Child-infant interaction: a micro-analysis

Thesis

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Child-Infant Interaction: A Micro-analysis

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ABSTRACT

Child-Infant Interaction: A Micro-analysis

Thirty-two children were video-recorded in face-to-face interaction with 10 month old infant partners. The child sample comprised equal numbers of two age groups (4 & 7 years), two experience levels (with & without baby siblings) and the two sexes. The sample of babies was similarly balanced for sex and experience with older siblings. The dyadic interactions were subjected to frame-by-frame analysis.

The speech and behaviours of the children were classified according to a category system pertaining to the speech style, Motherese, and the caregivers' repertoire of behaviours. Social-approach behaviours and number of responses to babies' overtures were also noted. A sample of mothers interacting with their infants was included in the analysis to provide a source of comparison with the children.

The babies' behaviours were classified according to the number of vocalizations and social-approaches made.

The emergence of child-infant interaction skills is discussed, with special reference to the evolution of the speech style, Motherese, and the caregivers' repertoire of behaviours. The different aspects of interaction - speech style, behaviours, approaches and responsiveness, were found to vary in the child as a function of age, sex and experience with a baby sibling.

Social-approach behaviours in the baby were found to vary according to experience with an older sibling. There was no variance in the babies' behaviours due to sex.

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CHAPTER 1

Introduction & Review

Mother-Infant Interaction

The micro-analysis of mother-infant interaction has been well researched, cataloguing the unique vocal and behavioural style that the mother adopts when talking and playing with her young infant (Snow, 1972, 1977; Newport, 1976; Newport, Gleitman & Gleitman, 1977; Stern, 1977). The function of this specific vocal and behavioural repertoire is seen to be to attract and maintain the infant's attention upon the mother's face or actions, thus establishing a point of joint reference upon which further interaction can be based.

The speech style, Motherese, can be described in terms of both its production and its content. In production, it contains many exaggerations of stress, pitch, loudness and speed. A high proportion of the speech is high pitched. These exaggerations may be cues to the infant that maternal speech is addressed to him/her and may serve to direct his/her attention into the interaction (Sachs & Devin, 1976).

The content of Motherese is comprehensively described by Newport, Gleitman & Gleitman (1977) and by Snow (1977). The lengths of utterances made to infants are shorter than those made to an adult. There is little unclear speech and frequent interjections and deletions occur. These adaptations serve to maintain a short, clear

speech style, suitable for the limited attention span and processing capacity of the infant. Possibly for these reasons, the speech is also often repetitious and thus displays a good deal of semantic redundancy. Furthermore, a high proportion of imperatives and questions, both of structure and intonation, are used to direct and control the infant's behaviour or attention (Schaffer, 1978), and frequent deictic statements are included to direct attention to points of joint reference.

Snow (1977) portrays the adoption of this speech style as an attempt by the mother to establish a conversational mode in interaction. The mother's speech is structured so that it signals to the infant that a response by the infant is required. Although the very young infant may make no response, the mother attributes the intention to respond to any infant behaviours that occur at the appropriate turn.

Facial expressions are similarly exaggerated over time and space, to emphasise speech and maintain the infant's attention on the mother's face. Some body movements, such as frequent nodding or shoulder shrugging also emphasise speech and maintain attention on the face. Similarly, in an attempt to maintain or gain eye-contact with the infant, the mother will frequently align her head or body with, or suddenly move her face close to, that of the infant (Stern, 1977).

Mother-infant interaction is further identified by the high proportion of time spent by the mother in looking at the young infant

(Farran, Hirschbiel & Jay, 1980; Stern, 1974). This high rate of gazing at the baby indicates the mother's permanent readiness to communicate with the infant. It allows her to respond to, or stimulate, the infant if s/he should at any point turn to her, and ensures that she is aware of any of the infant's behaviours that could be interpreted as responses to her own overtures. Thus, the mother maintains synchrony of interaction within the dyad, whilst the amount of mutual visual contact between mother and infant remains under the control of the infant. However, as the likelihood that the infant will initiate a mutual gaze bout increases with the occurrence of maternal gaze, then a high rate of maternal gaze towards the infant maximises the the probability of mutual gaze occurring. In the young infant, especially, such maternal gaze indicates that mother and baby have established joint attention. Mutual gaze bouts between mother and infant may also be abnormally long in comparison with adult mutual gaze bouts (Stern, 1977).

Most mother–infant interaction sequences also contain frequent imitative acts (Pawlby, 1977). At first these imitations are mostly by the mother of the baby but then, increasingly, the infant joins in to imitate the mother. These imitations too, are communicative in intent, indicating a shared understanding between mother and child, and showing that one partner has attended to the other and reciprocates.

The aim of the mother in adopting this vocal and behavioural style is not specifically to form the infant's speech or behaviour,

for indeed it seems doubtful whether there is any relationship between the adoption of the speech style in its purist form, and the infant's later linguistic competence (Gleitman, Newport & Gleitman, 1984). Nor is the adoption of a simplified speech style related to the infant's existing linguistic competence. For Motherese, and the short MLU, are used by parents when talking to infants who are too young to show any true speech. Snow (1977) observed Motherese in use between parents and infants of 3 months. She also noted that questions were frequently asked, even though there was no possibility of an answer being given. It would seem, therefore, that the mother adopts these strategies as the most effective means of directing the infant's behaviour and attention into the communicative act.

The Emergence of Motherese

The function of these behavioural and vocal strategies may be well established, but how they evolve is not: for little research has been directed at the emergence of Motherese and the caregivers' repertoire of behaviours.

There are three theoretically plausible sources for this vocal and behavioural style. Firstly, the behaviours may be imitated from appropriate adult models. Secondly, they may be learned very rapidly as a result of feedback from the attentional orientation of the infant. Thirdly, humankind may have a biological propensity to respond with a specific vocal and behavioural style when with an infant.

Modifications have been found to occur in the speech of parents when the child listener was absent (Snow, 1972; Jacobson et al, 1983). These modifications, however, increased when the child was present. Feedback, from the attention of an infant or from the linguistic competence of a child listener, may therefore enhance specific speech modifications - but it is not necessary for their production.

The Jacobson study also looked at differences in pitch modification between groups of adults with or without experience of children. No differences were found between these groups, for all adults modified their speech pitch when talking to 4-8 month old infants. Young children have also been found to modify their speech when talking to infants (Shatz & Gelman, 1973; Sachs and Devin, 1976) and the modification was also seen to take place whether or not the infant was present.

It would thus seem that the modification of speech style to one appropriate to an infant's attentional capacities does not require the presence of the infant. The adoption of Motherese must therefore depend upon either the imitation of a speech style seen to be appropriate to an infant, or upon a biological propensity to adopt certain vocal mannerisms when talking to an infant - although this does not necessarily mean that feedback from the infant has not, at some point, been instrumental in forming the adult's modified speech style. It is also worth noting, in the light of the above findings, that the putative biological propensity would have to be generalised

to situations in which the infant is assumed to be present.

If the specific modification of speech and behaviour to an infant is biologically programmed in the adult (Sachs, 1977), then we might expect it to occur more in the female, who is the biological caregiver, than in the male. But Jacobson et al (1983) found that both males and females modified their speech pitch when talking to infants. And Field (1978) found that there was very little difference between the speech of primary caregiver mothers and primary caregiver fathers when speaking to their infant children.

It must be then either that all adults are biologically programmed to modify their speech to an infant, or that all adults imitate an appropriate speech style from another adult model. However, if such imitation does occur, it must take place in childhood, as shown by the studies of Sachs & Devin (1976) and Shatz & Gelman (1973).

Thus, the abilities of children to interact with infants seem particularly relevant to the investigation of the three theories based upon feedback, imitation and biological propensity. By analysing child-infant interactions, we can observe how both the sex of the child and his/her willingness and opportunity to imitate a caregiver model affect the emergence of Motherese and of the caregivers' repertoire of behaviours. We can ask whether experience with a younger sibling enhances either the vocal or the behavioural strategy appropriate to infant interaction. And we can study in detail how age

and experience interact to influence different aspects of vocalization and behaviour.

Childrens' Interest in Babies: The Effects of Sex & Experience

Few studies have directly investigated the role of Motherese in child-infant interaction. However, several have investigated childrens' behaviour with and willingness to approach babies. Although no physiological difference in responsiveness to babies has been found between children of different sexes (Frodi & Lamb, 1978), differences in the willingness to approach babies have been reported. Berman, Monda & Myerscough (1977) found that amongst nursery school children, mean age 49 months, girls approached a 13 month old baby girl present in a play-pen more often than did boys. Increase in age of the boys was also related to a decrease in the number of baby-approaches made. However, of those children who did approach the baby, girls and boys spent the same proportion of time engaged in interaction with the baby. In their willingness to approach the baby, the children were thought to be responding with sex-role stereotyped behaviour. But interaction with the baby after the initial approach had been undertaken did not, at this age, seem to be constrained by the adoption of appropriate sex roles.

Berman, Monda & Myerscough also found some evidence of a differential reaction towards the baby due to the experience of the child with younger siblings. No boys with younger siblings approached the baby, whereas girls with younger siblings spent more time near the

baby than girls without younger siblings.

Further studies have been undertaken to investigate systematically the possible differences, due to child sex, and experience with siblings, in interest in and type of approach to a baby (Feldman & Nash, 1977; Frodi & Lamb, 1978; Nash & Feldman, 1981). On some points the findings of these studies are contradictory, but the data generally support the authors' hypotheses that conformity to sex-role stereotypes would result in girls being more interested in, and more responsive to, babies than are boys. In all three studies, which used a similar waiting room situation, girls were found to interact more with the baby and to ignore it less than did boys. It was also found that 14-15 year old children and 4-5 year old children ignored the baby more often than did 8-9 year old children. Furthermore an interaction between age and sex was found to affect childrens' interest in babies. Fourteen year old boys spent less time with babies than did 8 year old boys, whilst 14 year old girls spent more time with babies than did 8 year old girls (Frodi & Lamb, 1978). These findings replicate the trends noticed by Berman, Monda & Myerscough (1977) that conformity to appropriate sex-roles, specifically in interest shown in babies, increases with age. In contrast, however, Fullard & Reiling (1976) found that 14-15 year old children showed more interest in infants' faces than did younger children.

Differences in child-infant interactions according to the child's experience with siblings were, however, in a direction contrary to

that hypothesised. Inexperienced children were found to make more distal bids (looks, smiles, shows and talks) and to ignore the babies' vocal overtures less often than did experienced children. This difference, however, was only found in boys' behaviour, and there was no difference due to experience found in the girls' behaviour (Nash & Feldman, 1981). This again replicates the finding of Berman, Monda & Myerscough (1977) that boys with younger siblings are less interested in babies than are any other group.

The procedures used in these studies do, however, seem to be weighted against the boys. Frodi & Lamb (1978) themselves cite Berman (1976) who states that social context, and specifically the presence of mixed sex groups, can affect the expression of attraction towards infants. Thus, where one is aware of a sex-role stereotype to which one should conform, the presence of others of the opposite sex may enhance conformity. The waiting-room situation used by Nash, Feldman, Frodi & Lamb involved the monitoring of a child's behaviour while with a strange baby and its mother. It could be that the child was differentially affected by this situation according to its sex. However, in a study by Blakemore (1981), children of three age groups, the youngest 4-5 years, were observed when alone with a 12 month old baby. In all age groups it was found that girls vocalized more and showed more entertainment behaviours towards the infant than did boys. Thus, it may be that girls are more interested than are boys in interacting with babies.

In further consideration of these studies, however, we find that

each category used for analysis embraces a wide range of behaviours. Nash & Feldman's (1981) category "distal bids" included facial expressions, looking, actions and vocalizations. It seems probable that any differences occurring between the behaviour of children of varying age, sex and experience levels may be reflected by differences within this category. For example, the type of vocalization and facial expressions used by the child when with a baby would indicate skill in gaining and maintaining the infant's attention. The rate of looking shows the extent of the child's interest in the baby, its responses and overtures. The appropriateness of behavours towards the baby reflects the child's understanding of both the baby's abilities and the meaning of the behavioural cues that s/he is sending out. All of these behaviours and skills are likely to vary according to the child's age, sex and experience with younger siblings.

Interaction Between Baby Sex & Child Sex

A further factor to be considered when looking at child-infant interactions, is the effect on the child of the infant's sex. A study looking at the interaction of sex of baby with sex of child (Melson & Fogel, 1982), using a similar waiting room situation to that of Feldman, Nash, Frodi & Lamb, found no Main Effect due to sex of child or infant in the childrens' interest in babies. (This may have been due to the fact that Melson & Fogel were working with younger groups of children, 2-3 year olds and 4-5 year olds.) They did find, however, that the children looked longer at, and stayed face-to-face longer with, the same sex rather than opposite sex babies. This difference was not constant across sex or age groups. In the younger age group, the boys and girls engaged in more proximal interaction and were less negative with same sex than with opposite sex infants. However 15 of the 35 children in this group were unable to recall the baby's sex correctly at the end of the experimental session, suggesting that recall, if not discrimination, was no better than chance. In the older age group, girls showed more interest in a same sex baby, whilst boys preferred to interact with an infant of the opposite sex. This can, of course, be restated as both sexes preferring female babies, and could perhaps be related to Gunnar & Donahue's (1980) finding that 6-12 month old baby girls initiated more interactions with their mothers than did baby boys.

Although there is therefore some evidence that preschool children when with unfamiliar babies prefer to interact with girls, the effect

would seem to be reversed when children are observed with their siblings. Dunn & Kendrick (1981), observing children of mean age 44 months interacting with their younger siblings of 14 months, found that the sex of the younger sibling did not affect the first born girls but did influence the behaviour of the first born boys. The median score of positive behaviours directed towards the younger siblings in boy-boy pairs was 75%, whereas in boy-girl pairs it was 41%. These 4 year old boys therefore preferred boy babies to girl babies, whereas those in the Melson & Fogel study preferred girl babies. The salient difference between these two studies may be, not that one group of babies and children were familiar with each other and that the other groups were not, but that in the Dunn & Kendrick sample the children all had experience of younger siblings, whilst Melson & Fogel do not specify the experience level of the children and they were therefore probably heterogeneous.

Stewart (1983) adds a further conflicting set of data concerning sibling interaction. In a "strange situation" procedure the amount of attachment behaviour shown to distressed younger siblings, by older siblings aged 2-4 years, was found to be greater in cross-sex rather than same-sex dyads. Sisters showed greatest care for their younger brothers, older brothers showed least care for their younger brothers. However, even in this situation, Stewart once again found that, overall, girls showed more attachment behaviours to their younger siblings than did boys. In interpreting this difference in behaviour, Stewart suggested that the child may model his/her behaviour on the interactions of the same-sex parent with younger siblings. And,

indeed, preferential modelling of the same-sex parent has been observed in children aged 3-5 years (Duhamel et al, 1969; Hartup, 1962; Hetherington & Frankie, 1967). If Stewart's assumption is correct, then it is important to know what differences have been found in parent-infant interaction according to baby or parent sex.

The Effects of Parent Sex on Parent-Infant Interaction

In fact, differences in the micro-analysis of parent-infant interaction due to the sex of the parent seem to be few, especially when experience is also taken into consideration. Where differences do occur between parents, they are normally in the level of the specific behaviours exhibited rather than in the structural characteristics of the interaction style.

Lamb (1977) found no differences, in a laboratory setting, between mother-infant and father-infant play with infants between the ages of 7 and 13 months, other than that mothers tended to hold babies when performing caretaking functions and fathers to hold them when playing. However, in a study of parents at home with their infants of 15-22 months (Lamb, 1977b), a further difference was found: fathers were more active in interaction with their sons than with their daughters.

In comparisons of mothers' and fathers' speech to younger children, Golinkoff & Ames (1979) found mothers' and fathers' speech to 19 month old infants to be similar in Mean Length of Utterance

(MLU), number of questions, use of imperatives and declaratives. They did, however, find a difference between fathers' speech when the mother was present and when she was absent: fathers spoke to their children more when the mother was absent. In addition, Rondal (1980) found that fathers of children from 18 months to 3 years were more diverse in the types of speech they used to their children than were the mothers. The fathers also used a shorter MLU, fewer declaratives but more single-word or attentional utterances than did mothers. Vandell (1979) similarly found that fathers used more statements and label words, and that they smiled more often.

Warren-Leubecker & Bohannon (1984), investigating a more specific aspect of parents' speech - that of variations in pitch, which may function as attentional devices for the young infant - found once again very little difference between mothers' and fathers' speech. Both parents increased their pitch ranges from those normally used in adult conversation when with 2 year old children. Fathers did not, however, adjust their pitch when with 5 year old children whereas mothers did.

Hummel (1982), when looking at characteristics of fathers' speech to 2 year olds, made a distinction between fathers who invested some time with their children, and fathers who spent little time with them. They then investigated the extent to which modifications in parental speech to a child of limited language capabilities are made as a result of experience in interaction with the child. No differences were found between mothers and fathers, or between the two sets of

fathers, in terms of the syntactic complexity of the parents' utterances to their children. The only difference (non significant) found at all was in the type of question used. Fathers who spent little time with their children used more questions seeking information or requiring yes/no answers, fathers who spent more time with their children used more occasional, or inverted, questions.

Field (1978) carried out similar research to investigate the effect of experience on father-infant behaviour. She compared primary and secondary caregiving fathers with primary caregiving mothers, looking at a range of behaviours occurring between the parents and their 4 month old infants. Primary caregivers, both fathers and mothers, were found to display similar levels of smiling, imitative grimaces, and high pitched or imitative vocalizations. Secondary caregiving fathers, however, spent more time laughing with their infants. All fathers spent more time game-playing with, or poking (sic), their infants, whereas mothers spent more time in limb-holding. There were no differences between parent groups in the amount of time spent talking to or grooming the infant.

The Effects of Infant Sex on Parent-Infant Interaction

It may also be true, if parents respond differently to their infants according to their sex, that the children will also differ in their behaviour with infants according to child or infant sex. The child may mimic sex of infant appropriate behaviours from his/her parent. There is also the possibility that differences in social interaction styles used with the child when younger may form the basis of an interactional style for that child in future social encounters.

Moss (1967) found that mothers repeated their 3 month old baby girls' vocalizations more than they did those of their baby boys. Possibly as a consequence of this, at 13 months the baby girls talked to and touched their mothers more than did the boys. In a later study of 3 month olds and their mothers observed in the home, Lewis (1972) found little difference between the sexes in the frequency of infant behaviours, but did find differences in maternal responsiveness towards the babies as a function of their sex. Mothers of boys showed more proximal behaviours, holding and touching, whereas mothers of girls showed more distal behaviours, vocalizing and looking. These behavioural preferences were also reflected in the mothers' responses to the babies' behaviours: mothers vocalized in response to girls' vocalizations, but either touched or vocalized in response to boys' vocalizations. Mothers also differentially reinforced behaviours in the infants according to their sex. Mothers of boys responded more than mothers of girls to all behaviours with the exception of vocalizations, where the mothers of girls were more responsive.

Klein & Durfee (1978) found 1 year old girls to be more sociable than were boys, and that mothers of girls interacted more with their infants than did mothers of boys. However, taking maternal interaction rate into consideration, girls were still found to make more positive communications (smiles, vocalizes, shares) and more positive overtures (approaches, touches, smiles, vocalizes) than did boys.

Gunnar & Donahue (1980), however, propose that all the differences found in maternal behaviours towards different sex babies are a function of differences in the babies' behaviour. They found no differences due to sex, either on the number of attempts mothers made to initiate interactions with babies of 6-12 months, or on the number of responses the mothers made to them. They did find however, as did Lewis (1972), that girls responded more to vocal initiations and that girls initiated more interactions than did boys.

In older children, Golinkoff & Ames (1979) found that parents used longer conversational turns with 19 month old girls than with boys. It was assumed, therefore, that the parents expected the girls to be able to attend to longer and more complex messages than the boys. Lamb (1977b) found that parents of 15-24 month old infants interacted more with girls than with boys. The girls were also found to interact more with their parents than did boys, and also to show more proximity-seeking behaviour. However, the parents vocalized more to the boys than they did to the girls, whereas in a study by Cherry &

Lewis (1976), mothers were found to talk more to 2 year old girls than to boys.

There is therefore a difference due to sex of infant on parental behaviour, but whether it is determined by the infant or by the mother's approach/response pattern to the baby is unclear. We can, however, see in these studies the beginning of the differentiation that leads to the preferences in the orientation of older children in free-play interactions, where the boys concentrate on game-playing and the girls are more responsive to the social aspects of the situation (Tauber, 1979). For infant girls are more vocal and social, and receive a higher level of vocal and social behaviours from their mothers. Boys, however, do not have such a high level of social behaviours directed towards them, nor are their vocalizations reinforced in such a way that reciprocal interaction is maintained.

Child-Infant Interaction: Sex, Experience & Age-Related Differences

Although differences were clearly found in parent-infant interaction due to the sex of the infant, no such uni-directional trend was found in the studies discussed which investigated the effects of infant sex on child-infant interaction. Parents of either sex interacted more with baby girls than they did with baby boys. Mothers of young infants talked to girls more than they did to boys. However, in studies of children, girls were found to have no preference for an infant of either sex, whilst boys were found to prefer strange baby girls, but sibling baby boys. To explain this we must consider one of the implications of Dunn's work, that the early relationship between mother and child also affects the later interaction between siblings, and therefore affects any consequent reactions to strange infants by the child, according to his/her sex and experience with siblings. As the differences in child-infant interaction according to infant sex were found only in boys, we can also relate this to Klein & Durfee's (1978) finding that there was a difference in maternal interaction rates when with first born and later born children, but that this difference applied mainly to boys. Many of the studies investigating sex differences in child-infant interaction (Feldman, Nash & Cutrona, 1977; Frodi & Lamb, 1978; Melson & Fogel, 1982) did not introduce the factor of the child's experience with younger siblings and, if this experience affects one sex differentially, then the data are likely to be ambiguous.

It is also difficult to attribute differences between the sexes

in child-infant interaction to differences in same-sex parent behavioural modelling if parent-infant interaction styles are similar regardless of sex. The only difference due to *direct* imitation of male-appropriate behaviour must therefore be that of sex-role conformity in willingness or reluctance to approach, or to be seen to approach, an infant.

Therefore, what differences could we expect to find in the micro-analysis of child-infant interaction? We might expect girls to be more adept, in that all the studies so far considered have found baby girls to be more sociable, more vocal and to initiate more interactions. We may also accept that girls have an advantage if modelling their behaviour on a same-sex parent, for they have more opportunity to observe a same-sex model: most primary caregivers are still mothers. Although boys may not be able to model a specific infant-interaction style from their fathers, they may still dismiss the mother's interaction style as not being appropriate to them, and so not adopt it in infant-interaction. For sex-appropriate behaviours may be adopted because the child observes the frequencies at which each sex performs certain behaviours in different situations. From the observed frequency of behaviours, the child may abstract what constitutes sex-appropriate behaviour (Fagot, 1985).

It could also be that the adoption of some of the caregiver's repertoire of behaviours and aspects of vocal style is enhanced by feedback from the infant, in that most of these behaviours are specifically aimed at getting and maintaining the infant's attention.

Experience with a baby sibling could then improve the child's style of interaction, the child having had an opportunity to learn the strategies most likely to attract and keep the baby's attention. In the study of primary and secondary caregiving fathers, Field (1978) showed that experience was an important factor in modifying the behaviour of adults in interaction with infants. There was also some indication in the child-infant studies that experience with babies may be a factor affecting type and degree of child-infant interaction. This seems to pertain especially to the boys (Berman, Monda & Myerscough, 1977; Nash & Feldman, 1981).

Thus far, we have discussed two factors which may be important in forming the child's style in interacting with an infant - namely sex differences in child and infant behaviours, and the opportunity and willingness to imitate the behaviour of a same-sex parent. In addition to sex and experience, there is a third factor yet to be considered. If the function of an infant-appropriate range of behaviours is to direct and maintain the attention of a partner with limited attentional and processing capacities, then to what extent does the ability to interact depend upon the "sensitive responsiveness" (Ainsworth, Bell & Stayton, 1971) of the older partner? If responsiveness depends upon the partner's ability to empathize with the infant, then we might expect the ability to respond appropriately to increase with age: to increase, in fact, with the child's ability to decentre, or to move away from his/her point of view and to accept that of another. According to Piaget (1928), this ability is not achieved by the child until s/he reaches the age of 7-8

years, although current work on perspective-taking skills demonstrates it in children of 3-4 years (Hughes, 1975, cited by Donaldson, 1978). Even though the relationship between perspective-taking skills in a laboratory context and pro-social responses in a natural setting is neither clear nor consistent (Ianotti, 1985), pro-social skills do increase with age (Yarrow & Waxler, 1976).

We have now identified three factors which may be important in determining the form of dyadic interactions between a child and an infant: experience in interaction with the infant, sex differences in the imitation of vocal and behavioural strategies from a caregiver model, and the age-dependent ability of the child to assume the perspective of another and to respond appropriately to his/her needs.

Two studies have investigated the effects of these factors on childrens' speech modifications to babies.

Shatz & Gelman (1973) found that both 4 year old boys and girls were able to modify their speech appropriately for 2 year old listeners. In doing so they showed a reduction in MLU from that used to adults and peers, and used more attentional utterances than in speech to adults. These adjustments were not found to be dependent on either the child's sex or previous experience with younger siblings.

Sachs & Devin (1976) similarly found speech modifications in four 4-5 year old children when talking to both a baby and a baby doll, compared to the child's speech with adults and peers. The children

used more attentional utterances, more imperatives, and utterances of less syntactic complexity when talking to a baby or baby doll. When talking to the baby doll, they also showed a significantly lower MLU than they did in speech to mothers. Unlike the typical pattern of Motherese, however, the children directed more questions to the mother than to the baby, although those directed to the baby were appropriate in that they requested information about the state of the baby, whilst those directed to the mother requested external-world information.

These studies would seem to indicate that neither feedback from the infant, experience with a sibling, nor imitation of a same-sex model is instrumental in the production of a speech style appropriate to a younger listener. However, the Sachs & Devin study, which did investigate various speech characteristics pertaining to Motherese, looked at only four children, only one of whom had a younger sibling. The Shatz & Gelman study used a larger sample, balanced for the sex and experience of the child, but few of the investigated speech categories would be classified as elements of Motherese. Some evidence that experience may aid interactions between children and younger siblings is, however, seen in a study by Weist & Kruppe (1975). They found, when looking at 6 year old childrens' speech, that children with younger siblings were able to comprehend younger childrens' speech more readily than were children without younger siblings.

Pro-social Responses & Egocentricity

Sachs & Devin also found that, when asked to role play "as a baby", the four children in their sample were unable to maintain the necessary language modification, but repeatedly switched between normal and modified speech styles. Shatz & Gelman did not ask the children in their study to role play, but gave instead a test of the childrens' egocentricity. The results of this test indicated that the children were unable totally to decentre from their own point of view. So, whilst the children were able to modify their language to a style suitable to the listener, they were still deemed egocentric. But how far can we predict the child's ability to empathize with and respond to the needs of another from performances on tests of egocentrism, or even from the ability to role play the part of another? Waxler, Yarrow & Smith (1977) found no correlation between role-taking measures and pro-social behaviours in 3-7 year olds. Similarly Strayer (1980) found no correlation between a range of role-taking measures and childrens' responses to naturally occurring socio-emotional cues in their play-group peers. Thus, to what extent does the ability to role play relate to the ability in the real world to respond appropriately to the behavioural signals given by an infant? If younger children can adopt a speech style appropriate to the attentional and processing capacities of an infant, can they also at this age adapt their behaviour to correspond with an infant's limited motor skills? It could be, instead, that these are two separate abilities. The first might simply be an imitated speech style, which the child learns from the mother's speech to him/herself

or to another child, and which is at least partly dependent upon behavioural feedback from the infant. The second ability, on the other hand, may be more dependent upon role-taking and upon the ability to see the world from the infant's point of view, with the infant's limited capabilities. Hoffman (1975) suggests that "affective" empathy, ie. a vicarious emotional response, may appear much earlier than do cognitive aspects of empathy, and that this affective response may be the source of the child's ability to show appropriate behaviours to another's signals of distress. However, not all pro-social behaviours are directed by an emotional response. Responding to another's sad face may involve affective empathy, but helping a younger infant to manipulate a toy is a cognitive act.

We might expect then, if responsiveness to others is linked with egocentrism in the child, that responsiveness would increase with age as egocentrism on other measures decreases. Furthermore, if we accept Piaget's (1926) suggestion that cognitive role-taking abilities may be enhanced by the opportunity to interact with others, and thus to experience a range of viewpoints other than one's own, then we may also expect a difference in responsiveness to babies due to the child's experience with younger siblings.

Chandler & Helm (1984), however, suggest that the effects of experience may interact with the age of the child. Looking at role-taking competence in children aged 4, 7 and 11 years, who had to assume the perspective of a peer, they found an increase in competence across the age groups. When a control procedure was introduced,

giving the children some experience in the perspective to be taken by their partner, they found that the effect was greatest for the 7 year olds. Initially adopting the other's perspective had no effect on the performance of the 11 year olds. However, Castle & Richards (1979) found that experience in group play improved the performance of 3, 4 and 5 year olds on tests of cognitive, perceptual and affective role-taking. Neither of these studies, however, addresses the question of the effect that experience has on the childrens' responses to naturally occurring behavioural cues.

There may also be a difference in responsiveness to babies due to the child's sex. Responses involving affective empathy are, for example, more likely to be made by girls than by boys (Hoffman & Levine, 1976; O'Bryan & Brophy, 1976).

Recognition of Emotion

In the Strayer (1980) study, 4-5 year old children responded directly to the behavioural cues emitted by their peers, with very little verbal mediation in the form of requests for help or support. These cues denoted a range of emotions: happy, sad, angry and hurt. This poses the further question of whether the ability to identify emotional cues correctly is a skill which increases with age and which therefore further links the ability to respond appropriately to the behavioural cues of an infant with the age of the child. Some studies conclude (Izard, 1971; Walden & Field, 1982) that pre-school children

aged 3-5 years are only really successful in identifying the emotion "happy" from schematic faces. Bullock & Russell (1984), however, looked at the type of errors made by young children in the judgement of emotion. Children and adults were asked to select photographs to illustrate an emotion word. Although children aged 3-5 years were inaccurate in comparison with adults, their errors were systematic. They tended to choose photographs of expressions closest, in the domains of pleasure and arousal, to the target expression. This range of choice narrowed with age. Green (1977) found that slightly older children, 5-6 years old, were able to relate the correct cause to the expression of an emotion. Also, for the girls in the sample, this ability correlated with teachers' ratings of the childrens' sensitivity to others.

It would seem, therefore, that even pre-schoolers can identify a range of emotions with some accuracy, and can even identify the cause of the emotion - although both skills increase with age. There would also seem to be a relationship between the ability to recognise the cause of an expression of emotion and responsivity to others. It is debatable, however, whether the judgement of schematic faces provides a valid test of the ability to recognise emotion. For the judgement of emotional expression depends, to some extent, upon contextual cues. In the naturally occurring social interaction, environmental factors would therefore help the child to recognise ambiguous emotional expressions.

We must also accept that there is likely to be a sex difference

in the ability to recognise facial expressions correctly. Hall (1978) in a review of all previous studies, found that a significant number of them showed that females, aged from 3 years to adulthood, were more skilled than males in decoding non-verbal cues conveyed by facial expression, body movements or voice tone. The effect appeared to be stable across all age groups. We may thus expect girls to be superior in responding, not only to facial cues of emotion, but also to behavioural signals emitted by the infant. We can assume from the work of Rogers (1978) that, once a behavioural signal has been recognized, then the child can attribute the correct intention to the action.

Childrens' responsivity to infants' behavioural cues is therefore likely to be enhanced by *experience* - in that this provides the opportunity to interact with others and to understand a range of viewpoints, by *age* - in that the abilities to recognise facial expressions correctly and to take another's perspective increase with age, and by *sex* - in that girls are more successful in decoding non-verbal cues than are boys.

Sex-Preferred Behaviours

Finally, in looking at the effect that age, sex or experience might have on a child's interaction with an infant, we should look at differences due to sex in the child's preferred free-play behaviours, given that most peer/sibling interactions take place within the context of play.

There were no differences found in childrens' imaginative and constructional play in studies by Greif (1978) and Vandenberg (1981). However, in children from 2-5 years it was observed that boys played more with blocks, cars and manipulative objects, and girls with dolls (Fagot, 1978). Boys were also found to spend more time in unstructured activities, showing the novel use of materials, than were girls (Carpenter & Huston-Stein, 1980). Smith & Connolly (1972), looking at a wide range of play behaviours in 3-4 year old children, found that girls talked to others more frequently and tended towards group play, whereas boys used more play noises, showed more rough & tumble play and had an overall higher level of physical activity than did girls. In Factor Analysis of the play behaviours, Smith & Connolly suggested that talking to others and group play behaviours could be thought of as correlates of social maturity.

These data suggest that girls are likely to be more skilled in interaction than boys, as they tend to be more socially mature, or at least more socially-oriented, in their preferred play behaviours. Pre-school children also have strong sex-role concepts, in that they

are aware of "appropriate" behaviours for girls/boys and men/women, and spend much time in sex-appropriate role playing (Greif, 1978; Kuhn, Nash & Brucken, 1978). Both girls and boys, from pre-school upwards, will therefore be aware that playing with a baby is thought to be behaviour more appropriate to a female than to a male. For, although Kohlberg (1966) states that children do not begin to adopt sex-appropriate behaviours until they understand that gender is constant across time - a stage reached at about 6 years, most children show sex-appropriate behaviours from the age at which they gain an idea of their gender identity - a stage reached at about 2 years (Kuhn, Nash & Brucken, 1978). The acquisition of gender identity must therefore correlate with sufficient cognitive development for the child to generalise a group of behaviours as appropriate to his/her sex. Pre-school children, especially girls, are also frequently reinforced in the use of sex-appropriate play behaviours by their parents (Langois & Downs, 1980). Therefore, with the greater opportunity that girls have for same-sex behaviour modelling in the role of caregiver, it is likely that girls will more closely mimic their mother's behaviour style in interaction with an infant than will boys. This does not, however, imply that boys will have no interest in, or success with, infant-interaction. It merely suggests that their strategies will not so closely mimic those of the mother.

SUMMARY

In a micro-analysis of child-infant interaction we can expect differences to occur between children according to their age, sex and experience with younger siblings.

All children are likely to modify their language, to some extent, to a style more appropriate to an infant partner. Younger children, however, are more likely to make those modifications that are most readily imitated from the mother. Whereas older children are likely to make those modifications that stem from a greater appreciation of the infant's limited processing capacity. Girls will possibly adopt a vocal and behavioural style that closely imitates that of the mother. Whereas boys, if they imitate their father's speech style with infants, are likely to use a shorter MLU, fewer declaratives and more single-word attentional utterances than do girls. Children with experience of younger siblings should show an increase in vocal and behavioural modifications due to the attentional feedback from the infant.

Overall, girls might show more skill in interaction and be more vocal and socially oriented than are boys. Boys are more likely to be oriented towards toys and game-playing than are girls. Also, boys without experience of younger siblings may be more positive in interaction with an infant than are boys with younger siblings.

Finally, age, sex and experience are all likely to affect

childrens' responsiveness to an infant's emotional and behavioural cues. Older children are likely to be more responsive than are younger children, girls are likely to be more responsive than are boys, and children with experience of younger siblings are likely to be more responsive than are children without such experience.

CHAPTER 2

Method

1) Data Collection

Video-recordings were made of 32 dyads: in each a child of 4 or 7 years played with a 10 month old baby.

Samples

The sample consisted of 32 babies and 32 children. The babies were 10 months plus or minus 2 weeks: the sample was balanced for sex and experience. There were 16 babies of each sex, and within each sex group 8 first-born babies and 8 babies with older siblings. The older siblings were aged between 3 and 7 years.

The child sample was similarly balanced. There were 16 children in each age group, 4 years (48-54 months) and 7 years (84-90 months), 16 of each sex, and 16 each of experienced and inexperienced children. In each age group 8 children were girls and 8 were boys. In each age * sex group 4 children were inexperienced and 4 were experienced. Experience was defined as having a sibling under the age of 18 months: inexperience was defined as not having a sibling under the age of 42 months. The mean sibling age of the experienced children was 14 months. Only 2 of the inexperienced children had younger siblings,

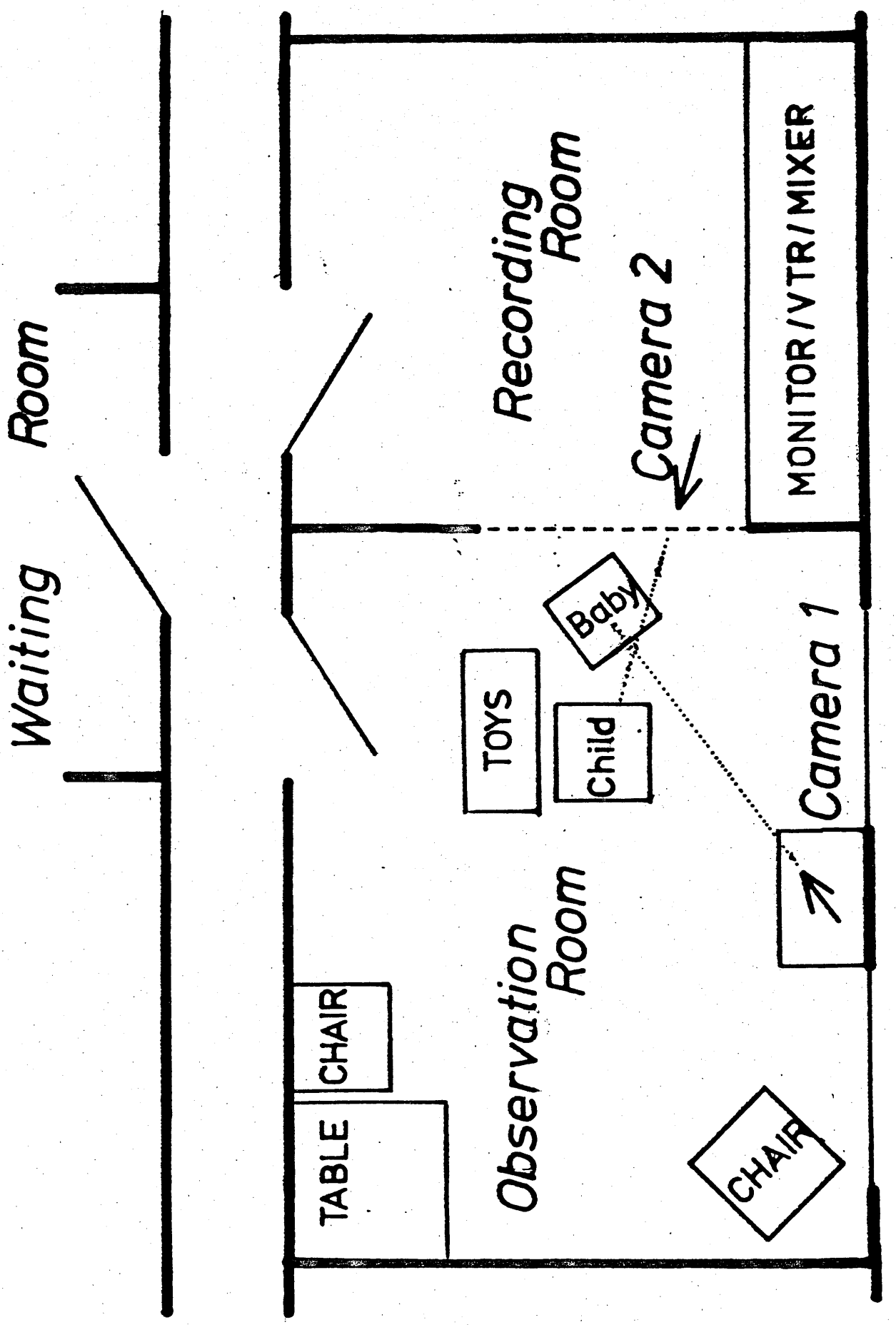
one 7 year old boy and one 4 year old boy: the mean sibling age here was 45 months.

