Sign Questions in School

Project Report to ESRC

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Outline:

Following a detailed analysis of the complex database collected in previous research projects funded by ESRC, and using data collected as part of this project, we can begin to examine issues concerning current theories on the formation and development of questions. Put very simply, deaf children in acquiring sign language at the usual ages for language acquisition, appear not to use a consistent interrogative form to signify questions. The question is signalled by a pragmatic indicator which is generally of the form of a terminal "hold" at the end of a signed sequence accompanied by gaze to the addressee. Previously noted adult question forms such as knitted eyebrows or raised eyebrows appear not to be functional in the acquisition of sign. The use of "wh" sign forms is also limited in extent, at least up to the age of 4 years.

In the light of a parallel study of deaf children's language level in school(Kyle, 1990) it seemed appropriate to collect data on a larger sample of schoolchildren from 4 years to 11 years. This was designed to describe more clearly the developmental pattern. The previous research had indicated problems in deaf children's acquisition of BSL and a general delay in both receptive an productive skills in sign. Question use is an important aspect of school development and is vital in the context of classroom interaction. Deaf children need to have a available a wide range of question forms to meet their learning needs.

Four schools took part and 44 children were tested. Although all the children were in signing programmes, the most significant finding was of the wide variability of the children's sign competence linked to the great range of language experience which they had. Question forms seem poorly developed and there are few age-determined significant effects. Questions formed by these deaf children, predominantly from hearing homes, use global markers for questions - pointing and head movements, rather than adult non-manual markers, such as eyes and brows. Imitation tasks produced inconsistent results implying that question development was relatively incomplete.

The major concern is that deaf children, even in signing programmes, still do not have sufficient language resources for the complex learning tasks which they will experience in school.

General Background

Although sign language seems to have a relatively recent history in our perception, sign language acquisition has been a feature of the development of most deaf children born in deaf families, for the last few hundred years. But this group are only a small minority of all those deaf children in our education system ie 5%. Over 90% are born into families with no other deaf members. In the past, deafness was treated as an aberration and the families and especially the children, were given no credit for their first language development. Children communicating fluently with their parents outside the school gates were effectively handicapped the moment they entered as no teachers could sign or understand the language of these young deaf children. The last 15 years have seen a rapid development in our knowledge about sign language both in Britain and abroad. Research findings on the richness of sign language and the complexity of its structure have persuaded educators and parents to implement change. This change increasingly allows for the emerging bilingualism of the child, even though the starting point of the school has been a form of English-related sign. The result is that deaf children are now entering a school where they are encouraged to sign to each other and to teachers. Parents are encouraged to learn to sign although facilities to teach the language to either parents or teachers, remain rather rudimentary.

Such a situation poses important questions: how feasible is it for deaf children to learn a language at a relatively late stage - most children enter school at the age of 4 or 5 years - when they will have had little contact with adult models of the language prior to this stage? Can we expect the same stages of development in the language, but simply displaced by a few years? What influences will the language of their parents and teachers have on the children, now encouraged to use sign? Such questions can be the focus of a much longer study of bilingual development. However, as a result of recent research work funded by ESRC, we have collected a database of deaf children's sign acquisition which can provide the beginning of an answer to some of these questions.

In Britain, signing in schools is a relatively new idea. There is as yet no nationally agreed plan or methodology although most programmes use some form of sign which is greatly influenced by English. In most programmes, teachers sign and speak at the same time. Our problem is simple - we cannot estimate the effectiveness of the programmes because we have no method of assessing sign or BSL performance. In addition, we have not fully understood the complexities of the interaction between the language and the modality which the majority of deaf children have to face in constructing their language of communication.

In bilingual theory, the solution for deaf children is simple: we should provide them with a language as early as possible such that they can grow cognitively and can acquire information through communication. From there, it is a small step to a second language(English) and to learning to read and write. In practice, the situation is much more complex.

Early Language Development in Sign

A primary focus for our research work has been to try to understand the natural language development of deaf children. This occurs in families where the parents are deaf and use sign. The child is surrounded by skilled users who provide the necessary linguistic data. There have been many studies of this group of deaf children with deaf parents(DCDP) - Volterra(1986), Petitto(1989), Erting and Prezioso(1990) and Kyle, Woll and Ackerman(1988, 1990). Although there can be seen to be major differences in the early interaction and in the way in which sign is exploited by parents(Ackerman and Woll, 1990) the outcome is very similar to that of hearing children learning to speak - ie fluency and mastery of significant grammatical structures by the age of 5 years(O'Grady et al, 1990, Ackerman et al, 1990). Sign language can be learned effectively in the right environment. Such children(DCDP) would be expected to be linguistically advanced and this seems to be the case even in English(Conrad, 1979). However, there is a snag: DCDP are the minority - deaf children with hearing parents(DCHP) constitute 95% of the deaf school population. This has, in the past, led educators to a rejection of the principle of deaf people as instructors or as role models.

Hoiting and Loncke(1990) suggest that the linguistic account of language development while positive, is essentially a descriptive one. What is required by educators is a normative model(which has usually highlighted the problems the deaf children face). Deaf children are then thought to learn language primarily in school(unlike hearing children who learn prior to school). Therefore, deaf children must be exposed to a regular planned curriculum within a single methodology. Such a view is dogmatic and essentially wrong since deaf children are typically, *atypical* in their acquisition of language.

Kyle(1987) presents an international collection of works on bilingualism in deaf education. This spans the linguistic description (Caselli, 1987) and the educational and methodological(Evans, 1987). In certain respects it represents a rather simplistic view that what is required is new methodology implemented by teachers in a systematic way - in this case a reflection of a widespread move towards sign in school. This is happening in Britain today. Bilingualism has become the most important topic for educators but the comparison to spoken language bilingualism is only fully relevant for DCDP and not for the majority. This is not to say that

bilingualism cannot flourish but rather to imply that the model used at present is insufficient to create a meaningful change.

Hoiting and Loncke(1990) claim that models of language (in deaf education) so far have failed to take into account at least two of the following points:

a) deaf children are exposed to 2 languages;
b) there are two major modalities activated in language acquisition;
c) deaf children's experience of language is typically atypical.
d) the languages and modalities have to be organised cognitively in an (as yet) unspecified relationship.

Our task in this research is to begin to specify this relationship by highlighting particular aspects of development. In this case it will be the use of questions.

Deaf children are prime exemplars of rare event learning (Nelson, 1989). Whether in oral or sign programmes, deaf children have to construct their language from ill-perceived messages in a mixture of modalities and from peers and adults who are incomplete and immature models. What has occurred in the past in an oral system was that deaf children learned spoken language imperfectly in a structured/semi-structured oral dominated environment (Conrad, 1979). At the same time they mastered to a questionable degree (Siple, 1985), sign language in the community of deaf peers(ie without adult models).

