CENTRE FOR DEAF STUDIES

DEAF CHILDREN DEVELOPING SIGN

A GUIDE FOR PARENTS AND TEACHERS

FINAL REPORT TO LEVERHULME TRUST FOR PROJECT F 182 AD

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DEAF CHILDREN DEVELOPING SIGN

AN ANALYSIS OF THE ACQUISITION OF BSL BY DEAF CHILDREN
REPORT TO LEVERHULME TRUST FOR PROJECT F 182 AD

SUMMARY

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OUTLINE

Video recordings of deaf children from the age of one year to three years have been analysed for 8 deaf children of deaf parents. The analysis system was developed to reflect the visual aspects of interaction as well as to reflect accurately the emerging sign language of the child. The data analysis carried out focused on the functions of the language and meaning and the way in which it was used rather than on the vocabulary or the grammar. This is consistent with an approach taken in large-scale research that has been carried out in Bristol on hearing children.

A system of transcription was created and this has been presented as a manual for others to use. An attempt was made to create a visual database on computer which would allow the notation and storage of video clips of emerging language but after several months of effort, this was abandoned as satisfactory results could not be achieved with the software available to the research team.

The results indicate that deaf children in a natural setting of language learning from their parents, achieve the same pattern of language use as hearing children do in speech, when interacting in the usual way with the their hearing parents. In this respect deaf children are not in any way language delayed or deviant. However, their language is structured differently to that of hearing children and their experiences of interaction may vary a great deal from the patterns in hearing household. Considerable differences in interaction between parent and child can be noted, and these are of great significance in advising the hearing parent in the care of their deaf children.

BACKGROUND

Although deaf people are a minority within society and although deaf children born into deaf families are rare, they constitute an important test of our theories of language development since they use a language that is not spoken but signed. In addition, their position as *different* in society means that hearing parents and hearing teachers need to have access to information that they would not naturally acquire through child-rearing. The project builds on continuous data collection over ten years that has focused on deaf children of deaf parents. This focus is deliberate - it represents the more natural circumstance of deaf children acquiring sign language from parents who are also users of sign language. By studying this group we are able to chart the natural growth of a language which is signed. The purpose of the project was to provide a cumulative analysis of deaf children's signing development up to the age of three years.

PROJECT RESOURCES

The project was able to call upon a large database[1] that had already been collected and to use this as the main source of information. In addition, deaf children of deaf parents were recorded where appropriate and these have been added to the analysis. Two members of staff worked on the project, full-time, Dr Lisa McEntee and Ms Jennifer Ackerman. A number of other staff and students participated in a voluntary or part-time capacity. Even so, the extent of resource and time available in the end, was a little short of what was needed for the ambitious goals of the second year of the project and there remains a great deal which can be done with the data.

THE PROJECT AIMS

There were two main aims that became extended into a third:

- to produce a transcription and analysis of the emerging language of deaf children in deaf homes
- to prepare a set of guidelines and materials which teachers and parents could use in interacting with deaf children
- to develop a computer database systems which would allow easier coding and analysis of the data and allow it to be shared with other researchers.

[1] Although the numbers of children involved in the analysis are small (only 8) and the total database is of less than 20 children, the monthly recordings are extensive. Taken as a whole, it is probably the largest set of continuous recordings of sign language acquisition available anywhere.

THE METHODOLOGY

The data is considerable in extent: over 500 hours of video data collected in the homes of the deaf children. The project had a number of stages:

1) the logging of all the data and the checking of the data for extent of interactions

2) the creation of a system for transcribing sign language and the adaptation of a system for coding the data (drawn from previous language work)

3) the application of the transcription system and the repeated checking and cross-checking of the results of this to ensure reliability

4) the choice of database (Microsoft Access) and the solving of a range of problems in its application

5) the training of deaf people as transcribers of sign and hearing people to work on the spoken language component

6) The transcription of the video data itself (by deaf and hearing researchers) which proved to be a mammoth and painstaking task (even when the target number of interactions and utterances for analysis was reduced)

7) the coding of the data on paper in a form which could be analysed

8) the planning of the materials and guides which would be suitable for parents and teachers

9) dissemination activities i.e. contributions to meetings, seminars and consultations which were requested in relation to the analysis which was being carried out

10) the preparation the report

Although there was not a detailed time-scale in the original project proposal, a number of stages of the method greatly exceeded what had been predicted in terms of the time needed. This showed up particularly in the latter stages of the project, where stages 3, 4 and 6 proved problematic to complete in the time available.

RESULTS IN GENERAL TERMS

A great deal has been achieved. The system of data analysis for semantic and pragmatic aspects of sign language has been formulated and is now available for use (Appendix 1: printed separately - *Coding and Transcription for BSL Acquisition*). This covers both transcription from video and coding from the transcription

A database specification for computer work on sign language acquisition is set out (see Appendix 2 of the extended report)

A set of plans and programmes have been prepared for materials to be provided to parents and teachers (Appendix 3 of the extended report)

In addition data analysis has been carried out and some details are provided below.

RESULTS IN MORE DETAIL

In the past, deaf children were always considered to be language disabled. They experienced great difficulty in achieving spoken language because they could not hear and the major focus of the education system on literacy was also unsuccessful. As a result deaf children were thought of as being without language and considered to be unable to develop language. With the advent of video, it became possible to record in detail the communication of deaf children. Although such recordings have been available for some time, the difficulty of working with video and the fact that all of the analysis systems are in written English, has meant that a definitive view of deaf children's capabilities has not been available. There are particular problems of encapsulating the richness of video data and visual language in systems of analysis which were designed for spoken language. There have been very few attempts to try to deal with spoken language in a visual way i.e. from videotape where the interaction of the partners had to be taken into account. Spoken language analysis (all we know about language acquisition) is based almost completely on the writing down of the spoken words of children and adults - even though the use of the original audio and video recordings are valued by researchers. When we begin to include the real physical interaction of children with adults and with the environment there are many more complex issues to be faced. In this project, we began the systematic analysis of the sign language capabilities of deaf children in a natural setting, where their parents are fluent in the language. This constitutes the richest environment which deaf children will experience. From an analysis of this we can apply the knowledge to the more common circumstance - where the children are born to hearing parents who are not fluent in sign language. In this context, we can set out the following results:

1. INCREASE IN CONVERSATION WITH AGE:

As one might expect, the extent and sophistication of deaf children's interaction in sign language increases as they become older. The greatest change is in the period between one year and two years, when (on the basis of spoken language research), we would expect the competence in conversation to be increasing most quickly. By the end of the second year, the child is able to initiate and terminate interactions - in effect, just in the same way that hearing children do. One feature that is noticeable in our recordings is that mothers tend to begin and to end the sequences of interaction. This is more prominent than in hearing children-mother interactions (where on the basis of research on naturalistic spoken language development, we expect hearing children to lead and to control in the interaction). We believe this to be a result of the visual modality and the fact that the child is in a stage of play when the objects in the environment occupy the child's visual attention, to a great degree.

The child is only beginning to learn how to divide attention so that while the child is examining a toy or object in the environment, there is no visual interaction with another person. The child has to learn how to deal with the division of attention that is necessary to handle this situation. At this age, interaction proceeds mostly when the deaf mother seeks it out (i.e. initiates visually) and the interaction ends when the mother provides the requested information.

2. CONTEXT FOR SIGNING

Although deaf children live in the same sort of housing and home environment as hearing children do, there seem to be major differences in the circumstances where language is used. While hearing families use mealtimes and bath-times as major opportunities for spoken language play and interaction, these seem less important to deaf families. One has to understand that a sign interaction has to take place in a visual context and where there is a competing visual task - such as eating - the extent of language produced by parent and child drops. The most common interaction situation was book-reading. Although this also occurs for hearing children, it is proportionately less frequent in random recordings in the home. The fact that book-reading is a highly regulated context, where divided attention may be easier to practise, is of some significance and deaf mothers seem to be comfortable with this task. In this situation, there is also the effect for the mother of being able to introduce vocabulary and simple grammatical constructions. The child tends to seek opportunities for naming.

3. SIGN PRODUCTION AND PURPOSE

The main interactions between deaf children and their parents involved the exchange of information. Supporting this is a high proportion of tutorial functions where parent or child attempts to provide a teaching context. When we examine the types of utterance in the heading of *control*, we find an increasing ability to converse with the predominant *wants* and *commands*, gradually being augmented by *assent*, *warnings*, *indirect requests* and *queries*. In effect we can see the child's language as becoming more sophisticated over time. Examining the representative functions, we find that there is a very early development of naming and indicating in the children. It is highly visual in that it appears as *point to objects* and events. However, this simple utterance is later developed into content questions, statements and indirect questions - in fact in much the same progression as it develops for hearing children.

We find similar developments in expressive functions (though later than we would have expected), in procedures (repetitions, clarifications, attention getting), social (greetings), tutorial (question-answer sequences, which were predominantly in book reading situations).

4. SENTENCE MEANINGS

In the same way we see the emergence of meaning in the children's utterances. These vary from simple comments on the locations of objects, to possession, and to a relatively small

number of instances of time being specified. It may be that the richest semantic categories do not appear until later for these deaf children.

IMPLICATIONS

These results are complex and are still under analysis. The simplest statement which we can make is that deaf children learning sign by the age of three years show that they are capable of learning all of the uses of language which hearing children achieve in speech. Although this may seem like a rather simple statement, it should be re-iterated that until recently deaf children were viewed as deviant in language - this data confirms that this is not the case. When we remind ourselves that we are dealing with deaf children younger than the age at which they would attend a nursery school, then we can obtain a proper perspective on the language problems ascribed to deaf children of school age. Deaf children may have problems in acquiring speech from hearing people, but deafness per se is not a barrier to language development.

There are differences in the extent of language production (that is, deaf children tend to produce many fewer utterances and of shorter length than do hearing children in speech). We believe this to be a function of the modality. There is also a difference in the contexts in which interaction takes place. Nevertheless, deaf children achieve the same language competence in terms of breadth of use.

Our work on the coding and transcription has been a success in the project and will allow others to work in detail on their own data in the same way. It will also form a basis for a future analysis of the syntax and lexicon of deaf children. The work on creating the computer database was less successful and constituted a disappointment. Despite the use of several computer consultants and extended attempts using different versions of the software, it was not possible in the time-scale of this project to achieve a working and effective computerised system for encoding and analysis. It would seem that the database design for a visual language has to be done independently of the main commercially available packages[2] and has to be done separately to the spoken language databases that are available.

The final component of prepared materials for dissemination to parents and teachers has reached the planning stage and guidelines for this is now available. We hope to prepare versions of the materials through the parallel development of a Family Centre for Deaf Children which has now come into being in Bristol.

It is inevitable that a project of this nature has much more to do. Our knowledge of sign language is still at an elementary stage and the number of studies and cases of sign

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[2] A number of new packages have appeared in the last 6 months, which might offer partial solutions to the problem. However, all of them share the same limitations of being based on a written English coding or on a linear view of sign language. A great deal remains to be done to optimise sign language encoding.

acquisition in natural settings is still rather small. This project has shown that video data in sign language can be tackled systematically and effectively. There remain many options to explore the data further and to provide the base of knowledge that will advise parents and teachers to the benefit of all deaf children.

There has been a range of dissemination activities. Project team members have presented aspects of the findings at conferences in the UK and at meetings in Mérida (Venezuela), La Coruña (Spain), Athens, Moscow, Amsterdam and Bristol. The findings have been used as a basis of the rationale of the new Family Centre for Deaf Children in Bristol and are incorporated into our assessment procedures for deaf children. The main cumulative presentation has been given at the Child Language Seminar in Bristol in 1995. The findings have been used as the basis of a book proposal to Cambridge University Press and a further research proposal to ESRC.

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DEAF CHILDREN DEVELOPING SIGN - MAIN REPORT AND TECHNICAL DATA ANALYSIS

CHAPTER 1: BACKGROUND

In recent years (particularly the 1980's) many advances have occurred in the study of language acquisition, with emphasis shifting from the study of formal language study, to that of the exploitation of pragmatic understanding; focusing particularly upon the analysis of mother-infant interaction, and the way in which the latter contributes to the acquisition process. Interest has broadened to encompass the study of for example: speech acts, deixis, repair; focusing more upon the development of language in communication, i.e. its function, rather than its structure. The 'pragmatic' approach has offered a window through which researchers can peer to view cultural, social and semantic negotiation and teaching between guardian and child. Through this process, the allocutionary force of an utterance has proven to be more salient to the understanding of interaction than syntactic structure.

