An observational study of the eating behaviour and related activities of children in the first two years

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AN OBSERVATIONAL STUDY OF THE EATING BEHAVIOUR AND RELATED ACTIVITIES OF CHILDREN IN THE FIRST TWO YEARS

Development of a method for the analysis of feeding behaviour suitable for investigating children with failure to thrive

by

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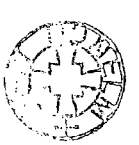

ABSTRACT

This study was carried out with the intention of providing a method for studying children with feeding disorders, especially those with nonorganic failure to thrive, in their own homes. Thirty-two children, four girls and four boys in each of four different age groups: 6-8, 12-14, 18-20 and 24-26 months, were recruited from volunteers in the Newcastle upon Tyne area. They were each observed individually on three separate occasions, totalling nine hours of observation from 8.00 a.m. to 5.00 p.m. This allowed most of the children to be observed during their three main meals, and between them.

The method adapted for the study used data sheets containing time rulers at one minute intervals, on which codings of direct observations of the child and caretaker could be recorded easily and systematically, without the use of video recorders. These were supplemented by a continuous 'Running Record' of speech, supplementary behaviour descriptions, and descriptions of all food given to and consumed by the child.

The boys in this study slept more than the girls, giving them a shorter waking time. Other behaviours were analysed as a percentage of the child's waking time. There were no significant sex differences, except that caretakers talked more to girls during their waking time. Older children were more active, they cried less and talked more. They also drank fluids more. They did not spend more time eating, presumably because they were able to eat more quickly than younger children. Caretakers attended significantly more to the care of younger children, they held younger children more, gave them solids more and prompted them to eat more.

The direct observational method used in this study allowed a detailed description of the eating behaviours and related activities of normal healthy babies and toddlers, without the reliance of recall by the mothers or caretakers.

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DECLARATION

This thesis conforms with the word limit set out in the Degree Regulations. None of this material has been previously submitted by myself for a degree in this or any other university.

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CHAPTER ONE

REVIEW OF PREVIOUS STUDIES FOR THE ANALYSIS OF FEEDING BEHAVIOUR IN YOUNG CHILDREN

1.1 Failure to thrive

An observational study was carried out on the feeding and related behaviours of four groups of children, at 6, 12, 18 and 24 months, with the intention of providing a method for studying children with feeding disorders, especially failure to thrive. Children suffering from the syndrome known as 'failure to thrive' do not grow at a normal or expected rate and in some cases do not survive. Those that do survive are at a high risk for lasting deficits in growth, cognition and socioemotional functioning (Frank and Zeisel, 1988).

The aetiology factors are complex and varied. Some are known to be organic, such as malabsorption, chronic infection, major congenital abnormalities, metabolic and endocrine defects, etc. (Iwaniec, Herbert and McNeish, 1985) and hence children in this category are classed as suffering from organic failure to thrive, but the majority have no known physical cause. This form of failure to thrive has been classed as nonorganic, and has caused a great deal of interest and research during the last few decades.

Homer and Ludwig (1981) attempted to categorise factors that would lead to accurate classification of organic and nonorganic failure to thrive. Their results led them to suggested a third category, based on the realisation that some children with organic disease also had psychosocial difficulties. In an assessment of 82 children hospitalised with failure to thrive, they listed six clinical categories based on the presence of historical and physical evidence of disease; six psychosocial categories based on factors which were

associated with social stress and indicative of deprivation, and also six possible causes of nonorganic failure to thrive: family dysfunction; parental dysfunction; child difficult (decreased feedback from child); parent-child interaction dysfunction; isolation or lack of support, and lack of preparation for parenting or ignorance. Twenty-one of their cases were identified as having organic causes; 34 as having nonorganic causes, and 19 as having a combination of the two. This third category has become known as 'mixed' failure to thrive.

Nonorganic failure to thrive has been attributed to emotional deprivation which leads to growth retardation despite adequate food intake. However, many children suffering from failure to thrive have been raised by caring parents, under stable conditions, where they have not been subjected to physical or emotional deprivation. Glaser et al. (1968) evaluated 40 of an original 143 cases of nonorganic failure to thrive in a follow-up study. They noted that most of the children in their study were members of intact, relatively stable families, with steady incomes, and that the parents were not novices, but were people in their mid-twenties who had two or three other children. They maintained that they could not consistently assign the growth failure of these children to poverty, family disruption, paternal immaturity, or large families.