Our current solution seems to be to create a teacher-controlled imperfect sign environment which does not adequately account for the expected relation with spoken language and which vaguely assumes that some form of mapping across languages and modalities can be effective by the use of simultaneous communication (SimCom - sign and speech at the same time). Wickham and Kyle(1987) have highlighted the confusion here in a study of teachers comments on children's signing. There is no adequate description of what is being attempted by SimCom or Total Communication(because there has been no attempt to work out how the languages might relate to each other. As Hoiting and Loncke(1990) point out, children have to separate language and modality, *as modality alone is not a determiner of the language being used.* Additionally, the mixture of codes and the multiplicity of codes that form this problem mean that the child has to separate *language distinct information* and *language connecting information.*

To put this simply: in a sentence (using teacher's signed English) such as THE BOY THROWS THE BALL, the child has to be able to realise that the order of elements is essentially English, that the sign THE is

distinctly English(being artificially created), that the sign BOY and the word, boy are language connecting(ie directly translatable) while the signs THROW and BALL (although English-like in root form) carry BSL modulation information which indicates for BALL, the size, shape and texture of the ball and for THROW, the direction, distance, speed of the throw. The task for the child is consistently more difficult than for any other bilingual setting.

Not surprisingly, DCHP of school age do not appear to master the morphosyntactic elements of sign language (Loncke et al, 1990, Kyle et al, 1990, Knoors, 1994). These studies consistently indicate that while incorporation and localisation may be acquired, DCHP have greater difficulty with key features such as directionality and sign order. Potential strategies to overcome this, such as the use of pantomime and English-oriented signing are not used. DCHP strive to use the sign grammar features but do so imperfectly. The spatial underpinning of sign is a major problem.

English Competence:

Deaf children have major problems in the acquisition of spoken and written language. There has been little advance on the normative studies of Conrad(1979) and Wolk and Allen(1984) which suggest average reading ages for profoundly deaf school-leavers of no more than 9 years of age. Yet other researchers have challenged the notion that this is a plateau. Wood et al(1986) maintain that incorrect assumptions have been made about the responses to reading tests and that these greatly under-estimate the extent of processing of which deaf children are capable. Ewoldt(1981) has suggested that deaf children can use higher level strategies and Banks et al(1990)   have looked for evidence of metalinguistic strategies. By looking at paragraph meaning rather then sentence or word substitution tasks deaf children can be seen to continue to improve beyond the levels previously assumed. Yet none of these studies has attempted to understand the relationships of the languages and codes to which the children are being exposed. Although these relations are complex, we can expect no real progress until we begin to understand them.

O'Grady, van Hoek and Bellugi(1990) have examined writing, spelling and sign(though unfortunately only with DCDP) and in doing so bring to the fore what has been a crucially ignored variable since the last century - fingerspelling. There have been studies of the acquisition of fingerspelling in the USA (Akamatsu,1985) but nothing in Britain until very recently (Sutton-Spence, 1994) and certainly no consideration of it in schools. *Fingerspelling is <u>the</u> precise mapping system for English* and would be most comparable to reading and writing. The envelope patterns which have been described for ASL are likely to exist in BSL (though differently, because British fingerspelling is two-handed).

In summary, it has become apparent that methodology in the education of the deaf has been given prominence without any adequate examination of the relationships in the languages which are being incorporated. The priority of the proposed study is to indicate the relative progress in sign in the domain of questions as a vital aspect of educational interaction.

Analysis so far:

A database of 13 children in deaf families and 7 deaf children in hearing families has been built up over the last few years. This constitutes over 500 hours of sign data collected in the homes of the deaf children.

Follow-up recordings of the original sample now aged between 5 and 8 years, has been completed and analysis of the question forms has been done. Some of the results are presented in the ESRC Report for the related Project: *Finding Out: deaf children learning to ask questions in BSL* (1994).

Pilot work was carried out on elicitation tasks and a number of tasks have been prepared appropriate for the age range 4-11 years. The question forms used by deaf children are considerably less obvious than expected and as a result more subtle measures were needed. The purpose of this study is to examine the levels of question use by deaf children in infant and junior schools.

Relevant Data

It was claimed in the past, on the basis of adult data in BSL and other sign languages, that the grammatical marking of yes/no questions were accomplished by raised eyebrows with chin, head and shoulders brought forward for the duration of the question, while wh-questions had eyebrows knitted and shoulders hunched throughout. In our analysis we proposed that wh- and content questions might be mastered earlier in sign than in speech as they do not involve any word/sign inversions nor the use of an auxiliary verb. However, we anticipated that questions form an area in which non-manual pragmatic/ emotional marking (eg puzzlement) may intersect with semantic marking and therefore provide insights on the relation between pre-linguistic and linguistic development.

As will be seen this latter prediction seems to be borne out, but those first proposed are not adequate explanations of the data in dcdp's early questions.

However, a parallel study completed in late 1990 by our research group cast some doubt on the levels of development of deaf children in sign when they had been introduced to it in school rather than at home. In a study of

4 school districts and 77 deaf children aged between 4 and 11 years, we found evidence of growth in sign competence with age but competence which seemed to level out before complete mastery. Deaf children even up to the age of 10 years were not able to perform reliably in test items which dealt with the spatial grammar of sign language and produced very low values when mean length of utterance was examined in picture description and simple question-answer sessions.

What this shows is that deaf children's development in sign is not as advanced as that of hearing children in speech. Such a finding is not particularly surprising in that one might predict that lack of contact with good models of the language weakens the child's acquisition process. But it does indicate that question development may also be delayed.

We have coded all the exemplars from our recordings of deaf children at home (see ESRC project report: *Finding Out*) . These questions are taken from both the parents' and the child's utterances. What we have found is that mothers tend not to use facial expression to mark question in the way that they would as adults. This might be explained as not wishing to upset the child by having an aggressive and negative facial expression (ie knit eyebrows for yes/no questions). In many questions in the data, however, mothers know the answer and they are rarely true content questions. Occasionally, there are situations where the mother needs information and the question form "what's the matter?" is used. Here the question is marked by expression different from that in an adult form. The eyebrows are raised rather than knitted.

This highlights what appears to be a general rule in the mother's questions. Wh-questions may be accompanied by a look of puzzlement, and yes/no questions may be accompanied by an "interested"/ surprised facial expression. Reilly et al (1991) have claimed that mothers tend to avoid wh-questions altogether as they may draw with them this negative expression. However, we can see in our data that facial expression is separate from question syntax. It seems that for young children (and for their mothers interacting with them) there is no syntactic characteristic for the interrogative.

In discovering this we had to begin to look elsewhere to ascertain why an utterance is treated as a question. It appears that the only distinguishing feature is the existence of a final hold. This may begin as a turn-taking device in early interaction but it can also be seen in adulthood as part of the question structure. It is this feature which seems to distinguish questions in children and is the feature most used by mothers in dealing with their young children.