Research on early spoken language acquisition has revealed that the development of pragmatic skill advances rapidly from an early age. Children express rudimentary desires and views in context through vocal and gestural channels. Moreover at the pre-categorical and categorical stages of development children's lexical vocabulary becomes more and more expansive, allowing greater sophistication and precision in their desire to communicate. The will to converse is seen from a very early age evidenced for example in early 'peek-a-boo' sequences. These can be initiated, engaged in, repaired and terminated by the child at ever increasing levels of complexity and length as time passes.

Similarly, early semantic development is witnessed in the child's expression of gestures, or later one word utterances in relation to some other non-linguistic context in which the utterance appears, e.g. the child produces the word 'doll' and reaches for the desired object. The latter being interrupted by the adult caretaker as the child expressing a desire for the doll.

1.1 THE BRISTOL LANGUAGE PROJECT

Within the climate of this research Gordon Wells (1985) wrote of a tripartite system of classification, identifying three major aspects of meaning in relation to their basis in the communicative situation. The first of these is classified as INTERPERSONAL PURPOSE which refers to the social function of language. More specifically, the relationship between the interlocutors and the act that the utterance performs, e.g. to exchange information; reprimand; express emotion. Within this over-arching conversational structure he defines more specific FUNCTIONS, e.g. requesting; commanding; refusing. The second type of meaning is that of TOPIC. This refers to the substance of the conversation or the 'cognitive content' of particular utterances. Moreover, the cohesive element between interpersonal

purpose and topic is DISCOURSE which serves to organise information in utterances in light of previous conversation, e.g. excluding information that has already been understood by the interlocutors. Finally, at the base of this structure is the UTTERANCE which is formulated through the selection of meaning and is articulated through the appropriate selection of lexical, morphosyntactic and phonological parameters available to the speaker. The above system can be represented in Table 1.1.

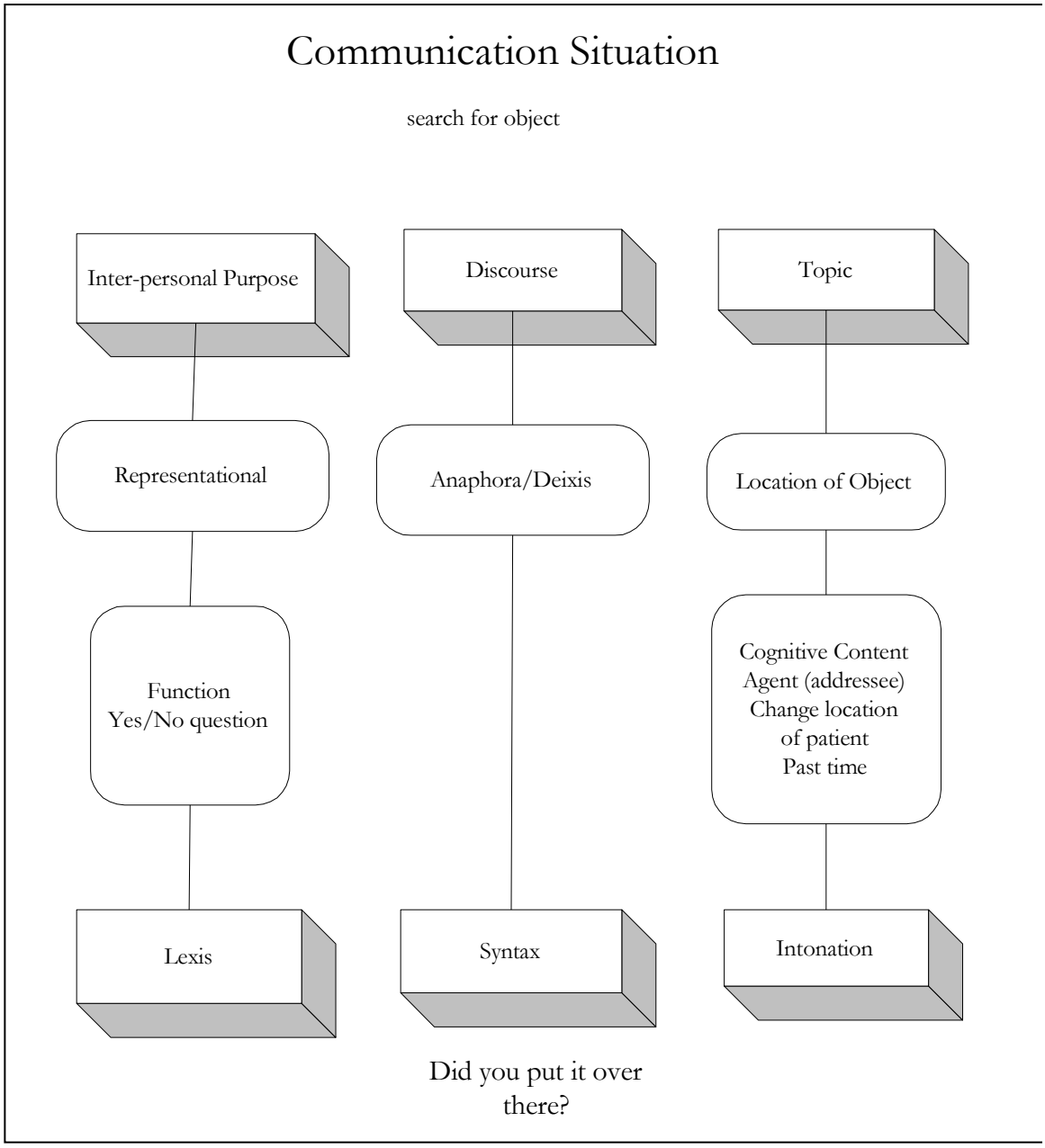

Table 1.1: System of Classification for analysis (after Wells, 1985)

The philosophy of Wells writing was subsequently applied to research documented in the Bristol Language Projects (1973-8) and subsequent publications. Wells (1981, 1985), Gutfreund, Harrison and Wells (1989). Both the methodology and coding scheme implemented in our work were derived in part from the application of procedures reported in the Bristol Language Projects. An account of this work will not be made in full, however an outline of the main aims and approaches adopted by Wells et al are provided below.

As mentioned above, the Bristol Language Projects evolved in a period of conflicting interests and approaches in linguistics. When the research began in 1972, linguists (e.g. Brown, Cazden & Bellugi, 1969, Klima & Bellugi, 1966) heavily influenced by the revolutionary theory of language proposed by Noam Chomsky (1957, 1965) were interested in examining grammatical development in the language of young children. Much research has subsequently superseded these accounts (e.g. Hyams 1986, Radford 1990) however findings at this time suggested certain universal similarities in the rate and pattern of acquisition of this linguistic system. Wells was however drawn to the theoretical approach propounded by Halliday (1975), whose study of his own child led him to suggest that the earliest meanings to appear in child language are pragmatic (functional) in origin, and are as much dependent upon the framework of interpersonal interaction and articulation as the structure of transformational grammar. In addition to this, the descriptive framework of 'case grammar' as developed by Fillmore (1968) and Chafe (1970) was adopted (Wells 1981:3). The major objective of the Bristol study was therefore to replicate the detailed studies carried out in America through the collection and analysis of data from a large body of English children. From this sample the researchers hoped to establish normative scales of acquisition.

1.1.1 Design

There were 128 pre-school children in two age groupings: between 15 and 42 months and 39 and 66 months, who were selected for the study. Within each of the age groups an equal number of boys and girls were represented, in addition to an equal number for date of birth, from each season of the year, and a representative sample from each of four classes of family background, defined according to parental education and occupation. Each child was observed at three-monthly intervals on ten occasions. Each observation consisted of audio-tape recordings in the child's home throughout the duration of a day and the completion of a number of tests at the Research Unit at the University. Parents were interviewed when the child reached 3;6 years in order to elicit information in connection with the child's upbringing and parental beliefs and practices in relation to child rearing.

1.1.2 Research goals and segmentation of data

The overall framework for their semantic description of speech was devised in collaboration with Slobin and Antinucci of the Berkeley Cross-Linguistic Language Development Project, and consists of an analysis of purely linguistic aspects of communication. The framework for the analysis is based upon the assumption that conversation between two or more interlocutors consists of a number of comparatively self-contained interchanges. These can

be identified by their topic and purpose. The analysis predominantly concerns the examination of features related to the acquisition of Function (Pragmatic) and Meaning (Semantic) categories. Data is segmented into a hierarchy of levels and these are defined in terms of descending order of scope, consisting of: Sequence, subsequence, utterance and clause. These will be considered in the discussion of the methodology (below) used in the work reported in this document. Prior to this however we will briefly review work connected with the acquisition of semantic and pragmatic categories in sign language.

1.2 ACQUISITION OF SEMANTIC AND PRAGMATIC CATEGORIES IN SIGN LANGUAGE

Research into the acquisition of sign language in deaf children of deaf parents suggests that the language learning process is as effortless as the process that hearing children experience when acquiring a spoken language (e.g. Deuchar 1984, McEntee, Ackerman & Kyle 1995, Mohay, Luttrell & Milton 1991, Volterra & Caselli 1983). Signs and sign combinations appear in deaf children's conversation at the same age as words and phrases in hearing children's spoken language. Some researchers, e.g. Bellugi & Klima 1982, have observed that the acquisition of phonological, morphological and syntactic rules pattern those of spoken language. It would seem therefore that communicative and linguistic development proceed according to similar stages of acquisition. There is perhaps a slight advantage in that the gestural modality may be used at an earlier point due to the more rapid development of the neuromuscular functions that control the use of the hands, in comparison to those which control the vocal apparatus. However research suggests that the use of gestures is dependent upon cognitive maturity, in the same way that development of symbolic speech is also dependent on cognitive maturity. Evidence for this has appeared for example, in the similarity between deaf and hearing children's later acquisition of the pronominal system. Examples are found in the literature, (e.g. Pizzuto 1990) of signing children confusing second and first person reference when using the signs YOU and I when referring to themselves and others.

To date however, little research has been carried out into the acquisition of semantic and pragmatic categories in BSL and there has been no attempt to provide such a comprehensive examination in sign language as evidenced by Wells' research into spoken language. However, a number of studies have investigated the acquisition of semantic relations in American Sign Language (ASL). These include studies by, for example, Klima & Bellugi (1972), Schlesinger & Meadow (1972), Prinz & Prinz (1979), Livingston (1983) and Pettito (1988). Their findings suggest that children produce the same range of semantic relations in the early stages of ASL acquisition as those learning spoken English. They found examples of ostension (or naming, e.g. MUMMY); locatives (e.g. OVER-THERE); recurrence (e.g. MORE): agent-action (e.g. GIRL-RUN); and action-object (e.g. PICK-UP TEDDY). They provide both cross-modal and cross-linguistic evidence to suggest that children appear to form similar semantic categories regardless of their first language or mode of communication.

Moreover, it would appear that the majority of research in relation to the acquisition of semantic and pragmatic categories in British Sign Language (BSL), American Sign Language (ASL) and Australian Sign Language (Auslan) has focused primarily upon the transition from

pre-linguistic to linguistic communication, and the establishment of the mode of communication and the setting of the conversational floor.

Research into deaf mother/child communication has shown that the importance placed upon the early establishment of the visual mode of communication is a necessary prerequisite for the internalisation of language. Control of eye gaze is an essential function for the absorption of information, and without this, the process of language acquisition can not adequately proceed. Moreover as Swisher notes 'children must learn the behaviour which is both socially and perceptually appropriate for communication'. In fact, deaf mothers spend the first year of their child's life fine-tuning attentional strategies (Kyle & Ackerman 1987). Deafness precludes the child from simultaneously inspecting the world around him and receiving linguistic information. They must divide their attention between their environment and the reception of linguistic messages.

Research has shown that other features of mothers' management of their children's visual field play an important role in their acquisition of sign language. Mechanisms include signing on the child's body or on or near objects, and bringing objects into the child's line of vision.