Evidence currently available suggests that inadequacy of nutrition and feeding difficulties are central to the development of failure to thrive. Whitten, Pettit and Fischoff (1969) challenged the concept that there is an emotional control over growth, independent of caloric consumption with their study in which 16 children with growth failure were given adequate calories. The children were aged between 3-24 months old, and all 16 had both height and weight below the 3rd percentile on the Stuart growth charts.

Thirteen of these children had been admitted into hospital and the other three had been newly referred because of growth failure.

The study consisted of four experimental designs. All 13 of the in-patients were subjected to the first one, for at least two weeks, i.e. low level of mothering in the hospital, plus adequate calories. The children were confined to a windowless room and visits from the parents were infrequent and brief. Carers did not talk to or smile at the children, and held them only briefly for physical care. Diets during this time were generous in calories, i.e. 140/kg of ideal weight for actual height.

Six of these infants were subjected to the second design, two weeks later, i.e. high level of mothering in hospital, plus adequate calories. The children were offered diets of the same calories, but they were also given high levels of sensory stimulation in the form of fondling, social contact and physical handling. The third design (adequate calories fed in the home by the mother after hospitalisation) was used with four of these 13 infants, after hospitalisation. After varying periods of time following discharge a measured diet was taken to the child's home at each mealtime, for a period of two weeks. Mothers were given no advice on feeding their child, and uneaten food was returned afterwards for measurement.

The fourth design in this study consisted of a measured diet being sent to the homes of the three newly referred failure to thrive infants. The parent was not informed that a diagnosis of maternal deprivation was suspected, and she was given no instructions regarding feeding her child.

During the two-week period of under-stimulation in hospital, ten of the 13 infants showed an accelerated weight gain which was greater than the 50th

percentile rate on the Stuart growth charts. Of the three infants who did not gain weight at this accelerated rate, two had grossly inadequate voluntary caloric intakes and the 3rd gained weight rapidly during a 3rd week of isolation. The two infants who did not gain weight in the first design, did not gain in the second either, when stimulation was high. The other four infants in this design continued to gain rapidly, as they had done when under-stimulated.

Although mothers were encouraged to improve the mothering and feeding of their children, only four of the ten babies who were returned home continued to gain weight at a satisfactory rate. However, all four of the children in the third design reverted back to an accelerated weight gain when fed on the diet that was sent to their home. Also all three infants who were not hospitalised gained weight at an accelerated rate when fed on a diet sent to their homes, even though no effort had been made to alter the mother and child interaction. This study is strong evidence that the children's growth failure was not emotionally induced but was a result of under-eating.

Skuse (1985) suggested that nonorganic failure to thrive is likely to be an interaction of maternal deprivation and under-eating. Once malnutrition occurs, it results in lethargy and irritability which contributes to nutritional inadequacy and the interactive breakdown between parent and child (Garcia, Kaiser and Dewey, 1990a; Frank and Zeisel, 1988).

We need, therefore, to know more about the intake and feeding patterns of children who fail to thrive, as well as the interaction between mother and child. There are three ways of collecting information of this kind: by unstructured interviews with one or both parents, by questionnaires, and by direct observation. Interviews usually consist of talking about the child's

previous and present feeding behaviours, and can include recall of the child's dietary intake. Questionnaires are similar, but the questions and the possible answers are specified. Observations consist of watching and coding behaviours, as they occur or from previously recorded videotapes.

1.2 Questionnaires and interviews

Iwaniec, Herbert and McNeish (1985), used questionnaires, structured interviews, and rating scales, in a study which compared 17 children with nonorganic failure to thrive and two matched contrast groups: one consisting of children with organic failure to thrive and the other consisting of sick children without growth problems. The interviews consisted of an assessment of temperament, based on Carey (1972) and of a collection and assessment of child rearing data, developmental data, attachment data, demographical data, and social history, by means of questionnaires. The children were also assessed by three personality tests, i.e. the Catell 16 Personality Factor Inventory, the Eysenck Personality Inventory, and the Spielberger Anxiety Inventory.

Iwaniec, Herbert and McNeish found feeding difficulties of the index children to include a history of poor sucking and excessively long feeding time, falling asleep every minute or so, crying during feeding, stretching out, vomiting and diarrhoea, regurgitation, a prolonged refusal to take solids, poor chewing and swallowing, and a lack of indication of hunger. However, although the data of the nonorganic failure to thrive children was compared with two matched contrast groups, it was not compared to a group of normal controls.