There were therefore 8 child groups: 4 and 7 year old experienced girls, 4 and 7 year old inexperienced girls, 4 and 7 year old experienced boys and 4 and 7 year old inexperienced boys. Each of these groups met 4 of the 16 babies, two of whom were girls, two boys, two were first-born babies and two had older siblings. Each child interacted with a different baby.

The sample of 7 year old children was obtained with the help of local primary schools: the sample of 4 year olds from local primary schools and playgroups. In both cases circulars were sent to the schools for distribution to the parents, asking permission for the names of interested parents or children to be passed on to the experimenter. The names of mothers with 10 month old babies were obtained through 'drop-in' centres and doctors' surgeries, where stamped addressed postcards were left for mothers interested in bringing their babies into the University, to return. The payment of travel expenses into the University was offered, and these were covered by a standard payment (of £5) made to each mother and baby, parent and child. The research study was always described as a study of babies playing with children. Children were not told that they were likely to be video-recorded. Mothers of babies were told that their babies were to be filmed, but only when playing with children.

The samples thus obtained were not primarily middle-class, for

FIG 1



Plan of Observation Suite

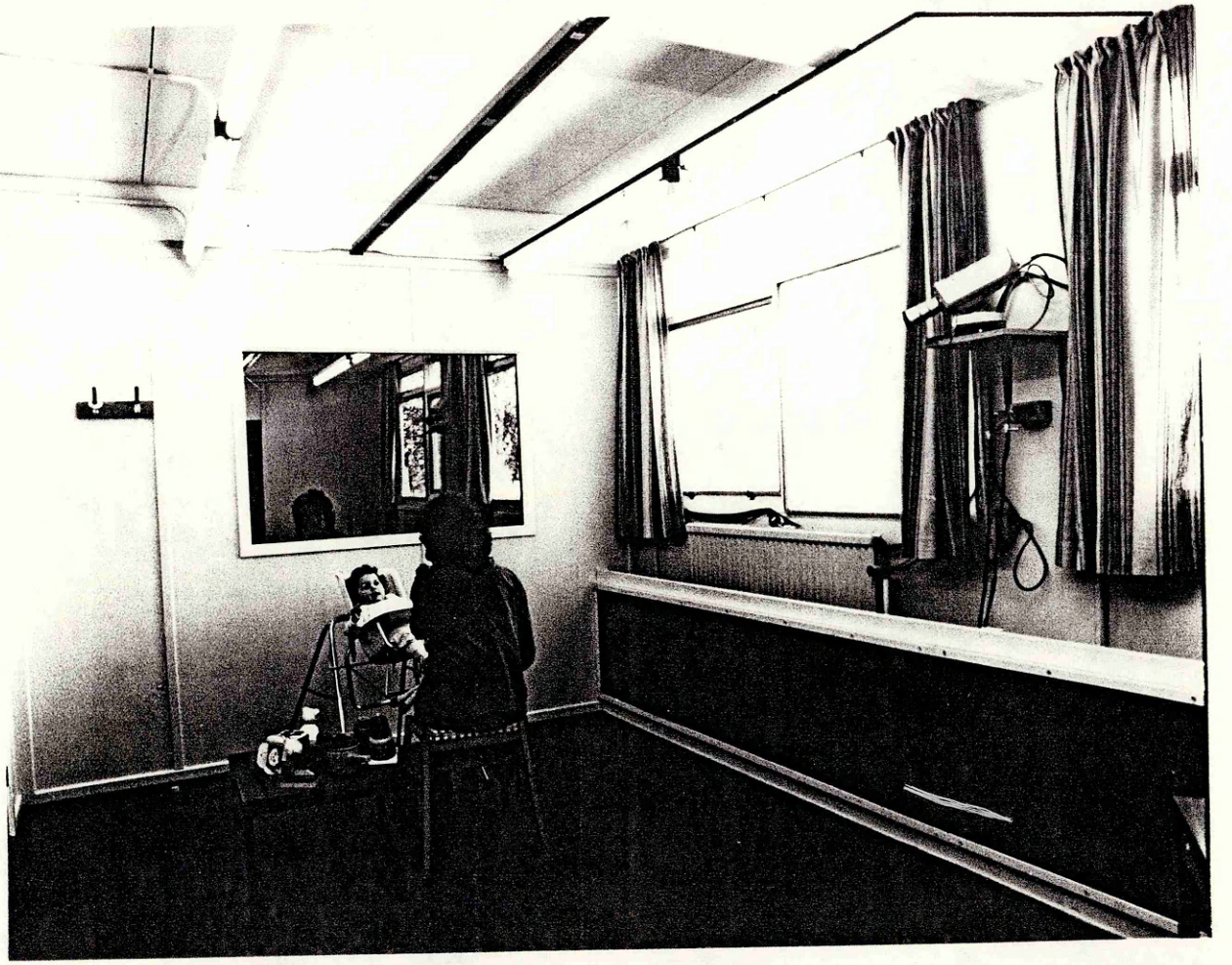
the areas of Milton Keynes around the University and from which the samples were drawn range from those providing rented accommodation for the unemployed, to private housing estates for the professional classes.

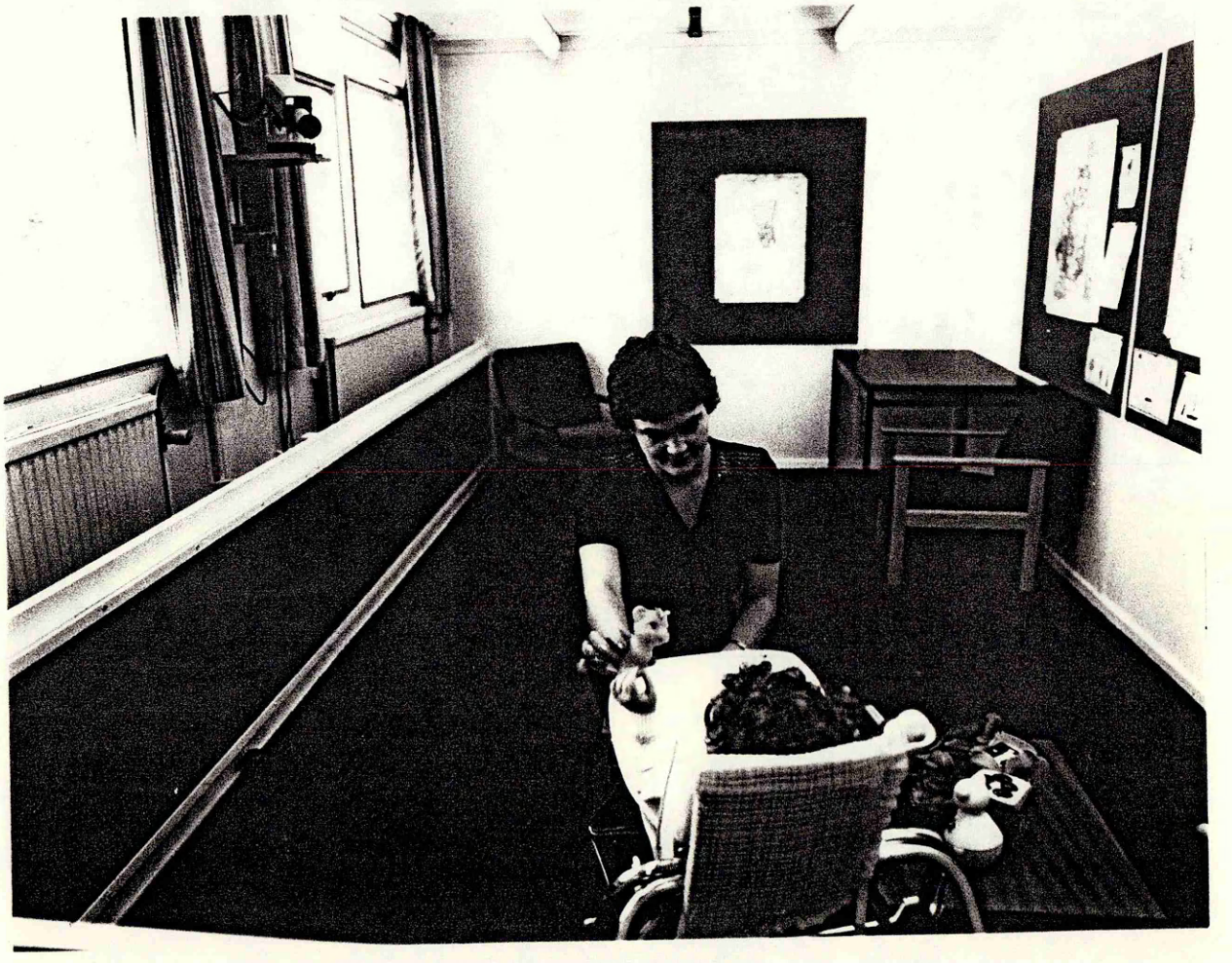
Experimental Method.

Pilot studies were carried out, using the children of University staff, to establish lighting, camera and seating positions. Analyses of the video-recordings made during these pilot studies were undertaken to devise a category system of behaviours and vocalizations upon which later analyses could be based. Also, during these studies, it was noticed that the babies showed no signs of anxiety if the mother moved out of the observation room. This was dependent upon the mother first settling the baby in the room and absenting herself only after the strange child had been introduced to the baby. As the presence of the baby's mother was seen to have a constraining effect upon the child this practice was continued throughout the main experiment.

For the recording sessions of the main study the observation room was set out as shown in Fig 1. It was furnished as informally as possible and provided with curtains, carpets, wall posters and armchairs. The baby was strapped into a high chair with tray, the child sat in front of the baby on a padded stool. Toys were arranged on a low table beside the child and within easy reach. The toys ranged from those suitable for very young babies (rattles, teething

FIG 2





Observation Room

rings) to those suitable for babies far older than 10 months (a 3D telephone puzzle). The selection of toys remained constant throughout all the recording sessions (see Appendix A for complete toy list).

There was one small remote-control scanning camera apparent in the observation room, but this was the one used exclusively for recording the baby's behaviour. Video-recordings of the child were made through a one way mirror, using a tracking camera. The mirror was a 3' by 5' Reflectafloat Glass Panel set into the wall 3' above the ground. Sound recordings were made with one microphone fixed to the baby's chair and one to the child. Using a split-screen mixer the information from both cameras and microphones was recorded simultaneously on a video-cassette recorder. A timing facility was included in the recording. After video-recording and mixing, the information retained was a view of both baby and child that was full face and included upper body, arms and hands. There was also a full view of the high-chair tray that stood between them.

Each video-recording session was carried out between 2:30 and 3:30 pm - a convenient time for most mothers, for their babies were usually awake and between feeds. All recording sessions involving 7 year olds were carried out during the school holidays. On arrival for a recording session all mothers, babies and children were shown into the waiting room and introduced to one another. The first mother and baby to be filmed were then shown into the observation room, where the baby was allowed to explore and settle down. The older children were asked to wait, with their mothers, in the waiting room which was

furnished with armchairs, toys and books. The older children were seen to be more relaxed if other children were already in the waiting room when they arrived: for this reason the experimenter's children (7 and 10 years of age) were usually present during recording sessions.

All babies were video-recorded first with their mothers, to provide a source of comparison with the child-baby interactions. The mothers, once in the observation room, were helped to strap the baby into the high chair. They were then asked to sit on the stool and play with the baby so that the baby might become familiar with its surroundings, and to enable the experimenter to focus the cameras. During this period of play a video-recording was made of the mother-baby interaction. This phase of the recording sessions was not mentioned to the mothers beforehand nor was any allusion made to the mirror or the camera behind it. At the end of the whole recording session the mothers were shown the video-recordings of themselves with their babies and their permission asked to use the material. No mother witheld permission or objected to this method of gaining data.

When the recording of the mother and baby had been completed then the older child was brought into the observation room and allowed to look around. The child's mother was not asked to accompany the child for, if she were present, the child tended to talk to his/her mother about the baby rather than talk directly to the baby. The child was then asked to sit down on the stool in front of the baby. The child was introduced again to the baby and the toys on the table were pointed out to him/her, as was the camera focused on the baby. The

child was then told that the baby was being filmed and that s/he was "to keep the baby happy whilst s/he was being filmed by talking to him/her and playing with him/her with the toys". The children were also asked not to move away from the stool because they might then be in the way of the camera filming the baby. No mention was made of the other camera directed on the child, nor was the mirror alluded to.

Whilst the baby was being settled on the stool and being shown the toys, the mother was asked to leave the room quietly and allowed subsequently to observe the baby through the viewing screen. No mother objected to doing this, nor did any baby show any signs of distress at her disappearance. When the child was happily established then the experimenter left the room and made a 5 minute video-recording of the child and baby. If the child did move out of camera range, or blocked the baby from view, then the video-recording was continued until a total of 5 minutes of analysable data was recorded.

If the baby cried on being put into the high chair or if a child showed extreme reluctance to sit and play with the baby then the recording session was abandoned. If any baby cried during the video-recording session with the child, then the mother or experimenter would intervene. However, it rarely occurred (only twice) that the session had to be abandoned because the baby was too upset to continue.

Any older child who was reluctant to enter the observation room

without his/her mother was allowed to have her present. The mother was, however, asked to sit in the far corner of the room and to join in with the child-baby conversation as little as possible.

Over the whole research study only one 10 month old baby girl was too upset to take part in the recording session, and two 4 year old boys refused to participate at all: these sessions were abandoned and the children replaced. Four 4 year old children had their mothers present in the observation room, one experienced girl, one experienced boy and two inexperienced boys.

Questionnaires were given to all mothers requesting information on family size, date of birth and sex of children.

Analysis of Data

Each child-baby dyad was assigned a code number. Analysis of the video-recorded sessions was carried out in blocks of four, each block containing children of different age, sex and experience levels. Interaction sessions were assigned to these blocks, by number, before analysis began. The experimenter was therefore blind to the child's level of experience at the time of encoding. Age, experience level and sex were also distributed systematically across the coding schedule thus randomising the effect of improvement (or deterioration) in coding over time.

Four mother-baby dyads were also analysed to provide a source of

comparison. These four babies represented one of each sex * experience level.

Frame by frame analysis was carried out on two minutes of each of the 5-minute interaction sessions. The two minute section analysed was usually the second and third minute of recording. This was thought to be the optimal period, allowing the child some time to adjust to the situation but before either partner was likely to become bored or fractious.

Each second was encoded according to a system of vocal and behavioural categories devised for the study. Data thus encoded were further analysed using a microcomputer and programs specifically written for this purpose.

Statistical analysis

Statistical analyses were carried out using available computer packages.

Raw scores were used in Analysis of Variance except when analyses of vocalization sub-categories or numbers of responses to specified behavioural overtures were undertaken. In these cases a percentage term was used for each child's score, showing the percentage of vocalization that fell into the speech sub-categories or the percentage of behavioural overtures that were responded to with the specified behavioural responses. This enabled comparisons to be made

across groups where vocalization levels or numbers were not constant.

This percentage was expressed, however, as the percentage that each child's score formed of the child's group score (eg. inexperienced 7 year old boys) as a whole. This gave a truer indication of group performance in terms of the number of overtures ignored by the group than if the percentage scores were calculated on, for example, one child's percentage response to the behavioural overtures that s/he met. An example of this calculation procedure is shown in Table 1.

Reliability

Reliability of coding over time was assessed by reanalysis, after a two month period, of previously coded material. Eight 30-second interludes from different dyads were reanalysed, giving a total of four minutes of data. A difference in attributed category occurred in only 8 of the possible 240 seconds. Rate-Rerate reliability over time was therefore 96.7%. (Table 2)

Although all the data were analysed and coded by the experimenter, reliability of the category system was also tested across raters. However, as frame by frame analysis using a hitherto unknown and complex category system requires an initial period of learning, inter-rater reliability was assessed by the percentage of agreement between raters on attributed categories. A co-rater analysed four 30-second interludes from separate dyads using the

experimenter's original coding sheets as a guide. Overall there was agreement between experimenter and co-rater on 96% of attributed categories.

2) Definition of Vocal Categories

Any sound utterance by the child was coded:-

1) Firstly from the video-recording, and therefore in context.

2) Secondly from speech transcripts taken from the video-recording. This second stage of coding allowed a more considered and precise analysis of whole utterances into their component categories.

Any sound uttered by the baby was coded only from the video-recording.

The first coding carried out from the video-recording gave the number of seconds in which *VOCALIZATIONS, PLAY NOISES, LAUGHTER* or *CRYING* occurred for the child, and the number of seconds in which *VOCALIZATIONS, LAUGHTER* or *CRYING* occurred for the baby. The child's vocalizations were further categorized according to the number of seconds in which *EXAGGERATIONS* of speed or pitch occurred, the number of seconds in which *WHISPERING* occurred, the number of seconds in which *NONSENSE TALK* replaced normal speech, the number of *IMITATIONS* of any sound which occurred between child and baby, and the number of words or phrases that were *REPETITIONS* or *QUESTIONS.* These last 6 categories are not mutually exclusive.

Any imitations by the baby, of sounds made by the child, were also noted.

The terms used in the first analysis are defined thus:-

VOCALIZATION - any speech-type sound.

PLAY-NOISES - sounds not readily transcribed as words: these are usually imitations of animal noises. The category does not include onomatopoeic words: it would, therefore, include an imitation of a dog barking but not the words "Woof Woof".

REPETITIONS - any word or phrase (with no more than one word changed, added or omitted), which is repeated within 20 seconds.

QUESTIONS - any word or phrase which is a question, either by sentence structure or intonation.

EXAGGERATIONS - words or phrases where the pitch is abnormally high or low (this latter category could include exaggerated stress put on part of a word), or where the speech is abnormally fast or slow. The criterion for judgement of abnormal pitch and speed was that the speech should differ markedly from other samples of the child's speech. This judgement was subjective.

This category also includes the use of loud speech, for emphasis, and "sing-song" speech, in which a phrase is almost sung rather than spoken. Sub-categories were used to retain the information about the nature of the exaggeration.

NONSENSE TALK - speech sounds, but not correct English words: usually referred to as "baby talk" eg. "Pee-bo", "Weebly wobbly", "Doggy-woggy".

IMITATIONS - where any sound made by a baby or child is mimicked by the partner. The baby's imitation of the child is usually in the form of a noise similar to the word spoken, or laughter of similar pitch and duration. The child's imitation of the baby can either be direct mimicry of the sound made by the baby or an expansion of the sound into a whole word. The child's imitation may therefore extend over more than one second, but would be counted as a single imitation regardless of its duration.

LAUGHTER, CRYING and *WHISPERING* - are defined in accordance with their normal use.

The second coding, carried out on the speech transcripts, sub-divided the child's utterances into categories. Before this was carried out, however, any repetitive nonsense talk was discounted, for this seemed to form a separate sub-set of data. These two categories, utterances and repetitive nonsense talk, are similar to the original vocalization and nonsense talk categories but, because utterances are now treated as units and counted by their occurrence, a precise analysis of the utterances into their component categories is possible. These categories showed whether the utterances were *SINGLE WORDS, IMPERATIVES*, showed *DELETIONS* or were *STATEMENTS*. Statements

were further sub-divided into *SIMPLE, SHORT PHRASES, DEICTIC* and *REFERENTIAL* categories.

The definitions of these categories are outlined below:-

UTTERANCE - a unit of speech standing on its own, whether a complete or incomplete sentence, short phrase or single word. Any repetitive nonsense talk is not included in this category. (*Sotto voce* or unclear speech was discounted).

REPETITIVE NONSENSE TALK (RNT) - speech sounds, usually "baby talk" repeated continuously and often forming part of a game. eg. "Weebly wobbly, weebly wobbly", "Pee-bo, pee-bo", "Gulp, gulp, gulp".

These nonsense words do not stand on their own, nor do they, when combined, form a coherent utterance. Because they are often repeated, at speed, in long runs, the measure used for RNT is the number of seconds in which it occurs.

SINGLE WORD UTTERANCES - this category was extended to include all one word utterances which seemed to be functionally similar to single word utterances in that they were often attention-gaining devices. eg. "Look", "Here", "Andrew", "C'mon" (the last included because of its functional similarity).

IMPERATIVES - any utterance, other than a single word utterance, which is intended as a command. eg. "Talk to me", "Stop that now", "Stop chewing it" (Here reference was made to the video-recording for often utterances appeared to be imperative but were not functionally so: they were instead commentaries on the child's action. eg. "You put this on here", also "Come-on" used as a term of encouragement).

DELETIONS - phrases greatly contracted beyond that commonly found in general speech, sometimes with implied words missing. The deletion quite frequently is a repetition of a preceding complete phrase. eg. "S'at?" following "What that?", "Dear" following "Oh dear", "S'good boy" following "There's a good boy".

STATEMENTS - factual sentences or short "fill in" phrases. The category excludes single-word utterances, imperatives and questions but includes statements showing deletion. This category is further sub-divided into:

SIMPLE STATEMENTS - a complete explicit sentence. eg. "Teddy is going with you".

SHORT PHRASE - designed to continue the interaction rather than convey information. eg. "Hello, Andrew", "'Ello, Teddy", "Little Teddy", "Good boy".

DEICTIC - statements, the meaning of which is implicit, referring to objects, places or actions within the interaction and therefore their full sense cannot be gained from the transcript alone. eg. "That goes there", "Here it is", "You've got some of these".

REFERENTIAL - statements which are aimed at establishing joint play with the baby by drawing his or her attention to some activity engaged in by the child. eg. "Let's have a look what else we've got then", "Let's have a look at this then".

(N.B. Deictic and referential statements are not mutually exclusive).

Statements showing deletion were included in the sub-category to which they would have belonged had the sentence been complete. eg. "Carrying a shoe", a contraction of "He's carrying a shoe" is therefore a deictic statement. In these cases reference was made to the video-recording for clarification.

QUESTIONS - were further defined according to whether they were questions by sentence structure or intonation, requiring a Yes/No answer or requesting information.

REPETITIONS - occurring consecutively. RNT was included when scoring runs of repetitions, for the purpose was to look at the structure of verbal game-playing and here RNT and frequently repeated utterances were functionally similar. The measure used, therefore, was that of the number of seconds in which consecutive repetitions occurred, and because of the balanced nature of the timing in verbal game-playing the number of seconds in which repetitive utterances occurred was often the same as the number of utterances.

eg:

"What's that?"

"What's that?"

"'S that?"

"'S that?"

"'S 'at?"

"'S 'at?"

"Wa's that?"

The mean length of utterance for each child had at first been calculated to include all speech type sounds. However, RNT was found to distort the measure for it was difficult to assess in terms of coherent utterances (and for this reason had been assessed separately from utterances in the second coding). A second mean length of utterance was therefore calculated discounting all RNT.

Behavioural Categories

Behavioural categories for both child and baby covered *ACTIONS*, specific and interpreted, *GAZE DIRECTION* and *FACIAL EXPRESSION*. Any change from one state to another in each of these areas was recorded for every second of video-recording analysed.

Firstly, however, the number of seconds spent *ENGAGED*, *NOT ENGAGED*, *ACTIVE* - with or without toy, or *INACTIVE*, was noted for each child and baby.

ENGAGED - was defined as monitoring the partner or the partner's behaviour, and/or exhibiting behaviours which could be interpreted as approaches, responses or communications with the partner.

Showing, proffering or accepting a toy, touching the partner or the partner's toy, imitating or gesturing to the partner were all seen as behaviours which denoted engagement of one partner with the other.

ACTIVE WITH TOY - included, for the baby, active with any object on or around the chair - for example, the baby's harness.

ACTIVE WITHOUT TOY - included reaching for, or selecting a toy.

INACTIVE - included passive toy holding or sucking and visual tracking.

Child-Action Categories

1) Demonstrates/shows toy - toy had to be held within baby's sight, above the level of the chair tray.
2) Selects toy from table - included consideration of selection.
3) Picks up toy from tray.
4) Picks up toy from floor.
5) Replaces toy on table.
6) Puts down toy on tray.
7) Proffers toy to baby.
8) Accepts toy from baby - when proffered by baby.
9) Lets go of toy - when baby attempts to take it.
10) Reaches for toy - on tray or held by baby.
11) Touches toy/plays with toy - held by baby.
12) Attempts to take toy from baby.
13) Snatches toy - forcibly takes toy from baby.
14) Avoidance of baby's grasp - moves toy played with so that it is beyond the baby's reach.
15) Reaches to touch baby.
16) Touches baby.
17) Violation of personal space - strokes or holds baby's body or face, not hands.
18) Gestures - waves, points to gain or direct attention.
19) Positive head alignment - in order to maintain eye contact.
20) Face 'looming' - pushing face close to baby's in order to gain attention, emphasise speech.
21) Head nodding - for emphasis with speech.

22) Shoulder hunching - for emphasis with questions, exclamations.

Interpreted Behaviour Sequences

1) Toy 'piling' - systematically placing one toy after another on the tray, so that the baby cannot play.
2) Baby oriented games - with toys and without toys - sequences of repeated behaviours to maintain or gain the baby's attention.
3) Attribution of intent - interpretation of the baby's signals or gestures with an appropriate response - giving a toy reached for, helping to move or manipulate difficult toys.
4) Imitates - baby's actions, within 20 seconds.

The categories "active with toy" and "active without toy" when not qualified by an action sub-category denote solitary play.

Baby Action Categories

1) Waves/rattles toy.
2) Picks up/attempts to pick up toy - from tray.
3) Lets go/throws/drops toy.
4) Proffers toy to child.
5) Accepts toy - when proffered by child.
6) Holds toy - placed by child, without picking up.
7) Reaches for toy - on tray, floor or held by child.
8) Takes toy - from child when not proffered.

9) Touches or hits child - with hand or toy.

10) Bangs tray/toy - with toy or hand.

11) Gestures - waves at child.

12) Avoids - moves away from child's touch, toy grab.

13) Pushes away - partner or toy held by partner.

14) Reaches out - to be picked up.

Interpreted Behaviour Sequences

1) Fusses - precursor to crying.

2) Excited - total bodily action denoting pleasure.

3) Aggressive - banging, throwing, pushing away proffered toys.

4) Attempts to/initiates game - with child, by proffering and snatching away, hiding behind and reappearing. Repeated behaviour sequences.

5) Imitates - childs actions, within 20 seconds.

Baby/Child-Gaze Direction

Towards:

1) Partner's face.

2) Partner's body - includes hands, back of head.

3) Into distance - (dreaming, looks blank).

4) Distant stimulus.

5) Toy on tray.

6) Toy on table/floor.

7) Toy held by partner.

8) Toy held by self.

9) Self/microphone on self.

10) Eyes downcast.

11) Eyes closed/frequent blinking.

12) Gaze averted - swift gaze change to break or avoid eye contact.

(No score denotes face obscured).

Child - Facial Expression

1) Smile

2) Exaggerated smile/grin - teeth showing

3) Alert - bright-faced, interested, but not smiling.

4) Gone to lunch - dreaming, expressionless

5) Watchful - sombre-faced, mouth set.

6) Pout/Sulk - lips protuberant.

7) Sad/Crying - lower lip protuberant, mouth downturned.

8) Exaggerated sad - mouth downturned, eyebrows lowered.

9) Frown - mouth set, brows furrowed.

10) Exaggerated frown - mouth clenched, eyebrows furrowed.

11) Worried concern/Puzzled - furrowed brow, pursed mouth.

12) Questioning - mouth open, eyes wide.

13) Surprise - eyebrows raised, eyebrow flash.

14) Exaggerated surprise - mouth open, eyebrows raised.

15) Exertion - lips compressed and stretched, face taut.

16) Sub-vocalize - expressionless mouthing, lip or tongue play.

17) Exaggerated vocalization - mouth or face play, face distorted.

Baby - Facial Expression

1) Smile

2) Laugh/Grin - gums showing.

3) Alert - bright-faced, interested.

4) Gone to lunch - dreaming, expressionless.

5) Watchful - sombre-faced, mouth set.

6) Frown/Fuss - furrowed brow, mouth downturned.

7) Cry - mouth open, face screwed up.

8) Puzzled/Worried - furrowed brow, mouth open or set.

9) Frown annoyance - face set, lips firmly clenched.

10) Angry - mouth open, chin jutting forward.

11) Pout/Suspicious - top lip protuberant.

12) Questioning (Greeting) - eyebrows raised, eyebrow flash.

13) Exertion - face taut, mouth clenched.

14) Winces - screws up face in response to visual/auditory stimuli.

15) Sub-vocalize - mouthing, tongue or lip movement.

16) Crow - eyes bright, mouth open, top lip protuberant - preparing to bite or vocalize.

Imitation - both child and baby were scored for imitation of facial expression. This scoring was done directly from the video-recording, not from the facial expression encoding. This was to ensure that the expressions were imitative and that errors and variance in the encoding of facial expresions did not affect the number of imitations scored.

TABLE I

RAW SCORE BABY BEHAVIOURAL OVERTURES	RAW SCORE CHILD BEHAVIOURAL RESPONSES	% RESPONSE OF EACH CHILD TO EACH BABY	% RESPONSE OF EACH CHILD TO BABY Gp OVERT
4	1	25	7
1	1	100	7
3	0	0	0
6	0	0	0
14 TOTAL	2 (14% Gp RESPONSE)	125 (OUT OF 400%)	14 TOTAL

Table II

Reliability for Separate Category Systems

Category	Rate-Rerate		Co-rater	
	Number disagree	% agree (240 secs)	Number disagree	% agree (120 secs)
Engaged/Active	0	100	4	97
Action	1	99.6	3	97.5
Interpreted behaviours	0	100	0	100
Gaze direction	2	99.2	8	93
Facial expression	3	98.8	9	92.5
Vocalizations	2	99.2	5	95
Overall	8*	99.5	29*	96

*out of 1,440 possible category scores
6cats systems x 240 secs

*out of 720 possible category scores
6 cat systems x 120 secs

APPENDIX A

Toys Used in the Research Study

Teething Ring

Finger Rattle

Hexagonal Rattle

Plastic Bell Ball

Wooden Bell Cage

Foam Bell Cube

American-design Bell Cube

"Red Rings"

Squeaky Bear

Squeaky Boy on Car

*Stacking Cups

*Pyramid Stacking Rings

*3-Dimensional Puzzle Phone

*Pull-along Dog

*Hopping Frog

Yellow Teddy Bear

Roly-Poly Bear

*Toys requiring constructional/manipulative skills of the older child.

CHAPTER 3

Vocalizations: Baby & Child

Vocalizations were used as the starting point for the analysis of the data resulting from this study, for it was thought that they would provide an initial indication of the degree of approach in each of the child sub-groups, as well as information about the nature of the interactions between child and baby. Using vocalization in this way does however presuppose a positive correlation between vocalization rate and activity levels in the child which only further analysis can substantiate.

Initially vocalization rates for the sample as a whole were analysed to test the relationship between degree of vocalization in the child and degree of vocalization in the baby. The measure used for this and subsequent analyses in this chapter was the number of seconds in which vocalization occurred within the two minutes of interaction analysed. This measure has the advantage of including, for the child, all the noises, game playing and nonsense talk that, as well as speech, could be thought to elicit a response from the baby or, in itself, be a response. Within the sample 25 of the 32 babies vocalized; as did 26 of the children. In the mother-baby sample all mothers and babies vocalised.

There was a negligible correlation between child and baby vocalizations ($r = -0.177$). A positive correlation might have been

expected; representing an optimal level of interaction in which children and babies both vocalize, or conversely representing a minimal interaction in which neither partner speaks nor is speech elicited. From casual observation, however, it seemed that vocalization between children and babies was not always mutually reinforcing. There did not seem to be much evidence of the reciprocal stimulation observed between mother and child (Lewis, 1972) in that baby vocalization did not seem to increase as a result of the vocal response of the child, nor did a high rate of vocalization in the child seem to be a response to baby vocalization. It seemed rather, in some specific dyads, that there was a negative relationship between vocalization rates. High rates of activity in one partner, including vocalization, served to suppress activity and vocalizations in the other. Perhaps this is as we would expect if reference is made to works on mother-infant synchrony (Brazelton, Koslowski & Main, 1974).

Also from observation it appeared that there was, as would be expected (Goldberg & Lewis, 1969; Blakemore, 1981), a difference in vocalization rates between the sexes for both children and babies, with females vocalizing more than males. Other differences were anticipated: that there should be a difference in the child's vocalization rate according to the sex of the baby spoken to (Goldberg & Lewis, 1969), with girl babies being spoken to more than boy babies, and that the experience of both child and baby should positively affect their degree of vocalization. It was hypothesised that experience in the child should particularly alter the extent of their

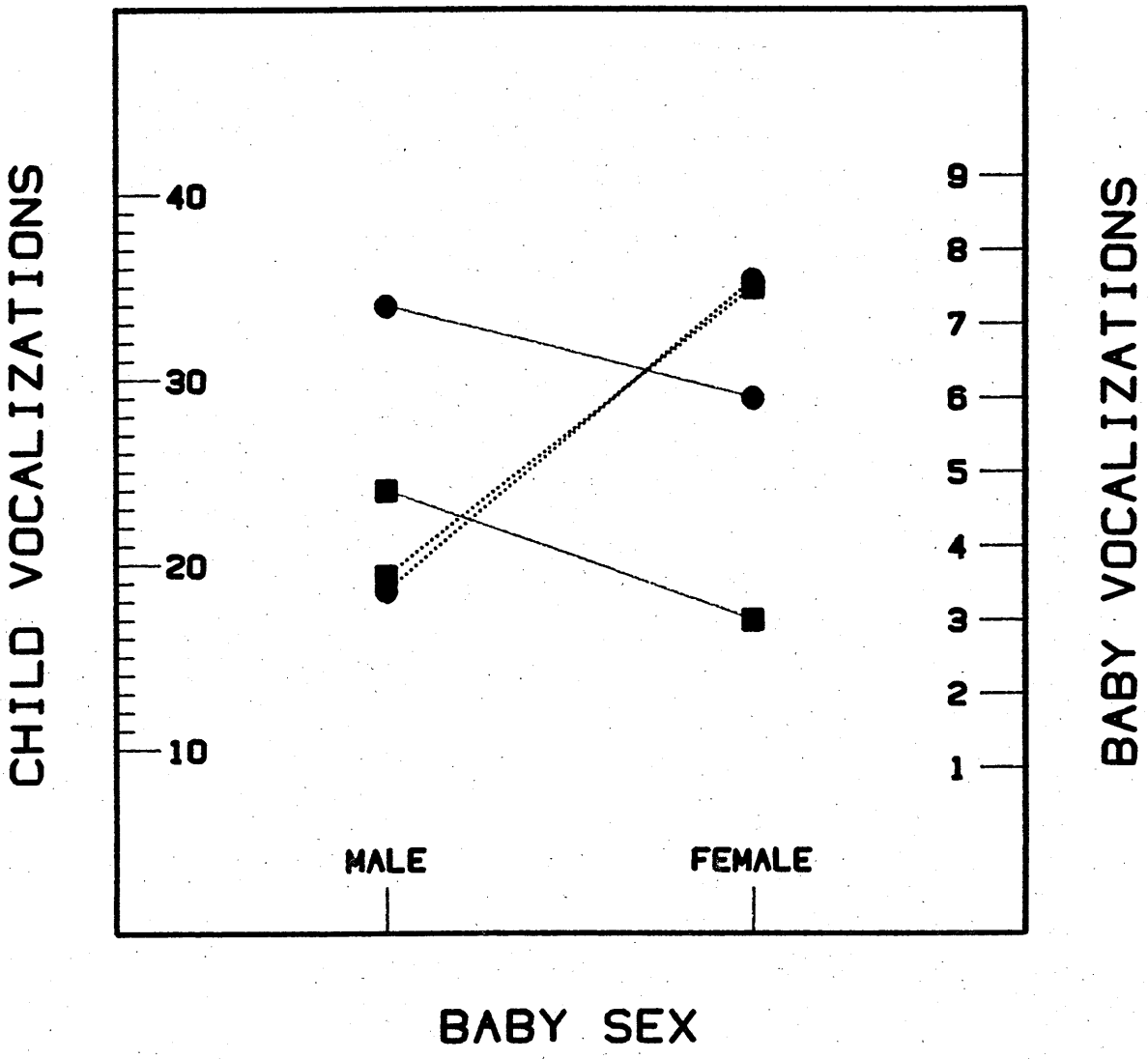
vocalizations, for the experienced children would have learnt the effectiveness of speech in attracting and maintaining a baby sibling's attention. Whether this was true for all or some of the sex and age groups was not immediately apparent. The age of the child did not seem to be a factor relevant to variations in vocalization rate, although it would obviously be relevant to the kind of speech produced by the child.

On looking at the data for both children and babies, within the various sex and experience groups, it could be seen that the extent of vocalization in both child and baby was dependent upon the interaction of these anticipated variables and so would not have been revealed by correlations carried out on the two undifferentiated samples. To test the strength of these interactions, two-way ANOVAs were used, looking at the factors of Sex and Experience in both the child and baby and their effect on child and baby interactions.

It was found that the sex of the baby and child did affect rates of vocalization: the sex of the baby in the dyad also affected the child's vocalization rate. There was, however, no significant overall difference in baby or child vocalization due to their experience, although babies with siblings did tend to talk more than first born babies, and inexperienced girls tended to talk more than experienced girls. There was no difference due to experience for boys. There were significant differences due to the interaction of sex and experience in both child and baby, and due to the experience or sex of the other partner in the dyad.