Another feature of deaf mother/child interaction which is of importance is that of *semantic contingency* - that is to say ensuring that the mother's response is related to the child's current activity or conversation. The literature on spoken language acquisition emphasises the importance of caretakers sensitivity to children's utterances, emphasising the importance of encouraging and expanding upon their present topic of interest. Similarly deaf mothers have been found to spend a considerable percentage of time engaging in related tasks with their children, and in the early years (approximately around the age of 24 months) spending a great deal of time naming objects and using repetitive utterances - far more so than hearing mothers with hearing children. Deaf mothers of deaf children have been found (Mohay et al 1992) to engage in more relaxed interactions with their children, communicating through touch and visual signals (such as showing, pointing and signing) but only when their children are looking at them. It would seem that following the child's lead is equally important, and possibly more so for the deaf child because of the importance of its role in synchronising eye gaze.

Additionally research by Kyle et al has shown that turning taking, as reflected by the appearance of point reference routines are established at a very early age ensuring effective communication and eye gaze. These consist of the mother: firstly, waving (to attract the child's attention); then pointing to the referent; naming the referent she wishes the child to look at (e.g. teddy bear); pointing to the referent once more, (which hopefully results in the child following the point); the mother then checks the child's gaze and finally brings her hand back to regain eye contact with the child again.

Therefore research into early communication through the medium of sign language reveals that early pragmatic and semantic development proceeds in a similar vein to that of spoken language acquisition. However there has, to date, been no attempt to provide a detailed examination of the emergence of semantic and pragmatic categories in BSL.

1.3 THEORIES OF ACQUISITION

Finally, it is interesting to address the theoretical implications of this research. The transition from pre-linguistic to linguistic communication has attracted considerable interest in the past decade or so, as revealed by the research discussed above. Conventional research suggests that language emerges from pre-linguistic communication, however in more recent years researchers have suggested that this continuum does not exist. The study of deaf children of deaf parents permits a clearer understanding of the conditions necessary for language acquisition in comparison to those which coincide with the emergence of language. Models of continuity versus discontinuity theories of language acquisition are therefore testable.

Interactive-based models of language acquisition (e.g. Bates 1976, Bruner 1975, Piaget 1959) are based upon the assumption that language evolves from the child's interaction with the environment, and from pre-linguistic knowledge of relations amongst objects and events. Therefore the child's only contribution is rather simple, consisting only of a very general language learning mechanism (Pettito 1983).

In contrast, innatist models of language acquisition suggest that language emerges from innate knowledge of the structure and form of human languages. The task of the child therefore is to infer the structure of his native language, i.e. the language to which he is exposed.

If the interactive model of acquisition is to hold water one would expect that the child's transition from pre-linguistic to linguistic communication would be relatively smooth; that is to say that there should be no abrupt discontinuity in the use of certain forms.

If however the innatist theory of child language acquisition is more representative of the process of early language development one would expect the use of certain forms to be discontinuous, i.e. one would expect the reorganisation of knowledge regarding the function and use of linguistic forms once they become established within a formal grammatical system.

It would seem that research to date would suggest that language is learned to some extent through experience with the environment but that its ultimate form is dependent upon the child's own cognitive and linguistic pre-dispositions as to how language is to be acquired and organised into a system. Findings supporting this view include such factors as:

a) the child is selective in what he acquires from the environment; and that

b) he is selective when certain parameters come into operation (e.g. pro-drop).

The work in this project made use of this base of research and has tried to develop a description of the deaf child's acquisition of sign language which will allow us to understand language development in general. The research described below is part of that attempt.

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CHAPTER 2: METHODOLOGY

2.1 BACKGROUND

The first opportunity to begin the collection of data on deaf children's acquisition arose some years before this project began (1983-6). Even before that, in the 1970s Bristol was host to a major study of children's language development which has been referred to in Chapter 1. The aim was therefore, to collect data which would allow us to understand the acquisition of sign language in deaf children in the same way that we have developed a picture of spoken language.

2.2 DATA COLLECTION

In total, 10 deaf children form deaf families contributed data to our archives. For reasons of completeness and to balance the monthly pattern, only seven children's data were analysed here. The recording involved both home and laboratory filming for the sample at ages from 3 months to 3 years. During the first year the infants were recorded at fortnightly intervals, alternating between the home and the lab. The former providing more relaxed environments and more spontaneous interaction. From the first year onwards the recordings were monthly. In this analysis, only recordings from one year onwards were used. However, it is important to recognise that the families and in particular, the mothers were familiar with the researchers and were able to behave in a relaxed way when the research moved around the house with a video camera.

The schedule for recordings was similar on each visit. For the first few minutes, the mothers were asked to demonstrate any features which had emerged with the child since the last recording and then to play with a fixed set of toys or books. As the child became older the emphasis shifted to book-reading from play with simple toys. In any case, this was a situation more conducive to language interaction. The rest of the session of either one hour or two hours was divided into five-minute slots and the researcher chose up to six slots to film. These were pre-determined but randomly chosen. Throughout the period, the researcher followed the child and appeared to be recording, but only during the randomly assigned periods was there actual recording of the interactions.

This method closely paralleled the methods used by Gordon Wells for spoken language, but there are fundamental differences in the recording principles for speech as compared to sign. In speech, all recordings could be achieved by a radio microphone and so no researcher need to be present. Audio recordings are omni-directional and so what was recorded included what all the participants were saying. Finally, audio recording represents also what the child was hearing and so consisted of input and output information.

In contrast, video recordings only show one participant's perspective and never show the input measure of what the child sees. Since there is some suggestion that children use peripheral vision, it is very difficult to determine how much of another's signing the child really has access to. Video recordings of sign frequently have problems with catching both parties in the interaction since one follows quickly on the other or may even overlap. Unless both partners happened to be physically close in arrangement, it is almost impossible to switch recording from one participant to another, in time to record both turns in the interaction. Using two cameras solves the problem only when the child is non-mobile ie under 9 months, since once the child is moving around, the camera records vast expanses of carpet or household furniture without any interaction.

Again, this is one reason why book reading provides such a rich source for our analysis. In this situation both parties are side by side.

Throughout all recordings the children were provided with unlimited opportunity to converse with their parents, and in some cases grand-parents and brothers and sisters. None of the children included in this study were deprived of this opportunity or displayed any reluctance throughout the period of recording to converse or unwittingly participate in the study. All effectively ignored the presence of the camera, or on occasion, merely attempted to include the camera person in the on-going activities being recorded, seeing the researcher as an able recruit to the game or story-book reading in hand. Moreover in the majority of instances the camera was completely ignored and interaction proceeded unhindered by any reference to the onlooker or camera.

2.3 THE CHILDREN AND THEIR FAMILIES

Details on the children who took part in the study are shown in Table 2.2.

Child	Year of Birth	Rank in Family	Parents age	Parents Job
AB	1989	5	34, 34	Housewife, carpenter
JB	1986	4	34, 34	Housewife, carpenter
ND	1984	1	29; 36	Housewife; carpenter
SH	1992	1	20,20	Unempl; unemployed
GS	1982	4	34; 38	Sign tutor, carpenter
ES	1982	2	27; 40	Information officer, engineer
ET	1991	1	36, 46	Factory wrkr, graphic designer

Table 2.2: Background detail on the deaf children who participated

2.4 THE SAMPLING

The initial task was to log the data which had been collected - not in terms of when the recordings took place or the length of the recordings and procedures but rather in terms of

the extents of sign language interaction which had occurred. It was important that we were able to examine interaction and not simply mother or child signing on its own. Although we had intended to transcribe and code a major part of all interactions recorded, it was discovered by extensive effort in the first year of the project that this approach was impractical in terms of time available and because of the fact that the amount of signing produced by the children varied enormously.

As a result, the first 100 utterances of each child at each age were transcribed and then encoded. Children were analysed at 6 monthly intervals throughout the periods for which we had recordings (not all children joined the project at an early enough stage and there were incomplete sets of recording on the children. This had occurred because there were typically some missed sessions in all of the children under study and also because there had been a pause in funding at one point and data collection had been greatly reduced at that time.

The extent of data analysis was of the first 100 utterances of the child (and the surrounding maternal talk and sign) at 6 monthly intervals (Table 2.3).

Age (yrs/mo)	1;0	1;6	2;0	2;6	3;0
Number of children	4	7	7	6	5

Table 2.3: Age and numbers of children included in the analysis.

Some children were excluded because they showed so little sign language, spoken language or any form of communication at all. One child did not take part as her diagnosis changed during the recordings, eventually verifying that the child was not deaf but partially hearing.

2.5 SYSTEM OF ANALYSIS

A detailed explanation of the coding and transcription systems - which were separate - is given in the major Appendix (1) attached to this report. It represents a major output from the project and is contained separately so that it can be accessed as a whole and used without reference to the report or to the data that we have already collected.

CHAPTER 3: RESULTS

3.1 BACKGROUND

This section will consider some general findings within the data, including comparative talkativeness with age and distribution of sign by context, in addition to more specific findings in relation to the emergence of sentence meaning relations and pragmatic categories in early child sign.

Despite the similarity engendered by the methodological consistency imposed throughout all recordings, some variation across children can be identified, and these differences, along with similarities will be discussed below. It is pertinent to note that the sampling of the data occurred as a predetermined random series of five minute periods of: interaction between care taker and child; or recordings of the child's egocentric signing, within these five minute intervals. All recordings were made at the convenience of parents, therefore some occurred in the morning, some in the afternoon, and some bridging meal times. The entire recording at each date amounted to approximately 30 minutes. Due to this method of sampling, there may therefore be some differences in the occurrence of contextual categories. These differences must be taken into consideration when reviewing the results displayed below.

It is important to state that a methodological decision was made early on in the transcription and analysis of the data, such that a *maximum* of 100 utterances per context in each recording of the children's data would be transcribed and analysed. Utterances produced over and above the maximum of 100 would not be included in the analysis. However, no child produced the ceiling of 100 utterances in any context, at any age, therefore all codable child utterances will be discussed in the following sections.

3.1 INCREASE IN CONVERSATION WITH AGE

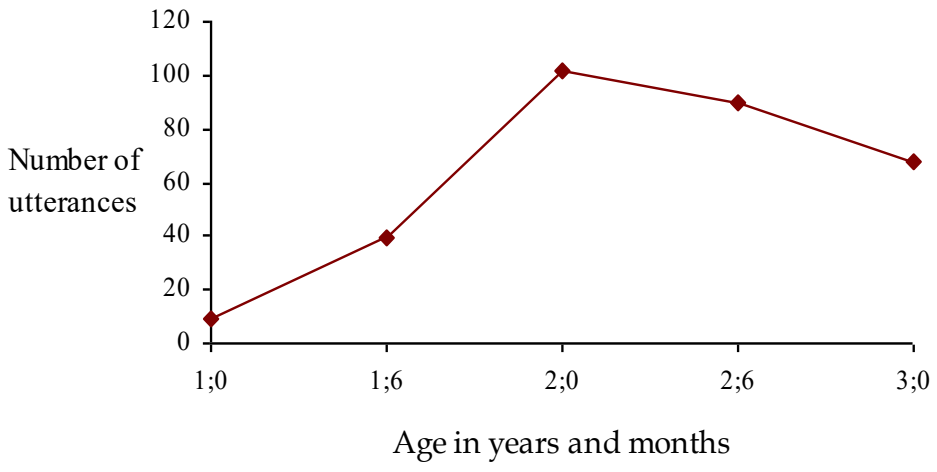
Signing begins to emerge towards to the end of the child's first year, and as in spoken language acquisition, the relationship between form and meaning become more and more invariable throughout the child's second year. However, to date, comparatively little research on BSL and other signed languages has meant that there are still a number of methodological problems in one's interpretation of children's earliest gestures/signs. At what point can one assert that the child has progressed from pre-linguistic gesture to linguistic sign? This means that results based upon the first two recordings at age 1;0 and 1;6 should be treated with some caution.

Wells (1985: 111ff) suggests that there is a 'real increase in talkativeness during the latter part of the [hearing child's] second and the first part of the third year of life.' It is therefore interesting to ascertain whether a similar increase will be revealed in signed data.

The results below are based upon the combined utterances[3] produced by all children at ages 1;0; 1;6; 2;0; 2;6; and 3;0 across all contexts appearing in their recordings. The maximum number of children considered for analysis at any one age grouping is six (ages 1;6 & 2;0) and the minimum, four (ages 1;0 & 3;0).

Figure 3.1 below represents the average number of utterances produced at increasing ages across the entire data set of six children.