Some Illustrations

In the elicited data for the follow-up part of the project we can see clear examples of this question formation.

I   Simple Questions: This eight year-old deaf child wishes to ask if it is her turn.

```
Gaze ------- Interviewer
Eyes ------- Wide
Mouth ------- 0
Head ------- Back
Sign ------- ME
 Hold ------- H
Meaning ------- is it my turn now?
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In this question there is only a single sign which may have its origins in simple turn-taking routines, but it becomes a question here because of the extended holding of the sign and by the continued gaze towards the addressee.

II WH-Questions: Here there are standard patterns in evidence with a possible conflict between an underlying English order of Wh-word followed by verb and the BSL order of verb followed by Wh-sign. In the first example, the English order seems to predominate and in the second, the bracketed construction appears combining both orders.

```
Gaze ------- Interviewer
Eyes ------- Neutral
Mouth ------- where you go
Head ------- forward
Sign ------- WHERE GO
 Hold -------               H
Meaning ------- where did you go?
Gaze ------- Interviewer
Eyes ------- Wide
Mouth ------- where go where
Head ------- 0                               Side
Sign ------- WHERE GO WHERE
Hold -------       H                         H
Meaning ------- where did you go?
```

III   Yes/No questions: In this situation in English, inversion or intonation is used in order to create the question. We had believed this would be expressed in sign by the facial grammar but this does not appear to be the case.

