merits further attention. Peer tutoring is a structured programme of learning where children are trained to tutor less able peers in some aspect of the school curriculum. It is thought to provide considerable benefits to tutor and tutee (Lloyd 1999a). To date, very little research has focused on the use of peer tutoring with HI children. However, a case study by Burley, Gutkin & Nauman (1994) suggests that it could be profitable to use this approach with HI and NH children.

For practical reasons, the present study included teachers of the HI and other support assistants as 'teachers'. To our knowledge no research has systematically investigated the effect of different types of teacher on HI children’s spoken language output. A recent study by Hopwood (2000) suggests, however, that some teachers of the HI are more sensitive to the facilitative effects of different styles of interaction than are the assistants who support them. Further research on the effects of language variation in different teaching contexts on HI children’s spoken language output is urgently required.

This study focused on oral communication, but in this paper we are not taking a position on the preference or otherwise of an oral approach over signing for HI children. It should be noted that signing between HI
and NH has also received little attention in the literature. Wood and his colleagues reported systematic relations in conversational moves and response types between oral classrooms and those where Signed English was used (Power et al. 1990, Wood & Wood 1991, Wood, D. J. & Wood 1992a, Wood, H. A. & Wood 1992b, Wood et al. 1992). In schools that employ a Total Communication approach, lessons in signing for NH children are often provided, and these are usually very popular. Future work should examine signing between HI and NH children and compare it with their oral conversations, as well as the effects of variables such as age, levels of hearing loss, and the age at onset of hearing losses on communication between HI and NH children.

REFERENCES