Figure 3.1: Average amount of sign by age of child



The results presented in Figure 3.1 show that there is a relatively steep increase in the number of utterances produced between 1;0 and 2;0 years of age, with a decline between 2;6 and 3;0 years. A number of factors must be taken into consideration when attempting to interpret these findings. Primarily, as mentioned above, in the earliest recordings (1;0 - 1;6) a small proportion of the child's interactive attempts may not have been transcribed due to difficulties in distinguishing between linguistic and non-linguistic attempts at communication and in the earliest recordings children were sometimes found to be sleeping at the allotted

[3] An utterance is defined as a discourse unit consisting of what is said by one person before, after or independently of another's utterance. It can consist of a single word, a clausal or sentential unit or more than one sentence. (See Coulthard 1985).

time for filming. This was also true in the case of Wells data collection and is a factor in the talkativeness measure. However, there is a noticeable increase in the level of talkativeness between 1;6 and 2:6 years. The average output for age 3;0 is somewhat skewed by the very limited production of only eight utterances by one subject, ES.

The general picture presented above however somewhat obscures strong individual differences across children. Tables 3.1(i-vii) below therefore reveals individual scores and variation across all children, age ranges and contexts.

Table 3.1 Number of utterances produced in each recording by all children

Child	**Age**	**Context**	**Number of Utterances**	**Total**
AB	1;6	Conversation	3	
		FPA	44	
		Reading	36	**83**
	2;1	Conversation	14	
		Eat	4	
		FPA	49	
		Read	87	**154**
	2;6	FPA	55	
		Read	63	**118**
	3;0	Conversation	22	
		Eat	46	
		FPA	10	
		Read	24	**102**
Child	**Age**	**Context**	**Number of Utterances**	**Total**
JB	1;5	Eat	3	
		FPA	3	**6**
	2;0	Eat	74	
		FPA	16	
		Read	45	**135**
	2;5	Eat	62	
		Read	48	
		Toilet	4	**114**

Child	Age	Context	Number of Utterances	Total
ND	1;0	Eat	1	
		Read	8	**9**
	1;6	Conversation	13	
		FPA	17	
		Read	14	**44**
	2;0	Conversation	10	
		Eat	5	
		Read	54	**69**
	2;7	Conversation	14	
		Eat	5	
		FPA	42	
		Read	59	**120**
	3;0	FPA	47	
		Read	90	
		Toilet	2	**139**

Child	Age	Context	Number of Utterances	Total
SH	1;1	Conversation	21	
		Eat	2	
		FPA	17	**40**
	1;6	FPA	10	
		Read	11	**21**
	2;0	Conversation	18	
		Eat	5	
		FPA	12	
		Sleep	2	**37**

Child	Age	Context	Number of Utterances	Total
GS	1;1	Read	23	**23**
	1;7	FPA	4	
		Read	10	**14**
	2;1	Conversation	9	
		FPA	71	
		Read	25	
		T.V.	2	
		Toilet	1	**108**
	2;6	Conversation	22	
		Eat	2	
		FPA	4	
		Read	78	**106**
	3;0	Eat	9	
		Read	70	
		T.V.	27	**106**

Table 3.1 (continued) Number of utterances produced in each recording by all children

Child	Age	Context	Number of Utterances	Total
ES	1;0	FPA	3	
		Read	2	**5**
	1;6	Eat	3	
		FPA	24	
		Read	32	**59**
	2;0	Conversation	2	
		FPA	26	
		Read	8	**36**
	2;7	Conversation	4	
		Eat	6	
		Read	5	**15**
	2;11	Read	8	**8**

Child	Age	Context	No of Utterances	Total
ET	1;7	FPA	9	**9**
	1;11	Conversation	3	
		FPA	31	
		Read	37	**71**
	2;6	Conversation	1	
		FPA	22	
		Read	42	**65**
	2;11	FPA	72	
		Read	56	**128**

Table 3.1 (continued) Number of utterances produced in each recording by all children

As we can see, only one child ES, deviates markedly from this projected pattern of increased talkativeness over the period of these recordings. The growth in language use is parallel to that of hearing children in speech.

In addition to the above considerations and prior to considering the distribution of sign by context, (as revealed by scores in the tables above), it is of interest to consider whether the child or the conversational partner is more or less responsible for the initiation and termination of conversation in each sequence. This will permit an examination of the willingness of both conversational partners to engage in conversation and to terminate a conversational topic at an appropriate point. Table 3.2 shows the number of times adult or child initiated or terminated[4].

[4] Initiation is any sequence or subsequence which is begun by that person; termination is where that person has the last utterance before the topic changes and a new sub-sequence begins.

Table 3.2: Number of sequences initiated and terminated by child (C) and adult (A) across all contexts

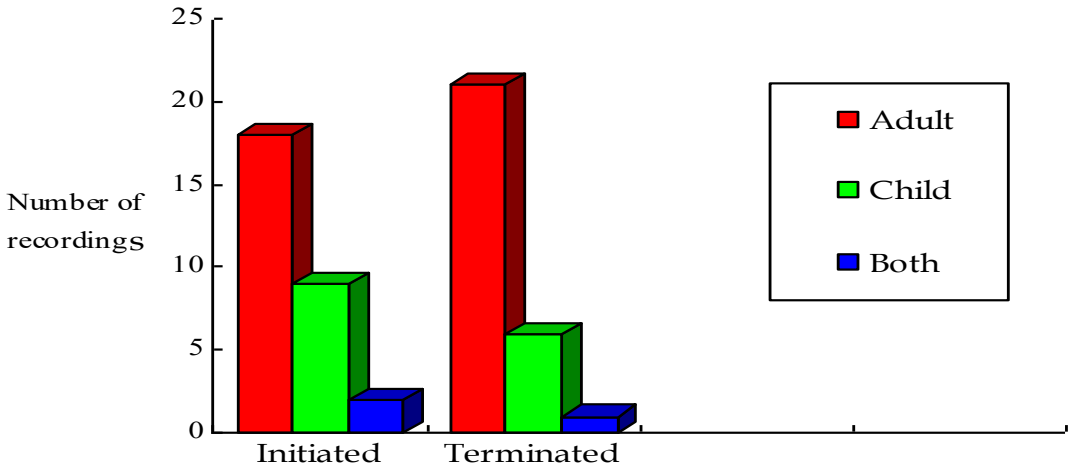
Child	Age	Number of utterances initiated by adult/child		Number of utterances terminated by adult/child	
AB	1;6	C = 10	**A = 16**	**C = 14**	A = 12
	2;1	C = 25	**A = 43**	C = 24	**A = 44**
	2;6	C = 13	**A = 18**	**C = 17**	A = 14
	3;0	C = 6	**A = 16**	**C = 11**	**A = 11**
JB	1;5	**C = 2**	A = 1	C =1	**A = 2**
	2;0	C = 8	**A = 36**	C = 21	**A = 23**
	2;5	**C = 20**	A = 18	**C = 21**	A = 17
ND	1;0	**C = 3**	**A = 3**	C = 0	**A = 6**
	1;6	C = 5	**A = 25**	C = 3	**A = 27**
	2;0	C = 7	**A = 16**	C = 8	**A = 15**
	2;7	C = 15	**A = 27**	C = 15	**A = 27**
	3;0	C = 15	**A = 18**	C = 14	**A = 27**
SH	1;1	**C = 12**	A = 11	C = 7	**A = 16**
	1;6	C = 3	**A = 10**	C = 4	**A = 9**
	2;0	**C = 11**	A = 6	C = 5	**A = 12**
GS	1;1	C = 7	**A = 8**	C = 0	**A = 15**
	1;7	**C = 5**	A = 4	C = 3	**A = 5**
	2;1	**C = 25**	**A = 25**	C = 17	**A = 33**
	2;6	C = 14	**A = 20**	C = 13	**A = 21**
	3;0	**C = 22**	A = 17	C = 10	**A = 29**
ES	1;0	**C = 2**	A = 1	C = 1	**A = 2**
	1;6	C = 6	**A = 20**	**C = 14**	A = 12
	2;0	C = 5	**A = 10**	**C = 11**	A = 4
	2;7	C = 2	**A = 4**	C = 0	**A = 6**
	2;11	C = 2	A = 2	C = 0	**A = 4**
ET	1;7	C = 0	**A = 3**	C = 1	**A = 2**
	1;11	**C = 17**	A = 7	**C = 15**	A = 9
	2;6	C = 13	**A = 16**	C = 13	**A = 16**
	2;11	**C = 18**	A = 13	A = 7	**A = 24**

In over a quarter of the sessions, deaf children initiated more frequently than the mother. Almost the same percentage applies in the case of termination. The latter is more understandable as we expect the child to be leading and because of the relatively high incidence of representative function (see later), it would be reasonable for the mother to make the last contribution in a sub-sequence. The low incidence of the child initiating, indicates a higher than expected level of control by the adult.

These results can also be seen in Figure 3.2 below.

It is clear from these findings that in almost all cases adults predominantly controlled the conversational floor, initiating conversational exchange and terminating conversational topic. These findings are not compatible with those briefly mentioned by Wells (1985:113), who comments that 'overall, children initiate about two thirds of the sequences of conversation'. He does however provide the caveat that 'this proportion may be lower in the earliest recordings'. Despite some slight individual differences within the data set available in this study it would appear that, predominantly, the initiation and termination of conversation in

Figure 3.2 Number of recordings where sequences are initiated or terminated by adult, child or in equal proportions



deaf mother/child interaction is determined and controlled by the will of the adult interlocutor. An example of this in the extreme can be seen in the data provided for ND in Table 3.2 above, in which her mother is found to initiate and terminate almost all conversational sequences at every age range. Deaf mothers appear to be more controlling.

3.2 DISTRIBUTION OF SIGN BY CONTEXT

The consideration of the occurrence of sign in differing conversational contexts is most important for the interpretation of the emergence of sentence meaning relations and function types. All conversation takes place within the bounds of a context. However, what is signed, influences and is in return, influenced by the context in which it occurs. For example, adult/child speech conversation at mealtimes often includes discussion of the food to be eaten, and invariably reprimands to the child for behaviour, which is often unbecoming to the event in hand. Some contexts impose a more structured conversational style, e.g. getting dressed, which is predominantly concerned with the mother controlling the child's movements in order to take clothes on or off. Other contexts have a less predictable structure and more creative style, e.g. free play with adult.

Therefore, in assigning utterances to contextual categories, it was important to consider both what was signed and the situation in which it occurred[5]. As shown in Table 3.1 above a total of seven contextual categories emerged in the data, and these included: Conversation; Eating; Free Play with Adult (FPA); Reading; Sleeping; Watching Television (T.V.); and Getting Dressed and Visiting the Toilet, (the latter two coded in the category of 'Toilet'). The number of utterances produced in each of these contexts by all children across all age ranges, was presented in Table 3.1 above. Table 3.3 below shows these categories as percentages.

As previously mentioned, all recordings were made at the convenience of parents, and this factor, in some instances, has implications for the interpretation of the results presented in the table above. For example, all recordings made of JB included lunchtime and therefore more conversational exchange occurred within the context of 'eating'. Parents also determined the type of activity with which the child would engage, e.g. book reading or free play. This parental preference can be seen in the results; for example, ND's mother strongly encouraged book reading and this is reflected in the fact that in 4/5 recordings (ages 1;0, 2;0, 2;7 & 3;0) conversational exchange predominantly occurred within this context.

Despite these considerations however it is clear that overall there is no change in the relative proportions of sign occurring in different contexts with increase in age. It is noticeable however as shown in Figure 3.3 that that there is a strong preference for story book reading, this context occurring at least once in 25/29 recordings. Free play with adult is also found in 20/29 recordings.

