British Journal of Disorders of Communication, 26, 337–354 (1991)

Mother–child interactions with language-impaired children and their siblings

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ABSTRACTS

There are possible effects of language impairment on adult–child interaction. Previous research focused on (1) examining common features of adult–child interaction in different groups of atypical language learners and (2) examining differences between language-impaired parent–child dyads and normal control dyads. The present investigation studies language-impaired children and their mothers in comparison both to their own younger siblings of the same language stage and to normal controls of the same language stage. Consistencies within *families but not across families were found. In addition, large individual differences were observed for different families. The implications of these findings for our understanding of interactive styles and language impairment are discussed.*

Les troubles du langage peuvent avoir des effets sur les interactions adulte–enfant. Une étude antérieure s'était attachée à: (1) examiner les traits communs concernant les relations adulte–enfant dans différents groupes de sujets atypiques pour ce qui concerne l'apprentissage du langage; (2) examiner les différences entre les paires parent–enfant ayant des problèmes de langage et des paires de contrôle normales. L'étude présentée ici se penche sur l'interaction entre les enfants avec des troubles du langage et leur mère, en comparaison de leur plus jeune frère ou soeur de même niveau de langage, et en comparaison de sujets normaux de contrôle de même niveau de langage. Des régularités ont été trouvées à l'intérieur des familles mêmes mais pas entre les familles. De plus, des différences interindividuelles importantes ont été remarquées dans différentes familles. Les conséquences de ces résultats pour notre compréhension des styles d'interaction et des troubles du langage sont discutées.

Die Sprachstörungen können eventuell die Interaktion zwischen Erwachsenen und Kindern beeinflussen. Die bisherige Forschung hat sich mit folgenden Themen beschäftigt: (1) Untersuchung von Gemeinsamkeiten der Interaktion zwischen den Erwachsenen und Kind in verschiedenen Gruppen mit atypischem Spracherwerb; (2) Untersuchung der Verschiedenheiten zwischen Eltern-Kindpaaren mit Sprachstörungen und normalen Kontrollpaaren. Diese Studie untersucht sprachgestörte Kinder und deren Mütter im Vergleich mit ihren eigenen jüngeren Geschwistern im gleichen Sprachentwicklungsstand und mit normalen Kontrollgruppen im gleichen Sprachentwicklungsstand. Es wurden Übereinstimmungen innerhalb aber nicht zwischen den Familien festgestellt. Zusätzlich haben wir grosse individuelle Unterschiede zwischen den verschiedenen Familien bemerkt. Wir besprechen die Bedeutung dieser Ergebnisse mit Hinsicht auf unser Verständnis der Interaktionsarten und der Sprachstörung.

Key words: mother–child interaction, language impairment, siblings.

INTRODUCTION

It has been consistently demonstrated that adult interaction with children differs significantly from adult–adult interaction: in the study of Anglo-American language-learning children (see Snow, Perlman & Nathan, 1987, for a review), in the study of adult–child interaction in different cultures (Schieffelin, 1979; Ochs, 1982; Brice Heath, 1983), and in the study of atypical language learners and their parents (see Conti-Ramsden, 1985, for a review). What these differences entail, however, has not always been clear. The special features of parent–child interaction are quite culturally specific (Snow *et al.*, 1987), and some features are likely to have facilitative effects for language learning whilst others seem to offer no particular advantage to the task of cracking the linguistic code (Snow, 1989). The characteristics of the child, for example, whether the child has a language problem or not, may also affect the nature of parent–child interaction (Horsborough, Cross & Ball, 1985; Conti-Ramsden, unpublished data). This latter argument is of particular interest to clinician-researchers interested in language impairment as it has implications for assessment and remediation.

Previous research has focused on (1) examining common features of adult–child interaction in different groups of atypical language learners (Horsborough *et al.*, 1985) and (2) on examining differences between specific language-impaired (SLI) parent–child dyads and normal control dyads (Cross, 1981; Conti-Ramsden & Friel-Patti, 1983, 1984; Cross, Nienhuys & Kirkman, 1985). Horsborough *et al.* (1985) studied both autistic and language-delayed children's mother–child interactions. They found that mothers of these two groups were very similar in their styles. Both groups of mothers initiated more (used more interrogatives especially Wh- and quiz questions) and responded or commented less to the children (especially with respect to the description of objects). The authors interpret their results as suggesting that, in communicative interaction, mothers of atypical language learners are influenced by the characteristics of their children, and specifically that the formal linguistic characteristics of the children in terms of expressive language stage and language comprehension levels appeared to be more important for maternal adjustments than the functional–conversational abilities of the children.

Comparative research with normal control children has also suggested that mothers of SLI children may initiate more in interaction, in order to compensate for their children who tend to be less able to initiate in conversation than normal control children of the same language stage (Conti-Ramsden & Friel-Patti, 1983, 1984). In addition, Cross and her colleagues (Cross, 1981; Cross *et al.*, 1985) compared SLI with normal language learners of the same language stage. They found that mothers of SLI children had less numbers of utterances per turn, more non-informative or no responses, more directives (interrogatives and imperatives), and less expansions and initiations than mothers of the controls. To investigate the causal influence of the SLI children, Cross and her colleagues then looked at the younger siblings of the language-impaired children and compared them with normal language learners of the same language stage. The prediction was that mothers of SLI children when interacting with their younger offspring would *not* differ from a normal control group, supporting the position that it was the SLI child's special influence that

brought about the differences in maternal speech. The results were thought-provoking. Cross and her colleagues found that well over half the reliable differences between the SLI versus control mothers disappeared when mothers of language-impaired children interacted with their younger, normal offspring. However, some differences were persistent and involved the density of mothers' turns (utterances per turn), non-informative and no responses, and the fluency and intelligibility of mothers' speech.

However, because in the Cross studies mothers of language-impaired children were compared with normal controls outside the family, there was no way of examining *within*-family consistencies and discrepancies. The aim of the present investigation was to further this line of research by examining a natural but infrequently occurring situation where a family has both an SLI child and a normal younger sibling of the same language stage. This methodological approach, which involves comparing mothers' interactions with their SLI children to *the same* mothers' interactions with their non-language-impaired children, allows us to begin to tease out the relative effects of the mother and the child on the nature of the interaction. By keeping the control group within the same family we are able to ask questions such as: What characteristics of maternal speech change in interaction with the language-impaired child versus the normal sibling? What characteristics of maternal speech are constant across interactions with impaired and non-impaired offspring?