```
Gaze ------- Interviewer
Eyes ------- Wide
Mouth ------- it nice
Head ------- Side then Back
Sign ------- IT(point) NICE
Hold -------               H
Meaning ------- was it nice?
```

Again the distinguishing feature is the gaze to addressee accompanied by the hold on the last sign. This extends to more complicated questions.

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 Gaze ------- Interviewer
Eyes ------- Wide lowered wide
Mouth ------- have wife go Holland with
Head ------- side then neutral
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Sign ------- YOU HAVE WIFE[1] GO HOLLAND WITH
Hold -------   H
Meaning -------did your husband go to Holland with you

In the adult form this would be accompanied by a head movement forward and a slight knitting of the eyebrows. The common pattern is established in the question indicator being present in the pragmatic marker of turn-taking where the final hold signals a request for information from the addressee.

It is therefore, not clear as to when the other sign structures develop and this makes it necessary to take a broader perspective on developmental age.

The Study

Sampling

Data was collected in four locations in England(Bristol, Brighton, Birmingham, and London). These are programmes or schools where there is an established bilingual or Total Communication programme in place. In each case the child was in the signing programme for some time and was considered to be a "signing child" by their teachers. A total of 44 deaf children were recorded to give representatives in each age group from 6 years to 11 years.

The primary aim was to examine competence in the use of BSL questions. In order to achieve this, questions were elicited from the children using the techniques mentioned above. All the schools were using sign as part of their teaching approach. Teachers were expected to be able to teach in sign though we were unable to take any measure of sign competence. All four schools had deaf staff as well as hearing teachers.
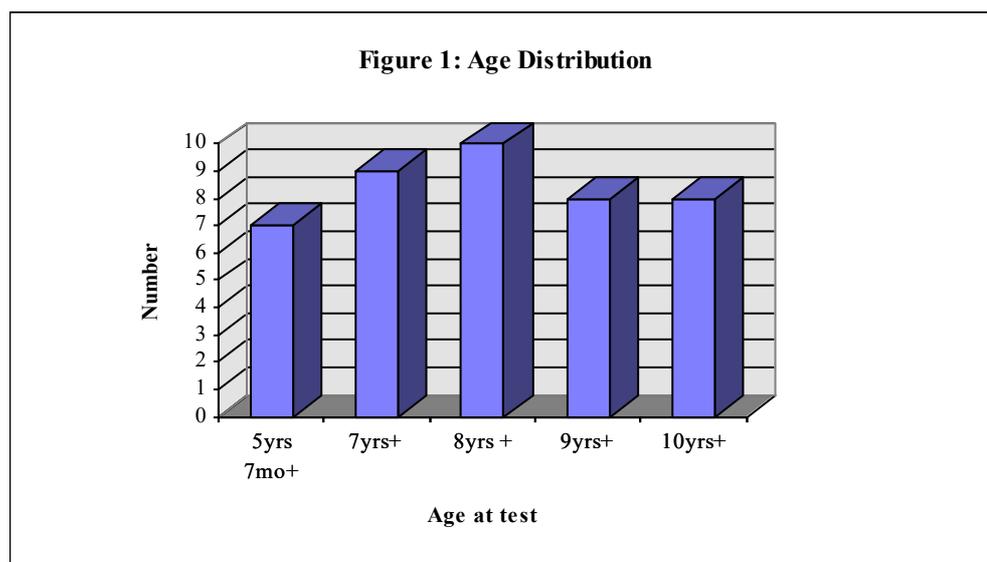
The Children

Access was requested to ten children in each school with a view to covering the full age range from 6 years to 10 years. No stipulation was made about the child's sign competence or intellectual ability but choices within the school were of children in the mid to upper levels of ability. There was an uneven distribution of gender (36% were female) and 9% (4 children) were from deaf families[1]. Average age was 8 yrs 6 months with

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[1] Here the child signs WIFE when she means HUSBAND (as the addressee is female). The signs are distinguished primarily by the lip-pattern attached.

[1] It is appropriate to mention that in the UK, this does not automatically mean that the child is exposed to BSL from an early age. There are many confusions

no significant difference in the distribution of boys and girls. The distribution is shown in Figure 1. Of the audiograms provided for the children, 75% had better ear averages of over 90dB, with a mean value of 100.3dB (SD 12.68) ie they were profoundly deaf.

Length of experience of signing *in the school* varied with a mean of 39.8 months(SD 24.05) which implies an average starting age of 5yrs 1 month (SD 20.32). This is a rather late age to begin using a language though it is possible that the children had experience of sign prior to school.

Figure 1: Age Distribution

Teachers were asked about pupil's sign at home (Figure 2) and to make judgements about how understandable the child's signing was (Figure 3) and about the child's general sign competence (Figure 4). For language use, the results indicate a rather mixed language environment and confirm the unusual nature of the children's learning. These ratings are somewhat problematic as they cannot be considered an absolute scaling. That is, it is difficult to compare those children rated most understandable by teachers at the age of 10 years with those rated most understandable at age 6 years. Correlations with our vocabulary measures do not hold.

concerning the importance of early sign, amongst deaf parents and this can lead to the withholding of sign contact even when family and friends are deaf.

Figure 2: Do parents use sign at home?
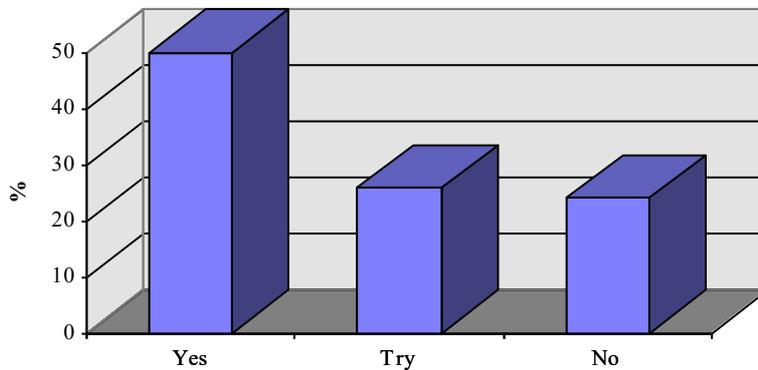
Fifty percent of parents were thought to use sign at home with the child and a further 26% were considered to make an effort. These are probably over-estimates of the language modelling encountered by the child. Since there are no measures of the parents' sign performance, there is no way of establishing the reality of the claims. Nevertheless, we can see that around a quarter of the children do not experience sign at home.

Figure 3: How understandable is pupil's signing?
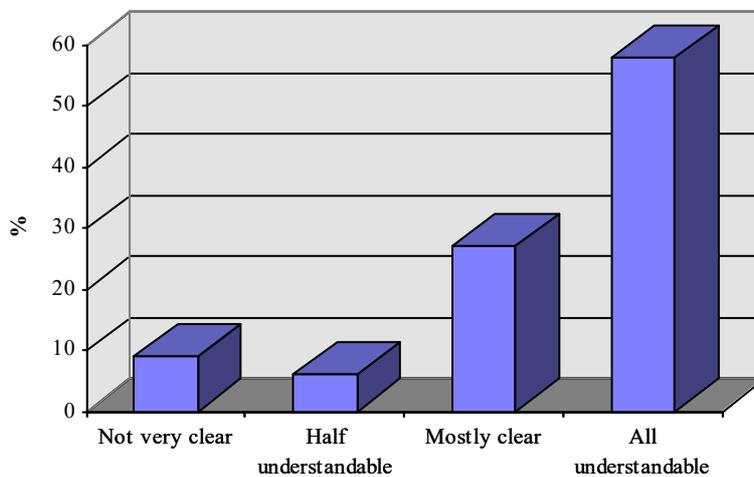
When asked to make the judgement about how understandable the pupil's signing was the teachers tended to believe that the signing was clear (Figure 3). However, one in six were thought to have signing which was not clear or which was only half understandable. Again this may over-estimate the competence and may be because of the constraints of the classroom interaction.

When asked about the extent of the signing, less than half of the pupils were rated as having fluent sign (Figure 4). This question is different from the previous one and it indicates linguistic competence rather than communicative competence. Not surprisingly, pupils are rated higher in the latter (Figure 3) than in the former (Figure 4). Perhaps significantly, nearly one in five were considered to have a mixture of sign and gesture which was not very clear. This accords with our subjective views on the children. These results are in marked contrast to what would be found for hearing children in speech.