Table 3.3 Percentage distribution of sign by context and age

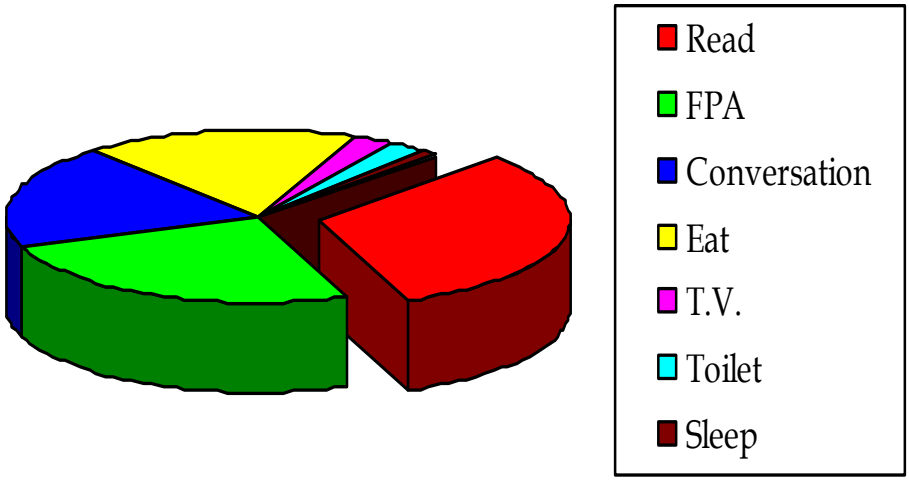
		1;0	**1;6**	**2;0**	**2;6**	**3;0**
Conversation	AB		3	9	0	22
	JB		0	0	0	0
	ND	0	29	14	12	0
	SH	52	0	49		
	GS	0	0	8	21	0
	ES	0	0	6	27	0
	ET		0	4	1	0
Eat	AB		0	3	0	45
	JB		50	55	54	
	ND	11	0	7	4	0
	SH	5	0	14		
	GS	0	0	0	1	8
	ES	0	5	0	40	0
	ET		0	0	0	0
FPA	AB		53	32	47	10
	JB		50	12	0	
	ND	0	39	0	35	34
	SH	43	48	32		
	GS	0	29	66	4	0

[5] This will be discussed in more detail in Section ? below.

	ES	60	41	72	0	0
	ET		100	44	34	56
Read	AB		43	55	53	24
	JB		0	33	42	
	ND	89	32	78	49	65
	SH	0	52	0		
	GS	100	81	23	74	66
	ES	40	54	22	33	100
	ET		0	52	65	44
Sleep	AB		0	0	0	0
	JB		0	0	0	
	ND	0	0	0	0	0
	SH	0	0	5		
	GS	0	0	0	0	0
	ES	0	0	0	0	0
	ET		0	0	0	0
Watch T.V.	AB		0	0	0	0
	JB		0	0	0	
	ND	0	0	0	0	0
	SH	0	0	0		
	GS	0	0	2	0	25
	ES	0	0	0	0	0
	ET		0	0	0	0
Toilet	AB		0	0	0	0
	JB		0	0	4	
	ND	0	0	0	0	1
	SH	0	0	0		
	GS	0	0	1	0	0
	ES	0	0	0	0	0
	ET		0	0	0	0

Table 3.3 (Continued) Percentage distribution of sign by context and age

Figure 3.3 Contextual categories occurring in recordings of all children (1;0 - 3;0)



The next most common are conversation (15/29) and eating (14/29), with watching television and toileting occurring only in two recordings. The greatest proportion of utterances of all children occur within this context, reflecting both the preference for story book reading and its convenience and also the benefit of this contextual category for the encouragement of conversational exchange in deaf mother/child interaction. One caveat is that this type of activity is very convenient to filming by a camera as it is one activity which is encouraged and which will keep mother and child in camera shot without too much difficulty. It is possible that the pressure of a researcher filming in this context may produce a higher proportion of this activity than would usually be the case in the home.

3.3 SIGN PRODUCTION AND INTERPERSONAL PURPOSE

Two main aspects are examined here:

- the production of function types in the sign across all subjects, contexts and at every age range;
- a comparison of function types appearing in the child's sign with those produced by his adult interlocutor;

Interpersonal purpose codings were made at three levels (see above): Sequence, Subsequence and Function. In this subsection, the frequency of functions in relation to subsequence modes will be described in relation to the age at which they were found to have been recorded. Prior to considering individual subject scores it is of interest to examine the relative frequency of the different subsequence modes across all children.

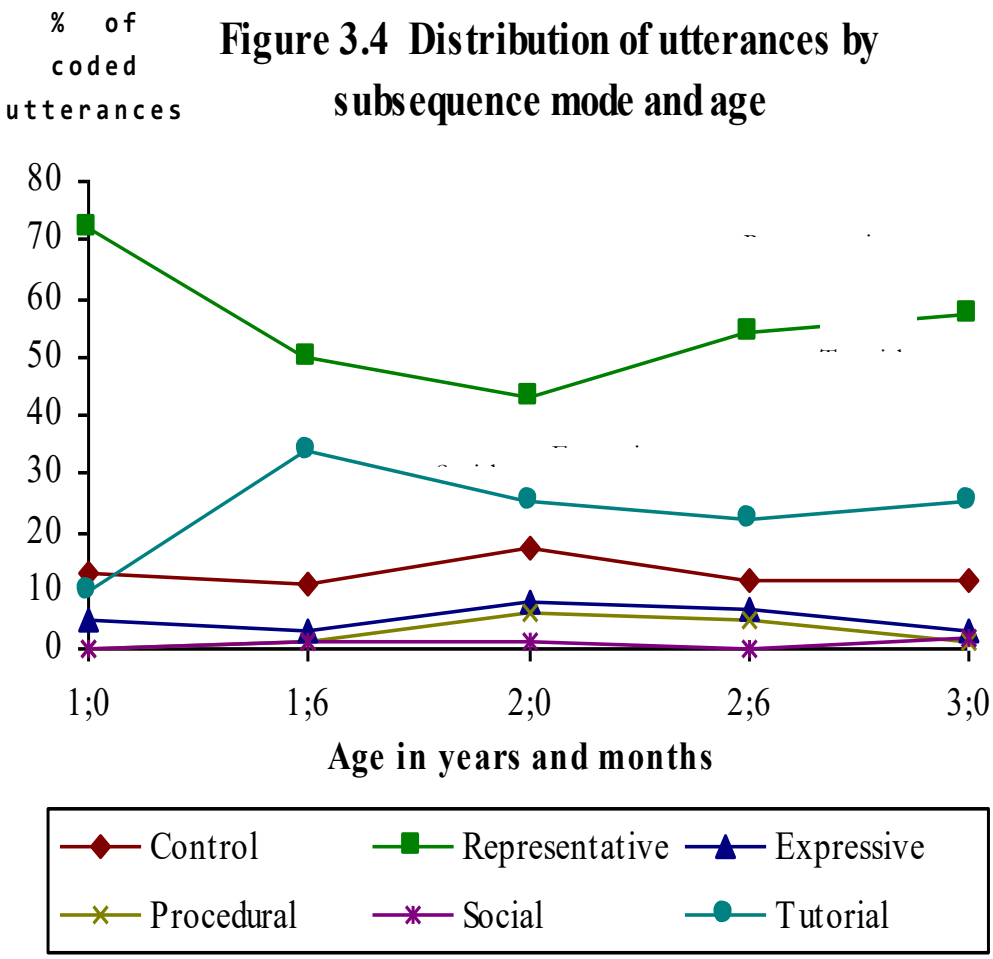


Figure 3.4 Distribution of utterances by subsequence mode and age

3.3.1 Subsequence mode

It is clear from Figure 3.4 that the relative proportions of utterances in the different subsequence modes remained similar at each age point. The main exception was the slightly greater proportion of Control functions as compared to Tutorial at age 1;0 in comparison to 1;6-3;0 years, in which the number of Tutorial functions exceeds those of Control. Representative utterances were most frequent for all seven children at each age grouping, and this is quite marked. The majority of conversations involved the exchange of information between interlocutors, either giving or receiving of information. One can perhaps account for such a preponderance of Representative utterances by recognising the number of indicative functions and simple ostensions being made across all data sets.

Second in frequency are Tutorial functions. A limited number of these were found to occur at age 1;0, however an increase in the number of these for all children can be seen at age 1;6

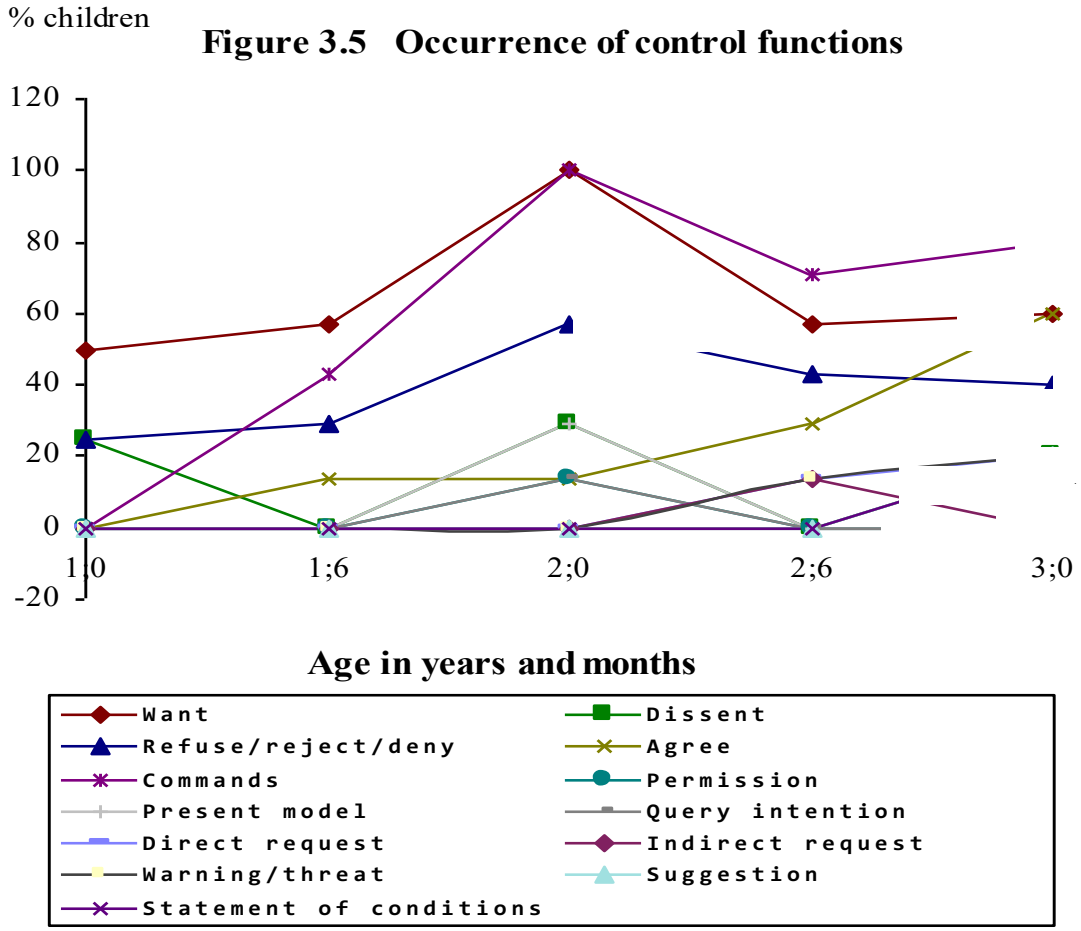
onwards. Finally Expressive, Procedural and Social Functions were found to remain constant across all age groupings.

3.3.2 Distribution of utterances by Function type

3.3.2.1 Control

The largest group of function types are subsumed under these category heading in the coding manual, and analysis of the data reveals that with increasing age there is an increase in the range of control functions produced across children.

Figure 3.5 Occurrence of control functions



At age 1;0 year two children, ND and SH (i.e. 50% of our data set at this age grouping) produced three different Control functions, including **Dissent, Refuse/reject /deny, and Wanting** functions. The appearance of these persisted throughout our data set, with **Wanting** statements being made by the majority of children at every age grouping. **Assent and Positive and negative commands** were found in the analysis of seven children at age 1;6. Agreement to do what was asked was only produced by SH, however commands were made by three children (AB, SH and ES). At age 2;0, three more control functions are found

to appear in the data, reflecting a development in the children's ability to converse socially and question speaker intention, these included **Permission to do something/acknowledge/ or accept, repetition of an adult's model utterance,** and **Query intention.** At age 2;6 **Direct and Indirect Requests,** in addition to **Warning or threat** functions first appear in the data set. Finally, at age 3;0 a further two functions were found to appear in the data, these included **Suggestion** and **Statement of conditions under which event will take place**, demonstrating the acquisition of the subtleties of Controlling functions**.**

Therefore the range of functions appears to increase from the production of three different types at age 1;0 to the maximum of nine at age 3;0 as shown in table 3.4 below.