METHODS

The Families

Potential SLI subjects and their families were informed of the research project through the speech and language therapy services in the north-west of England, and asked if they would be willing for the research workers to visit them to discuss their possible involvement in more detail. During this initial visit, the researchers collected language samples by means of an audio recording from the SLI child and the younger normal language learning (NL) sibling. The first 50 utterances of the recordings were transcribed in order to ascertain whether the SLI child and NL sibling belonged to the same language stage. From the outset, it was made clear that no identifying information would be revealed except to the research workers and that the family could terminate their involvement in the research project at any time, and any data collected from the family at that point would be destroyed if desired.

There was some difficulty in identifying families whose children fitted the strict criteria of the investigation – that is, that the SLI child and his or her NL sibling were of the same language stage, and falling within the limits of Brown's stage I and early stage II. It was thought to be important that all children be in the same language stage so that comparisons could be made across children. An early stage of development was chosen because it is in this early stage of syntactic growth that maternal effects are believed to play an important role (Nelson, Bonvillian, Denninger, Kaplan & Baker, 1984). A total of 35 families were visited, of which 5 were used for this research.

The control subjects were families with children who had similar mean length

Table 1: *Characteristics of the children.*

	Age (years)	Sex	MLU	LIPS (years)	PLS (years)	BPVS (years)	TROG (years)
Family 1							
LI	4;9	M	1.67	5;0 (110)	4;10½ (103)	2;10 (6%)	5;0 (50%)
Sibling	2;5	F	1.22	2;3 (98)	2;3 (98)	*	*
Control	2;5	F	1.32	2;6 (108)	2;6 (103)	*	*
Family 2							
LI	5;3	M	1.94	5;9 (115)	5;6 (105)	4;4 (26%)	5;0 (50%)
Sibling	1;11	F	1.42	1;10 (101)	2;7½ (131)	*	*
Control	2;1	F	1.66	2;3 (109)	2;3 (108)	*	*
Family 3							
LI	5;10	M	1.30	4;9 (86)	5;4½ (91)	4;7 (22%)	4;9 (20%)
Sibling	2;4	M	1.43	2;0 (91)	2;4½ (98)	*	*
Control	1;9	M	1.19	1;6 (86)	1;6 (86)	*	*
Family 4							
LI	4;9	F	2.24	4;3 (95)	3;10½ (103)	3;0 (7%)	Below test floor
Sibling	2;4	M	2.15	2;3 (101)	2;1½ (91)	*	*
Control	1;11	M	2.05	1;9 (96)	1;9 (91)	*	*
Family 5							
LI	3;9	M	1.26	3;9 (105)	3;10½ (103)	2;8 (18%)	Below test floor
Sibling	1;11	M	1.39	1;9 (96)	2;0 (104)	*	*
Control	2;0	F	1.31	2;3 (118)	2;0 (100)	*	*

M: male; F: female; LI: language-impaired.
MLU: mean length of utterance.
LIPS: Leiter International Performance Scale (Leiter, 1969). Mental age equivalent, quotient in parenthesis: normal range (1 s.d.) is within 15 points of the 100 quotient, i.e. 85 or over.
PLS: Preschool Language Scale (Zimmerman, Steiner & Pond, 1969). Auditory comprehension score, quotient in parenthesis: normal range (1 s.d.) is within 15 points of the mean 100 quotient.
BPVS: British Picture Vocabulary Scale (Dunn, Dunn, Whetton & Pintillie, 1982). Age equivalent, percentile rank in parenthesis.
TROG: Test for Reception of Grammar (Bishop, 1982). Age equivalent, percentile rank in parenthesis.
* Test not standardised for children of this young age, so test is not attempted.

of utterance (MLU) measures as in the SLI families. These families were recruited from local playgroup and parent toddler groups. After parents had volunteered, an initial visit was made to the families in the same way as to the SLI families.

Selection Criteria for Subjects

The characteristics of the children are presented in Table 1 in terms of age, sex, MLU and psychometric results. SLI children ranged in age from 3;8 to 6;4 years, their NL siblings from 1;11 to 2;10 years, and the control children ranged from 1;11 to 3;1 years. With regard to sex, four out of five SLI children were male, three out of five NL siblings were male and, in the control group, two out of five children were male. As can be seen from Table 1 all children were matched for MLU and fell within Brown's stage I/early stage II (Brown, 1973). All SLI children had severe expressive language deficits reflected in the fact that their MLUs fell far below age expectancies. The psychometric characteristics for all children were as follows:

1. Intellectual functioning within the normal range as measured by the *Leiter International Performance Scale* (LIPS), designed to test non-verbal ability (Leiter, 1969).
2. Language comprehension within the normal range as measured by one or more of the following tests:
   (a) *British Picture Vocabulary Scales* (BPVS), designed to measure receptive vocabulary (Dunn, Dunn, Wheton & Pintillie, 1982).
   (b) *Test for Reception of Grammar* (TROG), designed to assess understanding of grammatical contrasts (Bishop, 1982).
   (c) *Preschool Language Scale* (PLS), designed to appraise early stages of language development (Zimmerman, Steiner & Pond, 1969).

As can be seen from Table 1, there appears to be a fair degree of consistency with regard to the measures of the Leiter International Performance Scale – all children scored around the 90 quotient mark. The data for language comprehension on the Preschool Language Scale indicates all children functioning normally, with scores around, or above, the 90 quotient mark. Interestingly, all SLI children presented with problems with receptive vocabulary measured by the British Picture Vocabulary Scale (scores ranging from 7% to 26%). In addition, some SLI children had difficulties with reception of grammar, whilst others did not (see results of Test for Reception of Grammar in Table 1). As these tests reveal, language comprehension is not a unitary phenomenon and different tests measure different aspects of comprehension. The authors used a battery of tests in an attempt to overcome some of the difficulties associated with finding a suitable measure of language comprehension ability. The young controls were not able to be tested successfully on the BPVS and TROG given the lack of age norms for this population.