FIG 1

CHILD SEX (A) * BABY SEX (B)



CHILD VOCALIZATIONS *A:* $F(1, 27) = 1.96$

●——● FEMALE CHILD

■——■ MALE CHILD

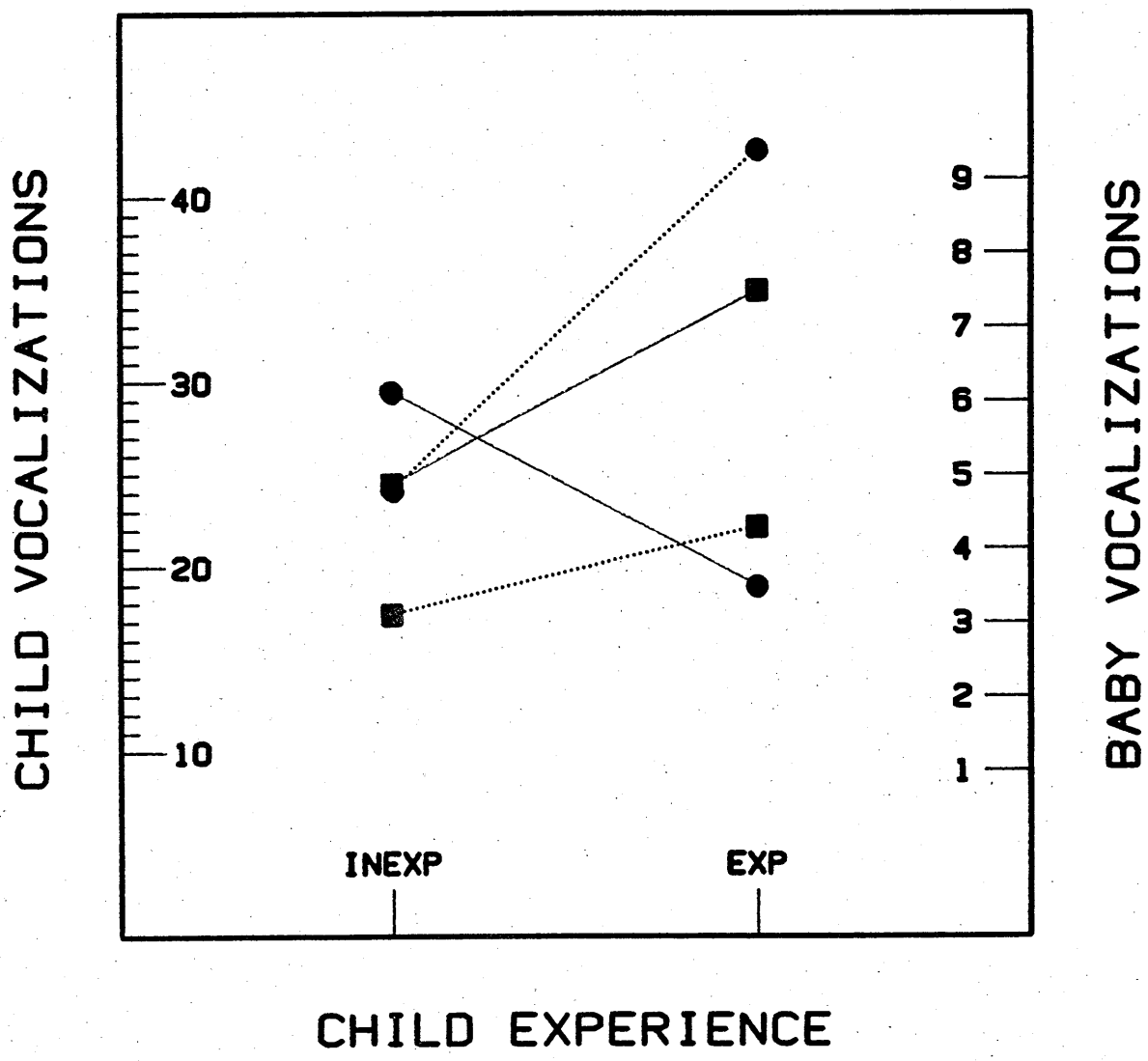
BABY VOCALIZATIONS

●·····● WITH FEMALE CHILD *B:* $F(1, 27) = 4.03$ $p < .10$

■·····■ WITH MALE CHILD

FIG 2

BABY SEX (A) * CHILD EXPERIENCE (B)



CHILD VOCALIZATIONS

WITH FEMALE BABY

WITH MALE BABY

AB: F(1, 27) =1. 64

BABY VOCALIZATIONS

A: F(1, 27) =2. 93 p<. 10

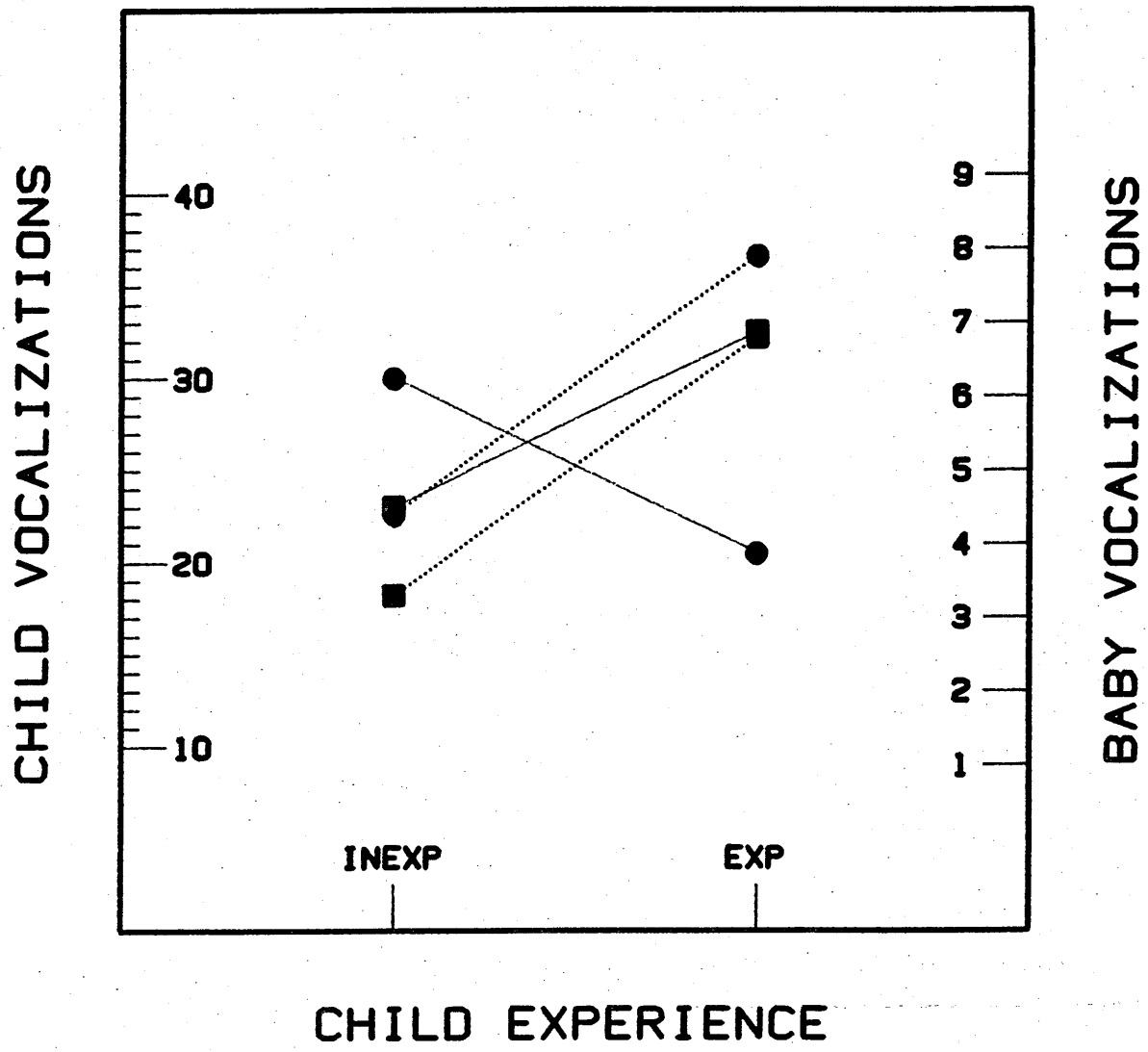
FEMALE BABY

B: F(1, 27) =2. 13

MALE BABY

FIG 3

CHILD EXPERIENCE (A) * BABY EXPERIENCE (B)



CHILD VOCALIZATIONS

●——● WITH SIB'D BABY

■——■ WITH FB BABY

AB: F(1, 27) = 1.31

BABY VOCALIZATIONS

A: F(1, 27) = 2.89 p < .10

●·····● SIB'D BABY

B: F(1, 27) < 1

■·····■ FIRSTBORN BABY

Sex Differences

Fig 1 shows some expected trends in the vocalization rates due to child and baby sex, although none of these trends reaches significance. Regardless of the sex of their partners, female babies tended to vocalize more than male babies. (This difference approaches significance at the 5% level, $F(1,27) = 4.03$, $p < 0.10$: see Table 1.) There were no differences in babies' vocalizations according to the sex of their partner. Female children also tended to vocalize more than male children, regardless of the sex of their partner. However, both male and female children vocalized slightly more to male babies than to females.

Child Experience

At first glance these trends seemed to support the original hypothesis that there should have been an overall negative relationship between baby and child vocalizations, with both sexes of children vocalizing most to the baby group which vocalized least. However, if we look at the interaction of baby sex with child experience (Fig 2, Table II) it is clear that this effect was not constant. The experienced children talked slightly more to the male babies than to the female, whereas the inexperienced children talked more to the female babies than to the male. However, this interaction was not significant. A similar, but still non-significant, difference in vocalization trends can be seen in Fig 3 and Table III, which shows the interaction between child and baby experience. Although siblinged babies tended to talk more than first born babies, experienced children talked less

to the siblinged babies than to the first born, whilst inexperienced children talked more to siblinged babies than to first born.

Although neither of these two interactions is significant, they may point to a difference in strategy between the experienced and inexperienced child. Whereas the experienced children vocalize more when with babies who vocalize least, inexperienced children vocalize when with babies who vocalize most. If we then return to the correlations between child and baby vocalizations, but this time take into consideration the factor of child experience, we find a positive correlation ($r = 0.647$, $p < 0.01$) between the vocalization rates of inexperienced children and babies but a negative correlation ($r = -0.649$, $p < 0.01$) between the vocalization rates of experienced children and babies. (These correlations remain constant even if the experience of the baby is also taken into consideration). This negative correlation between the experienced children and babies vocalization rates reflects that found between the four mothers and babies in the sample ($r = -0.677$, N.S.).

No other significant correlations were found between child and baby vocalizations when the sample was regrouped according to child or baby sex or the experience of the baby.

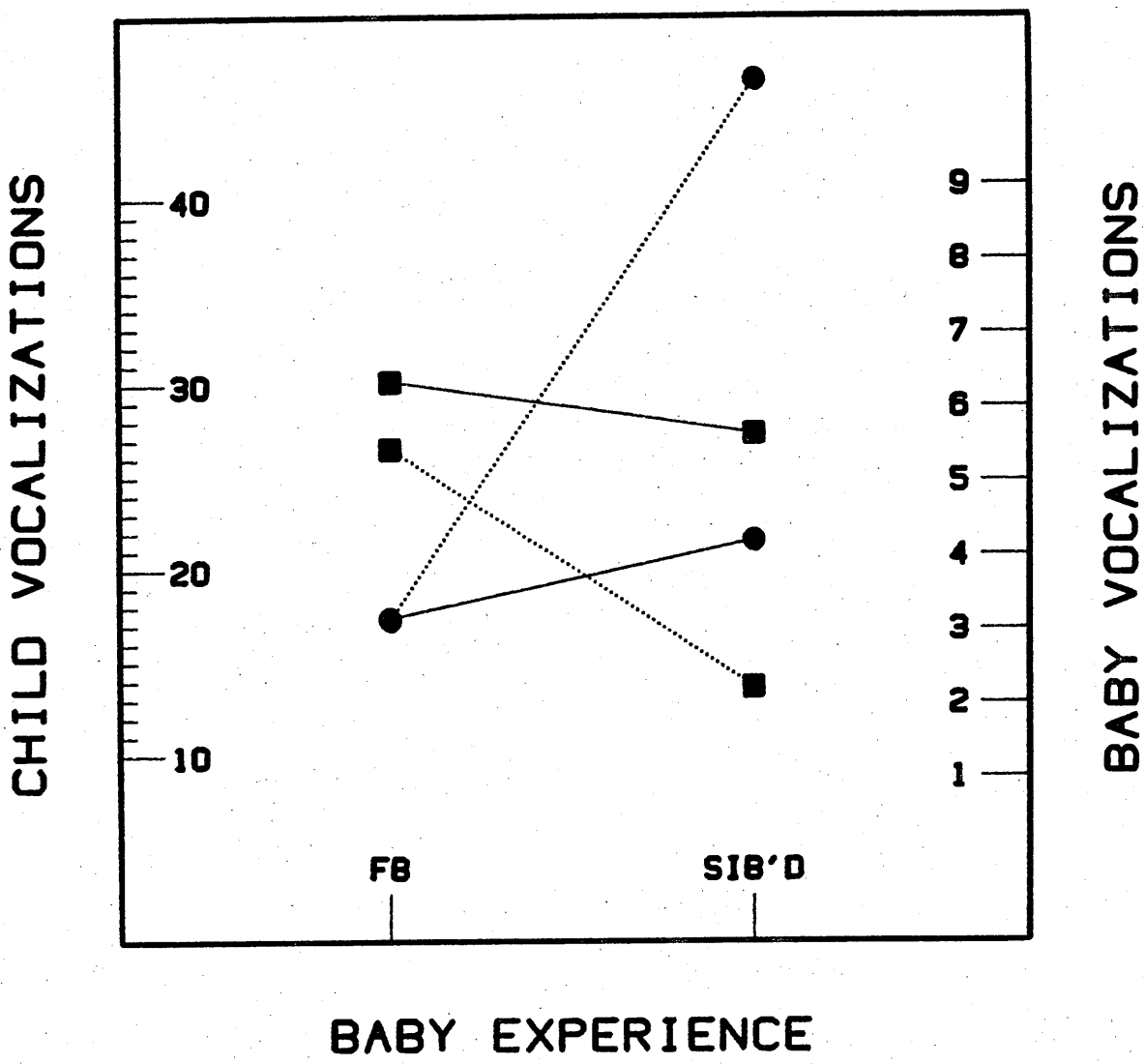
These data indicate the presence of a learned response, by the experienced child to the level of stimulation provided by the baby: a heightened sensitivity, in fact, to the requirements of the interaction - a skill similar it would seem to that found in the

mother. If the baby talks the experienced child remains quiet, if the baby remains quiet, however, the experienced child talks; perhaps in an attempt to elicit some response. The inexperienced child, however, rather than trying to maintain a constant level of conversation within the dyad varies his/her vocalization rate with the baby. When the baby talks the inexperienced child talks, when the baby is quiet so the child remains quiet. That the experienced child does not necessarily meet a baby of the same sex as its own baby sibling (sex of the baby sibling is evenly distributed across the sample) and therefore does not meet with an expected level of vocalization from the baby, higher for female babies lower for male babies, indicates that it is a learned sensitivity in the experienced child which results in the maintenance of a constant stimulation level within the dyad, rather than a specifically learned reaction to a particular level of vocalization from the baby.

It is unlikely that this effect is caused by the baby reacting to different vocalization rates in the child and adjusting his/her vocalization rate accordingly, for this would mean that the babies were reacting differently to experienced and inexperienced children. If the experienced children were quiet the babies would talk to them, if the inexperienced children were quiet then the babies would remain quiet. It is possible however, that a difference in vocal response in the baby, according to the experience of the child, could be due to other behavioural strategies common to the experienced or inexperienced child and yet to be investigated. And although at this point it would seem wise, in the interests of parsimony, to reject

FIG 4

BABY SEX (A) * BABY EXPERIENCE (B)



CHILD VOCALIZATIONS — *A: F(1, 27)=1.23*

●——● WITH FEMALE BABY

■——■ WITH MALE BABY

BABY VOCALIZATIONS

●·····● FEMALE BABY — *A: F(1, 27)=2.69*

■·····■ MALE BABY — *B: F(1, 27)=1.31*

AB: F(1, 27)=8.45 p<.01

this theory and accept that the child is reacting to the baby's level of vocalization, it must also be mentioned that in individual cases lively babies faced with a silent and unresponsive child vocalized repeatedly whilst looking at the child. This was done, it would seem, with the intention of gaining some response from the child, or of starting a conversation.

Baby Experience

That the baby does adjust his/her vocalization rate according to his/her previous experience is suggested by the data resulting from the interaction of baby Sex * Experience (Fig 4, Table IV). Although there is little difference between the vocalization rate of the sexes in first born babies there is a significant difference in the vocalization rate of the babies with siblings according to their sex. The experienced male babies vocalized less than first born male babies, the experienced female babies vocalized more than first born female babies ($F(1,27) = 8.453$, $p < 0.01$). There is little difference in the child vocalization rate according to whether the baby has siblings or is first born, the babies were not, therefore, reacting to differences in the child's vocalization rate within the dyadic interaction. A possible explanation for this finding, the difference that experience has on male and female baby vocalization rates, could be that male babies are spoken to far more frequently than female babies by their siblings. This is confirmed to some extent in Fig 2, by the (non significant) difference between experienced childrens' vocalization rates when with male and female babies. Experienced male

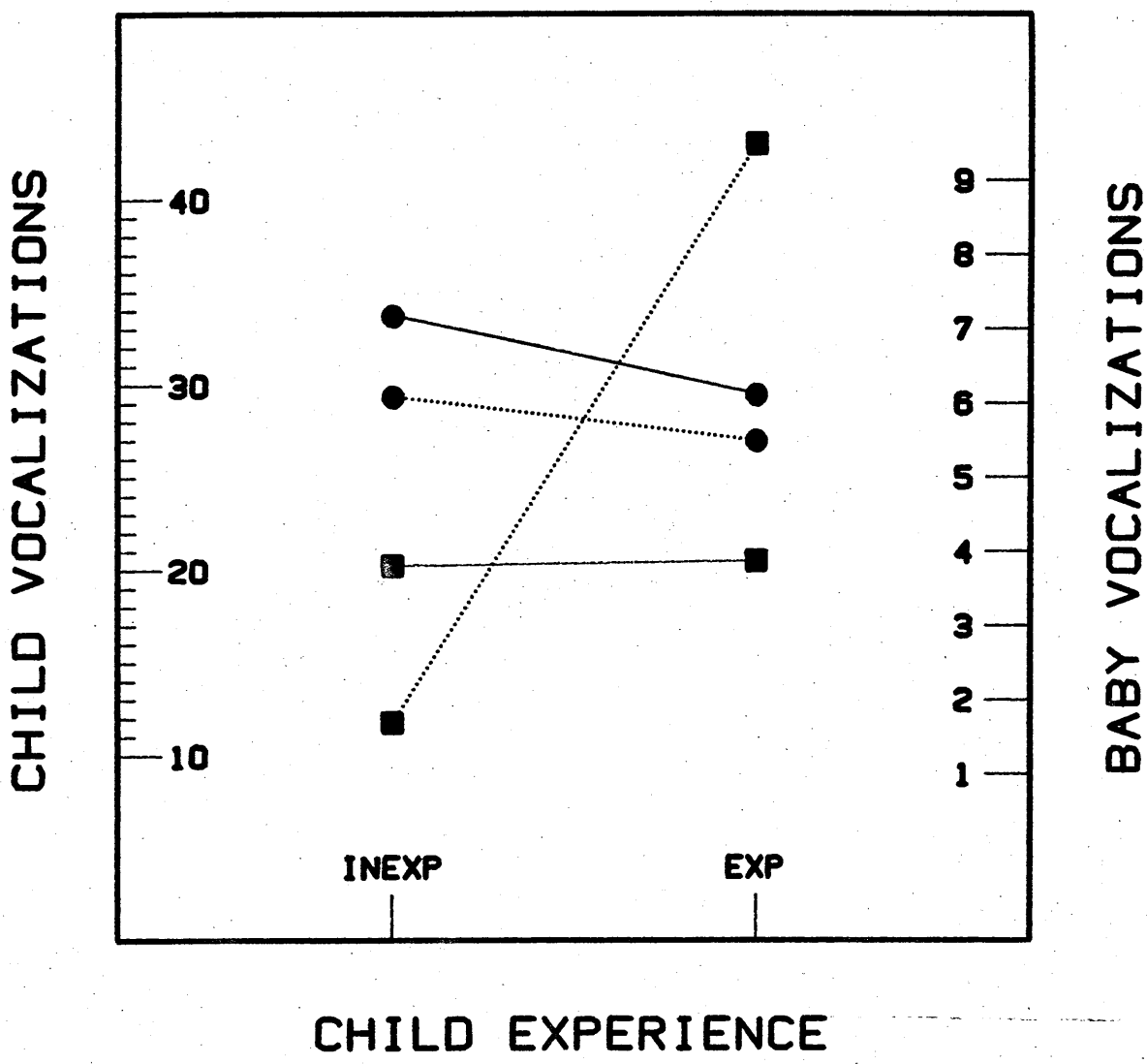
babies therefore expect a higher rate of vocalization to be directed toward them and in turn suppress their own vocalizations when with older children. Female babies with experience of siblings are used to being spoken to infrequently and step-up their vocalization rates accordingly when with older children.

This explanation is not entirely incompatible with that given for the difference in strategy between experienced and inexperienced children. The babies would have learned to expect certain vocalization levels from their siblings before they themselves could speak. The experienced child's sensitivity to maintaining a constant level of speech within the dyad would come with the emergence of speech in the baby. Mutually reinforcing strategies would therefore emerge. However, this model is based on the assumption that when faced with a new sibling baby, children tend to vocalize more to male babies than to female babies. That inexperienced children tend to vocalize most to female babies (Fig 2) throws some doubt on the hypothesis.

It could be argued alternatively that the female baby has a potential for vocalization which is only realised when she is familiar in interacting with older children. This increase in vocalization could in turn suppress the rate of vocalization in the older child, there being less stimulation required to maintain a contant level of conversation. However, as much as this appears to be the most likely explanation for the female babies, it seems unlikely that male babies would have a potential for vocalizing less which is realised after

FIG 5

CHILD EXPERIENCE (A) * CHILD SEX (B)



CHILD VOCALIZATIONS

●——● FEMALE CHILD

■——■ MALE CHILD

B: $F(1, 27) = 1.9$

BABY VOCALIZATIONS

●·····● WITH FEMALE CHILD

■·····■ WITH MALE CHILD

A: $F(1, 27) = 3.5$ $p < .10$

AB: $F(1, 27) = 4.88$ $p < .05$

experience.

Child Experience * Sex

Despite the different correlations already discussed between baby vocalizations and experienced and inexperienced child vocalizations, it is still not surprising to find that there is a tendency for babies, both siblinged and first born, to vocalize more with experienced children (Fig 3 & Table III; $F(1,27) = 2.89$, $p < 0.1$ N.S.). We could presume other aspects of the total interaction between baby and child to be responsible for this. But if we return to Fig 2 & Table II we see that the child's level of experience makes little difference to the vocalization rate of the male baby, this being nearly the same with both experienced and inexperienced children. It does, however, affect the vocalization rate of the female baby. Female babies, both with experienced and inexperienced children, vocalize more than male babies, but the highest vocalizing group of all is that of female babies when with experienced children. This is as would be expected from the data already considered: the higher rate of vocalization from a female baby and the greater sensitivity of an experienced child providing the optimal interaction.

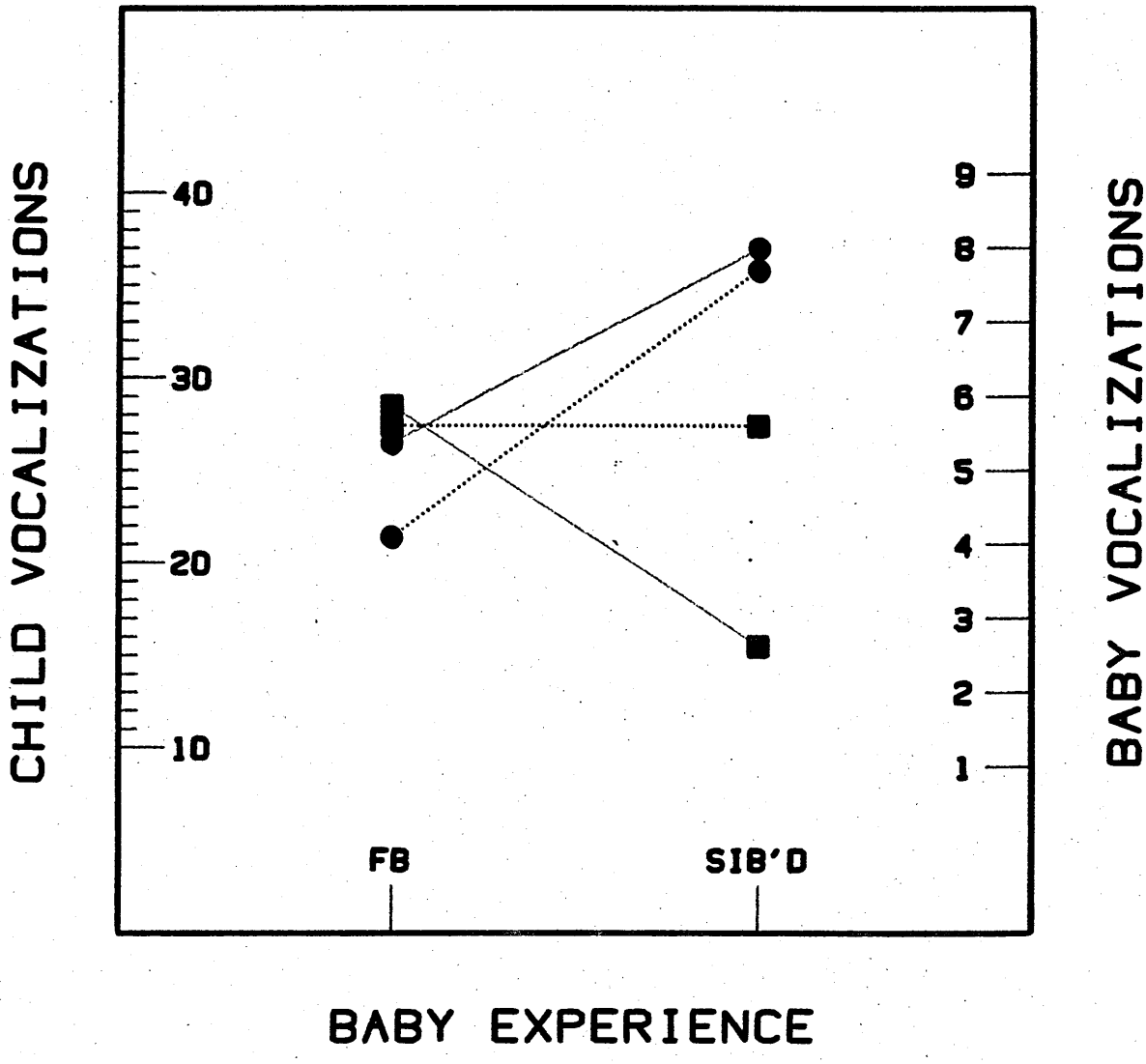
The data presented in Fig 5 & Table V, showing the effects of the interaction between sex and experience in children on baby vocalization, suggest however that there may be something about the experienced child's behaviour, or more specifically the experienced male child's behaviour, rather than his vocalization which elicits a

high rate of vocalization in the baby. For although there was no difference between the inexperienced and experienced boys' vocalizations to the baby, there was a difference between baby vocalization rates when with experienced and inexperienced boys. The babies vocalized more to experienced boys than to experienced girls, less to inexperienced boys than to inexperienced girls. (This interaction is significant, $F(1,27) = 4.88$, $p < 0.05$) There was little difference between baby vocalization rates when with experienced or inexperienced girls.

If the age of the child partner is included as a factor in this analysis it is still clear that the difference between baby vocalization rates when with experienced and inexperienced males was far larger than the difference between baby vocalization rates when with experienced and inexperienced females. A three-way ANOVA (Table VI) carried out on baby vocalization rates when with children of various Age, Sex and Experience levels, shows a significant interaction between Age and Sex ($F(1,24) = 4.641$, $p < 0.05$). The babies vocalized far more to experienced boys than to inexperienced boys. The three factor means for baby vocalizations show us that both this difference and the direction of the difference are constant for both male age groups:

FIG 7

CHILD SEX (A) * BABY EXPERIENCE (B)



CHILD VOCALIZATIONS

FEMALE CHILD

MALE CHILD

A: $F(1, 27) = 1.54$

AB: $F(1, 27) = 2.20$

BABY VOCALIZATIONS

WITH FEMALE CHILD

WITH MALE CHILD

7MX : 8.75 > 2.75 : 7MI

4MX : 10.25 > 0.75 : 4MI

However we now also find a difference in baby vocalization rates when with experienced or inexperienced females, but the direction of this difference was not the same for both age groups:

7FX : 3.75 < 7.25 : 7FI

4FX : 7.25 > 4.66 : 4FI

With the 7 year old girls the babies vocalized more to the inexperienced child than to the experienced, but with the 4 year old girls the baby vocalized more to the experienced child than to the inexperienced. These differences, almost equal but in opposite directions, led to the effect shown in the original data, that there was no difference in baby vocalization rates according to the experience of the girls. There would, therefore, seem to be a marked behavioural strategy common to experienced boys, plus perhaps a marked lack of expertise in inexperienced boys, which accounts for the high baby vocalization rates when with experienced males. However, there seems to be no such strategy specific to one age or experience group in the females.

Although the findings so far have been fairly consistent, the data presented in Fig 7 & Table 7 provide us with something of an anomaly. The interaction is not significant but it still indicates a tendency for girls to talk more to experienced babies than to first

born, and for boys to talk more to first born babies than to experienced babies. The highest vocalizing group of children, females, therefore talked more to the highest vocalizing group of babies: experienced babies tended to vocalize more than first born. Both boys and girls vocalized to the same extent with first born babies. However, that inexperienced girls tended to talk more than experienced girls (Fig 5) and that inexperienced children talked more to experienced babies than to first born (Fig 3), does explain some of the difference between girls' vocalizations when with experienced and first born babies. The corresponding tendency for boys to talk less to experienced babies than to first born is in accord with our other findings, those of negative correlations between child and baby vocalizations. In this case however both experienced and inexperienced boys appear to show this negative correlation, rather than just the experienced boys as would be expected from our earlier analysis.

However, if the data are further broken down so that we can look at the correlations between inexperienced and experienced boys when with experienced or first born babies, we find significant negative correlations between the vocalization rates of experienced boys when with experienced ($r = -0.89$) and first born ($r = -0.77$) babies, but only small, non significant, positive correlations between the vocalization rates of inexperienced boys with experienced and first born babies. This explains the skew in the boys' data, both groups appearing to talk least to the baby group which vocalises most because the strong significant positive correlation in the experienced boys'

vocalization rates is not counterbalanced by an opposing significant negative correlation in inexperienced boys' vocalizations. Why the correlation between babies' and inexperienced boys' vocalizations, although in the expected direction, is not significant, is not immediately apparent, although its cause is probably the very low vocalization rate found in the four year old boys groups.

SUMMARY

The interaction effects of sex and experience on child and baby vocalizations are complex and occasionally their causes seem unclear. However, some coherent and stable patterns have emerged from even the non significant trends:

1) There was no significant difference due to sex in the vocalization rates of either the babies or the children. However, females did tend to vocalize more than males, a difference which approached significance ($F(1,27)=4.03$) for baby vocalizations.

2) There was no significant difference in child vocalizations due to baby sex. However, both male and female children did vocalize slightly more to male babies than to females.

3) There is a difference in the direction of the correlation between child and baby vocalizations for experienced and inexperienced children. Experienced and inexperienced childrens' vocalizations correlate negatively with baby vocalizations ($r = -o.694$, $p<0.01$): inexperienced childrens' vocalizations correlate positively with baby vocalizations ($r = 0.647$, $p < 0.01$).

4) There is an effect on the babies' vocalization rate due to the interaction between baby sex and experience. Experienced male babies vocalize less than male first born babies, experienced female babies vocalize more than female first born babies ($F(1,27) = 8.454$, $p < 0.01$).

5) There is a difference between baby vocalization rates when with experienced and inexperienced boys. The vocalization rate is higher with experienced boys than with inexperienced ($F(1,27) = 4.88$, $p < 0.05$). This effect is constant across both age groups and therefore points to a behavioural strategy common to experienced boys which is likely to elicit a high rate of vocalization from the baby.

TABLE I: Child Sex * Baby Sex

Factor A - Child Sex
Factor B - Baby Sex

Child Vocalizations

Source	SS	df	MS	F
A	980.692	1	980.692	1.961
B	291.468	1	291.468	0.583
A*B	7.451	1	7.451	0.015
ERROR	13503.179	27	500.118	-
TOTAL	14403.015	30		

(Harmonic Mean Cell Size = 7.724)

Baby Vocalizations

Source	SS	df	MS	F
A	0.010	1	0.010	0.000
B	129.165	1	129.165	4.032
A*B	0.062	1	0.062	0.002
ERROR	864.964	27	32.036	-
TOTAL	1021.197	30		

(Harmonic Mean Cell Size = 7.724)

TABLE II: Baby Sex * Child Experience

Factor A - Child Experience
Factor B - Baby Sex

Child Vocalizations

Source	SS	df	MS	F
A	0.006	1	0.006	0.000
B	224.493	1	224.495	0.444
A*B	831.570	1	831.570	1.643
ERROR	13666.389	27	506.163	-
TOTAL	13825.763	30		

(Harmonic Mean Cell Size = 7.347)

Baby Vocalizations

Source	SS	df	MS	F
A	61.551	1	61.551	2.127
B	84.653	1	84.653	2.925
A*B	20.544	1	20.544	0.710
ERROR	781.456	27	28.943	-
TOTAL	1141.871	30		

(Harmonic Mean Cell Size = 7.347)

TABLE III: Child Experience * Baby Experience

Factor A - Child Experience
Factor B - Baby Experience

Child Vocalizations

Source	SS	df	MS	F
A	0.457	1	0.457	0.001
B	51.682	1	51.682	0.100
A*B	680.880	1	680.880	1.312
ERROR	14007.137	27	518.783	-
TOTAL	14053.989	30		

(Harmonic Mean Cell Size = 7.483)

Baby Vocalizations

Source	SS	df	MS	F
A	93.110	1	93.110	2.890
B	9.431	1	9.431	0.290
A*B	0.023	1	0.023	0.001
ERROR	878.948	27	32.554	-
TOTAL	1065.297	30		

(Harmonic Mean Cell Size = 7.483)

TABLE IV: Baby Experience * Baby Sex

Factor A - Baby Sex
Factor B - Baby Experience

Child Vocalizations

Source	SS	df	MS	F
A	643.549	1	643.549	1.227
B	4.496	1	4.496	0.009
A*B	96.690	1	96.690	0.184
ERROR	14156.032	27	524.297	-
TOTAL	14977.481	30		

(Harmonic Mean Cell Size = 7.665)

Baby Vocalizations

Source	SS	df	MS	F
A	66.906	1	66.906	2.687
B	32.577	1	32.577	1.308
A*B	210.480	1	210.480	8.453
ERROR	672.294	27	24.900	-
TOTAL	1103.355	30		

(Harmonic Mean Cell Size = 7.665)

TABLE V: Child Experience * Child Sex

Factor A - Child Sex
Factor B - Child Experience

Child Vocalizations

Source	SS	df	MS	F
A	974.485	1	974.485	1.914
B	30.347	1	30.347	0.060
A*B	34.296	1	34.296	0.067
ERROR	13743.179	27	509.007	-
TOTAL	14431.773	30		

(Harmonic Mean Cell Size = 7.724)

Baby Vocalizations

Source	SS	df	MS	F
A	0.298	1	0.298	0.011
B	97.539	1	97.539	3.500
A*B	136.022	1	136.022	4.881
ERROR	752.357	27	27.865	-
TOTAL	992.978	30		

(Harmonic Mean Cell Size = 7.724)

TABLE VI: Child Age * Child Sex * Child Experience

Baby Vocalizations

7 YEARS FEMALE EXP	5.63	5.75	4 YEARS MALE INEXP
	7.50	3.88	

	7 YEARS	4 YEARS
FEMALE	5.50	6.00
MALE	5.75	5.50

	7 YEARS	4 YEARS
EXP	5.50	9.50
INEXP	6.00	1.75

	FEMALE	MALE
EXP	6.25	8.75
INEXP	5.00	2.75

7 YEAR OLDS				4 YEAR OLDS			
FEMALE		MALE		FEMALE		MALE	
EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
3.75	7.25	8.75	2.75	7.25	4.66	10.25	0.75

ANOVA Summary Table

Source	SS	df	MS	F
A	0.125	1	0.125	0.004
S	0.125	1	0.125	0.004
E	105.125	1	105.125	3.584
A*S	1.125	1	1.125	0.038
A*E	45.125	1	45.125	1.538
S*E	136.125	1	136.125	4.641
A*S*E	3.125	1	3.125	0.107
ERROR	704.000	24	29.333	-
TOTAL	994.875	31	-	-

TABLE VII: Child Sex * Baby Experience

Factor A - Baby Experience
Factor B - Child Sex

Child Vocalizations

Source	SS	df	MS	F
A	8.363	1	8.363	0.178
B	724.995	1	724.995	1.536
A*B	1049.557	1	1049.557	2.223
ERROR	12747.329	27	472.123	-
TOTAL	13628.866	30		

(Harmonic Mean Cell Size = 7.483)

Baby Vocalizations

Source	SS	df	MS	F
A	23.215	1	23.215	0.663
B	0.613	1	0.613	0.018
A*B	25.005	1	25.005	0.714
ERROR	946.037	27	35.038	-
TOTAL	1006.195	30		

(Harmonic Mean Cell Size = 7.483)

CHAPTER 4

Vocalization: Child

In the preceding chapter we looked at the relationship between child and baby vocalization rates: how this was affected by the sex and experience of both partners, and the interaction between these factors. The relationship proved complex and the presence of strategies specific to certain age, sex and experience levels in the child was often indicated. It now seems appropriate, therefore, to look more closely at child vocalizations so that we may ascertain how both the degree of vocalization and its content are affected by the interaction of the three variables pertaining to the child: age, sex and experience. In order to do this we need to look at some of the basic categories of speech used in this study, their distribution across the child sample, and whether this distribution indicates the presence of different vocal strategies for each or any of the various age, sex and experience groups.

If we look firstly at the rate of vocalization for each of these groups we find that the original hypothesis, that there would be no difference in vocalization rate due to age but that the main differences would be due to the sex and experience of the child, is only partly supported. Three-way Analyses of Variance were carried out on the child data alone. To get a more accurate idea of the true differences in vocalization rate between the age, sex and experience groups, those children in each group who did not speak at all were

discounted in this and all subsequent vocalization sub-category analysis. (This meant discounting six children, two 7 year olds and four 4 year olds: one 7 year old inexperienced female, one 7 year old experienced male, two 4 year old experienced females, one 4 year old inexperienced male and one 4 year old experienced male. The inexperienced 7 year old female and one 4 year old experienced female not included in the speech sample did make some play noises, but only 2 each in two minutes of interaction.)

There was no significant effect due to age in the childrens' vocalization rates (Table I). The mean scores for the two groups show us, however, that the 7 year old children did vocalize slightly more than the 4 year old children. The analysis also reaffirms our former findings that there was no difference in vocalization rate due to experience nor any significant difference due to experience when age was taken into consideration. There was a significant difference in vocalization rate due to sex ($F(1,18)=4.92$, $p < 0.05$): girls vocalized more than boys. The two-factor cell means for age and sex indicate, however, that this sex difference may be age related. Although 7 year old girls do vocalize slightly more than 7 year old boys (means 38.54: 35.17), the greater difference is between 4 year old girls and 4 year old boys (means 41.67: 10.5). As the 4 year old girls' vocalization rate exceeds that of the 7 year old child groups, the overall difference in vocalization rate due to both age and sex could be accounted for by the low vocalization rate of the 4 year old boys. The three-factor cell means show us, in fact, that it is the extremely low rate of vocalization shown by the inexperienced 4 year

old boys (mean 5.0) that makes the overall mean score so small; although the mean vocalization rate for the 4 year old experienced boys (mean 16.0) is still lower than any other cell.

In summary, then, we have a significant difference in vocalization rates due to sex: a difference that is constant across both age groups but that is still due largely to the difference between the vocalization rates of 4 year old boys and girls. There was no significant difference due to experience or age, although inexperienced 4 year old boys were the lowest vocalizing group.

This difference found in vocalization rate, due to sex but not to experience confirms findings from earlier analyses, but with the additional information on the interaction of the effect of sex across the age groups.

That there is no consistent difference in vocalization rate due to experience indicates that familiarity in interacting with babies does not lead to an increase in the general level of vocalization. It may, however, lead to changes in the structure of the vocalizations which may make it more appropriate to the communicative skills of the infant partner.

The age difference in vocalization rates that did appear in the Main Effect means can be explained in that the difference is largely sex related. Even at the earlier age we would expect girls to be more socially and linguistically competent than boys (Smith & Connolly,

1972). The lower vocalization rates of the 4 year old boys therefore seem to reflect a lack of social competence, ie. the ability to deal with a novel social situation. An effect that is, as we would expect, more apparent in inexperienced than in experienced boys. This would assume then that the child's vocalization rate is a positive correlate of social competence rather than a correlate of specific experience with babies.