In terms of onset of deafness, 68% were thought to have been born deaf and a further 15% before the age of 2 years. Fifteen percent wore glasses.

Figure 4: How would you describe pupil's signing to the teacher?
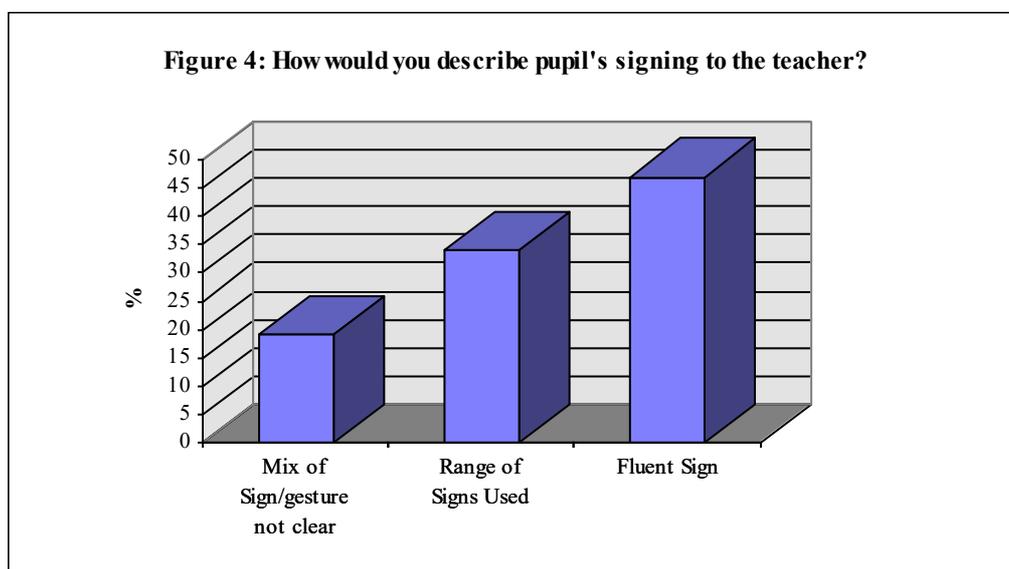
The Measures

Two principal techniques for elicitation were used together with a direct test of imitation of signed questions from videotape. A measure of receptive and of productive sign vocabulary was also used - this is a measure which has been used in a previous study (Kyle, 1990).

(A) *Reverse Interview*: Following a set of relaxed interview questions from the deaf researcher, (your name, your family, your pets, favourite subjects and so on), the child was asked to become the questioner. This was helped by the use of a clipboard which was now handed to the child to pretend to be the interviewer. We have recorded so far the number of questions which the child produced, the length(number of signs), and the extent to which the eyes, brows and head were involved in the question. These are the key non-manual markers of an adult form of BSL question.

(B) *Ask the Panda*: A second technique was for the researcher to bring out a panda who sat on her lap and was to be asked questions by the child. This had proved effective in the past and no problems were raised that it was the researcher who answered the questions. The same measures as in (A) were taken.

(C) *Imitation of Questions* - Copying: A prepared videotape had 24 questions and 8 statements, which the child had to copy exactly. Question length varied from a single sign to seven-sign utterances. Responses of the child were videorecorded and coded for accuracy of the manual and non-manual elements.

(D) The vocabulary test consists of an English Picture Vocabulary -like test which has been developed specifically for sign and is in experimental use in Bristol. *Receptive vocabulary* is measured by the number of pictures which the child correctly identifies and *productive vocabulary* by the number of pictures for which the child can produce a correct sign. More details of the construction of this measure are provided in Kyle(1990).

Results

Results

It is fair to warn that we are still working in an area of measurement which is completely new and there are still many rough edges and inaccuracies in the data and in the techniques themselves.

In this section results will be reported according to chronological age of the child. This may seem usual but in hearing children one can assume relatively similar patterns of exposure to the (spoken) language over the period of the child's development; in deaf children, this may not be the case. Four groups of year ages were constructed and the figures which follow represent the data consistently in this way.

Table 1: Age related mean values for principal measures

	- 7 yrs 5 mo	- 8yrs 4 mo	- 9yrs 6 mo	- 11 yrs 4 mo
Number	12	10	10	12
Mean Age	6yrs 8mo (7.78[2])	8 yrs (2.04)	9yrs 1mo (4.34)	10yrs 4mo (6.11)

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[2] Standard deviation in brackets.

Hearing Loss	102.7(7.55)	95.4(16.61)	106(11.33)	97.9(12.08)
Copy Question	3.2(2.75)	3.9(3.25)	7.2(7.03)	7.2(4.19)
Copy Face Expression	1.3(2.17)	1.4(1.33)	3.2(3.29)	1.5(1.36)
Panda	10.4(9.19)	7.3(5.27)	12.1(9.55)	16.4(10.97)
Interview	5.9(8.56)	8.8(6.68)	9.3(6.60)	17.8(12.02)
Receptive Vocabulary	24.1(19.95)	29.6(12.62)	34.6(13.90)	23.4(9.52)
Expressive Vocabulary	15.7(5.74)	19.5(4.83)	22.4(5.38)	21.9(7.17)

Although there seems to be a trend in the data to reflect age, the effects are not strong (Table 2). Receptive vocabulary is not determined by age as it would be for hearing children although there were significant results in the past (Kyle, 1990). Otherwise the effects are weak or just non-significant.

Table 2: Analysis of Variance by Age

2.1: Copy Questions

ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	147.541	3	49.1805	2.36627	0.08611	2.85174
Within Groups	789.792	38	20.784			
Total	937.333	41				

2.2: Copy Questions(Facial Expression)

ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	25.6767	3	8.5589	1.77921	0.16754	2.85174
Within Groups	182.799	38	4.81051			
Total	208.476	41				

2.3: Panda

ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	481.894	3	160.631	1.93134	0.14001	2.83875
Within Groups	3326.83	40	83.1708			
Total	3808.73	43				

2.4: Reverse Interview

ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	940.353	3	313.451	3.93007	0.01505	2.83875
Within Groups	3190.28	40	79.7571			
Total	4130.64	43				

2.5: Productive Vocabulary

ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	304.42	3	101.473	2.89288	0.0474	2.84507
Within Groups	1368	39	35.0769			
Total	1672.42	42				

2.6: Receptive Vocabulary

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*Fcrit*
Between Groups	750.54	3	240.18	1.1677	0.3368	2.8916
Within Groups	6787.6	33	205.68			
Total	7508.1	36				

It is fair to warn that we are still working in an area of measurement which is completely new and there are still many rough edges and inaccuracies in the data and in the techniques themselves. Nevertheless the consistency of pattern in the measures goes some way toward reassuring us that there are important aspects to report.

In this section results will be reported according to chronological age of the child. This may seem usual but in hearing children one can assume relatively similar patterns of exposure to the (spoken) language over the period of the child's development; in deaf children, this may not be the case. Five groups of year ages were constructed and the figures which follow represent the data consistently in this way.