Table 3.4 Control Functions at ages 1;0-3;0 years across subjects

Age	**Control Function Types**
1;0	Dissent; Refuse/reject/deny; Want
1;6	Assent; Commands; Refuse/reject/deny; Want
2;0	Assent; Commands; Dissent; Permission; Present model; Query Intention; Refuse/reject/deny; Want
2;6	Assent; Command; Direct request; Indirect request; Refuse/reject/deny; Want; Warning or threat.
3;0	Assent; Command; Direct request; Dissent; Refuse/reject/deny; Suggestion; Statement of condition; Want; Warning or threat.

Comparison of these findings with the Well's data (1985:176ff) for spoken language acquisition suggests that a similar pattern of emergence occurs[6], although five categories were withdrawn from analysis (i.e. Performance of command to Verbalise; Assent, Refuse, Reject and Acknowledge) since they predominantly involved the vocalisation of only one word. Wanting was the first function type to emerge in his data, followed by requests (including commands), queries, offers and suggestions. The appearance of permission, warning and threatening functions took much later to reach significance within his data set.

Further analysis of the production of control functions by context across the data set reveals that specific function types are produced within certain contexts, such that for example eight function types were recorded in the context of FPA, whereas only one was recorded in the contexts of Getting Dressed, Sleep and Toileting. The results are summarised in Table 3.5 below.

[6] One must remember that Wells' data included a much larger data set of children and all findings have been proven statistically.

Table 3.5 The Production of Control Functions in differing Contexts

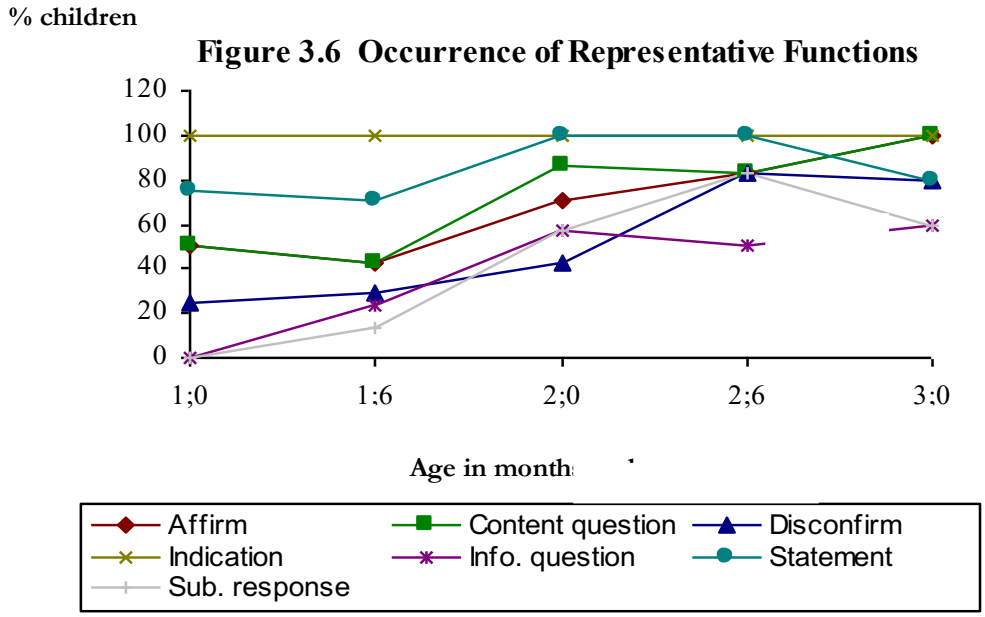
Context	Control Function Types	No.
Eat	Assent; Command; Dissent; Permission; Present model; Refuse; Statement of Conditions; Want	8
FPA	Assent; Command; Dissent; Direct request; Indirect request; Query intention; Refuse/reject/deny; Want; Warning or threat	9
Get dressed	Want	1
Read	Assent; Command; Dissent; Refuse/reject/deny; Suggestion; Want; Warning or threat	7
Sleep	Dissent	1
Talk	Assent; Command; Dissent; Refuse/reject/deny; Want	5
T.V.	Assent; Want	2
Toilet	Want	1

It is apparent therefore that certain function types are produced within particular activities, for example, although Want unsurprisingly appears in all contexts it is found to be the only function category to appear in Toileting and Getting Dressed. Dissent is similarly the only function to appear in the context of Sleep. Permission to do something, Principle of behaviour and Statement of Conditions under which an event will take place, are produced only whilst eating, and requests and queries are only made when at play with adult interlocutors. Further, Warnings and Threats were only found in two contexts: free play with adult and reading.

In summary therefore, it is apparent that an increasing number of Control functions are produced with increase in age and that some Control functions are contextually bound. The production of Representative functions in signed data will be considered next.

3.3.2.2 Representative

Unlike Control functions the range of Representative functions does not increase greatly with age across the data set. Figure 3.6 below reveals the occurrence of Representative functions across children.



Indication (or 'Ostension') is one of the first categories to emerge in the data and appear in the sign of all children. This function was found to occur when the child wanted to draw something to the adult's attention and frequently involved simple utterances with a point e.g. THAT CAR THAT or simply THAT. It would appear that by the use of these utterances the children are predominantly naming objects or attempting to establish joint referencing in order to initiate or sustain conversational exchange. Wells (1985:180) refers to such early utterances as 'proto-representational', preferring to refer to the following functions as truly 'representational'. For example, close behind 'Indication' is the production of Statements, appearing in 75% of the subjects sign at age 1;0, increasing to 71% at age 1;6, and to 100% at ages 2;0 and 2;6, dropping slightly to 80% at age 3;0. The number of children using affirmations and dis-confirmations also increased with age. Content questions were produced by 50% of the data set at age 1;0, 43% at age 1;6 and increasing to 86% and 83% at ages 2;0 and 2;6. All children produced this function type by age 3;0. Indirect questions did not appear in the data until age 2;0, and the number of children producing this function type also steadily increased with age. Few children produced Substantive responses to content questions until age 2;0. Explanations or Request for Explanations were found in the data at all. Similar findings to this were reported in Wells (1985:180ff), similarly finding that Explanations and Request for Explanations did not reach significance until the age of 5;0.

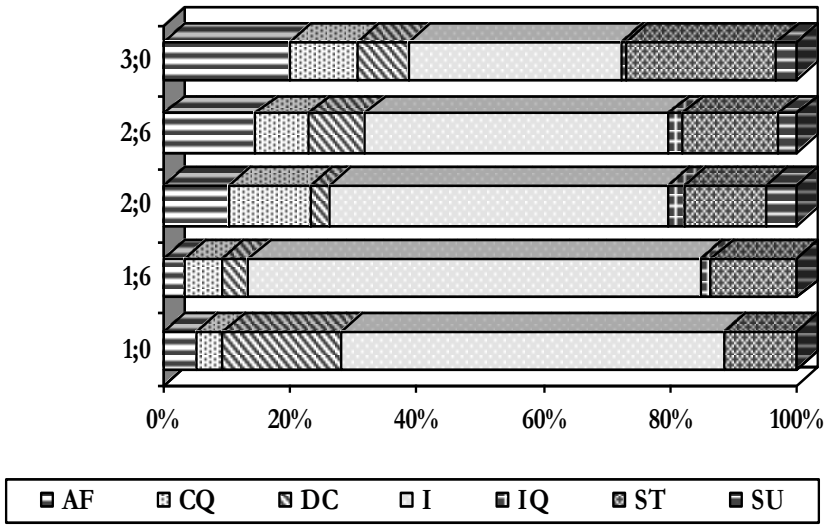
Calculation of the raw data, averaged across children and including all contexts, suggests that there is a general increase in the production of representative functions over time with increasing age, as shown in Table 3.6 below:

Table 3.6 Number of different function types across the range of age groups

	1;0	1;6	2;0	2;6	3;0
Affirm	5	4	29	47	70
Content Question	4	7	36	27	38
Disconfirm	18	5	8	28	29
Indication	58	85	149	155	118
Indirect question	0	2	7	8	3
Statement	11	16	36	49	84
Substantive response	0	0	13	9	11

Interestingly the number of Indicative utterances rises steadily up to 2;6, and as shown in Figure 3.7 below proves to be the largest category of Representative Functions up to 3;0. However, the comparative reduction of this category at age 3;0 is almost mirrored by the increase in the number of Statements. This development suggests that the children are progressing from the conveyance of known, shared information to that of 'new' more elaborate information. Moreover Indirect questions did not appear in the data until 1;6 and Substantive Responses to content questions until age 2;0.

Figure 3.7 Proportion of Representative Functions at each age grouping



Finally, few Representative functions were found to be context dependent, however none appeared within the contexts of 'Getting Dressed' or 'Toileting'.

3.3.2.3 Expressive

Expressive functions were produced by a limited number of subjects in the data set up to the age of 2;0. Only one subject produced them at age 1;0 and two at age 1;6. Of those

produced at the earliest age grouping, Exclamation and Disagreement were the first to appear. Since these utterances consist of only one sign it is perhaps unsurprising that they should appear at this age. Moreover, Challenge and Verbal/Sign Accompaniment to Action were first found at age 1;6. At age 2;0 all subjects produced Expressive functions, and this increase is accompanied by an increase in the range of functions produced, to include all those listed at age 1;6, in addition to Agreement and Positive/Negative Reinforcement of the interlocutors utterances. Moreover at 2;0 and 2;6 a further two Expressive function types appeared in the data, i.e. Encourage and Deride or Goad. This increase in the range of Expressive functions reflects the development (as in spoken language acquisition, Wells 1985:179) from predominantly self-orientated expression to reactions towards the actions and utterances of others, as reflected by positive and negative reinforcement and the ability to goad, deride and encourage. The latter moreover reflects an emerging conversational maturity in which the child is learning to monitor and react towards the conversation of his interlocutor, in addition to analysing the significance/worth of his interlocutors opinions and perhaps therefore also influencing their subsequent action.

Analysis of function type by context reveals that the largest range of Expressive function types are produced whilst eating, playing or reading. Expressive functions were also found however in conversation, whilst watching the television and toileting. A summary of these is provided in the table below:

Table 3. 7 Range of Expressive Functions by Context

Context	**Function Type**
Eat	Disagree, Encourage, Exclamation, (+/-) Reinforcement.
FPA	Agree, Disagree, Exclamation, (+) Reinforcement, Verbal/Sign Accompaniment to Action.
Read	Agree, Deride or goad, Disagree, Exclamation, (-) Reinforcement.
Conversation	Exclamation, (+) Reinforcement, Verbal/Sign Accompaniment to Action.
T.V.	Exclamation
Toilet	Disagree

Encouragement was only found in the context of Eating, a reflection perhaps of adult behaviour towards the child in attempting to encourage him/her to eat. In contrast however, Exclamation appeared in all but one context (Toilet) reflecting the children's' projection of their own feelings. Positive and negative encouragement were found in four contexts. A high percentage of adult conversation with young children includes their positively or negatively reinforcing the actions/utterances of their children and this is perhaps reflected within their children's projection of this to their adult interlocutors.

No examples were found in the data of Apology; Query Feelings or Attitudes; Report of Behaviour; or Assignment of Blame to third person. Each of these categories are reported (BLADES) as appearing comparatively late within children's spoken language acquisition also.

3.3.2.4 Procedural

Procedural functions are concerned with opening conversational exchange or repairing it on breakdown (e.g. calls for repetition or clarification). No procedural functions were produced

at age 1;0 and the first to emerge at age 1;6 unsurprisingly were calls to Attract Attention, produced only by 3/7 subjects. All subjects produced such attention seeking devices at age 2;0, in addition to one subject (ND) demanding clarification of a speakers previous utterance, and two others, (AB & JB) requesting repetition. Although it may appear that these children genuinely wish to request clarification or repetition of an utterance due to misunderstanding, or misinterpretation, it is also possible that at this age they wish to use these procedural devices to maintain conversational flow. Finally, at age 3;0 one subject (ET) was found to produce a response to an attention-seeking device.

Examples of the above include waving, banging objects, pulling adult's arm and shouting.