If we look, however, at the distribution of play-noises, those imitative sounds not included in the vocalization category, we find some slight difference in the scores due to the experience of the child. A three-way Analysis of Variance carried out on the play-noise scores for each group showed no significant effects (Table II). However, the mean scores of the experienced children were higher than those of the inexperienced children. There was little difference in play-noise scores due to child Age or Sex. Also, if we look at the three-factor cell means, we find that, for play-noises, we do get a consistent trend in the scores. Each experienced age and sex group makes more play-noises than the corresponding inexperienced age and sex group. The group making the most play-noises was that of the 4 year old experienced boys; that making the least, in fact none at all, was the 4 year old inexperienced boys group.

It is clear from these data that, although the effect is not significant, the experienced children do have a vocal mannerism in common, a mannerism which they also share with the mothers (the mean

number of play-noises made by the experienced children, 2.25, is similar to the mean number made by the sample of mothers, 2.5: the mean for inexperienced children is 0.44). But whether this is merely a vocal mannerism found to be effective in amusing babies or an indicator of different play strategies carried out by experienced and inexperienced children, for which this kind of noise is a necessary adjunct, is as yet unknown. We can similarly explain the high mean number of play-noises in the 4 year old experienced male group (4 year old overall mean = 1.25, 4 year old experienced male mean = 3.25) in terms of either a preferred vocal mannerism or part of a preferred play strategy. And although it seems obvious to anyone with a working knowledge of 4 year old boys that this mannerism would specifically appeal, for it is the noisiest and most effusive of vocal categories, it is surprising in the light of Smith & Connollys' (1972) findings that it appears only in the experienced group and not at all in the inexperienced group.

A pattern similar to that found for play-noises was also found for the Repetitive Nonsense Talk, one of the component categories of vocalization. Vocalizations, which comprise all speech-type sounds, were divided at the secondary stage of analysis into utterances (single units of speech) and RNT (repetitive game-playing "baby talk"). The Analysis of Variance carried out on RNT scores did, however, show a significant effect.

In order that the differences in the composition of the speech samples between the childrens' groups might be studied, proportional

data were used in the analysis of vocalization and utterance sub-categories. For each child the percentage that speech in each sub-category formed of the total vocalizations or utterances for the child's group was calculated. These percentages for each child were then used in component analyses.

A three-way ANOVA carried out on the percentage for each child that RNT formed of the number of vocalizations made by each child's group showed a significant effect due to experience ($F(1,18)=5.58$, $p<0.05$: Table III). Experienced children used more RNT than did inexperienced children.

The pattern for RNT scores is the same as that for play-noises, with each experienced group making more play-noises and using more RNT than any of the inexperienced groups. It must be, therefore, that the use of play-noises and RNT constitutes a learned vocal strategy. This learning could either take place as a result of imitation by the child of its mother's vocal interactions with the child's sibling, or as a result of positive reinforcement by the baby sibling to these specific vocal strategies when used by the child.

In considering the other component category of vocalizations, that of utterances, we find no significant effects. The distribution of the number of utterances for each of the child age, sex and experience groups does, however, reflect the distribution of vocalization rates across the sample; with the highest mean number of utterances being made by 7 year old children, and girls. And although

we would expect this, that the number of utterances would vary with the vocalization rate, we would not expect a straightforward relationship. Different levels of experience in the children, or merely differing vocal strategies, would result in the use of different utterance lengths, and any tendency towards the use of certain lengths of utterance would affect the ratio of utterances to vocalizations. However, because vocalizations were broken down into two component categories, those of utterances and RNT, little can be learnt about possible differences in childrens' utterance lengths by looking at vocalization:utterance ratios. This measure was instead calculated separately.

The mean length of utterance for each age, sex and experience group was calculated, as before, by restricting the sample to include only those children who spoke. It was based on utterances only and was a measure of the number of words in each utterance. All game-playing Repetitive Nonsense Talk was discounted. When looking at measures of utterance length we would expect, on the basis of earlier data, a difference due to experience. The experienced child either imitates from the mother, or learns the strategy of using short, structured phrases to gain and maintain the baby's attention. Inexperience, or the presence of a strategy dissimilar to that of the mother, would possibly be indicated by the use of longer, more complex phrases similar to those used in normal conversation. If there were also to be a difference in mean length of utterance due to the interaction of age and sex, then it is probable that immaturity and a lack of social competence when attempting to maintain a conversation

with a non-speaking partner, would result in the use of very short, possibly monosyllabic utterances.

A three-way ANOVA for unequal cell sizes, carried out on the mean lengths of utterance showed a significant Main Effect and two significant interactions. The significant Main Effect was due to Sex ($F(1,18)=7.55$, $p<0.05$: Table IV), girls' mean length of utterance was longer than boys'. The significant interactions were due to Age * Sex ($F(1,18)=12.59$, $p<0.01$): the 4 year old girls' utterances were longer than all the other groups', the 4 year old boys' utterances were shorter than all other groups', and Sex * Experience ($F(1,18)=6.65$, $p<0.05$): inexperienced girls' utterances were longer than all the other groups, inexperienced boys' utterances were shorter than all other groups'.

TABLE V: MEAN LENGTH OF UTTERANCE

	7 YEAR OLDS		4 YEAR OLDS	
	EXP	INEXP	EXP	INEXP
FEMALES	2.15	3.20	3.00	3.77
MALES	3.20	2.55	1.83	1.55

These findings indicate the presence of two opposing trends. The three-factor means for each of the sexes (Table V) show us that, for the girls, utterance length increases with inexperience and immaturity whilst for the boys it *decreases* with inexperience and immaturity. Young or inexperienced girls, therefore, tend to use longer phrases than older or experienced girls, although their vocalization rates are similar, whereas young or inexperienced boys tend to use much shorter phrases than older or experienced boys. The young boys also vocalize less than any other group. If we can discern any specific strategies underlying these data, they would appear to be that, in general, the girls tend to talk using longer phrases than the boys and, with increased age and experience, graduate towards the use of shorter utterances when talking to a baby. Boys, conversely, tend to use shorter phrases than girls but with increased age and experience lengthen their utterances when with babies.

It is surprising, however, that these trends result in the experienced 7 year old boys, rather than the experienced 7 year old girls, having a MLU which most closely approximates that of our small sample of mothers (MLU = 3.1). If we accept that girls are more

likely than boys to approach and show interest in babies in conformity with a sex-role stereotype (Berman, Monda & Myerscough, 1977), then we might expect 7 year old experienced girls, rather than boys, to mimic more closely the mothers in any adaptations made in their speech when with babies. Here, however, we find the experienced 7 year old girls' speech has a MLU which approaches that of the least socially competent group, the 4 year old boys. That the MLU of the experienced 7 year old girls is similar to that of the 4 year old boys does not, however, mean that they share an underlying vocal strategy.

In order to gain information in support of this hypothesis, that similar MLUs can still reflect differing vocal strategies, we can look at the number of single word utterances that appear in the speech of each group and how these relate to MLU. We would expect that a low MLU, associated with inexperience or immaturity in the child, would contain a very high proportion of single word utterances: a form of speech which indicates a very fundamental level of conversation.

Firstly, there was a significant negative correlation ($r = -0.74$, $p<0.01$) between MLU and the percentage of single word utterances in the child's speech. This is as we would have expected: the lower the MLU the higher the number of single word utterances in the child's speech. A three-way ANOVA carried out on the percentage that each child's single word utterances formed of the child's group's utterances showed no significant effects (Table VI). The data do, however, follow the direction that would be expected on the basis of our negative correlation, with one exception.

TABLE VI

	7 YEAR OLDS		4 YEAR OLDS		
	EXP	INEXP	EXP	INEXP	
FEMALES:	2.15	3.20	3.00	3.77	MLU
	7.45	11.24	9.52	5.80	%SWU
MALES	3.20	2.55	1.83	1.53	MLU
	10.90	9.49	18.00	16.67	%SWU

There is a general trend for the percentage of single word utterances to decrease as the age of the boys, and their MLUs, increase. There is also a similar trend apparent in the 4 year old and 7 year old inexperienced girls: the percentage of single-word utterances increases with age and the decrease in MLU. The 7 year old experienced girls, however, although having a very short MLU have a relatively low proportion of single word utterances in their speech - lower in fact than six of the other child groups. For this group, the 7 year old experienced girls, a low MLU is not therefore linked to a high proportion of single-word utterances as it is for the 4 year old boys' groups, and the presence of a separate strategy is indicated - one in which the 7 year old experienced girls consistently use short simple phrases but without reverting unduly to single word utterances.

Unlike the vocalization categories already considered, experience does not seem to be the most important factor determining the use of single word utterances. The most marked differences are due to the

interaction of age and sex, and in this there is a similarity to the distribution of vocalization scores. The highest percentages of single word utterances are found in the 4 year old boys' groups, and this is where the lowest vocalization rates are also to be found. However, it is important when looking at proportional data relating to the 4 year olds to remember the effect of such a low vocalization rate. The 4 year old experienced boys had a mean utterance score of 8.0, that of the inexperienced boys was only 3.3. Therefore their mean number of single word utterances, 5.75 and 1.67 respectively, seem disproportionately high when expressed as a percentage. But it still remains clear that, however little they spoke, most of the 4 year old boys' speech was monosyllabic and, as such, represents a vocal style specific to their age and sex. As would expected those children least linguistically competent use the highest percentage of single-word utterances.

In summary, we have established three trends in basic vocalization categories, each of them indicating the presence of vocal styles or strategies specific to certain of the age, sex and experience groups.

There was a significant effect due to sex found in the distribution of the vocalization rates. This effect may be explained by the differences in vocalization rates between 4 year old girls and boys. The 4 year old boys' vocalization rate was relatively low when compared with all other groups. A similar, though non-significant, pattern was found in the distribution of single-word

utterances. Four year old boys used a relatively high percentage of single-word utterances. These data would seem to indicate the possibility of a lower level of linguistic competence in the 4 year old boys than in the 4 year old girls, as well as an inability by the 4 year old inexperienced boys to cope successfully with a novel social situation.

There is also evidence that inexperienced children learn specific vocal mannerisms, either from their mothers or from interactions with their baby siblings, and that these mannerisms are used most by experienced 4 year old children.

There was a significant difference between the amount of Repetitive Nonsense Talk used by experienced and inexperienced children. Experienced 4 year old children used more RNT than any other group. There was also a non-significant trend for all experienced child groups to make more play noises than any inexperienced group. The highest mean number of play noises was made by 4 year old experienced boys. Not only, then, is there evidence that experience in the child leads to the adoption of certain vocal mannerisms, but the data also seem to indicate that, in the use of RNT, these mannerisms are adopted to a greater extent by 4 year olds than by 7 year olds, and that their use is not therefore related to linguistic competence. That RNT is used most by the experienced 4 year olds could be due to one of two possible causes: either that this type of vocalization, noisy repetitive and game-playing, features more widely in the normal speech of 4 year olds and that this gives greater scope for its reinforcement when used with babies, or that it is an aspect of the mother's speech

to the baby sibling that most appeals to the 4 year old and is therefore most widely imitated.

The third finding was of certain significant interactions in the childrens' MLUs which can most efficiently be described as opposing trends across the two sexes. The younger boys make short, mainly monosyllabic utterances, the older boys use longer phrases. For the girls this tendency is reversed, the older girls make shorter utterances than the younger girls. So it would seem that, when talking to a baby, as the boys' age and experience levels increase so do the lengths of their utterances. Conversely, as the girls' age and experience levels increase, their utterance lengths get shorter. Despite the fact, however, that the experienced 7 year old girls use utterance lengths almost as short as the 4 year old boys, their speech is not largely monosyllabic. Their strategy seems to be to shorten their utterances to accord with the baby listener's limited processing capacity, to an extent that surpasses even the mother, but without resorting to the use of single-word utterances. It is probable then that the difference in MLU between 7 year old experienced girls and boys indicates the presence of different underlying vocal styles which are the product of an interaction between sex-role differentiation in social intercourse and learning.

The stated intention of this chapter has therefore been achieved in that specific vocal strategies have been identified by studying the distribution of basic vocal categories. There was also some evidence of experienced children mimicking strategies used by mothers, and it

now seems appropriate, therefore, to move on to the study of imitation by the various child groups of those vocal and behavioural categories used specifically by mothers when interacting with young babies.

TABLE I: VOCALIZATION RATES

Means

7 YEARS	36.85	26.10	4 YEARS
FEMALE	40.10	22.83	MALE
EXP	32.77	30.17	INEXP

	7 YEARS	4 YEARS
FEMALE	38.54	41.67
MALE	35.17	10.50

	7 YEARS	4 YEARS
EXP	35.04	30.50
INEXP	38.67	21.67

	FEMALE	MALE
EXP	40.88	24.67
INEXP	39.33	21.00

7 YEAR OLDS				4 YEAR OLDS			
FEMALE		MALE		FEMALE		MALE	
EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
36.75	40.33	33.33	37.00	45.00	38.33	16.00	5.00

ANOVA Summary Table

SOURCE:	SS	df	MS	F	p
A	718.52	1	718.52	1.91	
S	1847.22	1	1847.42	4.92	0.05
E	42.00	1	42.00	0.11	
A*S	1195.94	1	1195.94	3.19	0.10
A*E	240.33	1	240.33	0.64	
S*E	6.99	1	6.99	0.02	
A*S*E:	7.55	1	7.55	0.02	
ERROR:	6754.75	18	375.26		

TABLE II: PLAY NOISES

Means

7 YEARS	1.65	1.56	4 YEARS
FEMALE	1.60	1.60	MALE
EXP	2.67	0.54	INEXP

	7 YEARS	4 YEARS
FEMALE	1.71	1.50
MALE	1.58	1.60

	7 YEARS	4 YEARS
EXP	2.71	2.63
INEXP	0.58	0.50

	FEMALE	MALE
EXP	2.38	2.96
INEXP	0.83	0.25

7 YEAR OLDS				4 YEAR OLDS			
FEMALE		MALE		FEMALE		MALE	
EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
2.75	0.67	2.67	0.50	2.00	1.00	3.25	0.00

ANOVA Summary Table

SOURCE	SS	df	MS	F	p
A	0.04	1	0.04	0.00	
S	0.00	1	0.00	0.00	
E	27.97	1	27.97	2.35	
A*S	0.10	1	0.10	0.00	
A*E	0.00	1	0.00	0.00	
S*E	2.12	1	2.12	0.18	
A*S*E	1.82	1	1.82	0.15	
ERROR	213.83	18	11.88		

TABLE III: RNT

Means

7 YEARS	2.34	4.44	4 YEARS
FEMALE	3.55	3.23	MALE
EXP	6.10	0.69	INEXP

	7 YEARS	4 YEARS
FEMALE	1.93	5.17
MALE	2.75	3.71

	7 YEARS	4 YEARS
EXP	4.03	8.16
INEXP	0.65	0.72

	FEMALE	MALE
EXP	5.81	6.38
INEXP	1.28	0.09

7 YEAR OLDS				4 YEAR OLDS			
FEMALE		MALE		FEMALE		MALE	
EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
2.73	1.13	5.33	0.18	8.90	1.40	7.40	0.00

ANOVA Summary Table

SOURCE:	SS	df	MS	F	p
A	27.26	1	27.26	0.84	
S	0.61	1	0.61	0.02	
E	181.30	1	181.30	5.58	0.05
A*S	8.04	1	8.04	0.25	
A*E	25.66	1	25.66	0.79	
S*E	4.81	1	4.81	0.15	
A*S*E:	5.04	1	5.04	0.16	
ERROR:	584.68	18	32.48		

TABLE IV: MLU

Means

7 YEARS	2.78	2.53	4 YEARS
FEMALE	3.03	2.29	MALE
EXP	2.55	2.76	INEXP

	7 YEARS	4 YEARS
FEMALE	2.68	3.38
MALE	2.89	1.68

	7 YEARS	4 YEARS
EXP	2.69	2.41
INEXP	2.88	2.65

	FEMALE	MALE
EXP	2.58	2.53
INEXP	3.48	2.04

7 YEAR OLDS				4 YEAR OLDS			
FEMALE		MALE		FEMALE		MALE	
EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
2.15	3.20	3.20	2.55	3.00	3.77	1.83	1.53

ANOVA Summary Table

SOURCE:	SS	df	MS	F	p
A	0.39	1	0.39	0.87	
S	3.43	1	3.43	7.55	0.05
E	0.27	1	0.27	0.60	
A*S	5.70	1	5.70	12.59	0.01
A*E	0.00	1	0.00	0.01	
S*E	3.02	1	3.02	6.65	0.05
A*S*E:	0.18	1	0.18	0.39	
ERROR:	8.17	18	0.45		

TABLE VI: SINGLE-WORD UTTERANCES

Means

7 YEARS	9.77	12.49	4 YEARS
FEMALE	8.50	13.76	MALE
EXP	11.46	10.80	INEXP

	7 YEARS	4 YEARS
FEMALE	9.35	7.66
MALE	10.19	17.32

	7 YEARS	4 YEARS
EXP	9.18	13.75
INEXP	10.36	11.23

	FEMALE	MALE
EXP	8.49	14.44
INEXP	8.52	13.08

7 YEAR OLDS				4 YEAR OLDS			
FEMALE		MALE		FEMALE		MALE	
EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
7.45	11.24	10.90	9.49	9.52	5.80	18.00	16.67

ANOVA Summary Table

SOURCE	SS	df	MS	F	p
A	45.81	1	45.81	0.27	
S	170.95	1	170.95	1.02	
E	2.73	1	2.73	0.02	
A*S	120.32	1	120.32	0.72	
A*E	21.21	1	21.21	0.13	
S*E	3.00	1	3.00	0.02	
A*S*E	22.48	1	22.48	0.13	
ERROR	3027.62	18	168.20		

CHAPTER 5

Motherese & the Caregiver's Repertoire

PART I: Motherese

In the investigation of the adoption of Motherese by the child we take its primary function to be to attract and keep the baby's attention, either so that the speaker can establish eye contact and so embark upon a conversation, or to draw the baby's attention to an action or object of mutual regard in order that the interaction can be maintained. The extent to which Motherese is a teaching language is unclear, for although it is composed of short, clear utterances with frequent repetitions, it is still syntactically complex and varied. Nor is there strong evidence of any correlation between the use of Motherese and the baby's linguistic competence at a later age (Gleitman, Newport & Gleitman, 1984). Upon analysis, it is clear that the component elements of Motherese are all directed towards gaining and maintaining the baby's attention, firstly by indicating when speech is directed toward the baby and then by directing speech toward objects or actions of mutual attention. The typical short utterance lengths lend clarity and brevity to the speech and are appropriate to the baby's limited processing capacity. The frequent deletions, although not adding to clarity, also lead to greater brevity of utterance. Exaggerations of pitch and stress, questions, short phrases and one word utterances all serve to attract and maintain the baby's attention, whereas repetitions and imitations maintain the

interaction. Imperatives and deictic utterances direct either the baby's action or its attention towards objects of joint play.

These then are the aspects of speech in which we are interested. To what extent are they used by children when interacting with babies? Are the children able to adjust their speech to suit the level of competence of the listening baby and, by adopting Motherese, are they able to concern themselves primarily with gaining and maintaining the baby's attention, or are their expectations unrealistic? If the children do adopt Motherese, but only in imitation of their own mothers with their baby siblings, then we would expect to find elements of Motherese only in the speech of experienced children. If, on the other hand, children are imitating their mother's speech to themselves when younger, then we would expect a higher percentage of Motherese in the speech of the 4 year olds than the 7 year olds, for mothers also modify their speech when talking to 4 year olds (Warren-Leubecker & Bohannon, 1984). Finally, if the adoption of Motherese is dependent upon the child's understanding of the baby's limited abilities, and constitutes an appropriate adjustment by the child of both vocalizations and behaviours, then we would expect more Motherese in the speech of the older than the younger children.

In accepting that the adoption of Motherese by the mother is functional in maintaining an optimal interaction, then we would also expect that the use of such a speech style would increase with experience, since its effectiveness should become apparent with practice. If this be so, then it would also seem reasonable to expect

that experienced children should be more likely to use a higher percentage of Motherese in their speech than inexperienced children or, alternatively, that they should have devised a different, but equally efficient, strategy with a different function. After all, the aims of the child when talking to a baby may be different from those of the mother, in that there is less likely to be any element of "teaching", and the interaction may consequently be structured to meet the older child's end. At the simplest level this may only be to keep the baby involved or engrossed so that it can be seen (or heard) to be content and not actively involved in any negative behaviour. At a higher level it could be to maintain a mutually pleasing interaction.

We may also expect that girls, having more opportunity to imitate a same-sex caregiver model, will show a higher percentage of Motherese in their speech than boys. Also, if the adoption of sex-appropriate behaviours increases with age (Berman, Monda & Myerscough, 1977) then the difference between boys and girls in the use of Motherese will be greater in 7 year olds than in 4 year olds. The difference due to experience will also be less for 7 year old boys than for 4 year old boys, since experienced 7 year old boys might be supposed to be less likely to spend time conversing with their baby siblings than are experienced 4 year old boys.

If the children are adjusting their speech in response to the baby, rather than merely imitating a speech style, then this response must be made according to the linguistic competence, behaviours or appearance of the baby. In this study the vocalizations of the babies

of such a young age are limited and so, if elements of Motherese are found, regardless of experience, in the childrens' speech, they are likely to be due to an adjustment in vocalization to a style more suitable for the baby, based on a judgement made from the baby's behaviour or appearance rather than his/her vocalizations. To ensure that this adjustment, if occurring, could take place, analyses were based on the second two minutes of interaction between child and baby.

Speech Categories

The measures of Motherese used in the study ignore differences in syntactic complexity and are thus not confounded by developmental differences in syntax which naturally occur between the two age groups of children. The sub-categories of speech used were those of exaggerations of speech, questions, deletions and repetitions, imitations of speech and imperatives. Statements were also further analysed to look at the distribution of simple statements, referential statements, deictic utterances and short, isolated phrases. The occurrence of traditionally-defined "baby talk" was also noted for, although this has been found in other studies (Shatz & Gelman, 1973) not to occur in the speech of 4 year olds, it did occur in our sample of mothers and children. Speech categories already defined and discussed in the preceding chapter are also included in our synthesis of Motherese: play noises, RNT, the Mean Length of Utterance and single word utterances.

The data on the 4 mothers and babies were collected and analysed

to provide a source for comparisons with the children and babies. The sub-categories used for coding vocalization were, in part, devised to describe Motherese, although any aspect of speech peculiar to children was not ignored and a special category included to describe it when needed (eg. "sing-song" speech). It is therefore necessary to look first at the mothers' speech to ascertain the percentages of the Motherese sub-categories employed.

Mothers' Speech

All the mothers spoke to their infants, mean vocalization rate 47.5, mean number of utterances 34.25. All the mothers used some whispered speech, exaggerations of speed and pitch, baby talk, repetitions and questions (Table I). Three of the mothers made play noises and imitated their child's vocalizations. None used any of the exaggerated speech sub-category "sing-song". (This type of speech in fact occurred in only 8 children: 3 experienced 7 year olds, 2 inexperienced 7 year olds and 3 experienced 4 year old children.)

All mothers showed deletions in speech and used questions requiring both yes/no and informative answers. Three mothers used RNT, single-word utterances and imperative statements. (These, were not the same 3 mothers - the omissions were distributed across the sample.) Of the 3 mothers using statements, all 3 used deictic statements and 2 (in this case the same 2) used simple statements, short utterances and referential statements. There were, however, only 2 simple statements used altogether.

This set of categories and sub-categories may therefore be said accurately to describe mothers' speech to babies. The speech style described by these categories is common to the mothers in the sample, with some minor variations in that one mother might not use one particular sub-category. Also, although the sample is small, the percentages of speech occurring in some Motherese sub-categories approximate those, similarly defined, found in other studies (Table I).

Childrens' Speech

When looking at the childrens' vocalizations it is interesting to note that the main characteristic components of Motherese are present in all age, sex and experience groups, with the exception of the 4 year old inexperienced boys. In this group there was no whispered speech, no baby talk, no questions and no statements of any kind. Only a few repetitions and some exaggerated speech occurred, and these were spoken by one child from the group, the child who vocalized most. His utterances were either monosyllabic or imperative, however, 50% of his 12 seconds of speech was high pitched and exaggerated in speed, and 5 of his 7 utterances were repetitions. The boy was, in fact, repeating inappropriate commands to the baby. This boy was also one of the few whose mother was present in the observation room, although not participating, and one of the two inexperienced children in the entire sample who did have a younger sibling (in this case the sibling was 42 months and therefore well over the specified "baby sibling"

age). In fact his utterances to the baby within the experimental situation showed that his approaches to the baby were not age-appropriate and were perhaps better suited to a child of his sibling's age.

TRANSCRIPT EXTRACT

"Say 'One'"

"One"

"Say 'One'"

"He won't say 'One'" (To the mother)

Of the other 3 boys in the 4 year old inexperienced male group, one made a short unfinished utterance and another made two monosyllabic utterances. For all the other groups, except those of the 7 year old and 4 year old experienced boys, the speech of all those included in the sample was distributed across the various sub-categories, with some children employing more of certain categories than others. In the 7 and 4 year old experienced male groups, however, one child included in each sample because of their use of speech, albeit very limited, made no use of any Motherese and none of their speech fell into the various relevant sub-categories.

Analysis of Motherese

Three-way Analyses of Variance carried out on the individual Motherese categories did not reveal any significant Main Effects of Age, Sex or Experience. Significant interactions were found, however, in the analysis of some of the categories.

The Mean Lengths of Utterance (MLU) for the various groups have already been discussed in a previous chapter, where significant effects were found due to the interaction of both Age * Sex and Sex * Experience of the children. However, as well as these between group differences it is also clear that each group was adjusting its utterance length to one more suitable for the age of the listener. Although this study could not include comparative analyses of childrens' speech when talking to a baby and when talking to peers, these analyses have been carried out elsewhere. Shatz & Gelman (1973) found MLUs of 4.0 for 4 year olds talking to non-sibling 2 year olds, but an MLU of 6.1 when the children were speaking to their peers. In this study, each group MLU was less than 4.0 and, assuming that our sample of 4 year olds is comparable with that of Shatz & Gelman, this would seem to show adjustment from an expected length of 6.1 or over to shorter utterance lengths when talking to a baby.

DELETIONS The use of deletions for greater brevity of utterance is found mainly in the speech of 7 year olds ($F(1,18)=4.972$, $p<0.05$: Table II) but to a greater degree in the speech of inexperienced rather than experienced children. This interactive effect is, however, not significant.

ATTENTIONAL SPEECH Categories of speech which might function to gain the baby's attention (ie. questions, short phrases, exaggerations, whispers and single word utterances) were used by all groups with the exception of the 4 year old inexperienced males. However, only one significant effect and one effect which approached significance were found for this group of categories.

In the use of short phrases, the interaction of Age * Sex * Experience approached significance at the 5% level ($F(1,11)=4.739$: Table III). This finding was due mainly to the high percentage of short phrases used by the experienced 4 year old boys, whose speech consisted largely of attention getting devices such as single word utterances, questions and short phrases (Table IV). Whispered speech showed a significant effect, this time due to the interaction of Age * Sex ($F(1,18)=5.135$, $p<0.05$: Table V). Four year old girls used more whispered speech than did any other group. However, this was largely due to a difference in the function of whispered speech between the two age groups. From observation a high percentage of the whispered speech used by the 4 year olds, especially the girls, reflected timidity rather than an attempt to gain or keep the baby's attention by an exaggerated speech form. Only in the speech of the 7 year old

experienced males did a high percentage of whispering (13%, highest of all 7 year old groups) reflect a usage for dramatic effect.

There were no significant effects for the other three attention-gaining categories. The usage of exaggerations of speech was fairly uniform across the various age, sex and experience groups. Single word utterances were used mostly by 4 year old boys, and questions tended to be used more by the 4 year olds than the 7 year olds (Table IV). However, Moerk (1974) found that a high percentage of questions naturally occurred in the speech of 4 year old children. In the mothers' sample half of the questions asked requested information and half required a Yes/No answer. In the childrens' speech sample in all but one group, that of experienced 4 year old females, more Yes/No questions were asked than were "Wh-" questions (Table VI). Yes/No questions might be seen as being more appropriate for use with babies, for they can be answered with actions rather than speech.

MAINTAINING SPEECH Of those two categories, repetitions and imitations, which might be said to maintain an interaction once attention has been gained, only one, imitations, showed any effect approaching significance. Experienced children imitated the baby's vocalizations more than inexperienced children ($F(1,18)=3.558$, p approaching 0.05: Table VII). There were no significant effects for the use of repetitions, although 4 year old males did tend to make more repetitions than other groups (Table IV). However, it could be that the use of "baby talk" should be included in this function, for

it allows the continuation of speech without thought for subject matter and is both rhythmic and repetitious. Despite expectations to the contrary (Shatz & Gelman, 1973), "baby talk" did appear in most childrens' speech and figured largely in that of experienced 4 year olds ($F(1,18)=4.237$, p approaching 0.05: Table VIII). It was used most by experienced 4 year old girls.

DIRECTIVE SPEECH Imperatives and deictic statements serve to direct the baby's attention to actions carried out within the interaction. There was no significant effect found in the use of imperatives, and the use of this category by the children did not generally reflect the degree of its use by the mother, as did the childrens' use of most other categories. The mothers' speech sample included 16.8% imperatives, but only two childrens' groups used more than 6%. These were the inexperienced male groups, who used 15% and 40% (Table IV). This aspect of directing the baby's attention or behaviour did not then, in general, seem to form part of the childrens' repertoire. Nor was it that the mothers' imperatives were largely disciplinary, for no more than one imperative in any one child/mother group was negative. It is more likely that the children did not see it as their role to extend the baby's behavioural repertoire by pointing out new possibilities of play with their toys.

The use of deictic statements did yield significant results. There was an effect due to Sex ($F(1,18)=14.08$, $p<0.01$: Table IX): girls made more deictic statements than boys, an effect due to Experience ($F(1,18)=9.713$, $p<0.01$): experienced children made more

than inexperienced children, and an interaction between Age * Sex ($F(1,18)=22.155$, $p<0.01$). All these effects were due mainly to the high percentage of deictic statements made by 4 year old girls. If we include in the analysis all the deictic utterances made, that is all questions, imperatives and statements, we find a similar effect: a significant interaction of Age * Sex ($F(1,18)=6.0172$, $p<0.05$: Table IXb) with 4 year old girls making more deictic statements than any other group.

Most of the mothers' statements similarly fell into the deictic category, with few short phrases, few complex sentences and fewer simple declaratives. This pattern was most closely mimicked by the 7 year old experienced boys, who also used mostly deictic statements. The 7 year old experienced girls and 7 year old inexperienced boys groups used mainly short phrases. Similarly all of the 4 year old experienced male groups' statements were short phrases. The statements of the 7 year old inexperienced girls were evenly distributed across the three categories, simple, short phrases and deictic. Too few referential statements were made by the children to make analysis possible, and only 7 year old children made any simple declarative statements.

The childrens' statements can therefore be described largely as comments on their own or the baby's actions or on objects within mutual regard, or as short phrases aimed at gaining or maintaining the baby's attention. Few simple declarative or referential statements were used.

Category Profiles

These data do not, however, give a clear overview of how the factors of age, sex and experience may be at play in the use of Motherese: they merely give further indication of group preferences in the use of certain speech categories. We assume, from comparisons with other research studies, that all groups (except 4 year old inexperienced males) are making adjustments in their speech, both in length of utterance and in the use of specific categories associated with Motherese, which makes it more appropriate to the baby listener. We also found that experience was a significant factor affecting the use of RNT and number of imitations, and that age was a significant factor affecting the use of deletions. The interaction of age and experience was significant in affecting the use of "baby talk", and the interaction of age and sex significant in affecting the use of short phrases, deictic utterances and whispered speech. We could also say that attention-getting categories of speech (short phrases, single word utterances, whispers and questions) appear to be more prevalent in the speech of 4 year olds, whilst those that maintain interaction (imitations, "baby talk" and RNT) seem to be more under the influence of experience. A more comprehensible pattern does emerge, however, if we rearrange the data to look at it in another way.

Up to this point, we have only looked at between group differences in the use of speech categories. We can, however, look instead at the similarity in the profiles of all the Motherese categories between the mothers' speech sample and those of the

children, grouped according to the three factors of age, sex and experience (Table X). For each speech category a deviation score has been calculated (the absolute difference between the childrens' score and the mothers' score), indicating how close the childrens' group scores were to those of the mothers' group. In doing this we find that, for the 13 categories and sub-categories, the speech of the experienced children was closer than that of the inexperienced children to the mothers' speech in 8 categories, that of the girls closer than that of the boys in 9 categories and that of the 4 year olds closer than that of the 7 year olds in 8 categories. Correlated t-tests on these three sets of data, using the 13 categories as the error term, revealed that the mean deviation of the girls was significantly less than that of the boys ($t(12)=1.85$, $p<0.05$, 1-tailed) although the differences between the other two sets were not significant.

These differences are not large and any discussion of them must therefore be tenuous, but they are in the expected directions. The adoption of Motherese in the children is most likely to be due to an interaction between imitation of a speech style and feedback from experience in its use. We would therefore expect that young and experienced children would be most likely to use those elements of Motherese that are easily imitated from their mother's speech, either to themselves or to their baby siblings. We would also expect that experienced children would, in addition, adopt those elements which have been reinforced in use with their baby siblings. This theory is, to some extent, supported by our data. Those parts of speech used for

getting a child's attention, and therefore easily imitated, are used mainly by 4 year old children. Those devices used to maintain attention within the interaction, and therefore more likely to be the product of learning, are used more by experienced children.

The only category used significantly more by 7 year olds than by 4 year olds was that of deletions. This could be said to be the only category whose use shows an adjustment in utterance length to accord with the baby's limited processing capacity. It therefore might be the only category in which we would expect an increased usage to be positively correlated with the age of the user - increased maturity, possibly bringing with it an increased understanding of the baby's abilities.

It was also expected that the girls' speech would more closely approximate Motherese than that of the boys. Our data do support this hypothesis, but only in that the boys do not adopt the same speech style as the mothers when talking to babies. Our study does not, however, support conclusions reached elsewhere (Nash & Feldman, 1977), that sex differences, perhaps because of sex-role stereotyping, mean that boys are less interested in babies. It could be, instead, that the girls, identifying with the appropriate sex model or because of differences in social or linguistic competence, more closely mimic the mothers' speech style than do the boys, who evolve a method of interaction, equally successful, but based on a different interactional style. That there is something outstanding but successful about the interactional style of the experienced boys was

shown, in Chapter 3, by the high vocalization rate of babies when with experienced rather than inexperienced boys. The style of the 4 year old boys does seem to accord with the differences found in fathers' speech in comparisons of parent-infant interaction. Both groups, fathers and 4 year old boys, have a shorter MLU than comparison groups, use more attentional utterances, monsyllables or short phrases, and more imperatives. The 7 year old experienced boys however seem to have adopted a linguistic style of their own, and one that does not accord with differences found in fathers' speech. In comparison with other 7 year old groups, the experienced boys used fewest imperatives, exaggerations, repetitions and deletions. They made most deictic statements and used whispering for exaggerative effect. Inexperienced 7 year old boys used a speech style closer to that of the girls and the mother. The experienced 7 year old boys, therefore, must have evolved their style in interaction with the siblings.

These hypotheses are, at most, tenuously supported by the data and confounded by the lack of speech on the part of the 4 year old inexperienced males. For this reason we cannot fully explore the interaction between age and experience in the males. Superficially, however, the idea that the adoption of sex-appropriate behaviour increases with age, demonstrated by an unwillingness in the boys to interact with babies (Berman, Monda & Myerscough, 1977), is not supported. The 7 year old boys were happy to play with the babies, the 4 year old inexperienced boys, lacking perhaps social competence in a novel situation, were not. For although the children were

constrained to sit by the babies, they were not forced to show interest if they were disinclined.

PART II: Caregivers' Repertoire of Behaviours

So far we have only dealt with the specific categories of speech used by mothers with babies. Mothers' unique interaction style cannot, however, be described solely in linguistic terms. There is also a specific repertoire of behaviours associated with mothers' interactions with babies: behaviours that serve the same purpose as some of the speech categories. This "caregivers' repertoire of behaviours" (Stern, 1977) comprises positive body posturing, a high rate of eye contact or facial scanning and exaggerated facial expressions.

Positive head alignment, where the head is tilted to one side or the face pushed close into that of the baby, serves to establish eye-contact. Positive head emphasis, an exaggerated nodding to intimate agreement or exaggerated shrugging to emphasise questions, keeps the baby's attention on the mother's face and serves to maintain the interaction. Exaggerated facial expressions similarly keep the baby's attention on the mother's face and serve to maintain eye contact. Prolonged periods of eye contact or face searching, to a degree that would not be found in adult:adult conversation, again maintain the interaction and help to monitor the effect that the mother's behaviours are having on the baby.

Finally, certain of these behaviours combine to form specifically baby-oriented games. These can be thought of as similar in function to Repetitive Nonsense Talk, for they frequently involve

often-repeated actions geared towards maintaining the baby's attention. Examples from this study include a game of "peep-bo" played with a teething ring by a 7 year old experienced boy and the repeated balancing of a teddy bear on a baby's head by a 4 year old experienced boy. The games are usually accompanied by frequent facial monitoring and vocalization of some kind.

Analysis of Caregivers' Behaviours

The mean scores for each of these caregivers' behaviours were calculated for each age, sex and experience group. The scores were based on the number of seconds in which the behaviour appeared for each child. Two of these 5 behavioural categories (exaggerated facial expressions and facial monitoring) were present in all 8 childrens' groups. Positive head alignment and baby-oriented games appeared in all groups except that of the 4 year old inexperienced males. Positive head emphasis was less frequently used and appeared in only 5 groups (Table XI).

Analyses of Variance were carried out on the mean scores in these categories. Four behavioural categories yielded significant results. The use of positive head alignment showed a significant effect due to the interaction of Age * Sex * Experience ($F(1,24)=7.069$, $p<0.05$: Table XII). This effect was due to the high incidence of positive head alignment in the 7 year old experienced females and 4 year old experienced males, and the low incidence in 7 year old experienced males. Positive head emphasis similarly showed a high incidence in 7

year old experienced females and 4 year old experienced males, but yielded no significant results.

The use of baby-oriented games showed a significant effect due to Experience ($F(1,24=7.229$, $p<0.05$) and a significant interaction of Sex * Experience ($F(1,24)=6.221$, $p<0.05$: Table XIII). Experienced boys played more baby-oriented games than any other group, while inexperienced boys played very few.

Facial monitoring also showed a significant interaction of Age * Sex * Experience ($F(1,24)=5.791$, $p<0.05$: Table XIV). This, however, seems to indicate a lack of systematic pattern rather than otherwise, with 7 year old experienced males and 4 year old inexperienced males carrying out very little facial monitoring.

Exaggerated facial expressions were used mainly by experienced children, an effect approaching significance ($F(1,24)=3.608$, $p<0.10$), but most by 7 year old experienced females and 4 year old experienced males, thus yielding a significant interaction between Age * Sex * Experience ($F(1,24)=7.135$, $p<0.05$: Table XV).

Once again we get no concise overall picture of how caregivers' behaviours are adopted, according to age, sex and experience levels, from these individual Analyses of Variance. Three of the categories (positive head alignment, positive head emphasis and exaggerated facial expressions) are used mainly by 7 year old experienced females and 4 year old experienced boys. Seven year old experienced boys

carry out very little facial monitoring, but both 7 year old and 4 year old experienced boys play a lot of baby-oriented games (and perhaps in this last finding we have the cause of the high vocalization rate in babies when with experienced boys).