Pollitt (1975) compared the socio-economic background, dietary intake, and mother and child interaction of 15 failure to thrive children with 15 controls

matched on age, sex and ethnic group. Data was collected during 7-11 home visits of about one and a half hours duration each, during which mothers were questioned about income, education, mother's occupation, and household density. Other income-related information such as household facilities was obtained through direct observation. Mothers were also asked to recall items of food, including volume and frequency of consumption over 24-hour periods, and an average of these was taken to estimate nutrient intake over one 24-hour period. Finally mother and child interaction was assessed for developmental and vocal stimulation and emotional climate by means of two checklists. Developmental and vocal stimulation consisted of items relating to the mother playing with the child or permitting activities that involved 'mess' or maintenance, spontaneously speaking to the child, and attending to the child's needs. Emotional climate consisted of items relating to the mother speaking positively or negatively to the child and using positive or negative physical contact.

There was no significant difference between the groups on gross family income, but the controls came from families of higher socio-economic standing. Analysis of the dietary recalls indicated that controls consumed more calories, protein, iron, niacin and ascorbic acid than the index children. Mothers of the failure to thrive children provided less vocal and developmental stimulation and a less adequate emotional climate, but although there were differences of this kind, most mothers of the index group did not present extreme behaviours or pathology. Pollitt stated that dietary intake is surely the immediate causal antecedent, and socio-economic status only a more distal factor that may partly determine the quality and quantity of the child's diet.

Questionnaires and interviews can be useful in expanding data, but they usually depend on recall, and recall is not always reliable. Olinto et al. (1995) evaluated the accuracy of recall in a study of 50 two-year old children, in Brazil. Twenty-five of these children were more than two standard deviations below their weight-for-age, on the National Centre for Health Standards Statistics (NCHS, 1988). One of three university-trained nutritionists spent a whole day in the home of each child. The nutritionist questioned the person who had been responsible for feeding the child the previous day, in order to obtain a quantitative 24-hour recall of the child's food intake. Portion size was assessed by asking the caretaker to place the amount of food that the child had eaten on a plate, and weighing it. If the items of food were not available to be weighed, the caretaker was asked to describe the amounts in spoonfuls, etc. After completing the recall interview, the nutritionist measured all food as it was offered to the child, using a scale and a measuring cup. Leftovers were also measured and deducted from the amounts offered. Consumption of maternal milk was estimated by weighing the child before and after each feed, and the average of these was used to estimate each feed on the previous day. The overall consumption of energy, fat, and protein, was found to be significantly lower than thought by recall. Also these over-estimations were larger for the malnourished children. However, the 24-hour recall referred to the day preceding the one assessing food intake by weighing, so there may have been a discrepancy in the amounts consumed.

In order to select a valid method for obtaining dietary intake of pre-school children, Zuckerman et al. (1994) collected data on 17 children, aged two to four years, living in the District of Columbia. All consumables given to the children were measured for three days. Food and drink not consumed was also weighed. Each day caretakers were contacted and asked to recall the

type and amount of food the child had consumed the previous day. On the third day, each caretaker was given a questionnaire. They were asked how often their child had consumed the items listed during the previous week, and in what proportions. There were no significant differences in the means from measured and recalled intake, but there were significant differences in recalled intake for energy and percentage of calories from saturated fat. The questionnaire in this study did not provide an accurate assessment of measured intake.

Vitzhum (1994) carried out an observational study to access the accuracy of maternal recall of mothers who are breast-feeding. Thirty Andrean women, with a child under three years old, were interviewed in their native language, on practising on-demand nursing. A subset of ten women who were currently nursing were observed during the course of normal daily routine. Almost all the women's activities took place in the courtyards and rooms of their homes during the post-harvest season, so accurate and complete observations were possible. Comparisons revealed that there was virtually no agreement of recall and observational data. Overestimations were very common. Suckling duration was reported in five-minute units, when often it was only two to three minutes, and suckling durations of 30 minutes were frequently reported, but almost never observed. The results bring into question the conclusions of studies based on mother's recall.

1.3 Observations during a single meal

According to Frank and Zeisel (1988) the cause of the interactive feeding disorder is most easily identified by direct observation of a meal, ideally during a home visit. They suggested that the observer should determine whether the child is adaptively positioned for feeding, whether there are inappropriate distractions, such as consistent interruptions for cleaning by an

over-fastidious caretaker or whether there are multiple and inconsistent feeders. Drotar and Crawford (1987) suggested that as well as providing a valuable source of information about parent-child and family interaction patterns, the selective use of home observational assessment can facilitate psychological evaluation of behavioural and developmental deficits in failure to thrive.