In addition, all children had adequate hearing sensivity as determined by pure-tone audiometry screening bilaterally (500, 1000 and 2000 Hz at 25 dB). Children also had uneventful case histories with respect to severe neurological and/or emotional problems and no history of chronic middle-ear problems that necessitated regular otological treatment as ascertained by parental interview and by a questionnaire completed by the child's parents. All children spoke English in monolingual homes and came from intact (two-parent) families.

Video Recordings

The video-recording sessions were conducted in the homes of the subjects, using play materials such as jigsaws, Fisher-Price toys, books, Lego, models etc. Where there was a paucity of play materials (only two in this research), the researchers took a box of toys, which consisted of model farm animals, some jigsaws, five books and a ball. In order to keep the mothers as unconcerned as possible about the nature of their own speech, the mothers were told that the research was primarily about child language development. The instructions given to the mother–child dyads were 'to play as you normally do'.

All families had warm-up sessions, and were seen by the researchers at least once before the video-recording session. In the SLI families the mother was first recorded with either the SLI child or the NL sibling, dependent on which of the children was ready and available to interact. In four out of five families,

the SLI child was recorded first, and in the fifth family it was the NL sibling. The recording session lasted between 15 and 20 minutes, and researchers informed the interactants that the video equipment was operating. The researchers then became as inconspicuous as possible, by sitting near the video equipment.

The video equipment used included: Canon video-camera (Model VC-10E) and a Canon portable video-recorder (Model VR-10B). Time to the nearest second was recorded by an electric time generator, and was superimposed on the upper portion of the video screen.

Transcription

The transcription involved recording with pencil and paper all verbal and non-verbal interactions between mother and child, and the context in which these events occurred. The paper and pencil transcripts were then transferred to the computer in accordance with the guidelines produced by the Codes for Human Analysis of Transcript (CHAT) which is part of the Child Language Data Exchange System (CHILDES) (MacWhinney & Snow, 1985). Part of this study's data is available from CHILDES*. The computerized transcripts were then compared by an independent transcriber with the original video-taped data in order to verify their accuracy. Finally the video-tapes were viewed in conference by two researchers. Any disagreements concerning the transcription were resolved by re-examination and consensus was reached.

Analysis

The first step in analysing transcriptions was to organise the transcription into *turns* using Kaye and Charney's (1981) definition of a speaker turn as a string of one or more utterances with or without accompanying gestures, or one or more non-verbal acts (e.g. pointing, head nodding, waving etc.), strung together without a pause. Each turn was divided into utterances initially. Decisions regarding utterance boundaries were based on clausal syntactic units, intonation contours and pauses. Clausal syntactic units formed the basic criterion for identifying utterances. In unclear cases, pause and/or intonation information were used to reach a decision. Once the transcripts were organised into turns, the following analyses were carried out.

Structural analysis

Mean length of utterance (MLU) The child's MLU was counted in morphemes following Miller's (1981) morpheme counting rules, whilst the mother's

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* Currently, families number 1, 2, 3 and 4 are on the CHILDES databank. The children are identified by pseudonyms in CHILDES. Family number 1 in this study refers to Sid (specific language impaired – SLI) and Susan (normal language sibling – NL); family number 2 in this study refers to Abe (SLI) and Ann (NL); family number 3 in this study refers to Clay (SLI) and Chuck (NL); and family number 4 in this study refers to Kate (SLI) and Kyle (NL). More information about accessing data from CHILDES can be obtained in the USA from Brian MacWhinney, Department of Psychology, Carnegie Mellon University, Pittsburgh, PA 15213, USA. In the UK there are two CHILDES centres: in the north the first author can be contacted (Dr Conti-Ramsden), whilst in the south Dr Martyn Barrett can be contacted at the Psychology Department, Royal Holloway and Bedford New College, University of London, Egham Hill, Egham, Surrey TW20 0EX1.

MLU was counted in words. 'Sound effects', e.g. 'beep beep', were counted as single words or one morpheme. Paralinguistic features, e.g. laughing or grunting, were not included. MLU was only counted for fully intelligible utterances.

For example:

*Turn of mother:	Did you†	did you see that?	MLU = 4 words
*Turn of child:	broken		MLU = 2 morphemes

* Tier pause.
† Pause.

Mean number of utterances per turn The number of utterances per turn for each speaker was calculated in order to measure the density of each speaker's turn.

Percentage of non-verbal turns Each non-verbal turn was identified by a '0' on the speaker tier. The occurrence of non-verbal turns was then assessed, and the percentage calculated.

Topic analysis

Topic analysis was a turn-by-turn analysis. Following Conti-Ramsden and Friel-Patti (1984), a topic refers to an utterance or a set of utterances, and/or a string of one or more behavioural acts related to a particular focus or set of concerns. The following categories were examined.

Topic maintenance (TM) This occurs when one of the controversial partners continues to engage him- or herself with the previous set of concerns at a verbal and/or non-verbal level. For example, if the topic 'farm' is the centre of attention, then the introduction of animals, fences, farm vehicles etc., in succeeding verbal and/or non-verbal behaviours, is considered as maintaining the topic.

Example:

* Turn of mother:	put all the chickens together now	
Action tier:	collects all the farm animals together	
* Turn of child:	chickens† together	
Action tier:	passes animals to mother	Coding: TM

* Tier pause.
† Pause.

Topic shifts (TS) This occurs when one of the conversational partners disengages him- or herself from the previous set of concerns at the verbal/non-verbal level. A typical example of a topic shift is when the general centre of attention is shifted from one set of toys to another, or when behaviour control occurs.

Example:

* Turn of mother:	where's the food? Put it in this dish for me	
Gesture tier:	points to food near child	
* Turn of child:	want hide† want hide	
Action tier:	stands up and goes to sofa	Coding: TS

Topic other (TOT) This occurs when a decision regarding a topic cannot be made in any one turn, as when, for example, one of the controversial partners takes a non-verbal turn out of the video camera's field of view, or utterances are only partially intelligible.