If we look, however, at the differences in the mean scores for these behavioural categories between the mothers and the children, grouped according to age, sex and experience level as with the speech levels, we get a clearer picture of the trends (Table XVI). However, in comparison with the speech categories, one of the trends is reversed and another disappears. Experienced children are still closer to the mothers' sample than are inexperienced children for 4 of the behavioural categories and the mean deviation of the inexperienced children is significantly different from that of the experienced children ($t(4)=2.134$, $p<0.05$, 1-tailed). However, this time the 7 year old children are closer in all 5 categories to the mothers than are the 4 year olds and there is little difference due to sex, boys being closer to the mothers in 2 categories and girls being closer in the other 3. These differences are, however, very small, and any conclusions drawn from them must once again be tenuous.

Experienced children were then, once again, closer to the mothers' sample in more behavioural categories than were inexperienced children, the exception here being that of facial monitoring. There were also significant effects, due to experience, for baby oriented games and exaggerated facial expressions. The experienced children were, either by imitating the mother's interactional style or as a

result of their experience with their siblings, more closely approximating the mother's behaviours when with a baby than were inexperienced children. Although there were no significant effects in any of the behavioural categories due to age, that the 7 year old rather than the 4 year old children more closely mimic the mother's behaviour may indicate that these behaviours are dependent upon cognitive maturity rather than imitation, especially imitation of the mother interacting with the child itself when younger. And these caregivers' behaviours do in fact seem less open to imitation of use in the correct context than does Motherese. Although personal observations have been made of toddlers putting their head to one side and speaking in Motherese whilst attempting to "care for" a doll or sad adult, the head alignment neither achieved nor maintained eye contact: it was merely an imitation of a mannerism.

That neither sex was closer to the mothers' sample for all the behavioural categories illustrates again the difference of strategy in interaction between boys and girls. The girls were closer to the mothers for positive head alignment and positive head emphasis, behavioural categories that usually accompany vocalization, and for facial monitoring. Their interactions were typically conversational and face-to-face. Although the boys were closer to the mothers' sample for exaggerated facial expressions, and the 7 year old boys and experienced 4 year old boys did tend to make many exaggerated facial expressions, most were made by the 7 year old experienced girls (this interaction was significant and their mean score was closest to that of the mothers - Table XI). So perhaps, if we include extremes of

facial expression in our synthesis of the girls' interaction style, we might label it "facially oriented".

The boys were also closer to the mothers' sample in baby-oriented games, for which there was a significant effect due to Age * Experience. Experienced boys played more games than any other group whilst inexperienced boys played less than any other group. The experienced boys in their interactions typically concentrate more on elaborate games than on face-to-face conversation - games however that are geared towards the baby's attentional capacities. Looking at the mean scores for behavioural categories for each group (Table XI) it would seem that this concentration upon game-playing in experienced boys might develop over time. Seven year old experienced boys show less positive head alignment, head emphasis, exaggerated facial expression and facial monitoring than do 4 year old experienced males, although game-playing is high for both groups. Inexperienced 7 year old males, however, play very few games but show more of all the other behavioural categories than do 7 year old experienced boys. This might indicate that the interactional styles are in fact incompatible. Inexperienced 4 year old boys use only one category specific to caregivers' behaviours, exaggerated facial expressions, and carry out very little facial monitoring. So perhaps, for inexperienced boys, the increase in social competence that comes with greater maturity leads the boys to adopt some caregivers' behaviours as they attempt to approach and interact with the baby. We cannot tell, however, if this is really so until we are sure that inexperienced 4 year olds, if motivated to interact with the babies, would not exhibit a higher rate

of caregivers' behaviours.

For the experienced girls an increase in age brings an increase in all caregivers' behaviours. This is as would be expected: the older the children, the more their opportunities for caring for their baby siblings are likely to be increased (and the more their interaction skills are likely to be improved by increased empathy). However, for the inexperienced girls, increased age brings a decrease in 4 of the 5 behavioural categories. So as increased age in the experienced girls brings an increase in the use of the caregivers' behaviours, so with inexperienced girls, increased age brings a decrease in the use of behaviours imitated from the mother interacting with themselves when younger.

SUMMARY: Motherese & Caregivers' Repertoire

In concluding this chapter we need to consider how the three factors of age, sex and experience affect both the linguistic and behavioural modifications made by the child in interaction with an infant.

There were few Main Effects and most significant differences were due to interactions. However, older children did make more deletions which, with adjustments in utterance length, keep utterances brief and therefore suitable for the infants' limited processing capacities. The use of deletions does not seem to be immediately open to imitation by the child and therefore we can assume that the adjustment is made to accord with the child's appreciation of the infant's abilities.

Four year old children asked more questions than did 7 year old children. This use of questions can be seen as an attempt verbally to direct the infant's attention. Similarly imperatives, linked in function to questions, are found most frequently in the speech of inexperienced boys and 4 year olds. The use of directives reflects aspects of speech used frequently by fathers. It could either be that younger and inexperienced boys do imitate modifications in speech from their fathers or that the use of directives represents the least sophisticated style of interaction: verbal direction rather than behavioural distraction.

Girls used more deictic statements than did boys, a strategy that

establishes joint attention with the infant. Despite contrary expectations, however, this was the only significant Main Effect found for Sex.

Experienced children similarly used more deictic statements and made more imitations of the infant's vocalizations. These are both strategies that establish joint communication. Girls and experienced children would therefore seem to be more adept at establishing a true social interaction with communicative intent.

Experienced children also played more games, made more play noises, used more Repetitive Nonsense Talk and made more exaggerated facial expressions than inexperienced children. These strategies must therefore have evolved either as a result of positive feedback in interaction with the infant sibling, or as direct imitation of the mother with the infant sibling. All these interactional strategies occur in the experienced 4 year old boys, so if the latter theory is correct we must assume that at the age of 4 years there is no preferential modelling of a same-sex parent which excludes boys from imitating the mother's behaviour. Although aspects of speech favoured by the father do appear in the speech of the 4 year old boys, all of these boys had a primary caregiving mother and would have had less opportunity for observing father-infant interaction.

There is a difference, however, in the strategies used by the experienced 4 year old boys and the experienced 7 year old boys. The experienced 4 year old boys excelled in a diverse range of speech

modifications and behavioural mannerisms. They matched the experienced 7 year old girls in positive head alignment, positive head emphasis and the use of exaggerated facial expressions. They also played many baby-oriented games, a strategy which they held in common with the experienced 7 year old boys. In addition they used many repetitions, single word and short utterances and made more play-noises than any other group. They therefore used a wide range of strategies for gaining and maintaining the infant's attention. They were both facially oriented, as were the 7 year old experienced girls, and were skilled at game-playing as were the 7 year old experienced boys.

On the other hand, the experienced 7 year old boys showed the least facial monitoring and positive head alignment of any group but played more games, used more whispering and made more statements, most of which were deictic, than did any other group. They are therefore game-oriented rather than face-oriented and use speech to comment on their activities rather than as an attentional device. This strategy differs from that of the 7 year old experienced girls, the inexperienced 7 year old boys, the mother and the fathers. It must therefore have evolved through experience with the younger sibling. Experienced 7 year old girls may be *assumed* to be more skilled in social interaction with an infant in that their style most closely resembles that of the mother, but the strategy of the experienced 7 year old boy was certainly as successful, if not more so.

TABLE I

PERCENTAGES OF MOTHERESE SUB-CATEGORIES
IN MOTHERS' SPEECH

Exaggerations	52.0%
Whispers	13.2%
Repetitions	28.9%
Questions	38.0%
Imitations (Mean No)	1.5
Baby Talk	12.6%
Imperatives	16.8%
Deletions	17.6%
Statements	20.5%
RNT	12.7%
Play Noises	2.5%
MLU	3.1
Single Word Utterances	25.5%

Statement Sub-Categories
(Percentage of Statements)

Simple Sentence	7.2%
Short Phrase	14.2%
Deictic	71.4%
Referential	14.2%

Comparison of similarly defined categories of Motherese in other studies

	Imperatives	Questions	Deictic Stats	Repetitions
1	18.00	44.00	16.00	23.00
2	16.80	38.00	13.20	28.90

1 = Newport, Gleitman & Gleitman (1977)
2 = This Study

TABLE II: MOTHERESE - DELETIONS

Means

7 YEARS	2.70	0.80	4 YEARS
FEMALE	2.20	1.20	MALE
EXP	1.20	2.20	INEXP

	7 YEARS	4 YEARS
FEMALE	3.20	1.20
MALE	2.10	0.40

	7 YEARS	4 YEARS
EXP	2.10	0.40
INEXP	3.30	1.20

	FEMALE	MALE
EXP	1.10	1.40
INEXP	3.40	1.10

7 YEAR OLDS				4 YEAR OLDS			
FEMALE		MALE		FEMALE		MALE	
EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
2.20	4.30	1.90	2.30	0.00	2.40	0.80	0.00

ANOVA Summary Table

SOURCE	SS	df	MS	F	p
A	21.44	1	21.44	4.97	0.05
S	5.86	1	5.86	1.36	
E	6.48	1	6.48	1.50	
A*S	0.13	1	0.13	0.03	
A*E	0.23	1	0.23	0.05	
S*E	9.52	1	9.52	2.21	
A*S*E	0.82	1	0.82	0.19	
ERROR	77.60	18	4.31		

TABLE III: MOTHERESE - SHORT PHRASES

Means

7 YEARS	13.60	14.90	4 YEARS
FEMALE	10.50	17.90	MALE
EXP	18.80	9.70	INEXP

	7 YEARS	4 YEARS
FEMALE	16.20	4.80
MALE	11.00	24.97

	7 YEARS	4 YEARS
EXP	12.60	24.97
INEXP	14.60	4.80

	FEMALE	MALE
EXP	7.90	29.70
INEXP	13.10	6.30

7 YEAR OLDS				4 YEAR OLDS			
FEMALE		MALE		FEMALE		MALE	
EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
15.80	16.70	9.40	12.60	0.00	9.50	49.95	0.00

ANOVA Summary Table

SOURCE:	SS	df	MS	F	p
A	5.90	1	5.90	0.03	
S	206.89	1	206.89	1.11	
E	303.90	1	303.90	1.63	
A*S	597.70	1	597.70	3.20	
A*E	457.80	1	457.80	2.45	
S*E	751.30	1	751.30	4.03	0.10
A*S*E:	884.50	1	884.50	4.74	0.10
ERROR:	2052.90	18	186.63		

TABLE IV
VOCALIZATION SUB-CATEGORIES
Group Percentage Scores

NB: ANOVA Tables show *Mean* Percentage Scores

CATEGORY	MUMS	7 YEAR OLDS				4 YEAR OLDS			
		FEMALE		MALE		FEMALE		MALE	
		EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
MLU	3.1	2.2	3.2	3.2	2.6	3.0	3.8	1.8	1.5
QUESTIONS	38.0	28.9	30.2	7.7	21.9	50.0	46.4	65.6	0.0
IMPERATS	16.8	4.8	5.8	1.9	15.0	4.8	1.5	3.1	40.0
SING W'DS	25.5	29.8	33.7	32.7	37.9	19.0	17.4	71.9	50.0
STATEMENTS	20.5	36.5	34.9	61.5	33.3	26.2	30.4	9.4	0.0
BABY TALK	12.6	4.8	2.5	12.0	18.9	84.5	5.2	29.7	0.0
EXAGGER'NS	52.0	54.4	48.8	28.0	30.4	31.1	39.0	45.5	40.0
WHISPERS	13.2	4.8	3.3	13.0	4.7	28.9	21.7	17.2	0.0
REPETIT'NS	28.9	35.4	19.0	17.0	27.7	22.2	13.1	53.1	33.3
IMITATIONS	1.5	1.0	0.3	1.0	0.0	2.0	0.6	1.0	0.0
DELETIONS	17.6	8.7	12.8	5.8	9.1	00.0	7.3	3.1	0.0
Statement Sub-categories (Gp %age for the children making statements)									
SIMP DECLS	7.2	7.9	26.7	12.5	10.4	0.0	0.0	0.0	0.0
SHORT PHRS	14.2	63.2	33.3	18.7	50.5	0.0	28.6	99.9	0.0
DEICTIC	71.4	26.3	36.6	65.6	24.2	100.0	71.4	0.0	0.0
REFERENT'L	14.3	7.9	0.0	0.0	13.8	0.0	0.0	0.0	0.0
DEIC UTTS	56.3	24.0	41.9	43.6	26.4	59.5	57.9	6.2	0.0

TABLE V: MOTHERESE - WHISPERS

Means

7 YEARS	1.95	6.50	4 YEARS
FEMALE	5.99	2.50	MALE
EXP	6.10	2.40	INEXP

	7 YEARS	4 YEARS
FEMALE	1.20	10.80
MALE	2.80	2.20

	7 YEARS	4 YEARS
EXP	2.80	9.40
INEXP	1.10	3.60

	FEMALE	MALE
EXP	7.80	4.30
INEXP	4.20	0.60

7 YEAR OLDS				4 YEAR OLDS			
FEMALE		MALE		FEMALE		MALE	
EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
1.20	1.10	4.30	1.20	14.50	7.20	4.30	0.00

ANOVA Summary Table

SOURCE	SS	df	MS	F	p
A	127.87	1	127.87	4.00	0.10
S	77.78	1	77.78	2.43	
E	84.50	1	84.50	2.64	
A*S	164.14	1	164.14	5.14	0.05
A*E	26.40	1	26.40	0.83	
S*E	0.01	1	0.01	0.00	
A*S*E	13.82	1	13.82	0.43	
ERROR	575.36	18	31.96		

TABLE VI
PERCENTAGES: QUESTION TYPE

Q'n TYPE	MUMS	7 YEAR OLDS				4 YEAR OLDS			
		FEMALE		MALE		FEMALE		MALE	
		EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
"Wh-"	49.9	41.3	23.0	0.0	16.7	66.7	36.4	0.0	0.0
YES/NO	50.1	58.7	76.9	100.0	83.4	33.3	63.6	100.0	0.0

TABLE VII: MOTHERESE - IMITATIONS

Means

7 YEARS	FEMALE	EXP	0.60	1.00	1.25	0.90	0.50	0.25	MALE	INEXP	4 YEARS

	7 YEARS	4 YEARS
FEMALE	0.60	1.30
MALE	0.50	0.50

	7 YEARS	4 YEARS
EXP	1.00	1.50
INEXP	0.20	0.30

	FEMALE	MALE
EXP	1.50	1.00
INEXP	0.50	0.00

7 YEAR OLDS				4 YEAR OLDS			
FEMALE		MALE		FEMALE		MALE	
EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
1.00	0.30	1.00	0.00	2.00	0.60	1.00	0.00

ANOVA Summary Table

SOURCE	SS	df	MS	F	p
A	0.69	1	0.69	0.40	
S	1.55	1	1.55	0.89	
E	6.19	1	6.19	3.56	0.10
A*S	0.69	1	0.69	0.40	
A*E	0.17	1	0.17	0.10	
S*E	0.00	1	0.00	0.00	
A*S*E	0.17	1	0.17	0.10	
ERROR	31.30	18	1.74		

TABLE VIII: MOTHERESE - BABY TALK

Means

7 YEARS	2.70	6.60	4 YEARS
FEMALE	5.20	4.00	MALE
EXP	7.50	1.80	INEXP

	7 YEARS	4 YEARS
FEMALE	1.00	9.50
MALE	4.40	3.70

	7 YEARS	4 YEARS
EXP	2.60	12.30
INEXP	2.80	0.90

	FEMALE	MALE
EXP	9.20	5.70
INEXP	1.30	2.40

7 YEAR OLDS				4 YEAR OLDS			
FEMALE		MALE		FEMALE		MALE	
EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
1.20	0.80	4.00	4.70	17.20	1.70	7.40	0.00

ANOVA Summary Table

SOURCE:	SS	df	MS	F	p
A	94.70	1	94.70	1.91	
S	9.03	1	9.03	0.18	
E	196.70	1	196.70	3.98	
A*S	126.00	1	126.00	2.61	
A*E	209.70	1	209.70	4.24	0.10
S*E	32.45	1	32.45	0.66	
A*S*E	18.80	1	18.80	0.38	
ERROR:	890.70	18	49.48		

TABLE IX: MOTHERESE - DEICTIC STATEMENTS

Means

7 YEARS	15.90	30.95	4 YEARS
FEMALE	37.70	9.70	MALE
EXP	34.80	12.00	INEXP

	7 YEARS	4 YEARS
FEMALE	12.40	61.90
MALE	19.40	0.00

	7 YEARS	4 YEARS
EXP	19.70	50.00
INEXP	12.20	11.90

	FEMALE	MALE
EXP	53.30	16.40
INEXP	21.10	3.00

7 YEAR OLDS				4 YEAR OLDS			
FEMALE		MALE		FEMALE		MALE	
EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
6.60	18.30	32.80	6.05	100.00	23.80	0.00	0.00

ANOVA Summary Table

SOURCE	SS	df	MS	F	p
A	832.50	1	832.50	4.21	
S	2783.40	1	2783.40	14.08	0.01
E	1920.46	1	1920.46	9.71	0.01
A*S	4380.50	1	4380.50	22.16	0.01
A*E	863.63	1	863.63	4.37	
S*E	328.40	1	328.40	1.66	
A*S*E	3034.70	1	3034.70	15.35	0.01
ERROR	2174.90	18	197.71		

TABLE IXB: MOTHERESE - DEICTIC UTTERANCES

ANOVA Summary Table

SOURCE	SS	df	MS	F	p
A	34.94	1	34.94	0.23	
S	831.01	1	831.01	5.45	0.05
E	55.43	1	55.43	0.36	
A*S	916.82	1	916.82	6.02	0.05
A*E	56.05	1	56.05	0.37	
S*E	18.97	1	18.97	0.12	
A*S*E	238.08	1	238.08	1.56	
ERROR	2742.61	18	152.37		

TABLE X
SIMILARITIES IN CHILDRENS' MOTHERESE SPEECH
PROFILES TO THAT OF THE MOTHERS' SAMPLE

CATEGORY	MUMS	EXP	INEXP	GIRLS	BOYS	7 YR	4 YR
IMITATIONS (M)	1.5	- 0.25*	- 1.25	- 0.70*	- 1.00	- 0.90	- 0.60*
PLAY NOISE (M)	2.5	- 0.10*	- 2.00	- 1.20	- 0.90*	- 0.90*	- 1.20
RNT (%)	12.7	+ 5.90*	-10.60	- 3.60	- 1.10*	- 4.90	- 0.30*
EXAGGER'NS (%)	52.0	-12.30*	-12.50	- 8.70*	-16.10	-11.60*	-13.10
WHISPERS (%)	13.2	+ 2.80*	- 5.80	+ 1.50*	- 4.50	- 6.70	+ 3.80*
QUESTIONS (%)	38.0	0.00*	-13.40	+ 0.90*	-14.20	-15.80	+ 2.50*
REPETIT'NS (%)	28.9	+ 3.00*	- 5.60	- 6.50	+ 3.90*	- 4.10	+ 1.50*
DELETIONS (%)	17.6	-13.20	-11.35*	-10.40*	-13.10	- 8.50*	-15.00
BABY TALK (%)	12.6	+ 7.70	- 5.90*	- 0.80*	+ 2.60	- 3.00*	+ 4.80
IMPERAT'S (%)	16.8	-13.10	- 1.20*	-12.60	- 1.80*	- 9.90	- 4.40*
MONOSYLL'S (%)	25.5	+12.90	- 9.30*	- 0.50*	+22.50	- 8.00*	+14.10
DEICT ST (% S)	71.4	-23.40*	-38.30	-12.80*	-48.90	-33.20	-28.50*
SHORT PH (% S)	14.2	+31.30	+13.90*	+17.10*	+28.10	+27.20	+17.90*
TOTAL CLOSER TO MOTHER:		8	5	9	4	5	8

TABLE XI: CAREGIVERS' BEHAVIOURS - MEAN SCORES

		7 YEAR OLDS				4 YEAR OLDS			
		FEMALE		MALE		FEMALE		MALE	
CAT	MUMS	EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
PHA	27.8	10.8	2.3	1.3	4.5	3.8	7.3	6.8	0.0
PHE	2.3	4.3	0.5	0.0	0.8	0.5	0.0	2.8	0.0
BOG	26.3	2.5	1.3	11.0	1.0	2.5	3.0	10.0	0.0
EFG	86.5	56.5	46.3	31.3	64.8	47.5	54.3	54.5	29.8
EFE	12.5	12.3	1.0	5.5	5.5	1.8	5.0	9.5	1.5

PHA = Positive Head Alignment
PHE = Positive Head Emphasis
BOG = Baby Oriented Games
EFG = Eye/Face Gaze
EFE = Exaggerated Facial Expression

TABLE XII: CAREGIVERS' BEHAVIOUR
POSITIVE HEAD ALIGNMENT

Means

7 YEARS	4.70	4.40	4 YEARS
FEMALE	6.00	3.10	MALE
EXP	5.60	3.50	INEXP

	7 YEARS	4 YEARS
FEMALE	6.50	5.50
MALE	2.90	3.40

	7 YEARS	4 YEARS
EXP	6.00	5.30
INEXP	3.40	3.60

	FEMALE	MALE
EXP	7.30	4.00
INEXP	4.80	2.30

7 YEAR OLDS				4 YEAR OLDS			
FEMALE		MALE		FEMALE		MALE	
EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
10.80	2.30	1.30	4.50	3.80	7.30	6.80	0.00

ANOVA Summary Table

SOURCE:	SS	df	MS	F	p
A	0.50	1	0.50	0.02	
S	66.13	1	66.13	1.93	
E	36.13	1	36.13	1.06	
A*S	4.50	1	4.50	0.13	
A*E	2.00	1	2.00	0.06	
S*E	1.13	1	1.13	0.03	
A*S*E:	242.00	1	242.00	7.07	0.05
ERROR:	821.50	24	34.23		
TOTAL:	1173.88	31			

TABLE XIII: CAREGIVERS' BEHAVIOUR
BABY-ORIENTED GAMES

Means

7 YEARS	3.90	3.90	4 YEARS
FEMALE	2.30	5.50	MALE
EXP	6.50	1.30	INEXP

	7 YEARS	4 YEARS
FEMALE	1.90	2.30
MALE	6.00	5.00

	7 YEARS	4 YEARS
EXP	6.80	6.30
INEXP	1.10	1.50

	FEMALE	MALE
EXP	2.50	10.50
INEXP	2.10	0.50

7 YEAR OLDS				4 YEAR OLDS			
FEMALE		MALE		FEMALE		MALE	
EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
2.50	1.30	11.00	1.00	2.50	3.00	10.00	0.00

ANOVA Summary Table

SOURCE	SS	df	MS	F	p
A	0.03	1	0.03	0.00	
S	81.28	1	81.28	2.73	
E	215.28	1	215.28	7.23	0.05
A*S	7.03	1	7.03	0.24	
A*E	1.53	1	1.53	0.05	
S*E	185.28	1	185.28	6.22	0.05
A*S*E	1.53	1	1.53	0.05	
ERROR	714.75	24	29.78		
TOTAL	1206.72	31			

TABLE XIV: CAREGIVERS' BEHAVIOUR
FACIAL GAZE

Means

7 YEARS	49.70	46.50	4 YEARS
FEMALE	51.10	45.10	MALE
EXP	47.40	48.80	INEXP

	7 YEARS	4 YEARS
FEMALE	51.40	50.10
MALE	48.00	42.10

	7 YEARS	4 YEARS
EXP	43.90	51.00
INEXP	55.50	42.00

	FEMALE	MALE
EXP	52.00	42.90
INEXP	50.10	47.30

7 YEAR OLDS				4 YEAR OLDS			
FEMALE		MALE		FEMALE		MALE	
EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
56.50	46.30	31.30	64.80	47.50	54.30	54.50	29.80

ANOVA Summary Table

SOURCE	SS	df	MS	F	p
A	81.28	1	81.28	0.17	
S	294.03	1	294.03	0.60	
E	13.78	1	13.78	0.03	
A*S	57.78	1	57.78	0.12	
A*E	850.78	1	850.78	1.74	
S*E	75.03	1	75.03	0.15	
A*S*E	2831.28	1	2831.28	5.79	0.05
ERROR	11734.75	24	488.95		
TOTAL	15938.72	31			

TABLE XV: CAREGIVERS' BEHAVIOUR
EXAGGERATED FACIAL EXPRESSION

Means

7 YEARS	6.10	4.40	4 YEARS
FEMALE	5.00	5.50	MALE
EXP	7.30	3.30	INEXP

	7 YEARS	4 YEARS
FEMALE	6.70	3.40
MALE	5.50	5.50

	7 YEARS	4 YEARS
EXP	8.90	5.70
INEXP	3.30	3.30

	FEMALE	MALE
EXP	7.00	7.50
INEXP	3.00	3.50

7 YEAR OLDS				4 YEAR OLDS			
FEMALE		MALE		FEMALE		MALE	
EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
12.30	1.00	5.50	5.50	1.80	5.00	9.50	1.50

ANOVA Summary Table

SOURCE	SS	df	MS	F	p
A	21.13	1	21.13	0.60	
S	2.00	1	2.00	0.06	
E	128.00	1	128.00	3.61	0.05
A*S	21.13	1	21.13	0.60	
A*E	21.13	1	21.13	0.60	
S*E	0.00	1	0.00	0.00	
A*S*E	253.13	1	253.13	7.13	0.05
ERROR	851.50	24	35.48		
TOTAL	1298.00	31			

TABLE XVI: DIFFERENCES IN MEAN SCORES FOR CAREGIVERS' BEHAVIOURS BETWEEN MOTHERS' SAMPLE AND CHILDREN GROUPED ACCORDING TO EXPERIENCE, SEX OR AGE

CATEGORY	MUMS	EXP	INEXP	GIRLS	BOYS	7 YR	4 YR
POS HD ALIGN'T	27.8	-22.10*	-24.30	-21.70*	-24.60	-23.00*	-23.30
POS HD EMPH'S	2.3	- 0.40*	- 2.00	- 1.00*	- 1.40	- 0.90*	- 1.50*
BABY ORIEN GMS	26.3	-19.80*	-25.00	-24.00	-20.80*	-22.30*	-22.40
EXAG FACE EXPR	12.5	- 5.20*	- 9.20	- 7.50	- 7.00*	- 6.40*	- 8.00
FACIAL GAZE	86.5	-39.00	-37.70*	-35.30*	-41.40	-36.80*	-40.00
TOTAL CLOSER TO MOTHER:		4	1	3	2	5	0

CHAPTER 6

Approach and Empathy

Hitherto we have looked only at behaviours, the occurrence of which is specific to a caregivers' repertoire of behaviours. This chapter deals with behavioural categories that give some indication of the child's degree of positive approach towards the baby, the incidence of negative behaviours, and the extent to which the child shows empathy with the baby's needs and abilities.

Earlier studies have found a difference due to sex (Feldman & Nash, 1977) and experience, especially in the boys (Nash & Feldman, 1981), in a child's willingness to approach and interact with a strange baby. This study investigates the difference in positive and negative approach behaviours within the child-infant interaction when there are no constraints to conform with sex-appropriate behaviours due to the presence of the baby's mother.

In addition, accepting that skill in interaction may be based on the child's ability to respond sensitively to the infant's overtures or behavioural signals, the child's ability to empathize with the infant's state has been investigated. Here the term empathy is used to denote the "ability to understand and predict another person's feelings and behaviour" rather than as a "vicarious emotional response" (Feshbach & Feshbach, 1979).

Various studies have attempted to link tests of egocentricity in the child, ie. measures of role- or perspective-taking (Waxler, Yarrow & Smith, 1977; Stryer, 1980; Ianotti, 1985), with pro-social behaviours, and have found little relationship. Therefore, although the 4 year old children may be deemed egocentric in that they are unable to perform adequately on tests of role-taking competence, they may still be able to respond appropriately to naturally-occurring behavioural cues emitted by an infant. However, it may be that sensitivity improves with age as children show increasing ability to identify facial expressions correctly (Bullock & Russell, 1984).

Similarly, sensitivity to others may be greater in girls, for in a significant number of studies (Hall, 1978), girls were found to have greater skills in decoding non-verbal cues than do boys. The ability to role-take was also found to improve with experience of another's perspective (Chandler & Helm, 1984) and of group play (Castle & Richards, 1979). This effect, however, was not constant in the 4 year old children. There may therefore be a difference due to experience with siblings in the older rather than the younger children.

Measures of Approach & Empathy

We can gain some idea of any variations in the degree of approach towards the baby between the various age, sex and experience groups by comparing the childrens' willingness to engage the baby in play or mutual interaction. Although the children were physically constrained to be near the baby, they could still avoid any form of social interaction by the simple expedient of turning away, averting their gaze and maintaining solitary play. This was in fact the strategy usually adopted by 4 year old inexperienced boys. By this measure we gain an idea of any differences that might occur in the childrens' level of interest in babies. Further to this we can look at the extent to which the childrens' behaviour reflects empathy with the babies' needs and abilities. Not only can this latter characteristic be measured by looking directly at certain behavioural categories and at the incidence of negative or aversive behaviours, but also by looking at the extent to which certain behaviours occur in the children as appropriate responses to certain of the babies' behaviours.

No differences in interest and willingness to engage in interaction with the baby were expected between the various child groups, although a difference due to experience in the type of approach behaviours employed would be plausible. Differences due to sex have been found in degree of approach behaviours to a strange baby but, based on pilot study observations, this effect was not expected in the current study.

A difference due to age was expected in the occurrence of negative behaviours, and differences due to age, sex and experience in the number of appropriate responses made to babies' behaviours. Although total egocentricity was not expected in the 4 year olds, it seemed probable that increases in age would bring an increase in the number of empathic or appropriate responses and a decrease in the number of negative behaviours.

An effect due to experience was expected in the number of appropriate responses made, in that children with younger siblings have had greater opportunity to understand the limited capabilities of the infant and to learn appropriate responses to his/her behavioural cues. Also, based on the assumption that girls are more skilled than boys at decoding non-verbal cues, it was expected that girls should be more responsive to the infants' non-verbal signals.

The babies' signals and the most appropriate responses to them have, of course, been interpreted subjectively by the experimenter. This interpretation has, however, been based on experience as a mother, so that responses termed "appropriate" are those most likely to be made by a mother in these specific circumstances. This is justified in that comparisons made in this study are those between the child's responses to the baby and the mother's responses to the baby.

Approach

The first measure looked at was the number of seconds in which the child was engaged in interaction with the baby. Engaged in interaction meant that the child was either looking at the baby or the baby's actions and/or demonstrating, proffering or accepting a toy, touching the baby or the baby's toy, gesturing to the baby or imitating the baby's actions. The mothers from the experimental sample spent a mean number of 105 seconds (out of a possible 120 seconds) engaged in interaction with their babies, that is either monitoring their baby's behaviour or directing their own behaviour towards the baby.

A 3-way Analysis of Variance carried out on the childrens' data showed no significant Main Effects in the overall degree of engagement with the babies, for the various age, sex and experience groups. There was, however, a non-significant trend ($p < 0.10$) for older children to spend more time engaged in interaction than did younger children (Table I). There was also a significant effect due to the interaction between age, sex and experience ($F(1,24)=4.98$, $p<0.05$). Experienced 7 year old girls spent more time engaged than inexperienced 7 year old girls, whereas inexperienced 7 year old boys spent more time engaged than experienced 7 year old boys. Four year old girls and experienced 4 year old boys spent similar amounts of time engaged, but inexperienced 4 year old boys spent far less time engaged in interaction than did any other group. As with vocalization, there was a very low rate of behavioural interaction

apparent for the inexperienced 4 year old boys.

However, if the time engaged in interaction is broken down into the time spent actively engaged - ie. demonstrating, proffering or accepting a toy, touching the baby or the baby's toy, gesturing to the baby or imitating the baby's actions - and the time spent inactive but monitoring the baby or the baby's actions, there is a significant Main Effect due to age. Seven year old children spent more time actively engaged than did 4 year old children ($F(1,24)=9.59$, $p<0.01$: Table II). There is also an interaction approaching significance ($p<0.10$) between age and experience. Amongst 4 year olds, experienced children spent more time actively engaged than did inexperienced children; the reverse trend was observed for 7 year olds but the effect was not as great.

To ensure that these findings did not just reflect differences in overall activity level, a 3-way ANOVA was carried out on the time spent active, whether engaged with the baby or not. There were no significant effects nor any approaching significance. Moreover, there were no significant effects found for the amount of time spent inactively monitoring the baby and its behaviour, although this passive interaction was preferred by younger children, inexperienced children and boys, so that the trends were, as expected, complementary to those found for active engagement (Table IIa).

Individual analyses of the active approach categories (demonstrates toy, proffers toy, reaches to touch, touches baby or

touches baby's toy) yielded one significant result. Older children spent more time demonstrating toys than did younger children ($F(1,24)=8.84$, $p<0.01$: Table III). There was also an effect due to sex which approached significance: girls spent more time demonstrating toys than did boys.

Of these categories, "reaches to touch" had too few occurrences to be analysed, and "touches baby" showed no significant effects nor any that approached significance. This latter category was, however, of interest in that none of the mothers touched their babies during the 2 minutes of interaction analysed. Behaviours in this category did, however, occur in most child groups except for those of 4 year old inexperienced boys and experienced 7 year old boys.

In the final two behavioural categories, "proffers toy" and "touches toy held by baby", there were few occurrences but still some trends which approached significance. In the category "touches baby's toy", a category which frequently included behaviour serving to demonstrate the properties of the toy held by the baby, there was a Main Effect, approaching significance, due to sex. Boys demonstrated the properties of the baby's toy more than did girls. This was expecially true of experienced boys (Table IV). For the category "proffers toy", there was an interaction between age and sex which approached significance (Table V). Seven year old boys proffered toys more often than did 7 year old girls, whereas 4 year old girls, most particularly experienced 4 year old girls, proffered toys more often than did 4 year old boys.

Of the other approach categories included in the definition of "engaged in interaction", monitoring the baby, ie. gaze towards the baby's face or body, has been discussed elsewhere (Chapter 5). There was found to be a significant interaction between age, sex and experience; with 7 year old experienced boys and 4 year old inexperienced boys spending less time on this activity than did other groups. There were no significant effects, however, for the amount of time spent monitoring the baby's activity, although there was a non-significant trend due to sex (Table VI): Boys carried out more of this type of monitoring than did girls. The individual group means also show that 7 year old girls, especially, monitored very few of the baby's activities, whereas 7 year old experienced boys spent most time of all the groups on this type of monitoring.

Another approach behaviour not included in the original "engaged" classification was positive facial expression or, more specifically, the categories of "smile", "grin" and "bright faced". There were too few data for analysis in the category "grin", although this behaviour was relatively frequent amongst experienced 7 year old girls. For both the categories "smile" and "bright faced" there was a significant Main Effect due to sex ($F(1,24)=4.72$, $p<0.05$: Table VII and $F(1,24)=4.77$, $p<0.05$: Table VIII, respectively). In both cases girls smiled or looked bright faced more than did boys. The occurrence of these categories was particularly low for experienced 7 year old and inexperienced 4 year old boys.

It is interesting to note that even the girls did not approach the mothers' mean positive facial expression score of 84.3, of which 54.8 seconds, ie. almost half the analysed interaction time, was spent either smiling or grinning.

Discussion

In willingness to approach the baby and engage in interaction there were, therefore, two unexpected significant effects due to age. Seven year old children spent significantly more time actively engaged and demonstrating toys than did 4 year old children, whilst the younger children spent more time in inactive monitoring.

There were no Main Effects due to experience and although there were some differences due to sex these seemed to indicate a difference in the type of approach preferred rather than in overall level of engagement. Girls showed significantly more positive facial expressions than did boys, and tended to demonstrate toys more often than did boys. Boys, however, spent more time in mutual play with the baby's toy, and more time monitoring the baby's actions. Experienced 7 year old boys, especially, carried out little facial monitoring but much activity monitoring.

There was also some evidence that, amongst older children, inexperienced boys were more interested in the babies than were experienced boys, in that they spent more time engaged with the baby. This provides some support for the finding (Berman, Monda &

Myerscough, 1977) that experience with baby siblings causes boys, but not girls, to show less interest in strange babies. But the effect is only true for the older age-group of children. For 4 year old children, approach behaviours (actively engaged) increased with experience for both boys and girls and, of all the groups, inexperienced 4 year old boys seemed least willing to approach and engage in interaction with the baby.

Negative Behaviours

Certain of the behavioural categories used in the study described what might be termed "negative" behaviours: negative either in that they imply that the child withdraws from or avoids interaction, or in that they are antagonistic actions or expressions of discontent. It was expected that such negative behaviours would be more prevalent amongst the younger children than amongst the older children.

The categories deemed descriptive of negative behaviours were "avoidance of baby's touch", "toy snatching" (taking a toy when this was not altruistic in nature, ie.to demonstrate its use), and "toy piling" (aggressive and inappropriate placing of toys on the tray so that the baby could not play, and in some cases could not see over them). Equivalent gaze categories were "gaze into the distance", "gaze aversion" and "gaze downcast". Facial expressions deemed negative were "sad face", "frowning", "withdrawn" and "pouting/sulky". Distinctions were made in the category system between those expressions assumed in play and those indicative of negative emotion.

All of these categories were almost totally absent from the mothers' behaviours. One mother's gaze was designated "downcast" for one second, and as "gazing into the distance" for two seconds. In the childrens' sample, there were too few occurrences of "avoidance of baby's touch", "sad faced" and "sulky face" to be analysed. "Toy snatching" and "toy piling" occurred only in 4 year old children: one experienced 4 year old girl, one experienced 4 year old boy and three inexperienced 4 year old boys. In the other negative categories there were few occurrences in any of the groups. None of the analyses of individual categories yielded any significant results and there were few trends which even approached significance. For overall negative behaviours, however, there was a higher rate of occurrence amongst 4 year old children than amongst 7 year old children (correlated $t(6)=2.924$, $p<0.05$, 1-tailed: Table IX).

Negative behaviours were expected to occur more frequently in 4 year old rather than 7 year old children, and although the occurrence of individual behaviours was too infrequent to yield any significant results, the trends in the data are in the expected direction. Antagonistic behaviour, such as toy snatching and aggressive toy piling, occurred only in 4 year old children and most especially in inexperienced 4 year old boys. All other negative behaviours were more prevalent in 4 year old children than in 7 year old children.

Empathy

The degree of empathy or responsivity shown by the child towards the baby, ie. the extent to which the child correctly interprets the baby's behavioural signals and responds appropriately, can be measured in two ways. Firstly, we can look at categories deliberately devised to allow the interpretation of the childrens' behaviour as helpful, or as carrying out implied wishes on the part of the baby. Thus the child attributes some intent to the baby's activities and responds in a way that furthers that intent. Alternatively, we can look at the number of occasions on which the child has responded to a behavioural overture by the baby with an "appropriate" behavioural response.

In the behavioural categories devised to show incidences of empathy in the child - "attribution of intent" and "helping" - there were too few data for analysis. Each mother showed incidences of this type of response to her baby's actions (Mean mothers' score = 2.25 seconds). But amongst the child groups it only occurred in 7 year old children, most notably in 7 year old experienced boys. Three experienced 7 year old boys showed this type of behaviour (Mean = 3.67 seconds) as opposed to one 7 year old girl and one inexperienced 7 year old boy. Although the behaviour covered by these categories differs from other actions, such as "proffers toy" and "accepts toy", in that there is a great deal of interpretation of the baby's behaviour by the child, the interpretation is still that of babies' actions with or concerning toys. As we have already noted, the 7 year old experienced boys spend most of their time watching the baby's

actions rather than his/her face or expression. Therefore, because they either spend more time watching actions or because they are more sensitive to gestural rather than to facial cues, the 7 year old experienced boys seem more able to attribute the appropriate intent to the baby's actions than are other 7 year old childrens' groups.