Stein et al. (1994) carried out a home observational study on two groups of primiparous mother and child dyads, during play and during a mealtime. The index group consisted of mothers who had experienced an eating disorder, before the birth of their child, whereas the control group consisted of mothers who had not. All children were between 12-14 months old. Assessments were made of the mother's mental state, and the child's growth, before the observations took place. The mother and child were observed and video recorded during play, and during a mealtime.

The play session consisted of five 2.5 minute consecutive sessions of structured play. In the first two sessions, the child was handed a toy, by the mother, and asked to play with it. In the final three sessions, the mother gave the child a toy and explained how to use it. These were designed to be too difficult for the child, in order to observe how the mother responded.

The second observation session took place at the main meal of the day. Coding of the mealtime observations consisted of seven maternal ratings, three infant ratings, and two mother-child ratings. The maternal ratings consisted of negative expressed emotion (i.e. critical, negative, or denigratory expressions, directed to the child), positive expressed emotion (i.e. affectionate or complimentary), intrusiveness, maternal verbal control, non-controlling verbal utterances, and maternal facilitation. The infant

ratings consisted of emotional tone (i.e. mood scale from unhappy to happy), vocal frequency, and level of activity (rated from still to continuously active). The mother-infant ratings consisted of physical contact, and the extent of conflict or harmony between the mother and child during the meal. A method of time-sampling was used throughout both sessions for rating chosen behaviours on pre-defined scales. Behaviour was rated every two minutes during the meal and every two and a half minutes during play.

The rater who coded the videotapes was unaware of the mental states of the mothers. However, ratings can be subject to opinions. It is possible for two or more observers to rate the same behaviour differently. The main findings of the study were that, when compared to the control group, the index mothers were more intrusive with their infants during both mealtimes and play, and they expressed more negative emotion towards their infants throughout the meals. The negative expressed emotion related to three main issues: the mother's perception of mess; the child's refusal of food, and issues of control relating to concern about the quantity of and manner in which food was consumed. There were no differences between groups in their positive expressed emotion. The emotional tone of the index children was more negative, and their mealtimes more conflictual than in the control children. Also the index children tended to be lighter than the controls, and weight was found to be inversely related both to mealtime conflict and to the extent of the mother's concern about her own body shape. In a later study, Stein et al. (1996) found that mothers with eating disorders do not misperceive their infants body shape, nor do they prefer lighter/smaller infants. Stein suggested that the difficulty with feeding is due more to a transmission of the mother's disturbance rather than a direct effect of her psychopathology. However, they did not consider the child's energy intake. Pugleise et al. (1987) evaluated seven failure to thrive children, aged

between 7-22 months, and found that they were only consuming 60-90% of their recommended caloric intake for age and sex. This increased after parents had been given nutritional counselling, and so did the linear growth of the children.

Hoffmann (1992) carried out an observational study on 28 mother-child pairs, in order to study the interconnections between individual development and relationship events during early development. The mother-infant pairs consisted of acquaintances of the research staff, and contacts made by the mothers. Each family was videotaped every 30 days from the time the child started spoon feeding until he or she was one year of age. Coding of the observations consisted of four parts: infant activities, maternal response, dyadic events, and categorisation of the feeding situation.

The infant's activities contained five initiatives, seven aversive responses, and two signals of will. The initiatives consisted of attempts (i.e. incomplete forms of initiative), interactives (i.e. search for contact with caretaker), exploratory (i.e. having a clear aim of exploring the environment), experimentation (i.e. concentration, sequences, logical consequences of an exploration), and play (i.e. showing pleasure, sometimes, but not necessarily, following interactive initiatives). The aversive responses were spitting part of the food out, closing mouth to the approaching spoon, turning head away, slapping, throwing him or herself backwards, sitting down in the chair, and maximum crisis, through which the nutritional aim of the feeding had to be abandoned, and conflict dominates the scene. The signals of will were struggling with the objects (i.e. the child's insistence on handling the object his or her way), and showing signs of will that is related to interaction (i.e. clearly showing the caretaker his or her preferences). The

infant's activities and responses were given rating values according to levels of advancement.

The maternal response was a three-step process: perception of external events, internal events, and processing and response. External events, such as infant's initiatives, are recognised, by the mother, through empathy, inter-subjectivity, affect attunement, and intuition. The internal events are the mother's own cognitive processes. The external and internal events are expressed as maternal responses. These include tone, rhythm, and modulation of voice, facial expressions, and gestures.