Conversational analysis

Conversations Following Conti-Ramsden and Friel-Patti (1987), a conversation was defined as two or more turns linked together by a particular focus on a particular topic. The length of conversations was calculated by counting the total number of turns between topic shifts when the number of turns exceeded two.

Chains of topic shifts A chain of topic shifts was defined as a minimum of two topic shifts occurring in *consecutive* turns. This analysis was carried out because it provides some indication of the dyad's ability to negotiate and establish topics and thus engage in conversations.

Initiation/response analysis

This was a turn-by-turn analysis. First, a decision was made as to whether a turn had the power to move forward a conversational exchange or was a response to the preceding turn. The initiation and response categories followed the general guidelines of Conti-Ramsden and Friel-Patti (1984).

Initiations (I) These refer to an utterance or set of utterances and/or string of one or more behavioural acts in which the conversational partner moves forward the conversational exchange by providing a turn which demands a response (for example, an interrogative or a directive) or a turn where a response is possible but not required (for example, a comment).

Examples

* Turn of mother:	I'll put that pig there. Shall I put them next to the cows?	Coding: I
Action tier:	places animals inside fencing	

Responses These refer to an utterance or set of utterances and/or a string of one or more behavioural acts in which the conversational partner responds to the preceding requestive or directive turn.

Examples

* Turn of mother:	Where are the pigs going?	Coding: I
Action tier:	continues trying to put fencing together	
* Turn of child:	outside	Coding: R
Action tier:	picks up pig	

Initiation/response

These were turns where the conversational partner both responded and initiated, so the turns were double-coded.

Examples

* Turn of mother:	can you put that in there with the cow?	Coding: I
Action tier:	gives cow to child	
* Turn of child:	yes† two cows	Coding: I/R
Action tier:	puts cows into fencing	

Reliability

In order to measure the reliability of the analysis, a second coder was appointed, who independently coded 30% of the transcriptions chosen at random. Intercoder reliability was calculated using the formula suggested by Sackett (1978):

$$\text{Percentage agreement} = \frac{\text{Agreements}}{\text{Agreements} + \text{Disagreements}} \times 100$$

The total percentage agreement for *all* the analyses was 89.32%. Table 2 presents a breakdown of the reliability measures by category.

Table 2: *Percentage agreement by category.*

Transcript	Topic analysis (%)	Conversational analysis (%)	Initiation/response analysis (%)	Total (%)
1	97.28	79.59	83.33	86.73
2	97.66	94.74	76.47	89.62
3	97.75	96.40	81.01	91.72
4	95.65	88.93	87.72	90.77
5	93.75	90.63	78.95	87.78
Total	96.42	90.06	81.50	89.32

Table 3: *Total number of turns.*

	Language-impaired dyad			Sibling dyad			Control dyad		
	Child	Mother	Total	Child	Mother	Total	Child	Mother	Total
Family 1	51	52	103	73	74	147	162	161	323
Family 2	127	128	255	100	101	201	75	76	151
Family 3	85	86	171	79	80	159	48	48	96
Family 4	127	124	251	99	100	199	78	79	157
Family 5	111	111	222	93	94	187	104	105	209
Mean no. of turns	100.4	100.0	200.4	88.8	89.8	178.6	93.8	93.8	187.2

RESULTS

Turns

All the turn information for the 15 dyads is presented in Table 3. For the SLI mother–child dyads, the mean number of total turns in 10 minutes of free play was 200.4, whilst for the NL sibling dyads the mean number of total turns was 178.6. The mean number for the control dyads was 187.2.

To examine consistencies within families, a Spearman's rank order correlation coefficient was applied to the number of turns shared by each dyad. A correlation was found in the amount of talk shared by dyads in the same family, i.e. mother–child amount of talk (total turns) was similar when mothers interacted with both their SLI children, and their NL children: $n = 5$, $\rho = 1.0$, $P < 0.01$. No such correlation was found when SLI mother–child dyads were

compared with the mother–control dyads: $n = 5$, $\rho = -0.4$, $P > 0.10$; nor when the mother–NL sibling dyads were compared with the control dyads: $n = 5$, $\rho = -0.4$, $P > 0.10$.

Similarly, a correlation was found in the amount of non-verbal interaction shared by dyads with the same family: $n = 5$, $\rho = 0.90$, $P < 0.05$. As shown in Table 4, the percentage of non-verbal turns used by dyads within the same family was consistent. No such correlation was found between the SLI mother–child dyads and the control dyads ($n = 5$, $\rho = 0.3$, $P > 0.10$) and between the mother–NL sibling dyads and the control dyads: $n = 5$, $\rho = 0.3$, $P > 0.10$.

Table 4: *Percentage of non-verbal turns.*

	Language-impaired dyads (%)	Sibling dyads (%)	Control dyads (%)
Family 1	0.97	0.68	1.55
Family 2	2.35	2.99	12.74
Family 3	11.70	7.55	16.67
Family 4	5.98	9.55	8.92
Family 5	18.92	13.90	7.45
Mean percentage of non-verbal turns	7.98	6.93	9.47

Table 5: *Total number of utterances/turn.*

	Language-impaired dyads			Sibling dyads			Control dyads		
	Child	Mother	Total	Child	Mother	Total	Child	Mother	Total
Family 1	1.78	2.46	4.24	1.33	2.59	3.92	1.08	1.88	2.96
Family 2	1.27	1.46	2.73	1.22	1.61	2.83	1.33	1.99	3.32
Family 3	1.22	1.98	3.20	1.07	2.78	3.85	1.09	3.08	4.17
Family 4	1.17	1.81	2.98	1.15	2.14	3.29	1.11	2.59	3.70
Family 5	1.06	2.32	3.38	1.24	2.52	3.76	1.30	1.65	2.95
Mean no. of utterances/turn:	1.30	2.01	3.31	1.20	2.33	3.53	1.18	2.24	3.42

Next, the density of turns was examined. Information on the mean number of utterances/turn is shown in Table 5. Spearman's rank order correlation analyses revealed no relationship either within families ($n = 5$, $\rho = 0.8$, $P > 0.01$) or across families ($n = 5$, $\rho = 0.2$, $P > 0.01$ for SLI versus control dyads and $n = 5$, $\rho = 0.2$, $P > 0.01$ for NL sibling versus control dyads). Mothers' possible differential use of utterances per turn was examined. A Wilcoxon matched-pairs signed-ranks test revealed that mothers used *more* utterances per turn when interacting with their NL offspring than when interacting with their SLI child: $n = 5$, $w = 0$, $P < 0.05$. For the remaining comparisons across families, Wilcoxon's tests for independent samples were applied, and yielded non-significant results: for the SLI and control comparison: $n_1 = 5$, $n_2 = 5$, $R_1 = 24$, $P > 0.10$; for the NL sibling and control comparison: $n_1 = 5$, $n_2 = 5$, $R_1 = 28.5$, $P > 0.10$.