"Appropriate" Responses

Appropriate child responses to the baby's behavioural or vocal overtures are set out in Table X. There were, however, no data on the childrens' responses to baby "fuss", nor was baby vocalization "cry" included in the category list. The first indication that the baby was unhappy was usually its facial expression. If the child did not respond appropriately to this cue and the baby became upset, then behavioural "fuss" and vocalization "cry" might have occurred. At this point, however, the recording would have been stopped so that the mother might intervene and no analysis could have been carried on beyond this point.

In defining a response, a child was thought to be responding if his/her behaviour occurred in the same second as the baby's overture or within the next 3 seconds. This assumes that any incidence of the designated "appropriate" child behaviour which occurred within the 3 seconds after a baby's overture was in fact a response. There is a possibility that some of the behaviours were not true responses but simply occurred by chance, but this error would, of course, be equally likely to occur across the different childrens' groups. Also, this

type of error is made less likely by the fact that three of the child's behaviours - "accepts toy", "lets go toy" and "imitates" - could only be responses and could not occur independently of the baby's activity (eg. a toy cannot be "accepted" unless it has been "proffered"). However, as a precaution, each groups' percentage responses were compared with that group's baseline mean, ie. the number of times the behaviour deemed a "response" occurred throughout the entire two minute period of analysis.

Overall, the mothers responded appropriately to 76% of the baby's actions, 100% of their facial expressions and 50% of their vocalizations. Looking at each activity category separately, the mothers responded appropriately to 100% of the baby's "toy proffering" and "toy taking" and to 81% of the baby's attempts to initiate games. However, the appropriate responses to the baby's "reaches" were rather lower at 52%. There were no occurrences of the baby's facial expression "frowns/fusses" in the mother-baby interactions.

In comparison to the generally very high rate of appropriate response shown by the mothers, their relatively low rate of appropriate response to the baby's "reaches" and "vocalizations" might indicate either that there are errors in the experimenter's subjective definition of an appropriate response in these categories, or that mothers occasionally missed or ignored a behavioural cue. In order to test this, analysis of the experimenter interacting in the laboratory situation with her own 10 month old baby was carried out. If the experimenter's subjective interpretation of appropriate responses

differed from that of the other mothers in the experimental sample, then analysis of the interaction between experimenter and daughter should yield approximately 100% appropriate responses by the experimenter to the baby's cues in all categories. However, if the experimenter's level of the responses deemed "appropriate" was similar to that of the other mothers, then it would seem that, although in micro-analysis of an interaction a specific response by the mother may seem appropriate, other factors operating within the interaction may result in certain behavioural cues made by the baby being missed or ignored.

After analysis, the percentage of appropriate responses made by the experimenter was compared with the mean percentage of appropriate responses made by the mothers' sample (Table Xa). The experimenter's pattern of appropriate responses was very similar to that of the mothers in the experimental sample, with a very high rate of appropriate response to the baby's facial expressions and to her attempts to "proffer a toy", "take a toy" or to "initiate games". However, it would also appear that, like the other mothers, the experimenter quite often failed to respond in a way that she herself deemed "appropriate" to the baby's "reaches" and "vocalization", by missing or ignoring certain of her daughter's behavioural cues.

Results

Table XIa shows the percentage of babies' behavioural cues appropriately responded to by the children. Three-way Analyses of Variance carried out on these data showed no significant effects due to Age, Sex or Experience. There was, however, a consistent trend in the mean group percentages of appropriate responses made to babies' actions, vocalizations and facial expressions (smiles) due to age. Seven year olds made more appropriate responses in all three categories than did 4 year olds. (Table xIb) Although individually non-significant, these data show a trend in the expected direction, for a greater degree of empathy was expected with increased age. However, there is also a corresponding increase with age in the baseline rate of the response behaviours. This difference in baseline rate may make it appear that older children are responding more than younger children. Conversely, the higher baseline rate may be caused by the older childrens' tendency to give appropriate responses more frequently than do the younger children.

There were no other consistent trends due to either sex or experience. Boys and experienced children responded more to babies' actions, whilst girls responded more to babies' vocalizations. However, these tendencies were once again accompanied by an increase in the baseline incidence of response behaviours.

However, inexperienced children and boys did, unexpectedly, show a higher response rate to babies' smiles than did girls, despite a

decrease in the baseline occurrence of the appropriate response behaviours. Similarly, inexperienced children showed a slightly higher response to babies' vocalizations than did experienced children, despite a lower behavioural baseline.

In the responses to babies' vocalizations, the trend was fairly consistent across the child groups (Table XIc). Each inexperienced child group, with the exception of inexperienced 4 year old girls, responded more to babies' vocalizations than the corresponding experienced group. This may explain the difference found in correlations between baby and child vocalizations in Chapter 3. There was a positive correlation between the vocalizations of the baby and the inexperienced child, but a negative correlation between the vocalizations of the baby and the experienced child. The combined data would suggest that when the baby vocalizes, the inexperienced child frequently responds with a vocalization, but that this pattern is not so true of experienced children.

The high responsivity to babies' smiles of inexperienced children and boys reflects no consistent trend. It is due to the high response rate to babies' smile by the 7 year old inexperienced boys and the absence of any response at all to babies' smiles by the experienced 4 year old girls. Despite a similarly low behavioural base rate, there was a wide difference in the number of smiles responded to by experienced 7 year old boys and inexperienced 7 year old boys. The inexperienced boys responded to every smile, as did the mother, whilst the experienced boys responded to only 1 in 5 smiles. The

inexperienced 7 year old boys did, of course, spend twice as much time looking at the baby's face than did the experienced boys (Table XI, Chapter 5). Therefore the difference may be due to the fact that the inexperienced boys were more aware of the babies' smiles than were the experienced boys, who tended to direct their attention to the babies' actions. However, the experienced 4 year old girls did spend quite a high proportion of their time monitoring the baby's face and yet did not respond at all to their smiles. They also showed a low response to the babies' vocalizations despite a relatively high baseline vocalization rate, but responded well to the babies' actions. It would seem then that the experienced 4 year old girls are not as socially oriented as the older girls in their responses, for the 7 year old girls responded more to smiles and to vocalizations than to actions.

Although none of these differences is significant, it is interesting to note that all experienced child groups, with the exception of experienced 7 year old girls, responded more to babies' actions than did inexperienced groups. And all experienced groups responded appropriately more often than did inexperienced groups to babies' "reaches for toy" (Table XIa). The categories for baby "proffers toy" and "initiates game" did not occur in all child groups. However, when they did occur, they were frequently responded to by the boys but never "appropriately" by the girls.

It is also of interest that all of the childrens' groups responded appropriately to some of the babies' actions, facial

expressions or vocalizations. Even the inexperienced 4 year old boys, with very low baseline behaviour rates, showed some appropriate responses to babies' actions, smiles and vocalizations. They did not, however, respond to the baby's attempts to initiate a game, or respond appropriately to the baby's facial expression "frown/fuss". This latter category was only found to occur in interactions with inexperienced 7 year old boys and 4 year old children, and may therefore be an indicator of the skill of the interactor in keeping the baby amused, so pre-empting any distress. However, when this facial expression did occur, it was always responded to appropriately by the inexperienced 7 year old and experienced 4 year old boys.

Summary

Most of the differences found in approach and response behaviours were due to age. Older children spent more time engaged with the baby than did younger children. They also spent more time actively engaged, and this was possibly due to the fact that 7 year olds spent more time in demonstrating toys than did 4 year olds.

"Helping" behaviours only occurred in the 7 year old childrens' groups, whilst most negative behaviours were found in the 4 year old childrens' groups. Also, in measures of responsivity to the babies' actions, vocalizations and smiles, more responses were made by older children than by younger children. Four year old children did show interest in, and the ability to respond appropriately to, the baby - but both interest and ability were more evident in older children.

It would seem, therefore, that interest, skill in interaction and empathy with the baby increase with age. It cannot be said either that, within this study, this increase in skill is due to the younger childrens' inability to interpret facial expressions correctly, for 4 year old children were quite able to respond appropriately to the babies' facial expressions "frown" and "fuss".

The expected difference due to sex was not found. Despite girls being deemed better at decoding non-verbal cues (Hall, 1978) and more socially mature at an early age (Smith & Connolly, 1972), there was no general trend showing girls to be more skilled in interaction or more responsive than were boys.

Girls tended to demonstrate toys more than did boys, but then boys tended to play with the baby, or with the toy the baby was holding, more than did girls. Seven year old girls tended to respond more than did seven year old boys to babies' vocalizations, whereas 7 year old boys tended to respond more than did 7 year old girls to babies' actions. All appropriate responses to the baby categories "proffers toy" and "initiates game" came from boys. As has been discussed before, this difference is possibly due to the fact that the experienced 7 year old boys spent most of their time monitoring the baby's actions and little time monitoring the baby's face.

In common with the inexperienced 4 year old boys, the experienced 7 year old boys spent little time smiling. Girls, however, smiled

more at the babies than did boys, although the inexperienced 7 year old boys tended to respond to the baby's smiles more than did any other group.

Experienced children, as was expected, did respond appropriately to babies' actions more often than did inexperienced children. Experience with a baby sibling must therefore increase the child's understanding of the baby's intentions, as manifested through motor actions, and of the baby's limited physical capabilities. This understanding increased the child's responsivity to the baby's actions. Inexperienced children, however, did respond to babies' vocalizations by vocalizing, more often than did experienced children. Perhaps the baby's vocalizations held a novelty value for the inexperienced child which they did not hold for the experienced child.

It has been suggested (Nash & Feldman, 1981; Berman, Monda & Myerscough, 1977) that boys with younger siblings show less interest in babies than do boys without younger siblings, and that the increase shown by boys in interacting with a strange baby decreases with age. These tendencies were thought to be due to the polarization towards sex-appropriate behaviours that comes with increased age. The data from this study would seem to support these findings. Experienced 7 year old girls spent more time than did inexperienced 7 year old girls engaged in interaction with the baby. The experienced girls would have had more opportunity to model appropriate behaviours from the caregiving mother and to spend more time with a baby sibling, than would inexperienced girls. The skills thus acquired would carry over

into the interaction with a strange baby. Experienced 7 year old boys spent less time engaged in interaction with the baby than did inexperienced boys. The experienced boys presumably saw infant interaction as more appropriate behaviour for females than for males. This was not, however, true for the 4 year old boys. Experienced 4 year old boys spent as much time engaged with the baby as did 4 year old girls, but the inexperienced 4 year old boys showed much less interest and willingness to interact. It could be that 4 year olds do not see infant-interaction as more appropriate to any one sex. The experienced children gain empathy and skill in interaction from playing with their younger siblings, which motivates them to show interest in and play with a strange baby. The inexperienced girls, however, are more socially oriented or more socially mature than the inexperienced 4 year old boys, and it is this that causes the difference between the interest and appropriate reponses shown to the baby by the inexperienced 4 year old boys compared with all the other 4 year old groups.

TABLE I: TIME ENGAGED (No. Seconds)

Means

7 YEARS	77.80	64.90	4 YEARS
FEMALE	75.20	67.50	MALE
EXP	73.60	69.10	INEXP

	7 YEARS	4 YEARS
FEMALE	77.00	73.40
MALE	78.50	56.50

	7 YEARS	4 YEARS
EXP	75.40	71.80
INEXP	80.10	58.10

	FEMALE	MALE
EXP	77.00	70.10
INEXP	73.40	64.90

7 YEAR OLDS				4 YEAR OLDS			
FEMALE		MALE		FEMALE		MALE	
EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
82.25	71.75	68.50	88.50	71.75	75.00	71.75	41.25

ANOVA Summary Table

SOURCE	SS	df	MS	F	p
A	1313.28	1	1318.28	3.17	0.10
S	472.78	1	472.78	1.14	
E	157.53	1	157.53	0.38	
A*S	675.28	1	675.28	1.63	
A*E	675.28	1	675.28	1.63	
S*E	5.28	1	5.28	0.01	
A*S*E	2064.03	1	2064.03	4.98	0.05
ERROR	9953.75	24	414.74		

TABLE II: TIME ACTIVE AND ENGAGED
(No. Seconds)

Means

7 YEARS	65.13	40.81	4 YEARS
FEMALE	59.56	46.38	MALE
EXP	57.10	48.88	INEXP

	7 YEARS	4 YEARS
FEMALE	69.80	49.40
MALE	60.50	32.30

	7 YEARS	4 YEARS
EXP	61.80	52.40
INEXP	68.50	29.30

	FEMALE	MALE
EXP	65.00	49.10
INEXP	54.10	43.60

7 YEAR OLDS				4 YEAR OLDS			
FEMALE		MALE		FEMALE		MALE	
EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
70.00	69.50	53.50	67.50	60.00	38.75	44.75	19.75

ANOVA Summary Table

SOURCE	SS	df	MS	F	p
A	4728.78	1	4728.78	9.59	0.01
S	1391.28	1	1391.28	2.82	
E	536.28	1	536.28	1.09	
A*S	124.03	1	124.03	0.25	
A*E	1785.03	1	1785.03	3.62	0.10
S*E	57.78	1	57.78	0.12	
A*S*E	166.53	1	166.53	0.34	
ERROR	11833.53	24	493.05		

TABLE IIa: INACTIVE MONITORING

Means

7 YEARS	12.60	24.10	4 YEARS
FEMALE	15.60	21.10	MALE
EXP	16.50	20.25	INEXP

TABLE III: DEMONSTRATING TOYS
(No. Seconds)

Means

7 YEARS	40.10	17.90	4 YEARS
FEMALE	35.80	22.30	MALE
EXP	29.60	28.50	INEXP

	7 YEARS	4 YEARS
FEMALE	45.50	26.00
MALE	34.80	9.90

	7 YEARS	4 YEARS
EXP	35.60	23.50
INEXP	44.60	12.40

	FEMALE	MALE
EXP	36.90	22.30
INEXP	34.60	22.40

7 YEAR OLDS				4 YEAR OLDS			
FEMALE		MALE		FEMALE		MALE	
EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
40.00	51.00	31.30	38.30	33.80	18.30	13.30	6.50

ANOVA Summary Table

SOURCE	SS	df	MS	F	p
A	3938.28	1	3938.28	8.84	0.01
S	1444.53	1	1444.53	3.24	0.10
E	9.03	1	9.03	0.02	
A*S	57.78	1	57.78	0.13	
A*E	810.03	1	810.03	1.82	
S*E	11.28	1	11.28	0.03	
A*S*E	81.28	1	81.28	0.18	
ERROR	10686.75	24	445.28		

TABLE IV: TOUCHES TOY HELD BY BABY

Means

7 YEARS	1.50	0.88	4 YEARS
FEMALE	0.31	2.06	MALE
EXP	1.69	0.69	INEXP

	7 YEARS	4 YEARS
FEMALE	0.13	0.50
MALE	2.88	1.25

	7 YEARS	4 YEARS
EXP	2.13	1.25
INEXP	0.88	0.50

	FEMALE	MALE
EXP	0.00	3.38
INEXP	0.63	0.75

7 YEAR OLDS				4 YEAR OLDS			
FEMALE		MALE		FEMALE		MALE	
EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
0.00	0.25	4.25	1.50	0.00	1.00	2.50	0.00

ANOVA Summary Table

SOURCE	SS	df	MS	F	p
A	3.13	1	3.13	0.42	
S	24.50	1	24.50	3.28	0.10
E	8.00	1	8.00	1.07	
A*S	8.00	1	8.00	1.07	
A*E	0.50	1	0.50	0.07	
S*E	21.13	1	21.13	2.82	
A*S*E	0.13	1	0.13	0.02	
ERROR	179.50	24	7.48		

TABLE V: PROFFERS TOY

Means

7 YEARS	2.94	1.13	4 YEARS
FEMALE	1.88	2.19	MALE
EXP	2.50	1.56	INEXP

	7 YEARS	4 YEARS
FEMALE	1.63	2.13
MALE	4.25	0.13

	7 YEARS	4 YEARS
EXP	3.13	1.88
INEXP	2.75	0.38

	FEMALE	MALE
EXP	3.25	1.75
INEXP	0.50	2.63

7 YEAR OLDS				4 YEAR OLDS			
FEMALE		MALE		FEMALE		MALE	
EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
2.75	0.50	3.50	5.00	3.75	0.50	0.00	0.25

ANOVA Summary Table

SOURCE	SS	df	MS	F	p
A	26.28	1	26.28	2.09	
S	0.78	1	0.78	0.06	
E	7.03	1	7.03	0.56	
A*S	42.78	1	42.78	3.41	0.10
A*E	2.53	1	2.53	0.20	
S*E	26.28	1	26.28	2.09	
A*S*E	0.03	1	0.03	0.00	
ERROR	30.25	24	12.55		

TABLE VI: LOOKS AT TOY HELD BY BABY

Means

7 YEARS	7.75	10.44	4 YEARS
FEMALE	6.13	12.10	MALE
EXP	9.90	8.25	INEXP

	7 YEARS	4 YEARS
FEMALE	2.60	9.60
MALE	12.90	11.30

	7 YEARS	4 YEARS
EXP	9.90	10.00
INEXP	5.60	10.90

	FEMALE	MALE
EXP	5.60	14.30
INEXP	6.60	9.90

7 YEAR OLDS				4 YEAR OLDS			
FEMALE		MALE		FEMALE		MALE	
EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
2.80	2.50	17.00	8.80	8.50	10.80	11.50	11.00

ANOVA Summary Table

SOURCE	SS	df	MS	F	p
A	57.78	1	57.78	0.55	
S	282.03	1	282.03	2.69	0.10
E	22.78	1	22.78	0.22	
A*S	148.78	1	148.78	1.42	
A*E	52.53	1	52.53	0.50	
S*E	57.53	1	57.78	0.55	
A*S*E	13.78	1	13.78	0.13	
ERROR	2517.25	24	104.89		

TABLE VII: SMILES

Means

7 YEARS	11.80	9.84	4 YEARS
FEMALE	14.50	7.10	MALE
EXP	10.90	10.80	INEXP

	7 YEARS	4 YEARS
FEMALE	17.80	11.30
MALE	5.90	8.40

	7 YEARS	4 YEARS
EXP	10.50	11.30
INEXP	13.10	8.00

	FEMALE	MALE
EXP	12.30	9.50
INEXP	16.80	4.80

7 YEAR OLDS				4 YEAR OLDS			
FEMALE		MALE		FEMALE		MALE	
EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
16.80	18.80	4.30	7.50	7.80	14.80	14.80	2.00

ANOVA Summary Table

SOURCE:	SS	df	MS	F	p
A	32.00	1	32.00	0.35	
S	435.13	1	435.13	4.72	0.05
E	0.13	1	0.13	0.00	
A*S	162.00	1	162.00	1.76	
A*E	60.50	1	60.50	0.66	
S*E	171.13	1	171.13	1.86	
A*S*E:	220.50	1	220.50	2.39	
ERROR:	2211.50	24	92.15		

TABLE VIII: BRIGHT-FACED

Means

7 YEARS	22.00	17.90	4 YEARS
FEMALE	25.50	14.40	MALE
EXP	16.20	23.80	INEXP

	7 YEARS	4 YEARS
FEMALE	24.90	26.10
MALE	19.10	9.80

	7 YEARS	4 YEARS
EXP	13.80	18.60
INEXP	30.30	17.30

	FEMALE	MALE
EXP	19.90	12.50
INEXP	31.10	16.40

7 YEAR OLDS				4 YEAR OLDS			
FEMALE		MALE		FEMALE		MALE	
EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
19.50	30.30	8.00	30.30	20.30	32.00	17.00	2.50

ANOVA Summary Table

SOURCE:	SS	df	MS	F	p
A	132.03	1	132.03	0.64	
S	979.03	1	979.03	4.77	0.05
E	457.53	1	457.53	2.23	
A*S	225.78	1	225.78	1.10	
A*E	639.03	1	639.03	3.12	
S*E	108.78	1	108.78	0.53	
A*S*E:	712.53	1	712.53	3.47	
ERROR:	4922.25	24	205.09		

TABLE IX: MEAN SCORES OF NEGATIVE CATEGORIES

CATEGORY	7 YR OLD	4 YR OLD
TOY SNATCHING	0.00	1.30
TOY PILING	0.00	1.20
GAZE INTO DISTANCE	1.80	2.10
GAZE AVERSION	0.80	1.20
GAZE DOWNCAST	0.70	1.00
FACE EXP WITHDRAWN	1.00	2.80
FACE EXP FROWNING	0.25	3.70
MEANS	0.65	1.90

CORRELATED $t(6) = 2.924$, $p < 0.05$ (1-tailed)

TABLE X

DESIGNATED APPROPRIATE CHILD RESPONSES
TO BABY OVERTURES

BABY ACTIVITY	CHILD RESPONSE
REACH (UNOBTAINABLE TOY)	PROFFERS TOY PUTS TOY ON TRAY
PROFFERS TOY	ACCEPTS TOY TOUCHES TOY
TAKES TOY	LETS TOY GO
FUSS	DEMONSTRATES TOY PROFFERS TOY GESTURES TOUCHES PARTNER PLAYS B.O. GAME VOCALIZES
ATTEMPTS TO INITIATE GAME	ACCEPTS TOY REACHES FOR TOY TOUCHES TOY IMITATES GESTURES PLAYS B.O. GAME
BABY FACIAL EXPRESSION	
SMILE/GRIN	SMILE/GRIN
FROWN/FUSS	DEMONSTRATES/PROFFERS TOY GESTURES TOUCHES PARTNER PLAYS B.O. GAME VOCALIZES
BABY VOCALIZES	
VOCALIZES	VOCALIZES SPEECH VOCALIZES NON-SPEECH

TABLE Xa: MEAN PERCENTAGES OF APPROPRIATE RESPONSES MADE BY THE MOTHERS SAMPLE

	PERCENTAGES OF MOTHERS APPROPRIATE RESPONSES					
EXP'TER	66.70	100.00	100.00	85.70	83.30	66.70
MOTHERS	52.00	100.00	100.00	81.00	100.00	50.00
BABY CATEGORY	REACH	PROFFERS	TAKES TOY	INIT GAME	FACIAL EXPRES'NS	VOCAL -IZATIONS

TABLE XIa: GROUP PERCENTAGES OF APPROPRIATE RESPONSES

BABY OVERTS	MUMS	7 YEAR OLDS				4 YEAR OLDS			
		FEMALE		MALE		FEMALE		MALE	
		EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
ACTIONS									
REACHES TOY	52	35.7	33.3	62.5	60.0	69.2	17.6	47.1	33.3
PROFFER TOY	100	0.0	-	100.0	-	0.0	0.0	62.5	50.0
TAKES TOY	100	-	0.0	0.0	-	-	-	-	-
INITS GAME	81	0.0	-	100.0	100.0	-	0.0	100.0	0.0
FACIAL EXPS									
SMILE/GRIN	100	84.2	50.0	20.0	100.0	0.0	33.3	54.5	25.0
FROWN/FUSS	-	-	-	-	100.0	50.0	66.7	100.0	0.0
VOCALIZES	50	66.7	68.2	16.7	37.5	22.2	17.9	25.9	33.3

NB: "-" indicates no occurrence of Baby's Overture

TABLE XIb: % APPROPRIATE RESPONSES FOR
AGE, SEX & EXPERIENCE GROUPS

	BABY ACTION		BABY SMILE		BABY VOCALS	
	7 YRS	4 YRS	7 YRS	4 YRS	7 YRS	4 YRS
% RESPONSE	47.2	40.4	63.6	28.2	47.3	24.8
BASELINE	9.6	7.1	11.9	9.9	36.8	26.1

	BABY ACTION		BABY SMILE		BABY VOCALS	
	GIRLS	BOYS	GIRLS	BOYS	GIRLS	BOYS
% RESPONSE	34.2	53.4	41.9	49.9	43.8	28.4
BASELINE	6.0	10.7	14.6	7.2	40.1	22.8

	BABY ACTION		BABY SMILE		BABY VOCALS	
	EXP	INEXP	EXP	INEXP	EXP	INEXP
% RESPONSE	54.0	33.6	39.7	52.1	32.8	39.2
BASELINE	12.5	4.1	10.9	10.8	32.7	30.2

Each Group Percentage Response is paired with the mean rate, for each child group, of those behaviours deemed response behaviours.

TABLE XIc: MEAN % APPROPRIATE RESPONSES IN EACH CATEGORY AND BASELINE BEHAVIOUR RATE

BABY OVERTS	MUMS	7 YEAR OLDS				4 YEAR OLDS			
		FEMALE		MALE		FEMALE		MALE	
		EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
ACTIONS									
% RESPONSE:	76	27.8	31.8	70.0	59.1	64.3	13.0	53.8	30.8
BASELINE:	40	7.3	2.8	20.0	8.3	8.5	5.3	14.3	0.3
SMILE/GRIN									
% RESPONSE:	100	84.2	50.0	20.0	100.0	0.0	33.3	54.5	25.0
BASELINE:	44	16.8	18.8	4.3	7.5	7.8	14.8	14.8	2.0
FROWN/FUSS									
% RESPONSE:	-	-	-	-	100.0	50.0	66.7	100.0	0.0
BASELINE:	-	-	-	-	107.6	89.1	60.9	49.6	11.8
VOCALIZES									
% RESPONSE:	50	66.7	68.2	16.7	37.5	22.2	17.9	25.9	33.3
BASELINE:	50	36.8	40.3	33.3	37.0	45.0	38.3	16.0	5.0

CHAPTER 7

Behavioural Synchrony & Reciprocity: Baby & Child

In Chapter 2 the discussion centred upon the relationship between child and baby vocalizations, according to the child categories of age, sex and experience, and the baby categories of sex and experience. In subsequent chapters attention has been focused upon the child's behaviours alone. To conclude this analysis of child-infant interaction we return to a consideration of the babies' behaviours and of how the interaction between child and baby is structured. That is, how does the behaviour of one partner relate to that of the other?

We would expect that an infant of 10 months could take an active part in the interaction (Vandell, Wilson & Buchanan, 1980). Bruner (1977) found that infants, by 10 months, were able to be both agent and recipient in interaction with the mother. They were willing both to initiate and to maintain game-playing behaviours.

We would not expect an infant, even of this age, to be wary of a strange child. Although infants of 10 months are seen to respond negatively to unfamiliar adults, their responses to unfamiliar children are usually positive (Lewis & Brooks, 1974; Brooks & Lewis, 1976).

It might be, however, that the sex or experience of the baby

could affect the quality or quantity of the child-infant interaction. Girl babies from 6 months to 1 year have been found to initiate more interactions with the their mothers (Gunnar & Donahue, 1980) and to make more positive social overtures and communications in interaction than do boys (Klein & Durfee, 1978). Infant girls are therefore likely to participate more in child-infant interaction than are infant boys.

Infants' experience of interaction with older siblings might also cause them to be more skilled in interaction with unfamiliar children. Participation in social interaction with peers was found to increase the number of sustained interactions maintained by 16 month old toddlers (Mueller & Brenner, 1977). Similarly, consistent play with a peer increased the amount of peer-oriented behaviour shown by 9 month old infants in comparison with a control group of non-familiar peers (Becker, 1977). Furthermore, the increase in peer-oriented behaviour was found to transfer to subsequent interactions with a strange peer. Therefore it might be expected that social interaction with older siblings would enhance an infant's ability to sustain an interaction, and that this skill might be transferred to interactions with an unfamiliar child.

Thus, if both the child and the baby are likely to be active in the interaction, we can study the extent to which the behaviour of one partner affects the behaviour of the other. Are the partners' behaviours positively correlated, with the activity or interest of one partner increasing with that of the other? Or are they complementary,

with a high level of activity in one partner related to a low level in the other? In investigating this question, we are looking at the ability which underlies turn-taking in interaction - the ability to modify one's own behaviour so that it is attuned to the state of attention or activity of one's partner. Thus, if one partner is passive, with attention elsewhere, then increased activity by the other partner may attract his/her attention so that an interaction sequence may begin. If, however, one partner in the dyad is active, then the second partner must monitor his/her behaviours to establish points of joint reference upon which the interaction can be structured.

This chapter describes the relationships between approach and engagement behaviours in the baby and the child, the regulation and pattern of mutual gaze behaviours, and the incidence of imitations between baby and child. This latter category provided specific examples of reciprocal interaction within the dyad.

1) Approach & Engagement Behaviours

In Chapter 6 it was found that there was a significant effect due to age in the amount of time spent by the children actively engaged with the baby. Whereas older children were likely to be actively engaged, younger children were more likely to spend time in inactive monitoring of the baby and its actions. There were no significant differences in engagement or approach behaviours due to experience, but some differences in approach behaviours due to the sex of the

child.

The behaviour of the baby was analysed in a similar manner, investigating the factors of baby's sex and experience with siblings. Differences were found due to the experience rather than the sex of the baby. Although on the basis of other research findings (Klein & Durfee, 1978; Gunnar & Donahue, 1980) differences in the babies' approach behaviours due to sex were expected.

The first analysis carried out was of the babies' overall level of engagement with the child, ie. the time spent looking at the child or the child's actions: taking or accepting a toy from the child, proffering the toy, imitating an action, gesturing or waving at the child, touching the child or attempting to initiate a game with the child. The measures "not engaged" - not participating in any behaviours defined by the category "engaged", inactive watching of the partner or partner's behaviours, "actively engaged" - all behaviours defined within the category "engaged" except for passive monitoring, and "active" - physically active with or without a toy, were also subsequently investigated.

Experience: Baby

A difference was found in the amount of time spent by the baby engaged with the child due to the baby's experience ($F(1,28)=5.5$, $p<0.05$: Table I). Inexperienced babies spent more time engaged with their partners than did experienced babies. One explanation for this finding is that inexperienced babies spent more time than did experienced babies in inactive monitoring of the children and the childrens' behaviour ($F(1,28)=14$, $p<0.001$: Table II). Conversely, there was a non-significant trend for experienced babies to spend more time actively engaged than did inexperienced babies (Table III). This, however, could be accounted for by the difference in time spent active, whether engaged or not. Experienced babies were more active than inexperienced babies ($F(1,28)=10.18$, $p<0.01$: Table IV).

From these data it would seem, therefore, that the babies' experience with older siblings did affect the quality of the interaction with older children. Although there was no significant difference in the amount of time spent actively engaged between experienced and inexperienced babies, the experienced babies spent more time actively playing when not engaged with the child, the inexperienced babies spent more time inactively watching the child.

Smiling: Baby & Child

If the extent to which the baby smiles or grins is added to this analysis of time spent engaged, then we find effects due the experience of both the child and the baby. Experienced babies smiled more than inexperienced babies ($F(1,28)=4.8$, $p<0.05$: Table V), and all babies smiled more when with experienced children ($F(1,24)=4.46$, $p<0.05$: Table VI). There was also, however, a significant interaction between the age and the sex of the child ($F(1,24)=5.78$, $p<0.05$). Babies smiled most with 7 year old girls and 4 year old boys, and more specifically with experienced 7 year old girls and experienced 4 year old boys. Both these groups of children smile frequently at the babies, but no more than do some other groups (eg. 7 year old inexperienced girls). We must therefore assume that some other aspect of the interaction causes the high rate of smiling by the babies. It might be due, for instance, to one strategy that the two childrens' groups do have in common - both experienced 7 year old girls and 4 year old boys frequently use exaggerated facial expressions. The babies rarely smiled when with experienced 4 year old girls. This may be due to, or may have caused, the absence of any positive response to baby smiles by this group of children.

Sex: Baby

There were no differences due to sex in the time spent engaged, inactively monitoring or active. Nor were there any differences in the amount of time spent by the children on these behaviours, due to the age, sex or experience of the child. There was, however, a non-significant tendency for babies passively to monitor more of the older childrens' behaviours (Table VII). Since the older children spent more time actively engaged with, and demonstrating toys to, the babies, we would expect babies to spend more time inactively monitoring, or watching the toy demonstrations of, the older children. There was also a non-significant tendency for babies to be more active when their partners were boys (Table VIII). This was especially true of babies with 4 year old boys, the child group that showed least toy demonstrations and most inactive monitoring of the baby.

Mutual Engagement

Analysis of the number of seconds in which the partners in the dyad were mutually engaged - that is when child and baby's attention were mutually directed, either on each other or on a point of joint reference - would seem to support these interpretations of the data. Dyads with babies and older children spent more time mutually engaged than did dyads with younger children ($F(1,28)=4.26$, $p<0.05$: Table IX). And most time was spent in mutual engagement by dyads with inexperienced 7 year olds, that group which spent most time on

demonstrating toys. Least time was spent in mutual engagement by dyads with inexperienced 4 year old boys ($F(1,28)=5.02$, $p<0.05$), the group that showed least time in demonstration of toy use.

If we look at the babies' groups, we find that dyads with inexperienced babies spent more time in mutual engagement than dyads with experienced babies ($F(1,24)=4.66$, $p<0.05$: Table X). Mutual engagement was therefore higher with the group of babies who spent most time in inactive monitoring.

It would seem, then, that high scores of mutual engagement were dependent upon the degree to which the child demonstrated toys to the baby and the baby watched. That is both child and baby were mutually engaged in that they were looking at a point of reference that they held in common, the toy being demonstrated, or were monitoring each other's behaviours during the toy demonstration. While the child partner was actively engaged in toy demonstration, the baby was likely to watch inactive. Low scores for mutual engagement came from dyads in which the child watched inactively and the baby was active, but not necessarily engaged in activity directed towards the child.

Behavioural Correlations: Child & Baby

On the basis of these data it appeared possible that there might be a negative relationship between activity in children and babies. Certainly in pilot observations it was noted that a baby would attempt, by various means, to attract the attention of an unresponsive child.

Pearson's correlation coefficients between the time spent engaged, actively engaged, inactively monitoring and active, by child and baby groups, were calculated to investigate this relationship. There was a significant correlation between the time spent by the babies "engaged" with the children and the time spent by the children "actively engaged" with the babies ($r=0.59$, $df=30$, $p < 0.001$: Table XI). So it would seem that the more the child was actively engaged, the more likely it was that the baby's attention would be directed towards the child. This was more true, however, for babies with inexperienced children ($r=0.73$, $df=14$, $p < 0.001$: Table XIIB) than it was for experienced children ($r=0.49$, $df=14$, $p < 0.05$).

Similarly, there was a slight positive correlation between the extent to which the children were engaged with the babies and the extent to which the babies were actively engaged with the children ($r=0.23$, N.S.). The more the baby was actively engaged with the child, the more likely it was that the child's attention was directed towards the baby. The experienced child, however, was more likely to direct his/her attention towards the baby if the baby was actively engaged ($r=0.42$, p

approaching 0.05), than was the inexperienced child (r=-0.02, N.S.).

These correlations would seem to indicate that the child-infant interactions are most likely to be structured with the inexperienced child actively engaged, ie. making approach behaviours or demonstrating toys, and the baby attending to him/her. Whereas the experienced child is more likely to be attending to the approach or initiation behaviours of the baby.

In support of this explanation, there is a positive correlation (r=0.44, df=14, p approaching 0.05: Table XIIA) between the inexperienced child being engaged with the baby and the baby passively monitoring the child's behaviour. There is no such relationship between passive monitoring in the baby and the experienced child being engaged. When the baby is engaged, however, the experienced child is more likely to be passively monitoring (r=0.37, N.S.: Table XIIB) than is the inexperienced child (r=0.13, N.S.). Therefore, when the dyad is engaged in interaction, the baby is likely to be watching the inexperienced child, whereas the experienced child is more likely to be watching the baby.

There is some evidence therefore to support the hypothesis that one partner in the dyad is the performer while the other watches. Further support comes from the significant negative correlation found between passive monitoring in the child and passive monitoring in the baby (r=-0.3, df=30, p<0.05: Table XI). The children were unlikely to sit and watch one another. There was also a significant negative

correlation between activity in the child and activity in the baby ($r=0.32$, $df=30$, $p < 0.05$: Table XI). Both children were unlikely to be active. There was, however, a significant positive correlation between activity in the children and passive monitoring by the babies ($r=0.35$, $df=30$, $p < 0.01$: Table XI). Babies were likely to be sitting watching while the children were active. The children, on the other hand, were unlikely to be watching the babies if the babies were active ($r=0.97$, $df=30$, $p < 0.001$: Table XI). This could be interpreted in either of two ways. Firstly that if the baby was active, but with the activity not necessarily directed towards the child, then the child would not attempt to gain the baby's attention. Conversely, it could be that if the child were not attending to, or using any approach behaviours to the baby, then the baby would step up its overall activity level, perhaps in an attempt to gain attention.

Summary

The most important factor controlling the relationship between engagement behaviours in child and baby would seem to be that of experience. Although there were few differences due to experience directly affecting child approach behaviours, for most differences were due to the age and sex of the child, all differences in the baby were due to experience with siblings. None were due to the sex of the baby or to the interaction between the sex and experience of the baby.

Experienced babies spent more time actively engaged with the

child, more time active, and more time smiling at the child than did inexperienced babies. Inexperienced babies spent more time engaged with the child, but more of this time was spent in passive monitoring than by the experienced babies. Experience with siblings would therefore seem to enable the baby to take a more active part in interaction with a strange child. However, this difference between experienced and inexperienced babies may not necessarily be due to a greater skill in interaction. It may simply reflect a greater confidence or familiarity with the situation. Indeed, inexperienced babies spent more time in passive monitoring of the child, a behaviour which could denote wariness of a stranger. Brody & Axelrad (1971) found that the most usual response to an adult stranger by infants of 12 months was that of "customs inspection" - a steady regard with reduced activity but no signs of uneasiness. The second most frequent response made by the infant was of outgoing or positive responsiveness.

A difference was also found in the relationship between levels of attention and activity in the child and baby groups according to the experience of the child. Experienced children tended to watch inactive when the babies were actively engaged, inexperienced child tended to be actively engaged whilst the babies watched inactive.

Generally, however, most mutual engagement was found in dyads where the baby watched and the child was actively engaged. Where

least mutual engagement was found - with the 4 year old inexperienced boys - the baby was frequently active. It would seem therefore that the baby did try to elicit reciprocal interaction in dyads where the child showed little interest in the baby.

2) Imitation: Baby & Child

Imitations of actions, facial expressions and vocalizations were recorded both of the child by the baby and of the baby by the child. Each imitation was scored by its occurrence rather than by the number of seconds over which it occurred. And, as surprisingly few imitations were observed, the data from the three categories were pooled to give an overall score for imitative behaviour.

An imitation was defined as a discrete behaviour mimicking the model behaviour, and following it in the same second or in subsequent seconds with no intervening behaviours on the part of the imitator. The imitation was usually complete within 20 seconds (Eckerman, 1979).

The mean score for the mother's imitative behaviours was 4.25 for the two minutes of behaviour analysed. All of the mothers imitated some of the infant's behaviours. However, none of the childrens' groups scores approached that of the mothers sample, nor did all of the children show some imitative behaviour. There was no imitative behaviour observed for the group of inexperienced 4 year old boys.

A 3-way Analysis of Variance carried out on the child group data (Table XIII) showed no significant effects, although there was a non-significant tendency for experienced children to imitate babies' behaviours to a greater degree than did inexperienced children. Similarly, there was a non-significant tendency for experienced babies to show more imitative behaviours than did babies without siblings

(Table XIV). However, children tended to imitate the inexperienced babies more than they did the experienced babies (Table XV), although once again this tendency was not significant.

A significant effect on babies' imitations of children was found, however, due to the interaction between the age and sex of the child. Babies preferentially imitated 7 year old girls and 4 year old boys ($F(1,24)=6.48$, $p<0.05$: Table XVI).