Figure 2 indicates a developmental pattern. Older children ask more questions in the *reverse interview* than do younger children. Figure 3 is also consistent with predictions: older children use questions with more signs in them - longer mean length of utterance. However, when we begin to look for the presence of non-manual features we find that children even at the age of ten years are not consistently using these non-manual features. In Figure 4 we see something of a developmental trend to more use of open and narrowed eyes, but with very young children having difficulty with the task and the reversal at age 10+ years, the mastery of question forms seems suspect. Less than one in 6 questions on average, have any marking with eyes.

Figure 5 replicates this finding except to show that even less use of the brows is present. This feature is even more significant in deaf adult's questions, being the distinction between wh- and Yes/No questions. Less than one in 12 questions is marked with brow raising or lowering.

The weakness of these effects is mirrored in the simple correlations of these variables (Table 3). Age is not a strong predictive factor in terms of these measures of question production. More worrying is that there is little support for the view that the children are performing similarly across the various measures. The inter-correlations between the measures of elicited questions are not high. The measure within the imitation task show a higher level of consistency but the other measures are hardly related in this analysis.

An obvious reason is what has been suggested already - that the children are not typical of language learners and are not therefore likely to respond in a systematic way to these measures even when there is a deaf person interacting with them. To look at this aspect further, analysis was carried

out on sub-groups of better signers as rated by teachers. Tables 4 and 5 show the correlations for those who are rated good signers by their teachers and who have parents who sign or try to (Table 4) and for those who are rated as clearly understood and whose sign production is fluent (Table 5).

Table 3: Correlations of main variables for all children

	Age	Hearing	Copy-m	Copy-f	Panda	Interv	Recept
Hearing Loss	-.09						
Copy (manual)	.36	.12					
Copy (face)	.05	.11	.68				
Ask Panda	.35	.06	.17	-.03			
Rev Interview	.48	-.10	.30	-.02	.57		
Receptive voc	-.01	-.35	.05	.16	.03	-.36	
Expressive voc	.41	-.28	.42	.09	.12	.08	.30

Correlations are significant at around r=0.34

It seems likely on the basis of these results that the measures are encountering confounding factors of sign fluency in the children and aspects of sign experience in the extent of signing used at home. When only the ratings of sign fluency are used along with an indication of the teacher's ease of understanding of the child, the correlations appear to be of a higher order. However, in that analysis the numbers of children included drops to 12. Taken together these results indicate that the sample and/or the measures are not behaving exactly as expected.

Table 4: Correlations for those children who have sign at home and who are rated as fluent signers by their teachers(n=18).

	Age	*Copy*	*Face*	*Panda*	*Inter*	*Rec*	*Exp*
Better	-0.06						
Copy	0.43	1.00					
Face	0.22	0.79	1.00				
Panda	0.20	0.18	0.05	1.00			
Inter	0.27	0.10	-0.08	0.48	1.00		
Rec	0.19	0.50	0.47	0.33	-0.25	1.00	
Exp	0.54	0.37	0.14	0.41	0.19	0.26	1.00

Correlations are significant at around r=0.47

Table 5: Correlations for those children who are fluent in sign and for whom the teachers rate their sign as clearly understandable(n=12)

	Age	Better	Copy	Face	Panda	Inter	Rec	Exp
Better	0.05	1.00						
Copy	0.37	0.12	1.00					
Face	0.12	0.02	0.85	1.00				
Panda	0.27	-0.19	0.31	0.22	1.00			
Inter	0.66	-0.36	0.12	-0.17	0.52	1.00		
Rec	-0.50	-0.51	0.04	0.42	-0.16	-0.32	1.00	
Exp	0.56	-0.26	0.35	0.14	0.73	0.72	0.05	1.00

Correlations are significant at around r=0.58

Turning to the panda task, we find that younger children are better able to participate but a less clear developmental trend is apparent. Although young children ask more questions, older children ask less(Figure 6). Nevertheless, the extent of the question follows a consistent age profile(Figure 7). The proportion of questions which use the eyes is higher in younger children(probably corresponding to more frequent eyes wide, surprise expressions rather than non-manual question-marking, a proposal which we will have to re-check). Figure 8 shows that on average one in 5 of these questions is marked with eyes activity. Figure 9 repeats the finding that brows are less in evidence with a rather similar extent in all ages of children. Around one in six questions has a non-manual brows marking.

What this data indicates is that there are some developmental trends for sign indicating that deaf children are gradually catching up in the their sign achievement(given the late start) but that non-manual features of questions are not used reliably. This fits with previous work in Bristol on younger deaf children from deaf homes(4 - 6 years old). It is only by comparing all the features together that we can discern the pattern clearly. Figure 10 shows that while amount of questions increases, the increase in non-manual marking is at a much slower rate. Deaf children are not learning to use questions in an adult way and do not do so reliably by the age of ten years. Figure 11 for the panda measure is less consistent but similar in meaning.

In the third measure, which involved copying sign questions we found the performance levels very low indeed and very few questions in any age group had correct replication of the manual and non-manual components.