The third part of the coding system, i.e. dyadic interactions, codes those that are difficult to attribute to either the mother or the child. They include power struggles, negotiations, encounters, and disencounters.

Results of the observational analysis showed a clear quantitative increase of child initiatives, during the first year of life. Also the group of infants with the higher maternal response averaged more initiatives than the other group. There was also a negative relationship between conflictivity (i.e. aversive reactions and power struggles) and favourable maternal responses.

This was a very lengthy and time-consuming study, but the actual observations were brief. The average length of a meal was 25 minutes, but this was reduced to one-third because a time-sampling procedure was used coding only one minute out of every three. Also, because of the complexity of the coding system, it took 15 to 45 minutes to code each chosen minute of the observations; hence, the average time it took a good coder to analyse one feeding session was two hours.

In order to assess the nature and extent of feeding difficulties associated with cerebral palsy, Reilly and Skuse (1992) observed twelve infants with moderate to severe oral-motor dysfunction, and twelve control children, during their main meal of the day. The children were aged between 13 and 39 months, and were matched on age, sex, and ethnic group. The meal, which took place in the child's home, was video recorded. Mothers were asked to feed their children as usual. The children's mealtimes were timed from the presentation of the first mouthful of food, and ended when the mother signalled the meal was over. Written notes were made of the types and amounts of food offered to and eaten by the child at the meal. Also, the mother gave a 24-hour recall, estimating quantities of food from household measures, and she was also questioned about the child's past and present feeding practices. All children had regular patterns of three meals a day, with an occasional snack. The mean duration of mealtimes for case and comparison children did not differ significantly. The most striking feature of the case group children was the lack of maternal verbal interaction. The children were fed in a mechanical manner.

Mathisen et al. (1989) compared nine children with failure to thrive aged 9-15 months with nine comparison children matched for age, race, sex, ordinal position, mother's age and years of education, and type of dwelling and crowding. The children were each videotaped during lunch, which occurred at the usual time and place of the meal. The mothers were asked to feed their children as they usually did. A few minutes after the infant had completed lunch the infants were presented with foods of different textures, and each food eaten was recorded. In addition, the mothers were questioned about their infant's feeding behaviour and development, and asked to give a 24-hour dietary recall during a one hour interview.

Oral-motor functioning was found to be developmentally delayed in failure to thrive infants, and many were still receiving a large proportion of their food in the form of pureed or semi-solids. In all cases, failure to thrive children were fed much faster than comparison infants. Feeding time averaged 8.5 minutes (S.D. 6.0) compared to 21.1 minutes (S.D. 4.4) in the control children. Also the contexts in which the case children were fed were less appropriate. Only one of the case children was seated in a high chair, compared to seven of the control children. Case children were fed either lying in the mother's lap, sitting in a baby walker, or standing at a small table, and were fed in the living room where there were frequently high levels of noise. All of the comparison group were fed in the kitchen or dining room. Finally, there was a large difference between the children's abilities to communicate during mealtimes. Case children were less adept at signalling their needs during feeding, and resorted to crying to draw attention to them, whereas comparison infants used gestures, vocalisations, and body and facial postures to communicate.

Ramsey, Gisel and Boutry (1993) observed 38 infants with nonorganic failure to thrive and 22 with organic failure to thrive during one meal. They also asked the parents to produce a three-day diet summary of their children, and questioned them about the family's psychosocial and medical history and the infants prenatal, perinatal, medical and developmental history. The observation took place at a clinic, where the team watched the child through a one-way mirror for 15 to 20 minutes. The mother was asked not to feed the child for three to four hours before the appointment, and to bring a meal which included items that the infant liked and did not like. She was then asked to feed the child, as normal. Recordings were made of the type and texture of food offered, the method of feeding, and whether the infant was positioned in the mothers arms, in a high chair or at a table. Feeding

behaviours, maternal and infant affect and mother and child interactions were recorded on a checklist. Infant feeding behaviour was graded as 'pro-feeding', i.e. reaching for bottle, opening mouth eagerly, etc.; 'disruptive' i.e. holding food in mouth, etc.; or 'uninvolved' i.e. opening mouth only when food touches it, etc.