Summary

Imitations tend to occur to a greater extent in both experienced children and experienced babies. If we accept that imitation is communicative, in establishing a point of joint reference, then we would expect experienced children to imitate their partners more than do inexperienced children. For imitation serves to maintain the interaction by denoting a period of sustained attention on the part of the imitator, and by indicating to the partner in the dyad that they have been attended to. Children with experience of playing with peers were seen to be more able in sustaining a dyadic interaction than were children without such experience (Mueller & Brenner, 1977). Therefore imitation, which indicates a willingness to sustain interaction, would be more in evidence in the behaviours of children experienced in play with their siblings.

The high number of imitations by the baby of the 7 year old girls and 4 year old boys can be explained as a reaction to specific

behavioural strategies used by two child groups. Most imitations were of the experienced 7 year old girls and experienced 4 year old boys. On studying the pooled data it was found that 60% of the babies' imitations with these two child groups were imitations of facial expressions. These two most imitated child groups were also those who showed most use of exaggerated facial expressions when playing with the infants. The use of exaggerated facial expressions in the children seems therefore to lead to the imitation of facial expressions by the baby.

3) Gaze

Facial monitoring and mutual gaze play an important part in mother-infant interaction. For the mother, gaze towards the baby's face indicates that she is ready to engage in interaction (Stern, 1974) and enables her to monitor the baby's behaviour, gauging his/her reactions and state of attention (Argyle & Dean, 1965). Gaze towards the partner in a dyad therefore has a regulatory function, enabling synchrony of dyadic behaviours (Schaffer, 1977). Mutual gaze between mother and baby has been seen as an innate releaser of maternal caregiving responses (Robson, 1967). Although in adult interaction, mutual gaze is described as the means by which each participant expresses his/her continued commitment to the interaction (Kendon, 1967).

These gaze functions cause mothers to spend a high percentage of infant-interaction time looking at the young infant's face (This study

- 72% of interaction time; Farran, Hirschbiel & Jay, 1980 - 60% of interaction time). The infant therefore has a degree of control over the amount of social-visual contact time experienced by looking at, or averting his/her gaze from, the mother.

It would seem, however, that in comparisons across differing mother-infant interaction situations, the more the mother looks at the baby, the more the baby looks away (Perry, 1978). In child-infant interaction, therefore, where the infant is positively engaged in interaction with a partner who is unlikely to maintain such a high level of facial gaze as does the mother, different gaze patterns may emerge. Initiations and terminations of gaze bouts are likely to be determined less by the high rate of facial gaze of the older partner, and to be more under the direct control of the infant.

Facial Gaze: Babies

In comparison with the mothers' mean time of 86.5 seconds spent looking at the baby's face and the childrens' mean time of 48 seconds looking at the baby's face, the babies only spent a mean time of 28.5 seconds looking at the mother's face, and a mean time of 35 seconds looking at the child's face. Analysis showed no significant difference due to the baby's age or sex, in the amount of time spent looking at the partner's face, although there was a non-significant trend due to experience (Table XVII). As we would expect from earlier data, inexperienced babies spent more time looking at their partner's face than did experienced babies.

If the amount of time spent by the baby looking at his/her partner's face is analysed according to the age, sex and experience of the child, we find a significant interaction for age, sex and experience ($F(1,24)=6.6$, $p<0.05$: Table XVIII). Babies spent relatively little time looking at experienced 7 year old boys and inexperienced 4 year old boys, but relatively long periods of time looking at inexperienced 7 year old and experienced 4 year old boys. This would seem to reciprocate the pattern of facial gaze exhibited by the children. Experienced 7 year old and inexperienced 4 year old boys spent most time looking at the baby's face. Experienced 7 year old girls, however, spent similarly long periods looking at the baby's face without getting as much reciprocal attention from the baby.

Toy Gaze

There were no significant differences in the amount of time spent looking at the partner's toy due to the babies' age or sex, or due to the childrens' age, sex or experience. The babies, however, did tend to look most at toys held by inexperienced 7 year old girls, the group that spent most time in toy demonstration, and experienced 7 year old boys, the group which was most toy-oriented in play (Table XIX).

Mutual Gaze

Analysis of the amount of time spent in mutual facial gaze by the two partners in the dyad shows a trend, approaching significance, for experienced babies to spend more time in, and to have more bouts of, eye contact than do inexperienced babies (Table XX). So, although inexperienced babies spend more time looking at their partner's face, this would seem to be covert monitoring - as suggested when discussing earlier data - rather than being aimed at the establishment of mutual eye contact.

Analysis of mutual face gaze according to the age, sex and experience of the child reveals a significant interaction between all three factors ($F(1,24)=10.35$, $p<0.01$: Table XXI). Little time was spent in mutual gaze by inexperienced 7 year old girls, experienced 7 year old boys, experienced 4 year old girls and inexperienced 4 year old boys. A particularly high mutual gaze score (mean 31 seconds) was found for babies with inexperienced 7 year old boys. A high rate of mutual gaze does not, however, seem to indicate a particularly successful form of interaction, although a very low rate, as with the inexperienced 4 year old boys, may indicate that little mutual interaction is being carried out. The mean duration of mutual gaze between mothers and babies was only 15 seconds for the 2-minute interaction period, so it would seem that the 31.75 seconds mean mutual gaze score for the inexperienced 7 year old boys is somewhat atypical. In fact, all these scores for eye contact, with the exception of that of the dyads including 7 year old inexperienced

boys, are as would be predicted by the formula proposed by Strongman & Champness (1968), based on the amount of time each partner in the dyad spends looking at the other:

$$\text{EXPECTED MUTUAL GAZE TIME} = \frac{\text{CHILD'S LOOKING TIME} \times \text{BABY'S LOOKING TIME}}{\text{TOTAL INTERACTION TIME}}$$

Seven year old boys spend twice as much time in eye contact than would be expected (Table (XXII).

The analysis of mean mutual gaze bout lengths also showed that the longest bout lengths were found for dyads with inexperienced 7 year old boys - where the mean length was 2.4 seconds, compared with 1.6 seconds for mothers with their babies. This analysis, however, did not reveal any differences which reached significance.

From observtion of the specific dyads it was certainly evident that the gaze patterns of the inexperienced 7 year old boys were atypical. One boy in particular looked his infant partner in the face frequently, while touching the baby's arms and speaking. The infant showed obvious signs of discomfort, for although the boy's intentions were directed toward eliciting a response from the baby, the boy omitted to smile. His long bouts of facial monitoring must therefore have appeared threatening to the infant.

Analysis of mutual gaze towards a toy played with or touched by either partner in the dyad showed a significant interaction between

the age and experience of the child ($F(1,24)=9.7$, $p<0.01$: Table XXIII). Most mutual gaze towards a toy was found in dyads with experienced 7 year old boys and inexperienced 4 year old boys. This is not a surprising result for the experienced 7 year old boys, since they spent more time than any other group looking at toys held by the baby. Thus, by chance alone, any looking at the toy by the baby would lead to an enhanced mutual toy gaze score. Although it is also possible that the boy's interest in the toy did manage to direct the baby's visual attention toward it.

Gaze Aversion

Gaze aversions were defined as breaks in mutual facial gaze where the gaze was not attracted to and subsequently fixed upon an obvious alternative stimulus. Often the gaze break would be fleeting, and mutual gaze would quickly be resumed. Gaze aversions occurred infrequently in the children but frequently in the babies.

If long periods of mutual gaze are aversive to the infant, in that they provide too much visual stimulation, then we might expect to find differences in the number of gaze aversions by the infant according to the amount of time spent by the child and partner in mutual gaze. By the method of averting his/her gaze and thus breaking eye contact, the infant is able to control the level of intensity of the interaction.

There were no significant differences in the percentage of mutual

gazes that resulted in gaze aversions by the baby, due to the baby's sex or experience or due to the child's age, sex or experience. Although a higher percentage of mutual gaze bouts did result in gaze aversion by the baby in dyads involving inexperienced 7 year old and experienced or inexperienced 4 year old boys (Table XXIV). Two of these groups, the inexperienced 7 year old and the experienced 4 year old boys, had the highest mutual gaze scores. Thus it would seem that the percentage of gaze aversions is related to the amount of time spent in mutual facial gaze. Indeed, there was found to be a significant positive correlation between the percentage of gaze aversion and the extent of mutual facial gaze ($r=0.39$, $df=30$, $p<0.05$). However, this does not account for the high percentage of gaze aversion found in babies with inexperienced 4 year old boys, the group with the lowest facial gaze score.

If we look for the specific aspect of mutual face gaze which leads to gaze aversion in the babies, then we find that it is, as expected, the *duration* of mutual face gaze bout or, in other words, the duration of periods of eye contact. There was a significant positive correlation between the percentage of mutual face gazes resulting in gaze aversion and the mean length of a dyad's mutual face gaze bout ($r=0.681$, $df=30$, $p<0.05$). There was no relationship between the number of mutual facial gaze bouts for each dyad and the percentage of gaze aversions.

It is interesting to note that, whereas the mean length of mutual face gaze bout for the entire child sample was 2.8 seconds and the

mean gaze averted bout length 4.5 seconds, the mothers' mean bout length was 3.5 seconds and their mean gaze averted bout length 7.5 seconds. It would therefore appear that the baby would accept longer bouts of mutual face gaze from the mother without averting his/her gaze. If mutual gaze can either denote intimacy or a threat (Kendon, 1967), then the infant is more likely to accept a higher level of intimacy from the mother than from an unfamiliar child, and more likely to perceive lengthy mutual gaze with a stranger as a threat.

Initiations & Terminations

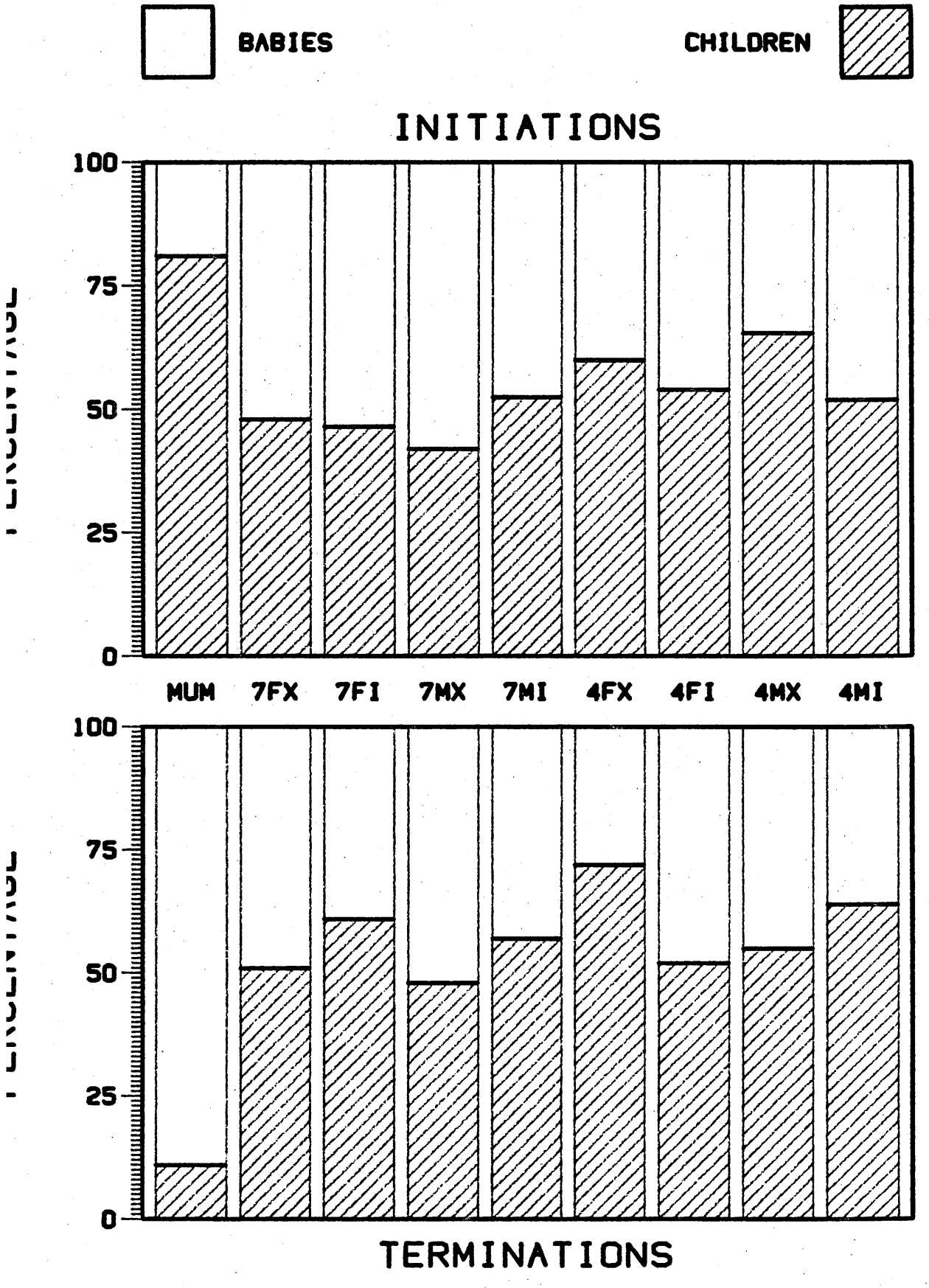
Finally, in looking at the degree of control which each partner in the dyad exerts over the interaction, the percentages of initiations and terminations of mutual face gaze bouts by child and baby were analysed. Initiations were scored for the partner in the dyad who was looking first, terminations were scored for the partner who turned away first.

As expected, there were no significant differences between the percentages of mutual facial gaze bouts initiated or terminated by child or baby, due to the age or experience of the baby or due to the age, sex or experience of the child. The ability to regulate eye contact in the baby is unlikely to vary as a function of the age or sex of the baby or a characteristic of the child.

However, there was a difference between the percentage initiations and terminations of mutal gaze bouts between children and

FIG 1

PERCENTAGES OF INITIATIONS AND TERMINATIONS OF MUTUAL GAZE BOUTS BY CHILD AND BABY ACCORDING TO CHILD GROUP



babies and between mothers and babies. In the mother and baby dyads, mothers initiated 81.25 % of mutual facial gaze bouts and babies terminated 88.6%. These data are similar to those presented by Harran, Hirschbiel and Jay (1980). Whereas, for all child/baby dyads, the initiations and terminations were equally divided between child and baby (Fig 1).

The variation, however, in percentages of initiations and terminations between groups does not seem to covary with the time spent looking or time spent in mutual gaze. Although, if the data for the inexperienced 7 year old boys are excluded, there is a relationship between the percentage of initiations by the baby and the amount of time spent by the child in looking at the baby's face. This relationship would be expected, for the more time a partner in the dyad spends in looking at the other's face, the more likely s/he is to initiate a period of eye contact. The mothers' high level of looking at the baby causes her to initiate most of the bouts of eye contact between mother and baby, and the baby to terminate most of these bouts. For child and baby, where the child on average spent less time than did the mother in looking at the baby and the baby spent more time looking at the child, the percentages of initiations and terminations of periods of eye contact were more evenly balanced within the dyad.

Summary

The investigation of gaze patterns demonstrates that babies spent a similar percentage of the time analysed in looking at the mothers' and in looking at the childrens' faces. There were, however, some significant differences in gazing due to the baby's experience and some significant correlations between child and infant gazing.

Inexperienced babies spent more time monitoring their partner's face than did experienced babies. Experienced babies, however, spent more time in mutual gaze than did inexperienced babies. Whereas the former trend was most likely to be due to the inexperienced babies' wariness of the strange child, the higher participation in mutual gaze by the experienced babies may indicate a greater commitment to interaction with the child.

The infants tended to look less at mothers than at children, although mothers spent more time looking at the baby than did any of the child groups. The more the mother looked, the less the baby looked. However, with the child groups, this trend was reversed and became reciprocal: the babies looked most at the children who spent most time looking at them.

Least mutual facial gaze was found with the experienced 7 year old boys, inexperienced 7 year old girls, experienced 4 year old girls and inexperienced 4 year old boys. For the 7 year old groups, this could be due to the amount of time spent in toy-oriented behaviour.

The 7 year old inexperienced girls spent most time in toy demonstration, the 7 year old experienced boys spent most time in demonstrating the toy held by the baby. Whereas the very low mutual facial gaze score found for the dyads involving inexperienced 4 year old boys reflects the lower level of interest in interaction shown by this child group.

However, the highest "mutual gaze towards toy" scores were found for dyads involving experienced 7 year old boys and inexperienced 4 year old boys. In dyads with experienced 7 year old boys, who played most baby-oriented games and played most with the baby's toy, we can assume that mutual gaze was on the common toy or on the toy held by the child. However, in dyads involving the inexperienced 4 year old boys, the group that showed least toy demonstration and fewest approach behaviours, mutual gaze is not likely to denote mutual play. The infant was either watching the toy held by the child as he was involved in solitary play, or the child was watching the baby in solitary play. As the baby was most likely to be active in dyads with 4 year old inexperienced boys, and the child most likely to be inactively monitoring the baby, we can assume that mutual gaze was towards the baby's toy.

Most mutual gaze was found in dyads with inexperienced 7 year old boys - at a level above that predicted by each partner's individual rate of facial gaze. In one particular dyad, this atypical rate was seen to result from the child's strategy of holding the baby and peering into his face in an attempt to elicit a response. The effect

on the infant was aversive.

Gaze aversions, found frequently in the infants' behaviours, were found however to correlate positively with mutual gaze bout length, rather than with the total time spent in mutual gaze. The infants did, however, accept longer mutual gaze bouts with the mother than they did with the children, before gaze averting.

Finally, it was found that the percentage of initiations and terminations of mutual gaze bouts was, for the infant, a function of the time spent by the older partner in facial gaze. Mothers spend an unusually high percentage of their interaction time looking at the baby's face. Mothers therefore initiate and babies terminate most of the mutual gaze bouts. In interaction with children, who spend less time looking at the baby's face than do mothers, the babies had more control over the initiation of mutual gaze bouts. Approximately 50% of all initiations and terminations in child-infant mutual gaze bouts were made by the infant.

Chapter 7

DISCUSSION

On examining the baby's behaviours within the dyadic interaction, the hypothesis that a baby with experience of interaction with an older sibling would be more skilled than an inexperienced baby in interaction with a stange child was supported.

Experienced babies showed more socially positive approach behaviours (actively engaged), were more active and smiled more often than did inexperienced babies. These behaviours show that the experienced baby was more at ease than was the inexperienced baby, and more willing to initiate an interaction with the strange child. The experienced baby was also more likely to imitate the child and to spend more time in mutual gaze than was the inexperienced baby - behaviours that might indicate a greater skill in maintaining a dyadic interaction.

The inexperienced baby, however, spent more time passively monitoring the child or the child's behaviour - a strategy which is taken to indicate a wary interest in, rather than a commitment to, interaction with the child.

The expected difference in skill in interaction due to the sex of the baby did not appear in this study. However, the cited research studies (Gunnar & Donahue, 1980; Lewis, 1972; Durfee, 1978), which found a difference due to sex in infant interation, were investigating adult-infant interaction. We must assume therefore that

sex differences in infant sociability are a function of a differential response by the adults to babies of a specific sex.

The dyadic interactions did show some overall synchrony in behaviours. The partners, infant and child, were unlikely both to spend time in passive monitoring of the other, nor were they likely both to be active. This did not mean, however, that the interaction was structured for the baby by the child, for either partner could be the performer. The interaction was, however, structured differently according to the experience of the child. Whereas the inexperienced child was likely to be performing whilst the baby watched, the experienced child was likely to monitor the baby whilst the baby performed. This might be due to a difference in expectation between the inexperienced and experienced child. The former adopt more attention-getting behaviours, such as toy demonstration, in attempting to elicit a response from the baby, the latter monitor the infant's behaviours in order that s/he might respond to them.

Similarly, the gaze pattern of the interaction was also under the control of both child and baby, in that either was equally likely to initiate or terminate a mutual gaze bout. The children, did, however, tend to look more at the baby's face than the babies looked at the child's face. Here the baby maintained control over the level of intimacy or intensity within the interaction by breaking eye contact and gaze averting.

The interaction was also structured by behaviours specific to certain child groups. Toy-oriented behaviour in the child led to a reduction in mutual facial gaze. A low level of interaction on the part of the child was related to a high level of activity in the baby. Older children, who spent most time on positive approach behaviours, were more likely to be watched by the baby than were younger children. These data would seem to indicate that the baby is both able and willing to modify his/her behaviour to fit in with that of the partner in the dyad. The experienced child, however, seems to be more able than the inexperienced child in modifying his/her behaviour to fit in with the baby. The experienced baby is more able than the inexperienced baby to maintain the interaction with the child.

TABLE I: TIME SPENT BY THE BABY
ENGAGED WITH THE CHILD

Means

	EXP	INEXP	MEANS
MALE	61.00	74.10	67.60
FEMALE	66.00	80.75	73.40
MEAN	63.50	74.40	

ANOVA Summary Table

SOURCE	SS	df	MS	F	p
S	270.28	1	270.28	0.95	
E	1554.03	1	1554.03	5.46	0.05
S*E	5.28	1	5.28	0.02	
ERROR	7972.37	28	284.73		

TABLE II: TIME SPENT BY THE BABY
IN INACTIVE MONITORING

Means

	EXP	INEXP	MEANS
MALE	27.00	48.60	37.80
FEMALE	30.50	53.25	41.88
MEAN	28.75	50.90	

ANOVA Summary Table

SOURCE	SS	df	MS	F	p
S	132.03	1	132.03	0.47	
E	3938.28	1	3938.28	14.01	0.001
S*E	2.50	1	2.50	0.00	
ERROR	7869.38	28	281.05		

TABLE III: TIME SPENT BY THE BABY
ACTIVELY ENGAGED

Means

	EXP	INEXP	MEANS
MALE	34.00	25.50	29.75
FEMALE	35.50	27.38	31.43
MEAN	34.75	26.44	

ANOVA Summary Table

SOURCE	SS	df	MS	F	p
S	22.78	1	22.78	0.11	
E	552.78	1	552.78	2.75	
S*E	0.28	1	0.28	0.00	
ERROR	5619.88	28	200.71		

TABLE IV: TIME SPENT ACTIVE
BY THE BABY

Means

	EXP	INEXP	MEANS
MALE	80.13	56.25	68.19
FEMALE	75.25	51.00	63.13
MEAN	77.69	53.63	

ANOVA Summary Table

SOURCE	SS	df	MS	F	p
S	205.03	1	205.03	0.45	
E	4632.03	1	4632.03	10.18	0.01
S*E	0.28	1	0.28	0.00	
ERROR	12739.87	28	454.99		

TABLE V: TIME SPENT BY THE BABY SMILING

Means

	EXP	INEXP	MEANS
MALE	7.87	2.00	4.94
FEMALE	5.25	2.38	3.81
MEAN	6.56	2.19	

ANOVA Summary Table

SOURCE	SS	df	MS	F	p
S	10.13	1	10.13	0.32	
E	153.13	1	153.13	4.84	0.05
S*E	18.00	1	18.00	0.57	
ERROR	886.25	28	31.65		

TABLE VI: CHILD FACTORS & TIME SPENT BY BABY SMILING

Means

7 YEARS	5.80	4.30	4 YEARS
FEMALE	4.30	5.80	MALE
EXP	7.30	2.80	INEXP

	7 YEARS	4 YEARS
FEMALE	7.60	1.00
MALE	4.00	7.60

	7 YEARS	4 YEARS
EXP	8.25	6.38
INEXP	3.34	2.25

	FEMALE	MALE
EXP	6.13	8.50
INEXP	2.50	3.13

7 YEAR OLDS				4 YEAR OLDS			
FEMALE		MALE		FEMALE		MALE	
EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
11.75	3.50	4.75	3.25	0.50	1.50	12.25	3.00

ANOVA Summary Table

SOURCE	SS	df	MS	F	p
A	18.00	1	18.00	0.49	
S	18.00	1	18.00	0.49	
E	162.00	1	162.00	4.46	0.05
A*S	210.13	1	210.13	5.78	0.05
A*E	1.13	1	1.13	0.03	
S*E	6.13	1	6.13	0.17	
A*S*E	144.50	1	144.50	3.90	
ERROR	872.00	24	36.33		
TOTAL	1431.88	31			

TABLE VII: CHILD FACTORS & TIME SPENT BY BABY IN INACTIVE MONITORING

Means

7 YEARS	44.60	33.30	4 YEARS
FEMALE	43.10	34.80	MALE
EXP	36.88	41.06	INEXP

	7 YEARS	4 YEARS
FEMALE	47.13	39.13
MALE	42.13	27.50

	7 YEARS	4 YEARS
EXP	40.38	33.38
INEXP	48.88	33.25

	FEMALE	MALE
EXP	38.75	35.00
INEXP	47.50	34.63

7 YEAR OLDS				4 YEAR OLDS			
FEMALE		MALE		FEMALE		MALE	
EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
39.50	54.75	41.25	43.00	38.00	40.25	28.75	26.25

ANOVA Summary Table

SOURCE:	SS	df	MS	F	p
A	1023.78	1	1023.78	2.51	0.10
S	552.78	1	552.78	1.35	
E	140.28	1	140.28	0.34	
A*S	87.78	1	87.78	0.21	
A*E	148.78	1	148.78	0.36	
S*E	166.53	1	166.53	0.41	
A*S*E:	38.28	1	38.28	0.09	
ERROR:	9806.75	24	408.61		
TOTAL:	11964.97	31			

TABLE VIII:CHILD FACTORS & TIME SPENT ACTIVE BY THE BABY

Means

7 YEARS	62.63	70.94	4 YEARS
FEMALE	60.13	73.44	MALE
EXP	70.38	63.19	INEXP

	7 YEARS	4 YEARS
FEMALE	58.63	61.63
MALE	66.63	80.25

	7 YEARS	4 YEARS
EXP	68.75	72.00
INEXP	56.50	69.88

	FEMALE	MALE
EXP	65.25	75.50
INEXP	55.00	71.38

7 YEAR OLDS				4 YEAR OLDS			
FEMALE		MALE		FEMALE		MALE	
EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
68.50	48.75	69.00	64.25	62.00	61.25	82.00	78.50

ANOVA Summary Table

SOURCE:	SS	df	MS	F	p
A	552.78	1	552.78	0.90	
S	1417.78	1	1417.78	2.31	0.10
E	413.28	1	413.28	0.67	
A*S	225.78	1	225.78	0.37	
A*E	205.03	1	205.03	0.33	
S*E	75.03	1	75.03	0.12	
A*S*E:	157.53	1	157.153:	0.26	
ERROR:	14730.25	24	613.76		
TOTAL:	17777.46	31			

TABLE IX: CHILD FACTORS & TIME SPENT MUTUALLY ENGAGED

Means

7 YEARS	50.13	38.38	4 YEARS
FEMALE	46.94	41.56	MALE
EXP	45.25	43.25	INEXP

	7 YEARS	4 YEARS
FEMALE	49.38	44.50
MALE	50.88	32.25

	7 YEARS	4 YEARS
EXP	44.75	45.75
INEXP	55.50	31.00

	FEMALE	MALE
EXP	48.38	42.13
INEXP	45.50	41.00

7 YEAR OLDS				4 YEAR OLDS			
FEMALE		MALE		FEMALE		MALE	
EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
50.25	48.50	39.25	62.50	46.50	42.50	45.00	19.50

ANOVA Summary Table

SOURCE:	SS	df	MS	F	p
A	1104.50	1	1104.50	4.26	0.05
S	231.13	1	231.13	0.89	
E	32.00	1	32.00	0.12	
A*S	378.13	1	378.13	1.46	
A*E	1300.50	1	1300.50	5.02	0.05
S*E	6.13	1	6.13	0.02	
A*S*E	1081.13	1	1081.13	4.17	0.10
ERROR:	6216.50	24	259.00		
TOTAL:	10350.00	31			

TABLE X: BABY FACTORS
& TIME SPENT MUTUALLY ENGAGED

Means

	EXP	INEXP	MEANS
MALE	38.75	46.75	42.75
FEMALE	37.13	56.00	44.56
MEAN	37.94	51.38	

ANOVA Summary Table

SOURCE	SS	df	MS	F	p
S	116.28	1	116.28	0.37	
E	1444.53	1	1444.53	4.66	0.05
S*E	236.53	1	236.53	0.76	
ERROR	8683.87	28	310.14		

TABLE XI: PEARSON CORRELATION COEFFICIENTS
FOR CHILD-BABY DYADS

E = ENGAGED
AE = ACTIVELY ENGAGED
A = ACTIVE
PM = PASSIVE MONITORING

BABY \ CHILD	E	AE	A	PM
E	+0.18	+0.59 ***	-0.26	+0.24
AE	+0.23	+0.31 *	-0.11	+0.15
A	-0.25	-0.19	-0.32 *	-0.97 ***
PM	+0.23	+0.09	+0.35 **	-0.30 *

*: $p < 0.05$
**: $p < 0.01$
***: $p < 0.001$

TABLE XII: PEARSON CORRELATION COEFFICIENTS FOR CHILD AND BABY

E = ENGAGED
AE = ACTIVELY ENGAGED
PM = PASSIVE MONITORING

A) CHILD ENGAGED

BABY	CHILD	
	EXP	INEXP
E	+0.06	+0.31
AE	+0.42	-0.02
PM	+0.04	+0.44

B) BABY ENGAGED

CHILD	CHILD	
	EXP	INEXP
E	+0.06	+0.31
AE	+0.49 *	+0.73 ***
PM	+0.37	+0.13

*: $p < 0.05$
**: $p < 0.01$
***: $p < 0.001$

TABLE XIII: CHILD FACTORS & NUMBER OF IMITATIONS BY THE CHILD

Means

7 YEARS	1.19	1.19	4 YEARS
FEMALE	1.40	0.94	MALE
EXP	1.80	0.56	INEXP

	7 YEARS	4 YEARS
FEMALE	1.40	1.50
MALE	1.00	0.90

	7 YEARS	4 YEARS
EXP	1.60	2.00
INEXP	0.75	0.40

	FEMALE	MALE
EXP	2.10	1.50
INEXP	0.75	0.40

7 YEAR OLDS				4 YEAR OLDS			
FEMALE		MALE		FEMALE		MALE	
EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
2.00	0.75	1.25	0.75	2.25	0.75	1.75	0.00

ANOVA Summary Table

SOURCE:	SS	df	MS	F	p
A	0.00	1	0.00	0.00	
S	2.00	1	2.00	0.57	
E	12.50	1	12.50	3.55	0.10
A*S	0.13	1	0.13	0.06	
A*E	1.13	1	1.13	0.32	
S*E	0.16	1	0.16	0.04	
A*S*E	0.50	1	0.50	0.14	
ERROR:	84.50	24	3.52		

TABLE XIV: BABY FACTORS & NUMBER OF IMITATIONS BY THE BABY

Means

	EXP	INEXP	MEANS
MALE	1.88	1.13	1.50
FEMALE	2.00	0.50	1.25
MEAN	1.94	0.81	

ANOVA Summary Table

SOURCE	SS	df	MS	F	p
S	0.50	1	0.50	0.20	
E	10.13	1	10.13	4.10	0.10
S*E	1.13	1	1.13	0.45	
ERROR	69.75	28	2.49		

TABLE XV: BABY FACTORS & NUMBER OF IMITATIONS BY THE CHILD

Means

	EXP	INEXP	MEANS
MALE	0.63	2.40	1.50
FEMALE	0.63	1.00	0.81
MEAN	0.63	1.69	

ANOVA Summary Table

SOURCE	SS	df	MS	F	p
S	3.78	1	3.78	1.27	
E	9.03	1	9.03	3.02	
S*E	3.78	1	3.78	1.27	
ERROR	83.63	28	2.99		

TABLE XVI: CHILD FACTORS & NUMBER OF IMITATIONS BY THE BABY

Means

7 YEARS	1.25	1.37	4 YEARS
FEMALE	1.25	1.37	MALE
EXP	1.81	0.81	INEXP

	7 YEARS	4 YEARS
FEMALE	1.87	0.62
MALE	0.62	2.12

	7 YEARS	4 YEARS
EXP	1.87	1.70
INEXP	0.62	1.00

	FEMALE	MALE
EXP	1.62	2.00
INEXP	0.87	0.75

7 YEAR OLDS				4 YEAR OLDS			
FEMALE		MALE		FEMALE		MALE	
EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
2.75	1.00	1.00	0.25	0.50	0.75	3.00	1.25

ANOVA Summary Table

SOURCE:	SS	df	MS	F	p
A	0.12	1	0.12	0.05	
S	0.12	1	0.12	0.05	
E	8.00	1	8.00	3.43	
A*S	15.20	1	15.20	6.48	0.05
A*E	0.50	1	0.50	0.21	
S*E	0.50	1	0.50	0.21	
A*S*E	4.50	1	4.50	1.93	
ERROR:	56.00	24	2.33		

TABLE XVII: TIME SPENT BY BABY
LOOKING AT CHILD'S FACE

Means

	EXP	INEXP	MEANS
MALE	31.83	40.33	36.08
FEMALE	23.83	43.33	33.58
MEAN	27.83	41.83	

ANOVA Summary Table

SOURCE	SS	df	MS	F	p
S	37.50	1	37.50	0.12	
E	1176.00	1	1176.00	3.79	
S*E	181.50	1	181.50	0.58	
ERROR	6208.33	20	310.42		

TABLE XVIII: CHILD FACTORS & TIME SPENT BY BABY LOOKING AT CHILD'S FACE

Means

7 YEARS	40.75	34.56	4 YEARS
FEMALE	36.93	38.38	MALE
EXP	36.06	39.25	INEXP

	7 YEARS	4 YEARS
FEMALE	40.88	33.00
MALE	40.63	36.13

	7 YEARS	4 YEARS
EXP	34.50	37.63
INEXP	47.00	31.50

	FEMALE	MALE
EXP	34.38	37.75
INEXP	39.50	39.00

7 YEAR OLDS				4 YEAR OLDS			
FEMALE		MALE		FEMALE		MALE	
EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
41.25	40.50	27.75	53.50	27.50	38.50	47.75	24.50

ANOVA Summary Table

SOURCE:	SS	df	MS	F	p
A	306.28	1	306.28	1.09	
S	16.53	1	16.53	0.06	
E	81.28	1	81.28	0.29	
A*S	22.78	1	22.78	0.08	
A*E	693.78	1	693.78	2.48	
S*E	30.03	1	30.03	0.12	
A*S*E:	1845.28	1	1845.28	6.60	0.05
ERROR:	6711.25	24	6711.25		
TOTAL:	9707.22	31			

TABLE XIX: CHILD FACTORS & TIME SPENT BY BABY LOOKING AT CHILD'S TOY

Means

7 YEARS	35.50	29.13	4 YEARS
FEMALE	34.75	29.88	MALE
EXP	32.50	32.13	INEXP

	7 YEARS	4 YEARS
FEMALE	38.00	31.50
MALE	33.00	26.75

	7 YEARS	4 YEARS
EXP	37.88	27.13
INEXP	33.13	31.13

	FEMALE	MALE
EXP	34.50	30.50
INEXP	35.00	29.25

7 YEAR OLDS				4 YEAR OLDS			
FEMALE		MALE		FEMALE		MALE	
EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
35.25	40.75	40.50	25.50	33.75	29.25	20.50	33.00

ANOVA Summary Table

SOURCE:	SS	df	MS	F	p
A	325.13	1	325.13	1.15	
S	190.13	1	190.13	0.67	
E	1.13	1	1.13	0.00	
A*S	0.13	1	0.13	0.00	
A*E	153.13	1	153.13	0.54	
S*E	6.13	1	6.13	0.02	
A*S*E	703.13	1	703.13	2.48	0.10
ERROR	6808.00	24	283.66		
TOTAL	8186.87	31			

TABLE XX: BABY FACTORS AND TIME SPENT BY THE DYAD IN MUTUAL FACE GAZE

Means

	EXP	INEXP	MEANS
MALE	15.80	19.90	17.80
FEMALE	13.00	25.10	19.10
MEAN	14.38	22.50	

ANOVA Summary Table

SOURCE	SS	df	MS	F	p
S	12.50	1	12.50	0.07	
E	528.13	1	528.13	3.13	0.10
S*E	128.00	1	128.00	0.76	
ERROR	2363.88	14	168.85		

TABLE XXI: CHILD FACTORS & TIME SPENT BY DYAD IN MUTUAL FACE GAZE

Means

7 YEARS	20.56	16.38	4 YEARS
FEMALE	17.94	19.00	MALE
EXP	18.00	18.94	INEXP

	7 YEARS	4 YEARS
FEMALE	19.00	16.88
MALE	22.13	15.88

	7 YEARS	4 YEARS
EXP	17.63	18.38
INEXP	23.50	14.38

	FEMALE	MALE
EXP	17.25	18.75
INEXP	18.63	19.25

7 YEAR OLDS				4 YEAR OLDS			
FEMALE		MALE		FEMALE		MALE	
EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
22.75	15.25	12.50	31.75	11.75	22.00	25.00	6.75

ANOVA Summary Table

SOURCE:	SS	df	MS	F	p
A	140.28	1	140.28	0.95	
S	9.03	1	9.03	0.06	
E	7.03	1	7.03	0.05	
A*S	34.03	1	34.03	0.23	
A*E	195.03	1	195.03	1.32	
S*E	1.53	1	1.53	0.01	
A*S*E:	1526.28	1	1526.28	10.35	0.01
ERROR:	3538.75	24	147.45		
TOTAL:	5451.97	31			

TABLE XXII: PREDICTED LEVEL OF EYE CONTACT
GIVEN OBSERVED DYADIC FACIAL REGARD

		7 YEAR OLDS				4 YEAR OLDS			
	MUMS	FEMALES		MALES		FEMALES		MALES	
		EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
CHILD GAZE AT BABY	86.5	56.5	46.3	31.3	64.8	47.5	54.3	54.5	29.8
BABY GAZE AT CHILD	28.5	41.3	40.5	27.8	53.5	27.5	38.5	47.8	24.5
PRED EYE CONTACT*	20.5	19.4	15.6	7.3	14.9	10.9	17.4	21.7	6.1
OBS. EYE CONTACT	15.0	22.8	15.3	12.5	31.8	11.8	22.0	25.0	6.8

* FROM STRONGMAN & CHAMPNESS (1968)

TABLE XXIII: CHILD FACTORS & TIME SPENT IN MUTUAL GAZE AT HELD TOY

Means

7 YEARS	24.44	20.25	4 YEARS
FEMALE	19.56	25.13	MALE
EXP	22.88	21.81	INEXP

	7 YEARS	4 YEARS
FEMALE	21.63	17.50
MALE	27.25	23.00

	7 YEARS	4 YEARS
EXP	30.88	14.88
INEXP	18.00	25.63

	FEMALE	MALE
EXP	18.38	27.38
INEXP	20.75	22.88

7 YEAR OLDS				4 YEAR OLDS			
FEMALE		MALE		FEMALE		MALE	
EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
20.75	22.50	41.00	13.50	16.00	19.00	13.75	32.25

ANOVA Summary Table

SOURCE	SS	df	MS	F	p
A	140.28	1	140.28	1.22	
S	247.53	1	247.53	2.15	
E	9.03	1	9.03	0.08	
A*S	0.03	1	0.03	0.00	
A*E	1116.28	1	1116.28	9.71	0.01
S*E	94.53	1	94.53	0.82	
A*S*E	1001.28	1	1001.28	8.71	0.01
ERROR	2760.25	24	115.01		
TOTAL	5369.22	31			

TABLE XXIV: CHILD FACTORS & % MUTUAL GAZE AVERSIONS BY BABY

Means

7 YEARS	1.42	1.98	4 YEARS
FEMALE	1.03	2.36	MALE
EXP	1.57	1.82	INEXP

	7 YEARS	4 YEARS
FEMALE	0.55	1.51
MALE	2.28	2.43

	7 YEARS	4 YEARS
EXP	0.80	2.34
INEXP	2.04	1.61

	FEMALE	MALE
EXP	0.69	2.45
INEXP	1.38	2.28

7 YEAR OLDS				4 YEAR OLDS			
FEMALE		MALE		FEMALE		MALE	
EXP	INEXP	EXP	INEXP	EXP	INEXP	EXP	INEXP
0.73	0.38	0.88	3.70	0.65	2.40	4.02	0.85

ANOVA Summary Table

SOURCE:	SS	df	MS	F	p
A	2.48	1	2.48	0.28	
S	14.18	1	14.18	1.63	
E	0.53	1	0.53	0.06	
A*S	1.32	1	1.32	0.15	
A*E	7.70	1	7.70	0.88	
S*E	1.49	1	1.49	0.17	
A*S*E:	32.60	1	32.60	3.75	0.10
ERROR:	208.82	24	8.70		
TOTAL:	269.11	31			

CHAPTER 8

Discussion

In Chapter 1, the theoretical basis of Motherese and the Caregivers' Repertoire were discussed. These were seen to be either a biological propensity for interacting in a specific manner when faced with an infant, or the imitation of an interaction style from an adult. These is also the possibility that awareness of the infant's limited processing capacity plays a part in the modification of utterance length, the clarity of the speech production and the introduction of semantic redundancy.