Deaf children do no use non-manual marking for questions. This is inevitably linked to sign competence and we can see that in both productive and receptive vocabulary deaf children do not perform at a high level. In a test similar in concept to vocabulary measures appropriate for

hearing children up to the age of 6 years, deaf children do not perform reliably beyond 50% correct(Figure 12)

We can probe further in the examination of the children's use of the expected components of sign questions. There is currently very little data which would allow us to predict what might be the order of natural development and there is even less which would give us information on what will occur when we take a sample of children with diverse language experience.

Figure 5: Imitation Task and Age
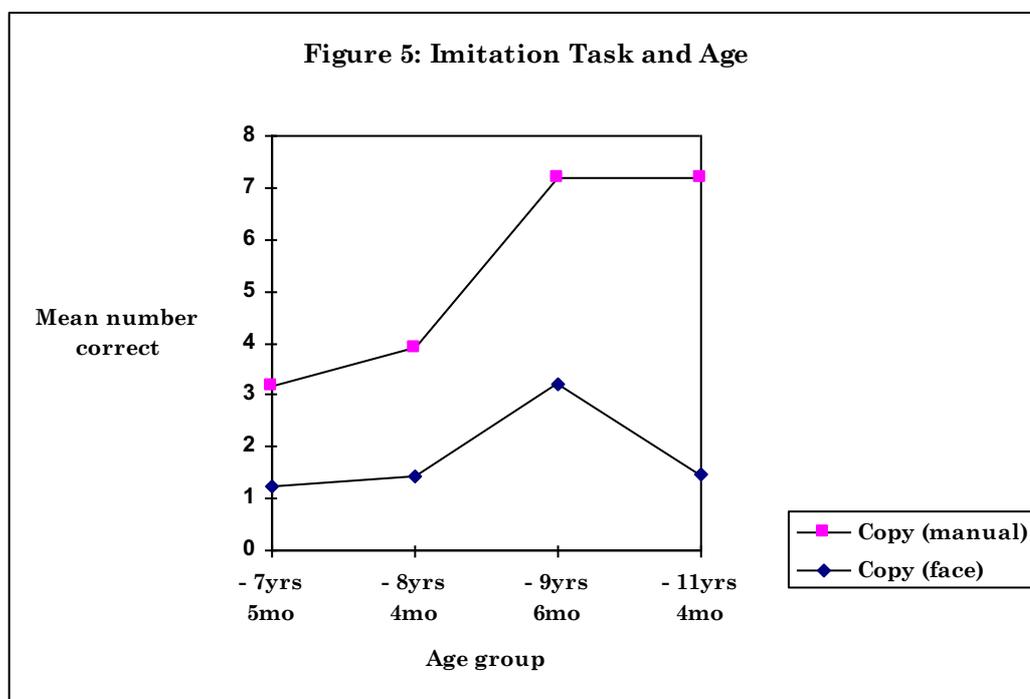
In Figure 5 it is possible to see the difference in pattern for imitation of the facial expression and of the question form on the hands. Even with the latter we can see a decline in accuracy in the oldest group. This could indicate a reduction in interest in the task as much as any other factor. However, the level of performance is nowhere near the ceiling of the test(32).

Figure 6 shows the different performances in imitation for each of the different types of question. It is possible to see that Yes/no questions are easier to imitate and that Wh questions are next. There is a slight trend towards better performance with age but as pointed out before, this drops off in the oldest age group.

Table 6 shows examples of the questions used in the imitation task. These were presented on video and the child had to copy all the features.

Table 6: Example questions used in the imitation task

Wh-Questions:
HOUSE WHERE
SCHOOL COME WHY
TEACHER point LIKE WHICH BEST WHICH

Yes/No Questions
HOT YOU
CHOCOLATE LIKE YOU
TOMORROW SWIMMING DON'T WANT YOU point

Rhetorical Questions
FIND YOU CAN REALLY YOU point
MAN FARM WORK TIRED TRUE

Statement
FINISH DRAWING
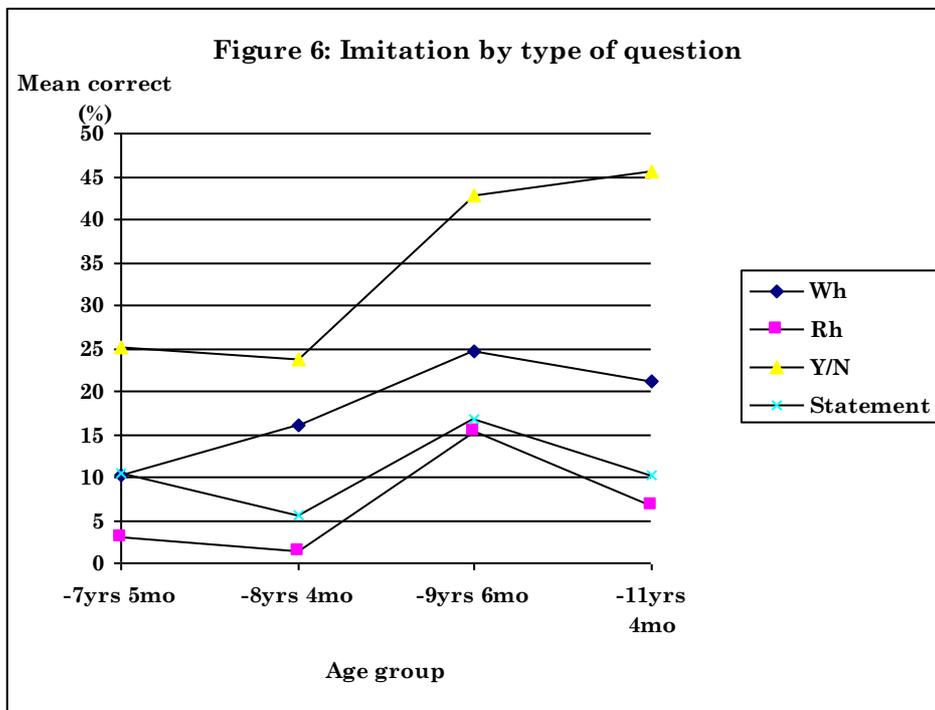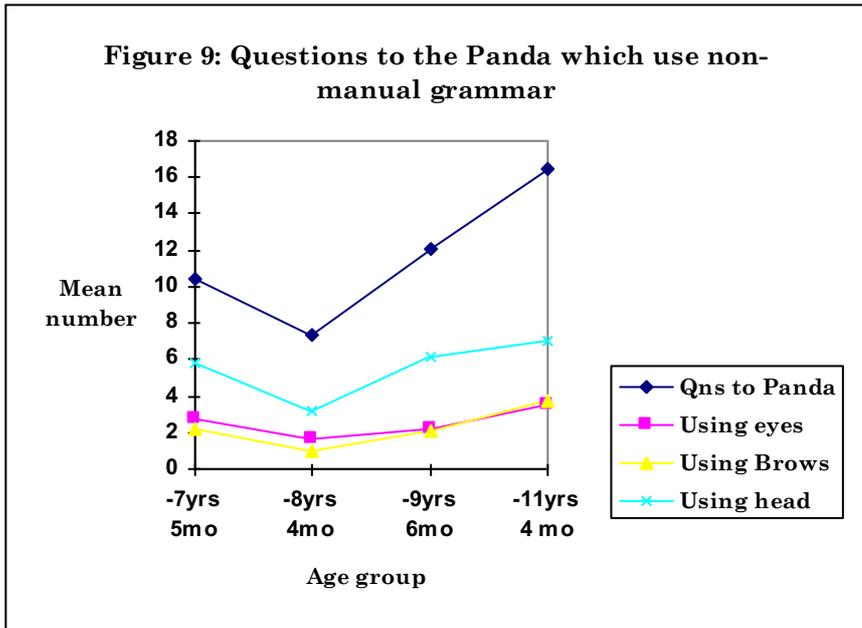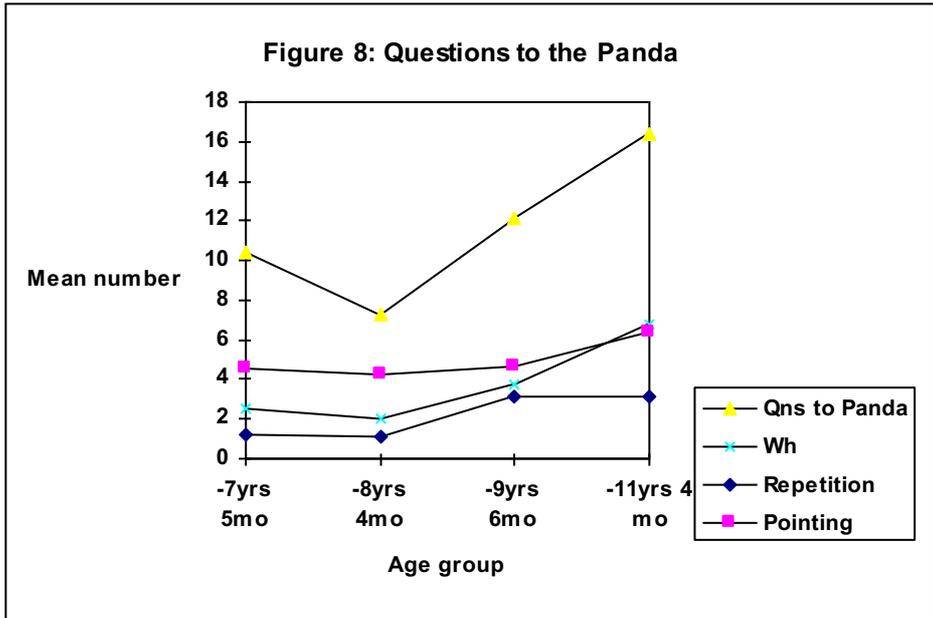FAVOURITE MINE HIPPO FAVOURITE

Figure 6: Imitation by type of question

Figure 7 examines the same variables but concentrating on whether the child was able to reproduce the facial expression of the model. There are some differences but these are not significant. As in Figure 6 statements

show the least use of facial expression. This could be expected as the main characteristic of the statement will be less prominent facial grammar though there is still emotional expression (eg DOG point HAPPY DOG point HAPPY or FAVOURITE MINE HIPPO FAVOURITE). These children do not seem to consider the use of the non-manual grammar as salient to this task. At this stage it remains unclear as to how strong we can make a claim for them not being able to use these non-manual grammar features in their own signing.

Figure 7: Imitation of facial expression by question type
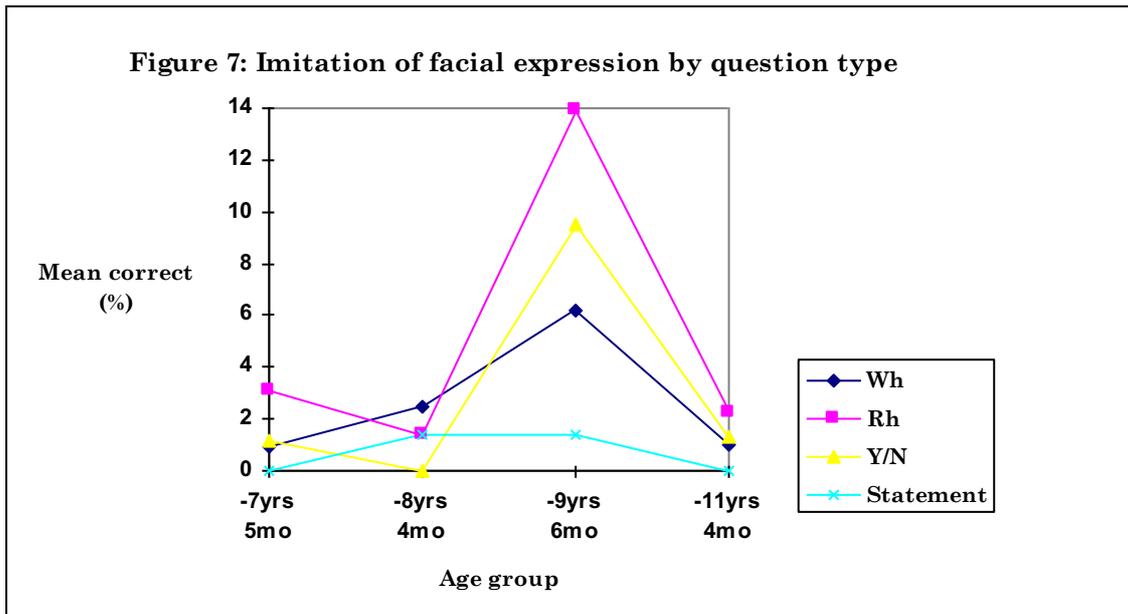
Figures 8 and 9 consider the productive element in the child's signing in terms of the features which were present. There is a change in the overall number of questions asked to the panda with older children producing more. However there is very little change in the use of features such as repetition (bracketing) or pointing. These remain infrequent in use. The number of wh-questions spontaneously produced remains limited. The majority of questions produced are of the yes/no type. But most remain unmarked. Whereas adults would mark most questions with facial expressions, these children do not do so in this situation. Most marking is with the head which tends to be a movement forward. There is no indication that the proportion of marked questions changes greatly with age.

Figure 8: Questions to the Panda

Mean number — Age group

Legend: Qns to Panda, Wh, Repetition, Pointing

Figure 9: Questions to the Panda which use non-manual grammar

Mean number — Age group

Legend: Qns to Panda, Using eyes, Using Brows, Using head

The first question to ask is whether there are differences in any of the question measures for the background variables. Whether the child's parents sign or not makes little difference to the performance on the measures used. Expressive sign vocabulary is marginally better in those children who are reckoned to have parents who *do not sign*. For the measures of imitation and asking the panda, those whose parents sign are found to produce more questions in each age group; however, the length of utterance in questions is on average greater in those whose parents do not sign.

Where the pupil is rated as having fluent sign, receptive sign performance tends to be better in all age groups. However, this is not true in the production of questions nor in the imitation task. The teacher's rating of fluency in sign is of limited help in identifying those children who have access to the most extensive question forms. However, length of utterance tends to be greater for those who are rated as having fluent sign.

In other analyses, the data is either incomplete because the information was unavailable from the schools - eg how long the child had been signing - or the numbers are too small when the age groupings are used. Where the interactions of the above variables are used, the results still tend to be counter-intuitive with children rated as fluent, whose parents do not sign, are almost the same in imitation and in the interview as those whose parents sign. When the rating for using a range of signs (but not yet fluent) is used, those whose parents do not sign, have higher scores. Where the length of experience of signing in school is used as the dependent variable, those who are fluent signers are only marginally more likely to have spent longer in the signing programme. There are clearly some difficulties in interpreting this data.