Although the observation period was brief, Ramsey, Gisel and Boutry believe it was long enough to confirm details discussed with the mother. Reports of the early feeding history of children with nonorganic failure to thrive were similar to those of children with organic failure to thrive. The duration of their feeding times were abnormal, i.e. 45 minutes to two hours. They had poor, or no appetites, and did not cry or demand food; they had delayed tolerance of food textures, and they had deviant feeding behaviours such as refusing food, falling asleep during feeding, gagging, vomiting, spitting food out, and holding it in the mouth. However, these results were not compared to those of a control group of normally-growing children. None of the children with nonorganic failure to thrive was diagnosed as having a neurological disorder and almost half of their histories indicated that they had some neurological association. Ramsey, Gisel and Boutry suggested that all of these feeding-related symptoms may be caused by different degrees of oral sensorimotor impairments, which in nonorganic failure to thrive, tend to go unrecognised. They did not take into account that the children's poor appetites, alone, may have caused the symptoms, so may have no link to any oral sensorimotor impairment.

Heptinstall et al. (1987) observed 23 growth-retarded children with 23 comparison children during one of their meals in an attempt to investigate whether specific family attitudes and feeding habits were associated with nonorganic growth delay. The children were selected from a whole-

population survey in a socioeconomically deprived inner-city area. The case children had no known organic disease and were all below the tenth centile for height and weight, in relation to mean parental height. The comparison children were matched for age, sex, birth-weight, and ordinal position. All children were four-year olds.

A 10s interval time sampling technique was used for coding pre-determined food-related behaviours, during the meal observations. Also, mothers were asked to keep a record of all food offered and eaten by the child for a minimum of three consecutive midweek days. The child's nutritional intake was analysed on the basis of the mealtime observations and the mothers' diaries. No significant differences were found between groups in the amount of food offered, or the total daily intake of energy or protein. Also, when the data was reanalysed to calculate intake per unit body weight, the mean intake of the case group was significantly higher than that of the comparison group. Case group children were confronted with more negative attitudes at mealtimes such as meals without supervision, irregular provision of meals and angry scenes. Heptinstall et al. maintained that lack of parental care was the most important discriminating feature between groups in this study, but the mechanisms underlying this finding are unclear. It is possible that the entries in the diaries were inaccurate, especially with regard to the amount of food consumed. The amounts of food provided and eaten were assessed in numbers of tablespoons or standard measures, using a technique described by Nettleton, Day and Nelson (1980). This *household measures technique* is known to underestimate or overestimate the intake of individuals, although it is very accurate in group comparisons. There is also the possibility that the unsupervised children did not eat as much as their mothers believed. Infants sometimes carry food around with them and leave it in unusual places where it can be unobserved for days.

Hutcheson, Black and Starr (1993) used video recordings of mothers feeding their children, and questionnaires completed by the mothers, in order to examine the interactional behaviours of low-income mothers and their nonorganic failure to thrive children. Thirty-four index children were matched on age, gender and race, with 34 normally-growing children who had similar socio-economic backgrounds.

Feeding occurred in a small room equipped with an adult chair, high chair, and a child's table and chair. The caretakers were asked to feed their children as they would at home, using either their own food, or food supplied for them. The interviewer left the room, after turning on the video recorder, until the meal was finished. The mother and child were assessed on six factors: maternal affective tone, maternal level of involvement, child affective tone, child level of involvement, dyadic affective tone, and dyadic level of involvement. Maternal affective tone consisted of flexibility or rigidity, angry or hostile mood, intrusiveness, and warm or kind tone of voice. Maternal level of involvement consisted of the amount of verbalisation, depressed, withdrawn or apathetic mood, creativity or resourcefulness, and social initiative. Child's affective tone consisted of assertion or aggresivity, impulsivity, compliance or non-compliance, emotional liability, and irritable or angry mood. Child level of involvement consisted of alertness or animated interest, social behaviour of child's initiation, passivity or lethargy, communicative competence, apathetic, withdrawn or depressed mood, and pleasant or easy-going. Dyadic affective tone consisted of tension or anxiety, anger or hostility, and joint attention or activity. Dyadic level of involvement consisted of reciprocity, flat, empty or constricted, and enthusiasm, joyfulness or mutual enjoyment.

Parental psychological functioning was assessed using three symptom domains, depression, anxiety, and hostile, which were intercorrelated and combined into a single factor labelled negative affectivity. A questionnaire was used to assess the fussy/difficult factor of the child's functioning, and questionnaires were used to assess the mothers levels of stress and levels of support.

The results revealed that there were few overall differences between the index group and the controls in the mother-child interactional characteristics during feeding, but the mothers of the nonorganic failure to thrive toddlers aged 8 to 13.4 months were more hostile and intrusive, and less flexible than the ones whose children were aged 13.5 to 26 months.