3.3.2.5 Social

As expected, few occurrences of social functions were found in the data. None appeared until age 1;6 and these included politeness forms in the context of eating, and greetings (e.g. HELLO, GOODBYE) in imaginary play with adult. At age 2;0 5/7 children produced greetings in the contexts of reading, sleeping and free play with adult; politeness forms in the context of eating and free play with adult; and one (JB) produced a ritualistic game (counting). At age 2;6, 2 children (ND & ET) produced greetings in free play with adult, and again at age 3;0 whilst reading, in addition to child ES who produced GOODBYE at the termination of a television programme.

3.3.2.6 Tutorial

This function type is developed subsequent to stimulus from the adult interlocutor, and tutorial subsequences are therefore predominantly initiated by adult signers. The first category to emerge in the data set is that of Imitation or Repetition of the adult form appearing in one child's (GS) sign at age 1;0. At age 1;6 three children (AB, JB & GS) were found to produce Imitations or Repetitions of the adult sign in addition to two children (AB & ND) producing responses to tutorial questions, e.g. Adult: WHAT THAT ? (what's that) Child: CAT (a cat). At age 2;0 however the range of tutorial functions appears to increase to include Expansions (e.g. Adult: CAT THERE Child: BLUE CAT SIT THERE); Negative Statements + correct form (e.g. Adult: RED BEETLE THAT (that's a red beetle) Child: NO BLUE BEETLE THAT (no that's a blue beetle)); and Response to a framed question (e.g. Adult: DOG EAT..... Child: FOOD). At age 2;6 a further two function types were found to appear in the sign of AB and GS. These included the child imitating his mothers tutorial questioning by his production of a question with a known answer (e.g. WHAT'S THAT? DOG) and supplying a required form, (e.g. Adult: SIGN YOU COW (sign 'cow') Child: COW).

Tutorial functions were found to be predominantly produced within the contexts of Reading and Free Play with Adult, although also being produced whilst in Conversation and Eating. The total number of tutorial functions per age grouping and context is represented in Table 3.8 below:

Table 3.8 Number of Tutorial Functions produced in different contexts and at different ages across the data.

	Read	Free Play with Adult	Eat	Conversation
1;0	14	0	0	0
1;6	39	8	3	2
2;0	94	46	14	6
2;6	111	21	9	2
3;0	133	32	1	6
Total	**391**	**107**	**27**	**16**

It is quite obvious from the results in the table above that the majority of tutorial functions were produced in the context of reading. These mainly consisted of responses to tutorial questions, such as, Adult: WHAT THAT ? Child: SPOT. In the youngest age groupings tutorial subsequences invariably consisted of two turns: a question by the adult and a response by the child. With increasing age however a different pattern was found to emerge, with an increase in the length of the subsequence, such that the mother would first question the child, e.g. WHAT THAT?, the child would then respond, e.g. HIPPO, and the mother would then expand upon the child's utterance, e.g. BIG HIPPO THAT, and the child may then repeat the mother's utterance or further expand upon it. Moreover another pattern can be seen to emerge involving the mother first questioning the child, e.g. THAT ? (what's that ?), the child then responding, e.g. CAT, the mother then replying with a negative statement and correct form, e.g. NO DOG and the sequence/subsequence culminating in the child imitating the mother's utterance. This increase in subsequence length is undoubtedly related to morphosyntactic development in addition to length of attention span.[7]

Having considered the distribution of sign by Interpersonal Purpose, the following section will discuss the incidence of sentence meaning relations.

3.4 DISTRIBUTION OF SIGN BY SENTENCE MEANING RELATIONS

In adherence to the analysis employed by Wells (1985), a method of 'rich interpretation' was used, such that both the utterance form and the context in which it was made were taken into account when coding the data. In the analysis of the data all incomplete and uninterpretable utterances were omitted from analysis, and all remaining utterances were analysed according to their core meaning. Only one code was given per utterance, according to the appropriate meaning relation, i.e. Location; Possession; Temporal; Experience; Attribution; Function and Purpose (see Coding Manual in Appendix 1).

[7]Neither of these variables have been tested in this study however it would be interesting to take these into account in any future study.

3.4.1 Location

As with function types, the range of locative meanings is found to similarly increase with age across the corpus of children. At age 1;0, 3/4 children had produced two different types of locative meaning, including utterances concerned with the stationary position of a person/thing, and predominantly at this age, early sign utterances which included only one or two signs, e.g. UP, THERE.

At age 1;6 6/7 children produced utterances with locative meaning, and an additional two categories were found to be produced, these included utterances where there is a 'change in location', e.g. BOOK ME PUT THERE (I put the book there); and 'an action causing the contact of person/thing with another', e.g. KISS, HIT.

At age 2;0 the range of locative categories across the corpus rose to seven, with the appearance of a further three more subtle meaning types, including 'agent moves himself no change of location', (e.g. BOY HOPPED); 'agent moves himself causing change of location' (e.g. BOY HOME RAN); 'object moves or an agent causes the movement of an object/person, with no change of location'(e.g. BOAT BOY ROCKED).

No further categories emerged at age 2;6 or 3;0 years.

It would seem therefore that the earliest categories to emerge in the sign data were predominantly those related to the stationary position of a person or object. This phenomenon is very much related to the high number of operator and/or nominal utterances in the data, which included a limited number of single sign utterances, e.g. UP, THERE. These however were clearly rapidly complimented by the appearance of utterances describing manner of movement, e.g. CAT OUTSIDE (the cat is outside) (i.e. 'change of location') and 'action on target', and increasingly, the appearance of both movement and change in location in the same utterance.

These results pattern similarly to those reported in the emergence of spoken language locative meaning, as reported by Wells (1985:149), who similarly noted that the first locative relation to be expressed in early child speech is that relating to the stationary position of a person or thing, and the last, those that specify the directional goal in addition to the manner of movement or directional goal in addition to action on the target. The latter two sentence meaning relations did not appear in the data.

3.4.2 Possession

This category includes meaning relations associated with the ownership or potential ownership of an object, and consists of a limited number of meaning types, i.e. four. Only two emerged in the data, these included utterances describing static ownership e.g. BOOK THAT MINE ('that book is mine'), and utterances describing change in possession, e.g. CAKE GIVE ME ('give me the cake'). None were recorded at age 1;0 and only 'change in possession' utterances appeared at age 1;6, produced by SH & ES. Utterances describing the

static possession of objects were not found in the corpus until age 2;0. Moreover a limited number of possessive utterances occurred overall, compared to other meaning relations.

Possessive utterances were found only in three conversational contexts: eating; free play with adult and reading. Both change in possession and static possession occurred whilst eating, e.g. SANDWICH GIVE ME ('give me the sandwich); DRINK MINE ('that's my drink') and similarly when playing, e.g. FOUND DOLL ME ('I've found my doll') and TEDDY MINE ('the teddy's mine'). Only static possession was found in the context of reading.

3.4.3 Time

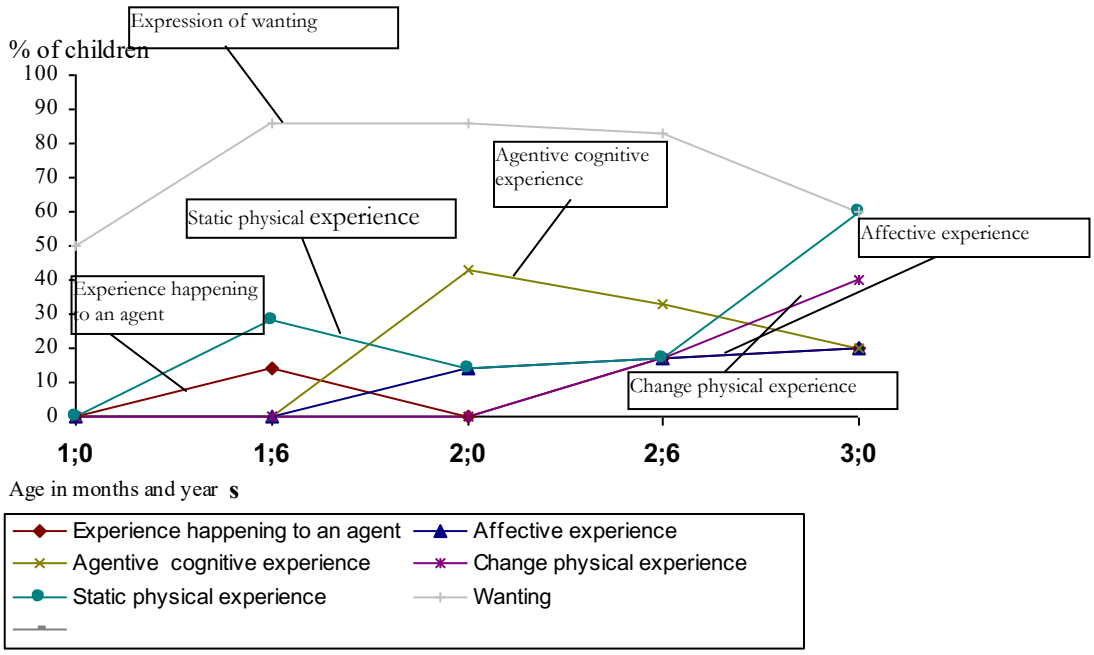
There is only one meaning type available under this heading, and it includes 'an utterance where the only topic is the time of an event or the passage of time', e.g. LUNCH-TIME. Such utterances occurred infrequently in the data, appearing first in our corpus at age 2;6 in the sign of AB and ND, and appearing once more at age 3;0 and additionally in the sign of GS. Only nine such utterances were recorded across the entire corpus.

3.4.4 Experience

Experiential meanings of utterances are related to the experience of animate beings, and have been divided into four different categories in the analysis: notably Wanting; Perceptual or mental states and actions; Emotions and feelings and Physical state.

The first category to emerge in the data was that of 'wanting', which first appeared in the sign of two children (ND & SH, i.e. 50% of our data set) at age 1;0. This meaning type proved to be, perhaps unsurprisingly, the most commonly occurring category throughout our data set, as reflected in Figure 3.below:

Figure 3.8 Occurrence of Experiential types



With increase in age, there appears to be an increase in the range of meaning types throughout the data set. At 1;0 only one meaning type is apparent in the data (i.e. want); at 1;6 two others appear, (i.e. experience happening to an agent e.g. THINK ME RIGHT (I think I'm right), and static physical experience, e.g. HOT ME (I'm hot)). Moreover at age 2;0 a further two categories appeared, to include affective experience, e.g. DON'T LIKE CAKE ME (I don't like cake), and agentive cognitive experience e.g. LOOK ME (look at me). At 2;6 and 3;0, six different experience types were found in the data, five of which had appeared in the previous age groupings, in addition to 'change of physical experience' (e.g. WILL WORSE WORSE, (it will become worse and worse)).

Figure 3.8, moreover, not only demonstrates an increase in the range of meaning types within the Experiential category but also an increase in the number of children discussing such features as: Static physical experience; changes in physical experience; affective experience and so on, in addition to a decline in the production of 'wanting' statements from age 2;6 to 3;0. This apparent decline may be due to children's linguistic and social development in other areas, such that direct and indirect requests serve to replace the expression of bland 'wanting' statements with increase in age.

3.4.5 ATTRIBUTION

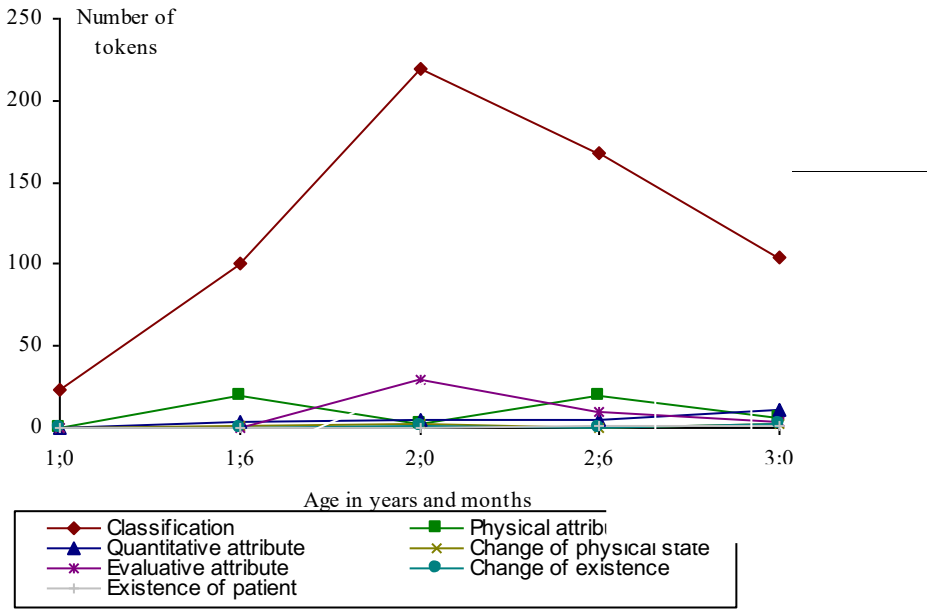
It would appear that a high proportion of the children's utterances are related to attributive meaning, and this is reflected in the extended range of meaning types across the corpus. It would seem that the high incidence of this category is due to the apparent focus in early deaf mother/child interaction upon naming and vocabulary teaching.