Topic shifts

The question of familial consistencies in topic shifts was posed. It was found that the mean number of topic shifts was similar for the three sets of dyads: 17.80 for the SLI mother–child dyads, 17.00 for the NL sibling–mother dyads, and 16.00 for the mother–control dyads. Spearman's rank order correlation coefficient test was applied, and no significant values were obtained; for the SLI dyad and NL sibling dyad comparison: $n = 5$, $\rho = 0.3$, $P > 0.10$; for the SLI dyad and control comparison: $n = 5$, $\rho = -0.3$, $P > 0.10$; and for the NL sibling and control dyads comparison: $n = 5$, $\rho = 0.5$, $P > 0.10$. Similarly Wilcoxon's tests for dependent and independent samples revealed no differences in maternal topic introduction patterns. Mothers introduced as many topics with SLI children as they did with the NL siblings, and no differences were found with the control families.

Table 6: *Number of chains of topic shifts.*

	Language-impaired dyads	Sibling dyads	Control dyads
Family 1	1	0	5
Family 2	2	2	3
Family 3	4	5	7
Family 4	9	7	3
Family 5	0	1	1
Mean no. of chains of topic shifts	3.2	3.0	3.8

As there were no differences in the dyads' topic introduction patterns, it was not surprising that the length of their conversation was also similar, because a conversation was defined as two or more conversational turns focused on the same topic. The mean length of conversations was 34.25 for the SLI dyads, 20.26 for the NL sibling dyads, and 20.29 for the control dyads. No correlations were found across dyads. In addition, Wilxocon's tests revealed no differences in the length of either maternal- or child-initiated conversations across dyads. However, the pattern for establishing topics revealed interesting results. Table 6 presents the number of chains of topic shifts for each dyad. A Spearman's rank order correlation coefficient was used to study possible consistencies within families in the number of these negotiating episodes. Consistencies were found within families ($n = 5$, $\rho = 0.90$, $P < 0.05$), but not across families ($n = 5$, $\rho = 0.33$, $P > 0.10$, for the SLI and control comparison, and $n = 5$, $\rho = 0.03$, $P > 0.10$, for the NL sibling and control comparison).

Initiating

Data on the frequency of initiations for the 15 dyads are presented in Table 7, including only turns that were initiations (but no double-coded turns – I/R). The mean number of intitiations was 133.2 for the SLI dyads, 122.3 for the NL sibling dyads and 115.8 for the control dyads.

A Spearman's rank order correlation coefficient revealed consistencies within families: $n = 5$, $\rho = 1.00$, $P < 0.01$. In comparing the SLI dyads with the control dyads, there was no significant correlation: $n = 5$, $\rho = -0.4$, $P > 0.01$; likewise in comparing NL sibling and control dyads: $n = 5$, $\rho = -0.4$, $P > 0.01$.

Table 7: *Frequency of initiations.*

	Language-impaired dyads			Sibling dyads			Control dyads		
	Child	Mother	Total	Child	Mother	Total	Child	Mother	Total
Family 1	27	43	70	44	50	94	41	147	188
Family 2	61	122	183	50	96	146	29	65	94
Family 3	22	81	103	33	73	106	26	37	63
Family 4	66	115	181	46	90	136	35	60	95
Family 5	20	109	129	43	89	132	52	87	139
Mean no. of initiations	39.2	94.0	133.2	43.2	79.6	122.8	36.6	79.2	115.8

It was interesting to know which member of the dyad was responsible for these consistencies within families. Therefore, a Spearman's rank order correlation coefficient was applied to the two members of the dyad: the mother and the child.

In comparing the children, there were no significant correlations. In examining mothers, a consistent relationship was found between mothers' initiations with their SLI and NL children: $n = 5$, $\rho = 1.0$, $P < 0.01$. No such relationship was found when comparing either SLI and control mothers ($n = 5$, $\rho = 0.78$, $P > 0.10$) or NL sibling and control mothers ($n = 5$, $\rho = 0.78$, $P > 0.10$). Thus, for the impaired and sibling dyads it was the mother who appeared to be responsible for the consistencies within families.

The frequency of initiations for mothers and children was examined. Previous research has suggested that mothers of SLI children tend to initiate more whilst SLI children themselves initiate less. The present investigation did not corroborate these results. No differences were found between the different groups of children: $n = 5$, $w = 6.5$, $P > 0.10$ for the SLI–NL sibling comparison $n_1 = 5$, $n_2 = 5$, $R_1 = 26$, $P > 0.10$ for the SLL versus control comparison; and $n_1 = 5$, $n_2 = 5$, $R_1 = 33$, $P > 0.10$ for the NL sibling versus control comparison. Also no significant differences were found in the mothers' data: mothers did not use more initiations with their SLI children than with their NL offspring: $n = 5$, $w = 1$, $P > 0.05$ ($P = 0.0625$). The comparisons for mothers with children versus control mothers and mothers of NL children versus control mothers were also non-significant ($n_1 = 5$, $n_2 = 5$, $R_1 = 31$, $P > 0.10$ and $n_1 = 5$, $n_2 = 5$, $R_1 = 25$, $P > 0.10$ respectively).