Dunn, Plomin and Nettles (1985) carried out a home observational study on 50 two-child families, in order to see how similarly mothers behave towards infant siblings. Sixty-five of the siblings were biological, and 35 were adopted. The observation of each of the 100 children took place at the child's home, when he or she was 12 months old. Children were first assessed for mental and motor development, and temperament, then the mother and child were video recorded during two five-minute sequences. One of the recordings was made during a feeding situation of either lunch or a snack, and the other was in a free play situation. The ten minutes of observation time was divided into ten second time units, and the occurrence of any of 14 categories of maternal behaviour, during each of these time units, was recorded.

The categories of maternal behaviour recorded were mother touches affectionately, laughs, accepts or approves of some behaviour, directs (i.e. instructions, commands, requests), rejects (i.e. rejection of a word or action,

e.g. "No, it's not a dog"), prohibits, questions, vocalises (i.e. utterances not included in any other category), refers to feelings, shows, gives, imitates, positive affect (i.e. speaks in warm tone of voice and smiles), and negative affect.

The results of this experiment showed that mothers' behaviour was similar towards both of their children, when they were 12 months old, although the observations were made approximately 35 months apart. However, as Dunn pointed out, the presence of the video recorder and the observer meant that negative, hostile, or punitive behaviour by the mother was rarely shown, so the video recordings probably only show the better exchanges between mother and child. Also the lengths of observations were brief.

Drotar et al. (1990) observed the mothers of 47 six-month old children with early histories of nonorganic failure to thrive, and 47 mothers of normally growing children, matched for age, sex, race, and birth order. The mothers were matched for age and education, and the families were matched for size, income, and structure. Observations were carried out in the homes of the children with nonorganic failure to thrive, within one month of their discharge from hospital. Each home visit was scheduled at a consistent time of day, when the infant was awake and interacting with the members of family. They were observed during feeding, play, and social interaction, by trained observers. Maternal social interactive behaviour was rated on six nine-point scales, devised to study behaviour relating to the child's security of attachment. The scales consisted of ratings of sensitivity-insensitivity, co-operation-interference, acceptance-rejection, and accessibility-ignoring. The final two scales measured positive affect, and emotional expressiveness of the mother. Ratings of maternal-infant feeding interaction consisted of timing (i.e. a high rating was given for flexible adaptation to infant's feeding

cues, and a low rating for arbitrary timing which seemed to be unrelated to the child's behaviour), pacing (i.e. an assessment of the mother's sensitivity to her infant's pace of feeding), and termination of feeding (i.e. highest ratings were given if they appeared to be responses to the child's cues). The mothers of the nonorganic failure to thrive children, in this study, were found to have less adaptive social interaction, less positive affect behaviour, and they demonstrated more arbitrary terminations of feeding. However, the coding system in this study and the one by Dunn, Plomin and Nettles, (1985) did not include any child feeding behaviours. They focused only on the caretaker's interaction with the child.

Black et al. (1994) compared 102 nonorganic failure to thrive children with 67 comparisons, under the age of 25 months. The index children were recruited from inner-city paediatric primary care clinics. They were all below the 5th percentile using National Centre for Health Statistics norms and they had no known organic disease. The control children were matched on age, ethnic group, sex, and socio-economic status, but they were all above the 10th percentile. All children were from low-income families.

Each child was videotaped in a room equipped with a high chair, a child's table and chair, and adult chairs. The recording took place at a time when the mother thought the child would be hungry. She was asked to feed the child as she did at home, and to take as long as necessary.

The mother's parenting style (i.e. emotional context of the interaction between parent and child) was assessed by direct observation of the parent-child interaction during feeding. Parenting nurturance consisted of four items: social initiative, involvement with the child, cheerful mood, and child-

oriented language. Parenting negative control also consisted of four items: hostility, unresponsivity, intrusivity, and flexibility.

Parents were attributed the categories of nurturant, authoritarian, and neglecting. These categories were formed by using the comparison group as a guideline. There was no normative data on parenting style, so scores of both parental nurturing and parental negative control were divided into two groups, according to whether they were above or below the median. Parents above the median on parental nurturance were classed as nurturant. Non-nurturant parents (i.e. those below the median in parental nuturing) were divided into two groups according to the level of their negative control. Parents below the median on parental nurturance, but above the median on parental negative control were apparently uninvolved with their children, and classed as neglecting. Although they were rated as flexible and permissive, they often ignored the child's cues and provided little direction or guidance. Parents below the median on both parental nurturant and parental negative control, were classed as authoritarian. They often used threats on their children, and were harsh, intrusive, and rigid. Children were rated on interactive competence during feeding, using five categories: communicative competence, social initiative, alertness, responsivity, and positive mood.