In addition, learning to modify speech or behaviour as a result of the attentional orientation of the infant was not entirely dismissed as a factor forming the caregivers' speech and behavioural repertoire. For although Motherese occurs in speech produced "as if" to an infant, this does not mean that feedback in previous infant-interactions has not played a part in forming the current speech-style.

Biological Propensity or Imitation of the Mother?

If the emergence of the caregivers' vocal and behavioural strategies were due to a biological propensity then we might assume that they would appear more frequently in girls, the future biological caregivers, than in boys, regardless of their age. If the styles evolved through imitation of an adult model then we would expect them to appear more in the behaviours of experienced children than of inexperienced children, regardless of age. There may however be an interaction due to sex in that boys, especially in the older age group, are less likely to mimic what they would see to be as sex-inappropriate behaviours from the mother.

Whether either theory be correct we would also expect the vocal and behavioural strategies of the experienced child to be enhanced by the opportunity to learn from sibling interactions.

However both theories ignore a source for imitation that is open to all children and therefore may be mistaken for a biological propensity. Mothers modify their speech, not only to infants, but also to older preschool aged children; they still in fact increase pitch ranges to 5 year old children (Warren-Leubecker & Bohannon, 1984). Therefore every child has had some years' experience of the mothers' vocal and behavioural strategies, and some years practice in imitating those mannerisms when playing in a nurturing role. This assumption presupposes that a pre-school aged child is able to understand the nature of the relationship between him/herself and the

mother and to realise that the mother's speech is that of a style appropriate to a baby.

For this third theory to be correct, certain aspects of Motherese would have to occur more frequently in the speech of all 4 year old children than in the speech of 7 year old children. And these aspects of speech occurring more frequently would have to be those that are open to imitation in that they are attentional markers. If there were to be a biological propensity to interact in a specific manner with young infants then we would assume that its evolution would be determined by its function - to provide the optimal face-to-face interaction between biological caregiver, ie. adult female, and infant. It would not be of advantage to have this skill emerge in all young children and then fade with age. And yet most attentional speech devices, questions, monosyllables, short phrases and play-noises,were used more frequently in this study by 4 year old children than by 7 year old children.

If we look at the attentional device, exaggerations of pitch (the measure used by Jacobson et al (1983) in their study into the effect of experience with infants on the speech of adults) no significant differences from 3-way ANOVAs were found for children in this study. However the mean scores are closer for 4 year old child groups (4 year old girls 35%, 4 year old boys 42.5%) than for 7 year old child groups (7 year old girls 51.6%, 7year old boys 29.2%). There is practically no difference between the mean scores if they are grouped according to age and experience. That there is no difference between the 4 year

old experienced and inexperienced child groups rules out the effect of imitation, from mother and sibling interactions, and learning, from child and sibling interactions. We are left only with biological propensity. However, the difference between the sexes in the 7 year olds although non-significant suggests an alternative interpretation. All 4 year old children possibly retain the high pitched speech style from imitating their mothers' speech to themselves. In the 7 year old children, however, the adoption of sex-appropriate behaviours creates a difference between the sexes. The boys view the high pitched speech style as one appropriate to mothers and therefore not appropriate for them. The girls see interest in a baby as sex-appropriate behaviour and therefore adopt the speech style in use with infants. In the Jacobson study although no difference was found in pitch adjustment between experienced and inexperienced adults, there was a difference between adults who saw themselves as being "good" with children and those who did not. There seems, therefore, to be a motivational, or identification, factor at force that would also account for the difference found between speech exaggerations in 7 year old girls and 7 year old boys. This difference between the sexes is likely to disappear again when adherence to sex-appropriate roles is less important, ie. in post-adolescence.

The only sex difference found which could possibly support the theory of a biological propensity for a specific skill in interaction, was the difference found between the number of positive social approaches made by boys and girls. Girls talk, smile and are bright-faced more than boys, and show the baby toys more often than do boys. These data confirm the findings of Smith and Connolly (1972)

who found that pre-school girls are more sociable than pre-school boys. However, although sex differences in babies' behaviours have been found in other studies (Klein & Durfee, 1978; Gunnar & Donahue, 1980) the babies in this study only showed a difference in vocalization rate due to sex. The difference in infant, and consequently child, sociability could therefore be due to the higher maternal interaction and vocalization rate when with baby girls than when with baby boys (Lewis, 1972; Lamb, 1977b) rather than an innate differences in the child.

The Effect of Experience in Interaction

The most frequently occurring differences found in the use of Motherese and the Caregivers' Repertoire were due to experience. This was especially true of the behavioural categories, where experienced children were closer to the mothers' profile than were inexperienced children. This effect for experience can either be due to the child's greater opportunity to imitate the mother-sibling interaction or to the enhancement of the behavioural strategies through learning in child-sibling interaction.

The speech and behavioural modifications that occurred most in the experienced child were the use of RNT, exaggerated facial expressions, and baby-oriented games. The experienced children also tended to imitate the baby more, and use more short phrases and play noises than did inexperienced children. These latter effects were, however, not significant. Play-noises, short phrases and exaggerated facial expressions are attentional markers and may therefore be most

easily imitated from the mothers' repertoire. Repetitive Nonsense Talk, although seen as maintaining attention in that it provides continuous rhythmic speech, may also be easily imitated from an adult model. However, the frequent imitations and the structured repetitive behaviour sequences that comprise baby-oriented games are less likely to be mimicked from the mother's behaviour. For they involve reciprocal acts on the part of the child, that are dependent upon the infant's state of attention. Possibly due to these periods of maintained interaction the babies were found to smile more in dyads with experienced children.

In addition to the higher rate of behaviours exhibited, experienced children tended to respond appropriately to babies' actions more often than did inexperienced children, although this effect was not significant. Experience in interaction with a sibling may therefore enhance a child's ability correctly to interpret an infant's behavioural signals.

Inexperienced children, however, tend to respond more often with vocalizations than do experienced children. This was possibly the cause of the positive correlation between inexperienced childrens' and babies' speech compared with the negative correlation found for the experienced childrens' and babies' speech. Mothers similarly tend not to respond to all of their older infants' vocalizations (Snow, 1977; This study), but only to those that are better formed. Therefore the inexperienced child may attribute a communicative intent to most of the baby's speech whereas the experienced child, and the mother may not.

There were also some differential correlations, due to child experience, between baby and child behaviours. Experienced children were more likely to spend time watching the baby whilst the baby made positive social approach behaviours. The inexeperienced children, however, were more likely to be watched by the baby, as they made positive social approach behaviours. This is taken to indicate that the experienced child is more able or willing to synchronize his/her behaviour with that of the infant. Whereas the inexperienced child is more likely to attempt to draw the baby's attention rather than maintain a bout of reciprocal behaviours.

Experience in interaction with a baby sibling would therefore appear, in some measures, to be generalized to, and enhance, interactions with a strange baby. Similar generalization can be observed to a greater degree in the behaviour of the baby. There were no differences due to the babies' sex in approach behaviours or activity levels. There were however differences due to past experience with an older sibling. Experienced babies tended to vocalize more, spend more time in appropriate behaviours, more time active, more time smiling, more time imitating and more time in mutual gaze than did inexperienced babies. Some of these increases in behaviours may only indicate that the experienced baby is more at ease in interaction with an older child, for the inexperienced baby spent more time in covert watching, a possible indicator of wariness, than did the inexperienced baby. However, the greater amount of time spent by the experienced baby in mutual gaze and in imitating the child

would also seem to demonstrate a greater skill in maintaining an interaction.

Same-sex Parent Modelling

A further factor in the synthesis of childrens' behaviours when with an infant is that of preferential modelling of appropriate behaviours from the same-sex parent.

Seven Year Old Children. Girls made more social approaches towards the baby, smiling, vocalizing and demonstrating toys, and were closer to the mothers' speech profile than were boys. This was not true however for the caregivers' repertoire of behaviours, where there was no overall trend across categories in favour of the girls. We might have expected girls to be closest to the mothers on all measures, for not only do they have greater opportunity to model a same-sex parent in the role of caregiver than do boys, but they also have social skills or preferential styles of interaction in common with the mother. Using this criterion we would expect the experienced 7 year old girls to mimic the mother most closely, for they have had most opportunity for observing mother and infant, and have also had experience in interaction with a sibling. This group certainly had the highest scores for head alignment, head emphasis and exaggerations of speech and facial expression. But these strategies would seem to be a function of experience rather than of a greater opportunity to model a same-sex parent, for three of these categories are used frequently by the experienced 4 year old boys. Furthermore, in the use

FIG 1: SPEECH PROFILE - EXP & INEXP 7 YEAR OLD GIRLS

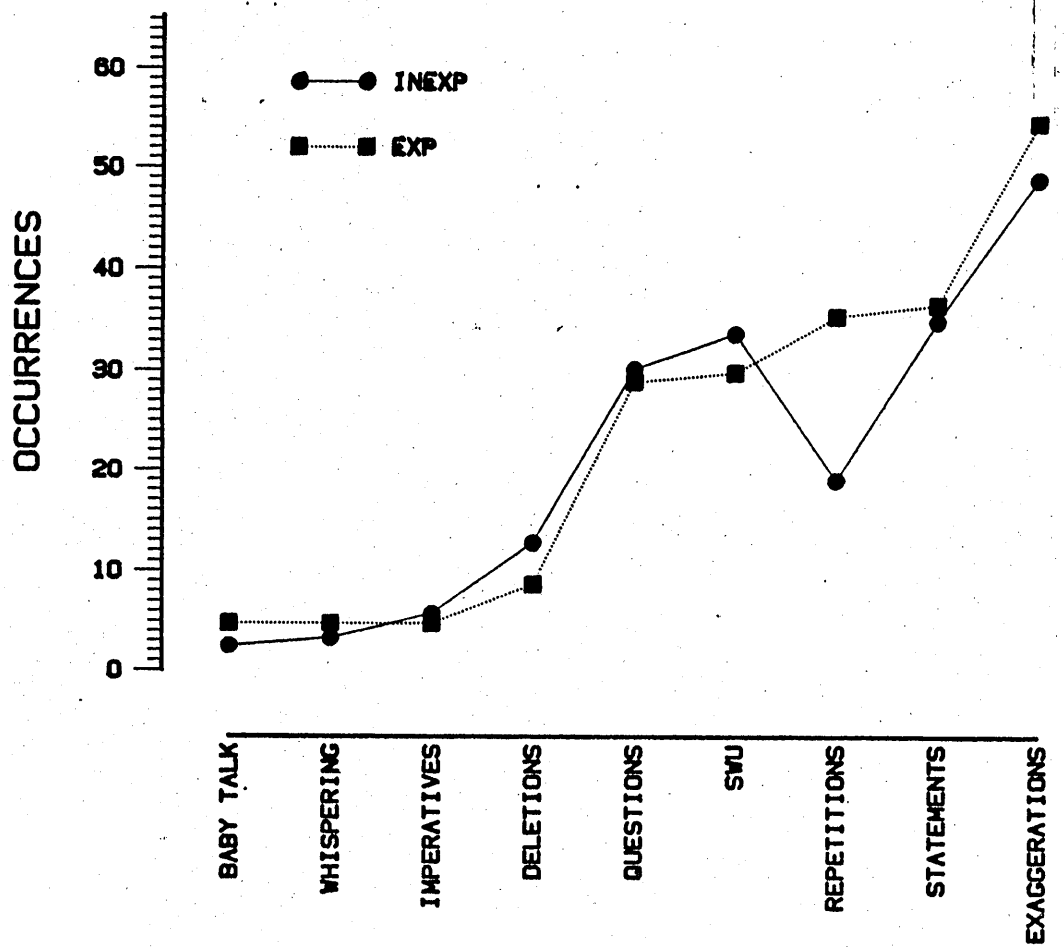
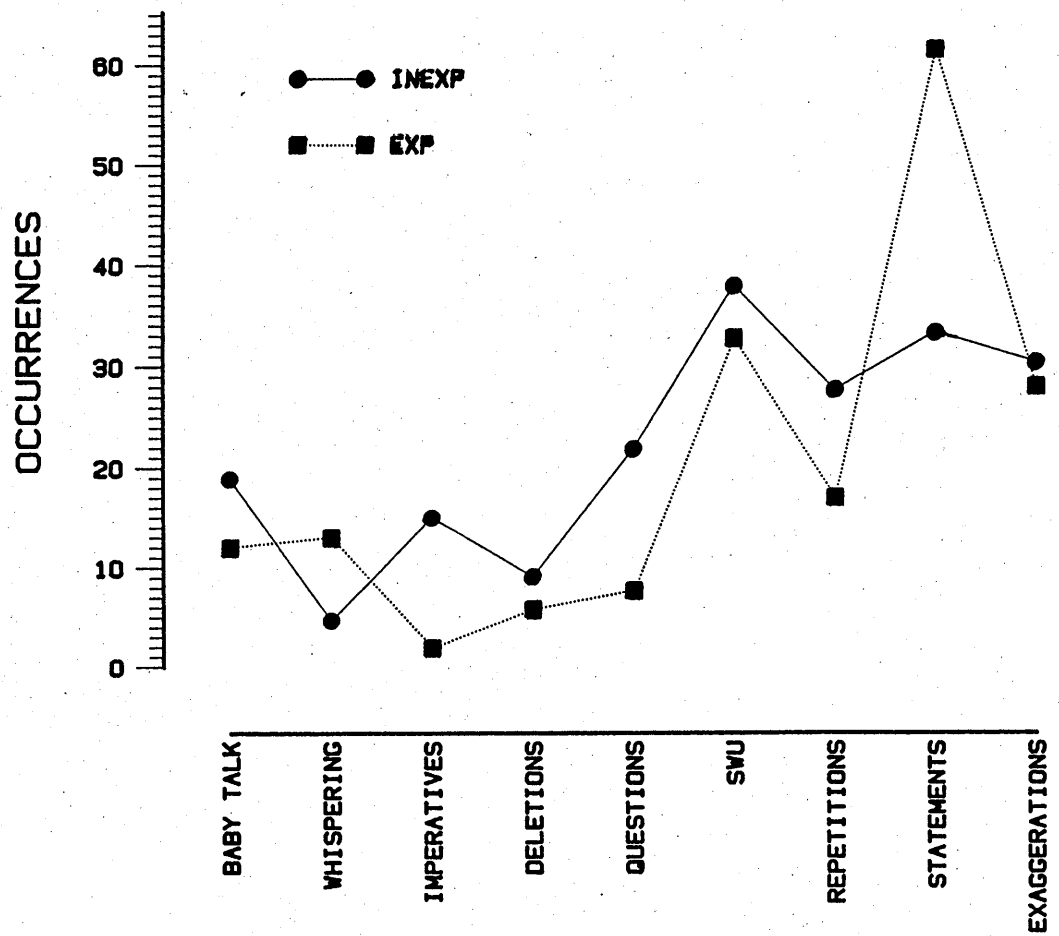


FIG 2: SPEECH PROFILE - EXP & INEXP 7 YEAR OLD BOYS



of most speech categories the experienced 7 year old girls were remarkably similar to the inexperienced 7 year old girls (Fig 1). Therefore opportunity to observe the mother in the caregiver role would not seem to be an important factor in the establishment of Motherese in the older age group. It must evolve from primary interaction with the mother and the establishment, in the pre-school years, of a speech style appropriate to babies.

This hypothesis is further supported by the disparity between the speech profiles of the inexperienced and experienced 7 year old boys. The inexperienced boys are closer to the 7 year old girls than to the 7 year old experienced boys in their use of all speech categories, with the exception of imperatives and baby talk (Fig 2). For, in comparison with the other 7 year old groups, the experienced boys seem to have evolved a unique style in interaction with infants. This style cannot be said to mimic that of the father in infant-interaction but may instead be a rejection of that of the mother. In studies by Vandell (1979) and Rondall (1980) the father's interaction style was distinguished by fewer declaratives, more imperatives, more single word attentional utterances and a shorter MLU than used by the mother . Inexperienced boys, in both age groups similarly used more imperatives and single word utterances than did any of their peer groups. The experienced 7 year old boys, however, used very few imperatives, more statements and had one of the longest MLUs of all child groups. And, unlike the mothers, they carried out little facial monitoring and mutual gaze, smiled little and rarely showed positive head alignment. The experienced 7 year old boys were not, therefore,

attempting to concentrate the babies attention upon their faces. Nor did they attempt to maintain attention by using a high proportion of attentional utterances and pitch exaggerations. They did however play most games with the baby, a strategy they did hold in common with fathers (Field, 1978), make most statements, nearly all of which were deictic, and spend most time monitoring the babies' actions and demonstrating the use of the babies' toys. In fact they were playing very elaborate toy-oriented games with the baby whilst maintaining a commentary on their own activities for the babies' benefit (Appendix B). During these commentaries whispering was often used for dramatic effect. It is difficult to establish a criterion for the success, or otherwise, of an infant-interaction but certainly the effect of the strategies used by the experienced 7 year old boys was to keep the babies spellbound.

In contrast, the experienced 7 year old girls rather than developing a style of their own, seemed to produce a "super"-style based on that of the mother. Although their speech style was similar to that of the inexperienced 7 year old girls, they used more short phrases, thus keeping their utterances brief but without being monosyllabic (Appendix B).

From the speech transcripts, therefore, it is apparent that three child groups, the inexperienced and experienced 7 year old girls and the inexperienced 7 year old boys, use an interaction mode similar to that of the mother. They structured a conversation providing "turns" in which the infant could give some response. The experienced 7 year

old boys, however, opted for an interaction style which maintained the babies' attention upon their own actions. We must assume that this style evolves from a combination of sex-preferred and sex-appropriate behaviours, for no such polarity of style is found amongst 4 year old boys.

Four Year Old Children The last born inexperienced 4 year old boys spoke infrequently during the period of interaction analysed. Subsequent observation of all the data collected during the course of the study uncovered very little further speech for analysis. What speech did occur consisted of short, attentional devices, eg: "C'mon", "What d'you want?", "Hey".

However, none of the inexperienced last born boys speech was high pitched (although that of the boy with a 3 year old sibling was frequently so). The speech content, of short attentional utterances, if imitated , must derive from their mother's speech to themselves or be generalized from occasional observations of their mothers and babies.

The effect of experience in interaction with a sibling on the behaviour of the experienced 4 year old boys was extreme. For however much the acquisition of speech and mannerisms may be due to the opportunity to observe and model the mothers behaviour, the overall skill and enthusiasm shown by the experienced 4 year old boys had to be due to experience in play with the sibling. The behaviour of the inexperienced boys when with babies could be described as being at a

loss as to what to do. The experienced 4 year old boys however did know what to do, and obviously pleased the babies. Babies smiled more in dyads with experienced 4 year old boys than with any other group, and vocalized most when with experienced boys of both ages.

The repertoire of the experienced 4 year old boys was extensive, seeming to be a synthesis of all strategies. They had a very short MLU which, in common with the inexperienced 4 year old boys, came from the frequent use of single word utterances and short phrases. However, in common with the 7 year old experienced girls the experienced 4 year old boys also frequently used positive head alignment and emphasis with many exaggerations of facial expression. The experienced 4 year old boys also use most repetitions, questions and play-noises of all groups and played nearly as many games as the experienced 7 year old boys. Their strategy was therefore both to attract the babies attention to the face and sustain the interaction through game-playing. An interaction style that, in fact, was very close to that of the mother, in that most Motherese categories and caregivers' behaviours are well represented. We cannot however dismiss the possibility of imitation from the father, for both boys and fathers styles comprise more single word attentional utterances, fewer statements and a shorter MLU than that of the mother. Therefore experience in interaction, or a greater opportunity to observe caregiver-infant interaction, plus a willingness to play with the baby provided the experienced 4 year old boys with a successful interaction style. We cannot say however to what extent this style is modelled upon that of the mother or on that of the father, for both parents'

interaction styles are too similar for discrimination.

The facially oriented behaviours found in the experienced 4 year old boys repertoire do not however appear in that of the experienced 7 year old boys; they may be dismissed, in this age-group, as sex-inappropriate. The inexperienced 7 year old boys, however, have had less opportunity to observe mother-infant interactions and therefore may not see the mothers' interaction style to be one appropriate to a particular sex. Their interaction style consequently retains the facially oriented aspects common to both mothers and 7 year old girls.

In comparison with the 4 year old boys no such extreme difference was found between the behaviours of the experienced and inexperienced 4 year old girls. All categories of Motherese and caregivers' behaviours, with the exception of Positive Head Emphasis, were used by 4 year old girls. There was no difference in the extent to which caregivers' behaviours were used by experienced and inexperienced groups. Although there was a slightly higher use of attentional speech devices, questions and single words by the experienced 4 year old girls. The main difference however was that 4 year old experienced girls used a high percentage of baby talk, in comparison with inexperienced 4 year old girls, and that all of their statements used were deictic. This latter finding could be linked to the high percentage of time spent by this group in toy demonstration, the girls tended to talk about the toys that they were showing to the baby. It is strange to note, however, that the experienced 4 year old girls

spent less time smiling than any other group of girls, were smiled at least of all groups by the babies and were least responsive to the babies' smiles - although they were responsive to the babies' actions. However, dyads with experienced 4 year old girls did not spend noticeably less time mutually engaged than other groups, nor did they have a particularly low score for facial gaze. In fact from observations of the experienced 4 year old girls it would seem that they, rather than the experienced 4 year old boys, were slightly disenchanted with playing with babies. They were efficient in that they demonstrated and picked up toys for the babies and chatted to them in infant appropriate baby-talk. But, almost as if they were talking to dolls or playing at mothers they rarely smiled or showed much enthusiasm in the interactions. It has been suggested (Maccoby and Jacklin, 1975) that in modelling parental behaviours children synthesize a style which is an exaggeration of the original behaviour. It may be, that in imitation of the mothers' behaviours in infant interaction the experienced 4 year old girls have evolved what is almost a caricature of the mothers style.

Approach behaviours Within this study all children were constrained to stay in the vicinity of the baby. It may still be true, however, that experienced 4 year old boys would be less likely than other groups to approach the baby if not constrained so to do (Berman, Monda & Myerscough, 1977). However, this seems unlikely, for the experienced 4 year old boys spent more time actively engaged, ie. showing approach behaviours within the dyad, than did both other inexperienced child groups. However, in the 7 year old children, the inexperienced boys did spend more time actively engaged with the baby than did the experienced boys; On the other hand experienced girls all spent more time actively engaged than the corresponding inexperienced girls' group. This accords with our hypothesis that the 7 year old experienced boys rather than the 4 year old experienced boys deem infant interaction as appropriate to the opposite sex.

The Effect of Age

It has been suggested (Shatz & Gelman, 1973) that the ability in a child to modify his/her speech when talking to a younger listener indicates an awareness of the young listener's limited processing capacity. This implies that the child is able to take the perspective of the listener and adjust his/her speech utterance lengths accordingly. However, this ability was not found to correlate with tests of egocentricity (Sachs & Devin, 1976). Therefore the children who made speech adjustments to accord with the age of the listener were still deemed to be centred on their own perspective.

How far can this view be supported by the data from this study? Certainly all the children did use shorter utterance lengths than have been observed elsewhere in children's speech to their peers, and that could be seen therefore as more suitable for an infant listener. There was however much variability within the sample. The experienced 7 year old girls used short phrases to yield a MLU of 2.2; the inexperienced 4 year old boys' sparse and monosyllabic speech yielded a MLU of 1.5. And, from observation, it seemed clear that the short MLU of the inexperienced 4 year old boys was not related to any real understanding of the abilities of, or appropriate behaviours towards, a young infant.

The measures used in this study to gauge a child's responsiveness to, or empathy with, the baby, were those testing a cognitive rather than an affective response to an infant's behavioural overtures. As such they can be directly equated with the ability to make a cognitive judgement concerning an infant's understanding of language. However, this ability to respond appropriately to an infant's behavioural cues did not correspond with adjustments in speech. Whereas speech modifications were largely a function of the interaction between sex and experience, responsiveness to the babies was largely a function of age.

"Helping" behaviours were only found in 7 year old children and most negative behaviours were found in 4 year old children. And whereas there was no consistent trend in responsiveness to infants' behaviours, vocalizations or facial expressions due to sex or experience, there was a consistent difference due to age. In all

three categories older children made more appropriate responses than did younger children. This does not mean that 4 year old children were not making appropriate responses, for each child group, even the inexperienced 4 year old boys, did respond appropriately to some behavioural cues. This skill, however, did increase with age.

The relationship between the modification of speech utterance length and childrens' responsiveness to infants is best measured by looking at the ability to respond appropriately to the babies reaches. This ability entails the cognitive appreciation of both the baby's perspective and limited motor skills and therefore corresponds most closely to an appreciation of an infant's limited processing capacity. However, no direct relationship was found between MLU, age, and the number of responses made to babies' reaches. There was an effect on the number of responses to reaches made by 4 year old children due to experience, and an effect in the 7 year old children due to sex. These findings, therefore, do not accord with those of Chandler & Helm (1984), that experience in cognitive role-taking improves the performance of 7 year old children but not of 4 year old children. In this study 4 year old children with experience of interacting with a sibling responded appropriately to all of the infants' behaviours more often than did inexperienced children. These higher response rates may, however, be confounded with the increase in baseline activity for these child groups. There was also a corresponding change in the MLU of the 4 year old children due to experience. The experienced girls' MLU was shorter than that of the inexperienced girls, the experienced boys' MLU was longer than that of the inexperienced boys; thus

bringing the utterance length of both groups closer to that of the mother.

In 7 year old children there was a slight difference in baby-reach response scores due to experience. Experienced children made more appropriate responses than did inexperienced children. However the greater difference in the 7 year old childrens' baby-reach responses was due to sex. Boys responded appropriately more often than did girls. There was no corresponding relationship between MLU and baby-reach responses in 7 year old children. These findings do not accord with Hall's (1978) reanalysis of available data showing that girls are better at decoding non-verbal cues than are boys. For although girls tended to respond more often to infants' vocalizations, boys tended to respond appropriately more often to infants' smiles and actions. There is, however, a difference between the ability to decode a non-verbal cue and the willingness to respond to it.

Experience in interaction may therefore improve the child's perspective-taking skills in social interaction. This, however, is more true for 4 year old children than for 7 year old children, and may be due to an increased baseline activity rate in the experienced childrens' behavioural repertoire.

The differences pertaining to childrens' responses to babies' overtures are, however, non-significant and any model based on them is, therefore, only tenuously supported. Nonetheless, it could be that the cognitive ability underlying responsiveness in social

interaction appears before the perspective-taking skills underlying tests of role-taking competence. Furthermore, if cognitive aspects of empathy are enhanced by experience in interaction with others (Mussen, 1977), then perhaps experience in nurturance and helping skills gained in the pre-school years causes children to be more responsive in naturally occurring social interactions than they are on artificial measures of perspective and role-taking ability. For even very young children are frequently prompted by parents to respond appropriately to others' behavioural cues. They are taught to nurture dolls, share with peers, comfort others, both by seeing others do so and by being directly instructed. Children are, however, rarely required literally to imagine another's view from a different vantage point or to imagine how another would see a half-obscured cartoon picture (Chandler & Helm, 1984). Nevertheless it must be remembered that experience in social interaction was found to facilitate such performances on role-taking tests, even in pre-schoolers.

In summary, addressing Shatz & Gelmans' (1973) suggestion that a reduction in MLU indicated a child's awareness of his/her infant partner's limited processing capacity, no direct relationship was found between the child's MLU and the number of appropriate responses made to babies' actions. These measures covaried with the sex and experience of the child. However, short utterance lengths and appropriate responses to babies' overtures were found in all child groups.

VALIDITY

The question remains of the validity of this study as a measure of childrens' differing interaction styles. The study certainly suffers in that, using such a comprehensive category system and frame-by-frame analysis, only short periods of interaction for relatively few children could be dealt with. However, the data gathered are consistent with findings from other research studies and do therefore add to these the details of interaction strategies that only come from micro-analysis.

It may also have been of interest to investigate further the structure of interaction in individual dyads. By this means turn-taking behaviours could have been looked at for each child-infant pair rather than by the gross correlations included in the study as it stands. This, however, was beyond the scope of a single study and not directly applicable to the investigation of the factors of age, sex and experience, for it pertains to individual skill in interaction.

The measures used in the study also gave rise to data similar to those from other studies. Even the unexpectedly low response rate of the mothers to babies' vocalizations and reaches was, upon investigation, found to replicate data from other research studies. Snow (1977) found that mothers did not always respond to their 7 month year old baby's vocalizations. Similarly Masur (1981) found that, in some mothers, response to their 10 month old baby's reaches was as low as 40%. Nor is it unusual that the mothers did not touch the baby

within the experimental situation. Personal observations of mothers and infants of 3-9 months in the home revealed that mothers rarely touch older infants in play, unless for specific grooming or cleaning.

Finally, to what extent can findings from this study be generalized to naturally occurring interactions? It must be said that the research setting militated against the inexperienced 4 year old boys in that they were constrained to remain face-to-face with a strange baby in whom they had little interest. However, this presumably would be reflected by a reluctance to approach the baby at all in a natural social environment. The older children and the mothers were not constrained by the setting, in that they did not seem to be aware that they were being observed. Some children did show interest in the microphone, but none did in the one-way mirror. Mothers similarly all said that they were not aware of being observed. One mother even looked in the mirror to rearrange her hair. We cannot but assume, therefore, that speech modifications and behavioural mannerisms that occur between child and infant in a laboratory environment are also likely to occur in a natural environment. If the child is aware of an appropriate infant-interaction style s/he will use it wherever s/he is.

In conclusion, it must be remembered that a study of interactions between strange children must be carried out on neutral territory. To introduce a child into an unfamiliar home and then to record his/her behaviour would have a more adverse effect than recording in the impersonal environment of the laboratory setting.

SUMMARY

The evolution of Motherese and the Caregivers' Repertoire of behaviours is, therefore, dependent upon more than one factor.

Some aspects of speech style appropriate to infants appear in all 4 year old children regardless of sex or experience with younger siblings. These must therefore have been imitated by the children from the mother's speech to themselves, or from casual observation of other mothers and babies, and adopted as a style appropriate to a younger listener.

The girls' greater skill in, or preference for, social interaction meant that both groups of 4 year old girls were able to play successfully with their infant partner. However, presumably the realisation that infant-interaction is sex-appropriate behaviour had also led 4 year old inexperienced girls to seek opportunities to play with babies or to maintain the mother's speech and mannerisms in play with dolls. There is also the possibility that caregivers' speech and behaviours are imitated from experienced girl peers.

Experience in interaction with a sibling enhanced all childrens' behaviours with, and responses to, strange babies. The effect was, however, greatest for the 4 year old boys. Experienced 4 year old boys were happy to play with the baby, and did so successfully. They did not appear to dismiss interest in the baby as sex-inappropriate

behaviour, although, of course, they may have been modelling their behaviour on that of the father as well as on that of the mother. Inexperienced 4 year old boys showed some interest in the baby, but no awareness of what one did with it.

Similarly, babies' experience with older siblings was generalized to interactions with strange children.

Finally, the appreciation of sex-appropriate behaviours and the polarity towards sex-preferred behaviours produced a unique interaction style in the experienced 7 year old boys. Whereas the other three 7 year old child groups structured a "conversational mode" of interaction with the infant similar to that of the mothers, the experienced boys drew and maintained the infant's attention upon their actions, whilst playing elaborate games. This style may not have had the same aim as that of the mother - engendering in the infant the skills required for conversation to take place - but it did "keep the baby happy".

APPENDIX B

Speech Transcript: Mothers

1)

2:03-04	:	That's a nice one
2:10	:	Say "Hello"
2:11	:	You say Hello?
2:13-14	:	Mummy, let mummy have it?
2:15	:	Give it to mummy
2:16	:	No?
2:17-18	:	Are you going to give it to mummy?
2:19	:	Can I have it?
2:20	:	Can I have it?
2:21	:	No?
2:23	:	Can I have it?
2:30	:	Aah

2)

2:22	:	Want that one?
2:23	:	Wha's that?
2:25	:	Wha's that?
2:26	:	Wha's that?
2:27	:	What is that?
2:29-30	:	Thats fallen on the floor too
2:31	:	'Goes bang
2:32	:	'Goes bang
2:33	:	Whe's it gone?
2:35	:	I've got it
2:37	:	Here 'tis
2:39	:	'tis

APPENDIX B

Speech Transcript: 7 Year Old Experienced Female

1)

2:00	:	You're okay aren't you?
2:01	:	Aren't you?
2:03	:	Aren't you?
2:10-11	:	Stop that now
2:12	:	C'mon
2:13	:	Look!
2:14	:	Look!
2:23	:	Look!
2:24	:	What's that?
2:25	:	What's that?
2:26	:	Come on
2:28	:	What's that?
2:29	:	What's that?
2:30	:	'S that?
2:31	:	'S that?
2:33	:	'S 'at?
2:35	:	'S 'at?
2:37	:	Was that?
2:39	:	Whee

2)

2:50	:	Oh!
2:51	:	Oh!
2:52	:	Oh dear
2:53-54	:	Oh dear
2:55-56	:	Goes "oh dear"
2:57-58	:	Oh dear
3:01-02	:	Oh, oh dear
3:06	:	Leap frog
3:07	:	Leap frog
3:08-09	:	You're going that way

APPENDIX B

Speech Transcript: 7 Year Old Inexperienced Female

1)

2:27-28	:	There's a teddy bear
2:29-30	:	Here, teddy bear
2:31-32	:	You like that don't you?
2:35	:	Whoops
2:36-37	:	Dropped this again
2:40	:	He's teddy
2:41	:	Teddy?
2:42	:	Like him?
2:43	:	Want him?
2:45	:	Yeah
2:47-48	:	You like that don't you? ...
2:49	:	... to chew
2:52	:	There
2:53	:	'S good boy
2:55-56	:	D'you want this?

2)

2:08	:	That's teddy bear
2:09-10	:	'Got big floppy ears
2:14	:	Look
2:16-17	:	See, oh! What's this?
2:21	:	Rubber
2:24	:	Look
2:26-27	:	I'm making it ring
2:29	:	Listen
2:41-42	:	Oh I've got a telephone
2:43	:	Look
2:46	:	Look
2:48	:	A number?
2:50	:	Look

APPENDIX B

Speech Transcript: 7 Year Old Experienced Male

1)

1:49	:	Now then ...
1:53	:	... a screw
1:58-59	:	This part ...
2:02	:	... goes through there
2:05-06	:	And of course ...
2:11	:	... the telephone

2)

3:18	:	You put that there
3:20-21	:	Now we've got ...
3:24-25	:	... this thing here
3:28-29	:	I don't know how this works
3:31-32	:	You just shake it

3)

3:36-37	:	Then we've got this saucepan
3:40	:	I'll open it up ...
3:42-43	:	... take a look inside ...
3:45-46	:	... there's all tissues ...
3:49	:	... inside ...
3:51-52	:	... there's a big drawing pin
3:55-56	:	Put it right back in there
3:58-59	:	We'll put that out the way

APPENDIX B

Speech Transcript: 7 Year Old Inexperienced Male

1)

2:41-42	:	Come on
2:44-45	:	Pick something up
2:48	:	Yeah?
2:50	:	Put it on there
2:51	:	Come On
2:52	:	Come on
3:12	:	Play a little game now
3:13	:	Come on
3:21-22	:	That's nice isn't it?
3:24	:	Eh?
3:27-28	:	'S nice bell
3:29	:	C'mon
3:30	:	C'mon
3:31	:	Pick it up

2)

2:14	:	Look
2:18-19	:	Look, going down on the floor
2:20	:	Watch
2:22	:	Watch
2:46-47	:	No, Look
2:52-53	:	Squeeze it like that
3:14	:	Look
3:16-18	:	Doggy got a shoe in his mouth
3:24	:	Listen

APPENDIX B

Speech Transcript: 4 Year Old Experienced Female

1)

2:17	:	Doggy
2:18-19	:	Turn him upside down shall we?
2:25-26	:	It's a doggy
2:27-28	:	Shall we do walk him?
2:29	:	Give him a walk
2:30	:	Give him a walk
2:36-37	:	See ee down there
2:38	:	Doggy
2:39	:	It's a doggy
2:41	:	Are quite funny isn't he?

2)

2:24-27	:	Do you like him, do you?
2:33-35	:	Do you like him, do you?
2:58	:	Ga ga
2:59	:	Ga ga
3:00-03	:	Kee kee kee kee
3:05-06	:	You like that don't you
3:10-11	:	Where's Friend eh?
3:12	:	Where's he?
3:14	:	Boo!
3:15	:	Where's Friend?
3:16	:	Boo!

APPENDIX B

Speech Transcript: 4 Year Old Inexperienced Female

1)

2:38-39	:	You're a nice baby aren't you?
2:47	:	Wha's in 'ere?
2:48	:	In da
2:59	:	Now
3:01-03	:	What do you want to play with?
3:04	:	Huh?
3:15	:	D'you want to play with ...
3:16	:	Ooh!
3:17	:	Ooh!
3:19	:	W'as in 'ere?
3:20	:	I's a bell
3:21	:	It's a bell isn't it?

2)

2:27-28	:	Want that one do you?
2:29	:	What's here?
2:30	:	Another one
2:38	:	Want to play?
2:41	:	With square
2:42-43	:	That goes up to six
2:50	:	Here now
2:52-53	:	'Play with them?
2:55	:	What's that?
2:57-58	:	Take that away

APPENDIX B

Speech Transcript: 4 Year Old Experienced Male

1)

2:16	:	'Right?
2:19	:	'Right?
2:23	:	'Right?
2:35	:	Oh
2:26-38	:	Does that mean you don't want me to sit here?
2:50	:	'Right?
2:54	:	'Right?
2:57-58	:	All right then
3:00	:	All right
3:04-05	:	Don't you want to play with Jeffrey?
3:11	:	'Right?

2)

2:00	:	Ticky, ticky, ticky
2:01	:	Ticky, ticky, ticky
2:03-04	:	Hello little feetie
2:07-08	:	Two little feetie
2:09	:	Tickly tickly
2:11	:	Tickly tickly
3:41	:	Ta
3:43	:	Thankyou
3:47	:	Thankyou
3:50	:	Thanks

APPENDIX B

Speech Transcript: 4 Year Old Inexperienced Male

1)

1:26-28	:	Look rattle
1:29	:	Rattle
1:51	:	Say "one"
1:53	:	"One"
1:54	:	"One"
1:56-57	:	Say "One"

2)

2:12	:	Ooh!
2:23	:	Here
2:30	:	Want it?

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