Table 8: *Frequency of responses.*

	Language-impaired dyads			Sibling dyads			Control dyads		
	Child	Mother	Total	Child	Mother	Total	Child	Mother	Total
Family 1	15	3	18	25	11	36	117	3	120
Family 2	56	3	59	44	1	45	39	4	43
Family 3	59	2	61	43	2	45	21	0	21
Family 4	56	5	61	52	3	55	43	4	47
Family 5	91	1	92	49	5	54	45	9	54
Mean no. of responses	55.4	2.8	58.2	42.6	4.4	47.0	53.0	4.0	57.0

Responses

Data on the frequency of responses for the 15 dyads are presented in Table 8, including only turns that were responses (no double-coded turns – I/R). The mean number of total responses was 58.2 for the SLI dyads, 47.0 for the NL sibling dyads and 57.0 for the control dyads. A Spearman's rank order correlation coefficient was applied to the dyads, and no significant results were detected for any of the comparisons across the dyads: SLI dyad versus NL sibling dyads: $n = 5$, $\rho = 0.84$, $P > 0.10$; SLI versus control dyads: $n = 5$, ρ 0.17, $P > 0.10$; and sibling versus control dyads: $n = 5$, $\rho = -0.33$, $P > 0.10$.

Table 9: *Frequency of initiations/responses.*

	Language-impaired dyads			Sibling dyads			Control dyads		
	Child	Mother	Total	Child	Mother	Total	Child	Mother	Total
Family 1	9	6	15	4	13	17	4	11	15
Family 2	10	3	13	6	4	10	7	7	14
Family 3	4	3	7	3	5	8	1	11	12
Family 4	5	4	9	1	7	8	0	15	15
Family 5	0	1	1	1	0	1	7	9	16
Mean no. of initiations/ responses	5.6	3.4	9	3	5.8	8.8	3.8	10.6	14.4

Initiations/responses

Data on the frequency of double-function turns, which served as both initiations and responses are given in Table 9. The mean number of double-coded turns was 9.0 for the SLI dyads, 8.8 for the NL sibling dyads and 14.4 for the control dyads. A Spearman's rank order correlation coefficient revealed consistencies within families but not across families. A correlation was found in the number of total initiations/responses shared by the SLI dyads and the NL sibling dyads: $n = 5$, $\rho = 0.98$, $P < 0.05$. No such correlations were found for either the SLI versus control dyads ($n = 5$, $\rho = -0.28$, $P > 0.10$), or the NL sibling versus control dyads ($n = 5$, $\rho = -0.28$, $P > 0.10$).

It was interesting to examine which member of the dyad was responsible for these consistencies within families. Consequently, a Spearman's rank order correlation coefficient was applied to the two members of the dyad: the mother and the child. In comparing the children, there were no significant results. In examining the mothers, however, a consistent relationship was found in the families. Mothers were consistent in their use of double-function turns with their SLI and NL offspring: $n = 5$, $\rho = 0.98$, $P < 0.05$. No such relationships were found either for mothers of SLI children versus control mothers ($n = 5$, $\rho = 0.63$, $P > 0.10$) or between NL sibling mothers versus control mothers ($n = 5$, $\rho = 0.63$, $P > 0.10$).

It was important to ascertain whether a particular group of dyads used double-function turns more or less frequently. It was found that mothers, when interacting with their SLI children, used significantly *fewer* double-function turns than when interacting with their NL offspring ($n = 5$, $w = 0$, $P < 0.05$) and significantly fewer double-function turns than control mothers ($n_1 = 5$,

$n_2 = 5$, $R_1 = 15$, $P < 0.01$), but when interacting with their NL offspring they did not differ from control mothers ($n_1 = 5$, $n_2 = 5$, $R_1 = 19.5$, $P > 0.05$). No significant results were obtained for the comparison across children.

Individual differences

The examination of the data so far has considered the five experimental families as a group. It was important also to examine individual patterns of interaction, to see if there were differences in communicative style. To examine this question families 1 and 4 were selected for comparison. Table 10 presents a summary of the communicative style characteristics of both families, using composites of the information obtained for the mothers interacting with their SLI children and their NL offspring. The measures on each variable for mother–SLI child dyad and mother–NL sibling dyad were added and divided by two in order to obtain a mean for the two dyadic alignments with mother. In this analysis data from both the mothers and the children were used. As can be seen from Table 10, family number 1 was found to communicate with a lower number of total turns, a higher density of turns (utterances/turn), a lower percentage of non-verbal turns, a lower number of topic shifts, chains of topic shifts and initiations, but had longer conversations and a higher proportion of turns that functioned as both initiations and responses.

Table 10: *Summary composite data for families 1 and 4.*

	Family 1		Family 4	
	Data	**Comment**	**Data**	**Comment**
Total turns	125.00	Low	225.00	High
Utterances/turn	4.08	High	3.14	Low
Non-verbal turns (%)	0.83	Low	7.77	High
Topic shifts	8.00	Low	44.50	High
Chains of topic shifts	0.50	Low	8.00	High
Length of conversations	54.16	High	5.95	Low
Initiations	82.00	Low	158.50	High
Initiations/responses	16.00	High	8.50	Low

Note: all frequency data except where specified.

Family number 4, however, communicated with a higher number of total turns, a lower density of turns (utterances/turn), a higher percentage of non-verbal turns, topic shifts, and chains of topic shifts and initiations, but had shorter conversations and a lower proportion of turns that functioned as both initiations and responses. Interestingly, the three remaining families fell in between these two contrasting styles.

DISCUSSION

The results of the present investigation involve a small number of families and as such should be considered exploratory in nature. Nevertheless, a number of findings were significant and deserve further discussion. It was found that families have consistent styles of interaction which are not evident in studies

that use controls outside the family (e.g. Conti-Ramsden & Friel-Patti, 1983; Horsborough *et al.*, 1985). The existence of parental styles of interaction, in this case maternal styles, is supported. Mothers and their children of the same language stage, whether they are impaired or not, engage in communication that has consistent characteristics. These include the number of turns in a conversation, the percentage of non-verbal communicative turns that affect the course of the interaction, the chains of topic shifts engaged in by mother and child, the number of turns that initiate or move forward the interaction, and the number of turns that function both to give feedback and to initiate. If a dyad of mother with her younger offspring is talkative, it is very likely that the mother–SLI child dyad will be talkative also and use a large number of turns in conversation. This is in relative and not absolute terms: it appears that families set overall parameters for interaction with different members of the family which result in consistency but which do not preclude differences. For example, in the case of turns that functioned both as initiations and responses, a significant correlation was found between the overall number of double-function turns used by the SLI and NL dyads. Nonetheless, there were also significant differences among mothers' use of the double-function turns with their SLI children. Although as a dyad within a particular family both interactants had established a relationship that was consistent and related to interactions with other members of the family, a particular member of the dyad could still engage in differential treatment when interacting with other conversational partners.