Discussion

The data is complex and the measures have not proved as robust as one might have hoped. There remains considerable descriptive analysis to complete and this will be reported more appropriately in the project report for *Finding Out*. This descriptive analysis gives more examples of the nature of the questions, used by the children and whether the hypotheses about the lack of non-manual features and about the substitution of the *terminal hold* are supported.

Much of the interpretation of the data has been provided as it was presented. To summarise it, age in itself is not a simple determining factor for sign performance for this group of children. Since they were not chosen for any specific purpose or any reason of ability, there is no evidence that the sample is untypical of deaf children in signing programmes today. In fact, on a subjective basis from the researchers involved, the children are entirely typical and the teachers are also representative of the signing levels and practices which are in use in schools at this time. The phrase *typically untypical* keeps coming back to describe the sample. Deaf children from hearing homes where their parents are not initially fluent in BSL, have considerable difficulty in access to the signing models which would be needed in normal circumstances. Even where signing is present in school, the extent of the teacher's fluency is not clear and where there are deaf people present as role models, they are typically shared among class groups. It is difficult to tell how much exposure to signing these children have, but it seems to fall far short of the exposure to speech which hearing children have. If there are few opportunities for adult contact, then at least children have the time to play and to interact with each other. However, if all the children have limited access to sign, then the type of interaction available is likely to be context bound. Not surprisingly, measures designed to work with samples of language *users*, seems to be problematic when applied to language *learners*.

It has always been said that the position of deaf children from deaf homes has been very important to the deaf community. In an oral school environment, they were likely to be the only ones who had easy communication with their parents and most educators agreed that their adjustment to deafness was much better. In general, their performance in language is also better. In the past, they were considered to be the children who were the source of knowledge for others and who were actively sought out by those with hearing parents (Mason, 1991). Interestingly, as the schools have moved towards signing, it is not necessarily the case that they attract the deaf children from deaf families. The opposite can be the case. Because of the disfavour with which sign has been viewed in the past, deaf people may not believe that it is appropriate as an educational medium. Because there has been and continues to be pressure to mainstream all children who have some language ability deaf people have formed the view that deaf schools are not ideal educational environments since they attract children at the lower end of the ability range. As a result of this deaf parents may wish to send their children into oral environments, where their language competence will be unrecognised. These children may be lost to the very environments in which they could flourish most - in signing schools. The situation is full of such contradictions. Deaf children from hearing homes suffer from this lack of peer stimulation in language. The extent of this problem is only now coming to be realised.

As a result, the findings tend to be negative in tone. Deaf children in these measures do not manifest the range of question forms which deaf adults do and in particular use the eyes and brows rather infrequently. Most commonly questions are of the yes/no variety - these are less complex syntactically and seem to be marked predominantly with a head movement - that is on the occasions when they are marked at all. Turn taking devices are also used - it seems likely that the use of pointing or terminal hold, is a carry-over from the use of this device for turn-taking in very early interaction. There is a gradual increase in the proportion of wh-questions to just under 40% in test circumstances at the age of 10-11 years.

It may be too early in our development of knowledge of signing to be trying to create a normative picture of deaf children's sign competence. It may be that the present study suffers from the incomplete knowledge of BSL in general and question formation in BSL specifically. Nevertheless,

the study described here is an important starting point. It identifies a number of areas of information on the child which will be necessary to explore in future work and it probably indicates that the way forward is to make descriptive studies the target for the moment. The deaf population will always be a minority and the children in deaf schools and in signing programmes are a sub-group of that minority. At the moment, they are probably not a representative sub-group in ability because of the filtering process which parents and local education authorities engage in when they place their children. Combining the scores of deaf children on measures such as those used here will be at the risk of the many variables which have been discussed. There is still a great deal to explore in the nature of BSL itself before this study can be accurately placed as a contribution to our knowledge of deaf children's sign acquisition.

Acknowledgements