At age 1;0 children's utterances consist only of static classification or naming, e.g. DOG/DOLL/TREE. However at age 1;6, one child (AB) was found to produce utterances concerning quantitative labelling, i.e. THREE BEETLES, in addition to noting the observable physical attribute of a patient, e.g. BLUE BEETLE. Another, (SH) commented upon an observable change in physical state, e.g. CUP FELL BROKE ('the cup fell and broke'). At age 2;0 a further two attributive meanings were identified in the data set and unlike age 1-1;6 in which only two child produced more than one different meaning within the 'Attribution' category, 6/7 produced more than one; 2/7 producing four different meaning types. The additional attributive meanings at this age included the evaluation of a patient on social or moral grounds, e.g. CAKE NICE (the cake is nice), which was produced by 6/7 children, in addition to the category 'change of existence', e.g. LEGO MAKE HOUSE ME (I'll make a house with Lego). At 2;6 and 3;0 a further meaning type was noted to have been introduced into the sign of JB and AB, and this included utterances concerned with the existence of a patient, e.g. FAIRY'S HAVE ? (do fairies really exist ?). The only meaning relation not to appear in the corpus was that of 'Change of classification or equivalence'.[8]

A comparison of the number of meaning relation tokens across children at each age grouping reveals that naming (or classification) is the main meaning relation to appear in the children's sign, as highlighted in the Figure 3.9 below:

[8] This is noted to be the last meaning relation to appear in spoken language acquisition of attributive meaning Wells 1985:151.

Table 3.9 Number of Attributive meanings



As previously noted the high incidence of this meaning relation can be attributed to the preponderance of object naming and vocabulary teaching in the corpus.

Wells (1985:247) similarly notes that the comparatively high frequency of classificatory meaning continues in spoken language development up until the child reaches the age of four, at which point there is a decline, only to be found to rise again at the age of five[9].

Finally, no attributive meanings proved to be necessarily context dependent.

3.4.6 FUNCTION

A heterogeneous range of eight function types are within the coding manual, and of these only two appeared in the sign sample, i.e. the characteristic action of an agent, e.g. DADDY WORK (daddy works), and the characteristic function or change of function of an inanimate object, e.g. BELL-RINGING (the bell is ringing). The former appeared in the sign of two subjects at age 1;6 (AB & GS); four subjects at age 2;0 (AB; ND; ES & ET); two at age 2;6 (i.e. AB & ND) and two at age 3;0 (AB & GS). Moreover the characteristic function or change of function of an inanimate object only appeared at age 1;6 in the sign of two children (ND & ET) and at age 3;0 in the sign of one subject (ND).

[9] This apparent resurgence is attributed to parental tuition of vocabulary prior to the child's attendance at school.

It is possible that the apparent scarcity of function types (both in number and range) may be due to adult concentration upon the naming of patients rather than actions, therefore influencing the emergence of these in the child data.

3.4.7 PURPOSE

No purpose meaning relations, (i.e. concerned with the use or purpose of an object) were found in the data at any age grouping.

CHAPTER 4: IMPLICATIONS

In one sense the project's conclusion can be simply expressed as the confirmation that deaf children acquire language to the same extent that hearing children do when they are offered the right circumstances. Such a statement could not have been made prior to this research work, except in theory. Yet this simple conclusion would not do justice to the extent of analysis which has gone into the statement. Deaf children's utterances have been encoded and examined for the period from one year to three years. The pattern of growth is complex and the progress is uneven because of the small numbers of children, but the end point is clear.

- By the age of three years deaf children are exhibiting in their production, the range of control functions (wants, commands, requests, assent/dissent, warning, suggestion) which hearing children will show in speech.

- By this time, deaf children show the use of representative functions, which are consistent in range at each age (affirmation, indication, content questions, statements, dis-confirmation, indirect questions); there were few examples of explanation or request for explanation.

- Expressive functions appeared later (in the third year) although all children showed it at this time. Agreement, encouragement, reinforcement, exclamation, sign accompaniment to action all appeared in the data.

- Procedural functions to open and close conversations and to repair breakdowns also occurred with all children producing calls to attract attention.

- Social functions were apparent but relatively fewer than for hearing children. Deaf children do not interact with other deaf children to a great extent at this age.

- Most tutorial functions are initiated by adults but there are a range of functions which emerge in the child's data in book reading situations.

- In meaning, we find examples of location, possession, time, experience and function.

- More interactions are initiated and terminated by adults (in contrast to hearing children's experiences).

- More extensive interactions occurred in book reading situations than in typical eating, toileting, bathing situations which would be used by hearing people. Book reading produced the richest data, followed by free play with adults.

These findings are indicative of the constraints of the signed language which the families use and we can add some general points from the analysis:

- Deaf children tend to produce fewer utterances than do hearing children at the same ages
- There are more one sign utterances than one word utterances in hearing children
- The extent of interaction tends to be less at this period (one to three years)
- Parents tend to intervene more than with hearing children, in order to initiate and to end sequences

These differences are however only superficial in terms of what we see as more fundamental differences in the use of a visual modality for language. As has been discovered in other research, deaf children have to spend a good deal of their early time in interaction, in dealing with attention. This is mostly to learn sequences for attracting and responding to attention and for dealing with the inherent divided attention which exists for most of the time in interactions where there is a third party or an intervening object. Although sign language structures can be simultaneous in realisation, deaf children have to learn to manipulate the language and interaction in a divided and hence consecutive way. In order to describe a picture to the mother, the deaf child has to

- obtain attention, by waving or touching
- indicate the focus of attention by pointing or holding in the line of sight
- check that the other partner is looking by monitoring his/her line of sight
- re-obtain eye contact
- and then offer an utterance to explain or to question
- Await a response, checking that the other person is on task
- react to the response and continue or terminate the interaction

Such a procedure is relatively complex compared to the speech overlay which the hearing speakers can use. The child uses a nominal to obtain attention indirectly (Mummy!) or directly on the object (Look at what I've made!) and then with limited monitoring, the child can continue the description, assuming that the mother is not blocking out the speech sound in some way or has left the room.

These are constraints of the modality which affect early interactions and the extent of utterances which are produced at this time. As with all relative constraints in language use, the advantages of a visual language are seen in other ways later in development. Deaf children's utterances become much more extensive as they grow older and the visual domain

can be exploited for simultaneity and for the use of spatial features for the realisation of the syntax of the language. We did not in this project, make any detailed examination of the syntax of the deaf children.

We are left with the broad conclusion that sign language development is different in its realisation but similar in its capabilities for deaf children up to the age of three years.

Much remains to be done with this form of analysis. The fact that the data can now be encoded effectively means that we can re-visit the materials and ask further questions of it. We can add the coding for further utterances (only 100 per child were included at each age group). However, two main issues have emerged which will need to be resolved or acted upon.

(1) the nature of visual data and the relative importance of non-linguistic features in interaction is complex.

(2) there are considerable implications for the hearing parents of deaf children (the majority) who will attempt to apply a hearing style of interaction with their deaf children and who are likely to experience problems with this.

(1) VISUAL INFORMATION

There are two basic problems in handling visual language data in this age group. The first is in the distinguishing of a sign from a gesture (or indicative movement) and the second is in describing inflection in the sign and deciding whether it is significant in syntactic terms.

There are rules which one can apply for signs which will allow some discrimination of signs from gesture (eg a sign will be used repeatedly, in different contexts and for objects not present - in order to be classed as a sign). However, the corpus of data which most researchers must work on may not allow these judgements since there is simply not enough productive data available. There is a secondary problem in how to deal with non-manual or apparently non-sing signs (gestures) which seem less important in speech interaction and have therefore not been full described. These include nodding, and head shaking for agreement and negation, the use of pointing (using fingers, whole hands or even whole body) and the use of physical action (pulling away, feigning fear, surprise, etc.) which although apparently non-linguistic in speech are incorporated into sign language and can bee seen in deaf adult's interactions. There is some ongoing discussion about what can be termed linguistic in adult sign but the debate is not conclusive and does not help us in our analysis of children.

In addition, of course, the signing of children is not well developed in the control of the handshape and the movement. Where there are differences in handshape or movement, we have a number of choice - it is just a baby sign, it is simply a poorly formed sign, it is wrong, it is an attempt at a modulation of the sign, or it is part of a game. We do not as yet have an easy way of distinguishing among these.

(2) PARENTS' INTERACTIONS

Deaf parents develop a means of interaction with the child which is appropriate to the modality and to the language. We have seen this in previous research and we have utilised it in our intervention programmes. It is apparent in the data which is described above. Deaf mothers wait longer for eye contact, yet intervene more, use shorter utterances and almost *teach* attention. Hearing mothers usually discover that the child is deaf after 6 months of age (beyond the time when the deaf mothers have begun the training of the child's pre-language skills). At the same time, the hearing mothers' early successes in interaction are misleading. The deaf child has the same pattern of development of visual acuity and of eye-hand co-ordination. The inter-subjectivity development is similar (the child is able to hold objects, attend to object and indicate objects in the same way). However, at the point at which spoken language becomes a key factor in the interaction, the hearing mother with a deaf child begins to experience failure. Such a failure, which is often not consciously recognised, leads to an adjustment. The mother reduces the demands on the child and acts directly when necessary. The mother, receiving little verbal feedback, reduces the number of times she initiates conversation, and uses more direct means of interaction - taking toys away, pushing toys into the child's line of sight, lifting the child physically away from the object or environment. Since this in turn, produces frustration and provokes tantrum behaviour, again the mother tries to avoid this or, more significantly, sees the interaction as a tussle of wills and strives to assert herself. One can see in this, the spiral of reduced communication leading to behavioural problems and weaker socialisation - all of which are common symptoms in families with deaf children. While the behaviour suffers, the language is non-existent. Pre-school intervention has focused on the teaching of speech and so much of the interaction at the age of two years may be rule-bound and constrained by simple games or tasks offered by the family's teacher/consultant. The child's lack of success in spontaneous language may be rolled up in a general weakness in interaction, but which the parents are attending to by reducing language demands and interaction to a minimum and in which some speech progress can be made. Although there can be progress in speech and while hearing aids may have improved to the extent that the child can receive speech sounds, the situation is inherently unsatisfactory. The problem arises in the adoption of an inappropriate interaction pattern.

There is no reason to imagine that early use of signing by deaf children would in some way affect their capacity to hear and then their capacity to develop speech. In fact, any reasonable theory of language would imply that it would be positively advantageous if the child could be shown to have mastered the functions of language in a different modality. This research has to reflect this situation and it has a commitment to develop the findings in a way, which can be used with hearing parents.

In the original proposal it was intended that a full-scale description of deaf children's language development would lead to a parents guide. In practice something less than this can be achieved and yet also something more. What has developed is not a single manual of guidance for parents, but a set of procedures and actions which have been fed into the practice for a Family Centre which we have been involved in setting up in Bristol.

Several actions have occurred:

- Saturday schools for families of deaf children
- training programme for deaf workers to allow them to be more responsive to the needs of parents and young children
- Workshops and meeting for parents
- a set of guidelines for the preparation of the support materials for parents (appendix 4)

Project staff have been involved in all of these and the progress of the Family Centre indicates how much of a demand there is for this application of research.

IN CONCLUSION

The project has been one of considerable significance in the field of deaf children's acquisition of language. It has been linked with development s at European level (as described in the interim report) and with local developments of a family centre. The research component has confirmed deaf children's' language competence and capabilities. It will require further publication to share this with colleagues in the research field.