Interestingly, there were no differences in the number of initiations/responses used by control mothers of NL offspring, strongly suggesting that the changes in maternal interaction with the SLI child are the result of specific characteristics of the impaired child affecting the mother. When consistencies within families are found, such as in this study, the question may arise as to who contributes to this state of affairs: mainly mother, or child, or both? In this study, five variables yielded consistent results within families. The first area involved conversational turns. This variable is dyadic in nature and represents the contribution of each member of the dyad towards interaction. The second variable, the use of purely non-verbal turns, emphasised those non-verbal behamiours that appeared to be affecting communication. Although non-verbal means of communication have often been associated with children (Bates, Camaioni & Volterra, 1975; McTear, 1985), it is suggested here that this may be something that is negotiated not only within the dyad but within the family. A family may be more or less ready to accept purely non-verbal means of communication from its children and thus set the limits within which interaction can take place. In this sense, we view the use of non-verbal behaviours not as residing within the child but as being part of interactional negotiation and development (Tiegerman & Siperstein, 1984; Cross *et al.*, 1985).

In the same vein, chains of topic shift involve clear negotiation between conversational partners. The child cannot be passive if a 'tug of war' involving consecutive shifts of topic is to occur. Interestingly, familial styles seem to exist in this respect and a family which has to undergo a great deal of negotiation to establish a topic with their SLI child will also be the family which has to undergo the greatest negotiation with their NL offspring.

We also found consistencies within families in turns used both as initiations and responses. Mothers appeared to be somewhat more responsible for the results, in that mothers' initiations and initiations/response were highly correlated across children but no such correlation existed if children's data were compared. The dyadic comparisons of mother–SLI child and mother–NL offspring *were* significant, however, suggesting that the children do have an effect, albeit somewhat smaller. Altogether the present results support the view that familial styles of interaction develop after mutual regulation. The adult may play a more active part on particular aspects of the interaction at particular stages in development but the child appears to always have a role to play.

One set of results needs to be examined further. There has been a large body of literature which suggests that mothers of SLI children may use more initiations or controlling moves than mothers of NL children (see Cross, 1984; Conti-Ramsden, 1985, for reviews). These results were not replicated in this study as the data failed to reach significance ($P = 0.0625$). But given the small number of subjects used in this study, caution needs to be exercised in interpreting the results as conflicting, because the trend was predicted in the right direction, although the result did not reach statistical significance. A larger number of subjects may have yielded significant results in accordance with the literature.

There are also certain aspects of communicative interaction that appear not to be consistent within families but that may be related to other factors. In this study no consistencies were found in the density of turns used by the dyads, the number of topic shifts, the length of their conversations, and the number of responses used in conversation. Much like Cross and her colleagues (Cross, 1981; Cross *et al.*, 1985), we found mothers of SLI children used fewer utterances per turn than mothers of control children of the same language state. Furthermore, this study expanded these results by finding *within*-family differences, in that mothers used fewer utterances per turn with their SLI children than with their NL offspring of the same language stage. These findings thus corroborate the suggestion that it is the language-impaired child's special influence that brings about *certain* changes in maternal speech. For example, shorter or less dense turns may allow a child with poor attention to get the message quickly and efficiently (Conti-Ramsden & Friel-Patti, 1984), or the intelligibility of the child may affect the ability of mother to recast which in turn may reduce the density of her dialogue contributions (Conti-Ramsden, 1990).

In recent years we have moved away from identifying commonalities in language development and disorders to considering the wide diversity of individual differences present in language learning and language impairment (Lieven, 1980; Tiegerman & Siperstein, 1984; Goldfield & Snow, 1985). The present investigation attempted to explore differences in interaction styles among families. Even in a small-scale study such as this ($n = 5$), two contrasting styles were identified. Family number 1 was a somewhat reticent family (average number of turns across dyads = 125) who nevertheless used more utterances per turn than any other family. Their use of non-verbal information as part of dialogue was very limited. Their topic shifts were few and easily established (virtually no chains of topic shifts) which allowed them to engage in

lengthy interactions on a particular topic. The frequency of initiations used was low and a high proportion of turns functioned both as initiations and responses. Family number 4, on the other hand, showed an opposite pattern. This family was somewhat talkative (average number of turns across dyads = 225) but nevertheless used a smaller number of utterances per turn than four out of the five dyads. Their use of non-verbal information to engage in dialogue was high (almost 8% of the time). This family engaged in frequent topic changes, which were not easily established, and had a larger number of chains of topic shifts than any other family. This resulted in very short conversations of an average of approximately six turns in length. The frequency of initiations used was high and a low proportion of turns functioned both as initiations and reponses.

The above discussion concerns clinicians and researchers alike because it points to the grave problem involved in generalising from significant group results to individual families. There is no doubt that more research is needed on individual differences to find if certain characteristics of communicative interaction persist in a particular speaker, for example, are some people more frequent initiators, more frequent topic shifters and less often givers of feedback? Does a change in a specific aspect of interaction, for example, initiation patterns, have direct effects on other aspects of interaction for a particular dyad? How can we foster change in individual styles of interactions? Answers to these questions may go some way towards a deeper understanding of the role of individual differences in interaction.

Finally, the design of the present study has important implications for future research methodology. This investigation examined SLI and NL children from the *same* family, thus partially controlling for the language environment. This afforded the possibility of teasing out the relative contributions of the mother and the child in the interaction process. At the same time, it should be noted that the strong reciprocity and bidirectionality of influence in parent–child interaction makes controlling completely for the language environment extremely difficult. Nonetheless, the current methodology offers distinct advantages over traditional designs in which SLI children are matched with NL children from different families.

ACKNOWLEDGEMENTS

Portions of this work were presented by Jane Dykins in the form of a thesis for the degree of MPhil at Manchester University. In addition, parts of this work were presented at the second meeting of The European Group on Language Disorders, Røros, Norway, March 1990. This work was supported by an ESCR linked-studentship and a Manchester University Research Support Grant to Dr Conti-Ramsden. Video analysis was possible thanks to an equipment grant from the College of Speech and Language Therapists to the first author.

REFERENCES

BATES, E., CAMAIONI, L. & VOLTERRA, V. (1975). The acquisition of performances prior to speech. In E. Ochs and B. Schieffelin (Eds), *Developmental Pragmatics*. New York: Academic Press.

BISHOP, D. V. M. (1982). *The Test of Reception of Grammar*. Medical Research Council. Copies available from: Dr D. Bishop, Psychology Department, University of Manchester, Manchester M13 9PL, UK.

BRICE HEATH, S. (1983). *Ways with Words*. Cambridge: Cambridge University Press.

BROWN, R. (1973). *A First Language*. Cambridge, MA: Harvard University Press.

CONTI-RAMSDEN, G. (1985). Mothers in dialogue with language-impaired children. *Topics in Language Disorders* **5**, 58–68.

CONTI-RAMSDEN, G. (1990). Maternal recasts, and other contingent replies to language-impaired children. *Journal of Speech and Hearing Disorders* **55**, 262–274.

CONTI-RAMSDEN, G. & FRIEL-PATTI, S. (1983). Mothers' discourse adjustments to language-impaired and non-language impaired children. *Journal of Speech and Hearing Disorders* **48**, 360–367.

CONTI-RAMSDEN, G. & FRIEL-PATTI, S. (1984). Mother–child dialogues: A comparison of normal and language-impaired children. *Journal of Communication Disorders* **17**, 19–35.

CONTI-RAMSDEN, G. & FRIEL-PATTI, S. (1987). Situational variability in mother–child conversations. In K. E. Nelson and A. von Kleeck (Eds), *Children's Language*, vol. 6. Hillsdale, NJ: Lawrence Erlbaum.

CROSS, T. G. (1981). The linguistic experience of slow learners. In A. R. Nesdale, C. Pratt, R. Grieve, J. Field, D. Illingworth & J. Hogben (Eds), *Advances in Child Development: Theory and Research*, pp. 110–121. Proceedings of the First National Conference on Child Development, University of Western Australia, Nedlands, Australia.

CROSS, T. G. (1984). Habilitating the language-impaired child: Ideas from studies of parent–child interaction. *Topics in Language Disorders* **4**, 1–14.

CROSS, T. G., NIENHUYS, T. G. & KIRKMAN, M. (1985). Parent–child interaction with receptively disabled children: Some determinants of maternal speech style. In K. Nelson (Ed.), *Children's Language*, Vol 5, pp. 247–289. New York: Gardner Press.

DUNN, L. M., DUNN, L. M., WHETTON, C. & PINTILLIE, D. (1982). *The British Picture Vocabulary Scale*. Windsor: NFER-Nelson.

GOLDFIELD, B. A. & SNOW, C. E. (1985). Individual differences in language acquisition. In J. Berko Gleason (Ed.), *The Development of Language*. London: Charles Merrill.

HORSBOROUGH, K., CROSS, T. & BALL, J. (1985). Conversational interaction between mothers and their autistic, dysphasic and normal children. In T. G. Cross & L. M. Riach (Eds), *Issues and Research in Child Development*, pp. 470–476. Proceedings of the Second National Child Development Conference, The Institute of Early Childhood Development, Melbourne College of Advanced Education, Victoria, Australia.

KAYE, K. & CHARNEY, R. (1981). Conversational asymmetry between mothers and children. *Journal of Child Language* **8**, 35–49.

LEITER, R. G. (1969). *The Leiter International Performance Scale*. Chicago: Stoeting & Co.

LIEVEN, E. V. H. (1980). Different routes to multiple-word combinations. *Papers and Reports on Child Language Developments* **19**, 34–44.

MCTEAR, M. F. (1985). *Children's Conversation*. Oxford: Basil Blackwell.

MACWHINNEY, B. & SNOW, C. E. (1985). The child language data exchange system. *Journal of Child Language* **12**, 271–295.

MILLER, J. F. (1981). *Assessing Language Production in Children*. Baltimore: Baltimore University Park Press.

NELSON, K. E., BONVILLIAN, J. D., DENNINGER, M. S., KAPLAN, B. J. & BAKER, N. D. (1984). Maternal input adjustments and non-adjustments as related to children's linguistic advances and to language acquisition theories. In A. D. Pellegrini & T. D. Yawki (Eds), *The Development of Oral and Written Language in Social Contexts*. New Jersey: Ablex.

OCHS, E. (1982). Talking to children in Western Samoa. *Language in Society* **11**, 77–104.

SACKETT, C. P. (1978). *Observing Behaviour*, vol 2. Baltimore: University Press.

SCHIEFFELIN, B. B. (1979). Getting it together: An ethnographic approach to the study of the development of communicative competence. In E. Ochs & B. B. Schieffelin (Eds), *Developmental Pragmatics*. New York: Academic Press.

SNOW, C. E. (1989). Understanding social interaction and language acquisition; sentences are not enough. In M. H. Bornstein & J. S. Bruner (Eds), *Interaction in Human Development*, pp. 83–103. Hillsdale, NJ: Lawrence Erlbaum.

SNOW, C. E., PERLMAN, R. & NATHAN, D. (1987). Why routines are different: Toward a multiple factors model of relation between input and language acquisition. In K. Nelson & A. van Kleeck (Eds), *Children's Language*, Vol 6. Hillsdale, NJ: Lawrence Erlbaum.

TIEGERMAN, E. & SIPERSTEIN, M. (1984). Individual patterns of interaction in the mother-child dyad: implications for parent-intervention. *Topics in Language Disorders* **4**, 50–61.

ZIMMERMAN, I., STEINER, V. & POND, R. E. (1969). *Preschool Language Scale*. Colombus, OH: Charles E. Merrill.

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Received April 1990; revised version accepted March 1991.