Two raters scored the videotapes. Results indicated that parents of nonorganic failure to thrive children were more likely to use a neglecting parenting style than parents of the control children. Also, within this group, more parents were neglectful than authoritarian. Within the control group there were almost twice as many authoritarian parents as neglectful ones. Regarding the children with nonorganic failure to thrive, both interactive competence and adaptive behaviour were associated with nurturing parental

styles, and were not dependent on the severity of the child's growth problem. Although this study focuses on some child behaviours during feeding, as with many failure to thrive studies, it is concerned mainly with the effects of the parents' interaction on the child.

Some observation studies carried out on children during feeding have focused only on the children. Connolly and Dalgleish (1989) studied the emergence of a tool-using skill in 16 infants aged 12 to 23 months. Each child was visited once a month, for a period of six months, during which a video recording was made of the child eating either a lunch-time or tea-time meal, at the convenience of the mother. The mother was asked to feed the child as normal, with food of a semi-liquid consistency. The process of transmitting food from dish to mouth consisted of ten units of behaviour. Some of the youngest children were unable to achieve this alone. The observer recorded which hand the child held the spoon in, and the way in which the spoon was grasped. A palmer grip involved holding the spoon in the palm of the hand, whereas a digital grip involved holding the spoon in the fingers. A recording was made of whether the grip involved the thumb, and whether the fingers were clenched or lightly flexed. A note was also made of the orientation of the spoon in the hand, i.e. medially (from the radial side of the hand), laterally (from the ulna side of the hand), or distally (along the long axis of the hand), and of the position of the hand on the spoon, i.e. top, middle, bottom of the spoon handle, or around the bowl of the spoon. A total of 11 grip patterns were recorded because the way in which the spoon is held causes constraints on its manipulation. In addition to recording grip patterns, some activities of the contralateral hand were recorded. There were two main classes: task related, such as steadying the dish, and non-task related. Finally, a recording was made of any finger,

hand, wrist, elbow, and shoulder movements involved in the act of filling the spoon, to removing it from the mouth.

A systematic pattern of change was observed in the way the spoon was used during the child's second year. Also, the contralateral hand became increasingly involved in task related activities. A study of this kind could be enlightening in a comparative study of failure to thrive children and normally-growing children, especially if food quantities were measured and the number of spoonfuls consumed by the child was counted. An additional factor of prompts could be added, as well as the child's reaction to the prompts, but this type of study is rigid, and does not focus on the normal eating patterns of the child in his or her usual environment. Nor does it allow the child to consume the variety of textured foods which are likely to be part of his or her normal diet.

Similarly, Kerwin et al. (1995) observed three children, aged two and a half years, three years, and five years, under set conditions. All children suffered from gastrointestinal problems, and all exhibited total food refusal. The observations occurred in one of two rooms; each conducted by a trained therapist. The meals consisted of four pureed foods: one each of fruit, vegetable, protein, and starch. Children were spoon fed with either an infant spoon or a child spoon. The amount of food on the spoon varied according to whether the spoon was dipped, quarter, half, or level. The therapist asked the child to open his or her mouth before presentation of food, and the spoon remained at the child's lower lip for five seconds, or until the food was accepted, whichever was first. Each feeding session consisted of 20 trials (i.e. bites of one type of food, offered in random order) with interims of 30 seconds between each trial. Acceptance resulted in praise and access to

toys during each interim, whereas refusal resulted in removal of the spoon and no attention for the remainder of the interval.

Response definitions consisted of acceptance (i.e. subject opened mouth 1.27 cm or wider within five seconds of the presentation of the spoon, and allowed the entire spoonful to be placed into the mouth), refusal, expulsion, and mouth clean (i.e. the absence of food in the oral cavity, following acceptance or expulsion). Trained therapists collected any occurrence and non-occurrence data on targeted behaviours for each trial.

During another set of trials, the same reinforcement was used, but the spoon volumes differed. For the eldest child, an increase in the number of half spoon volumes, resulted in a decrease in acceptance. Acceptance did initially increase, but his instances of mouth clean decreased so he was not rewarded. He was treated by non-removal of the spoon, and by being told that he would have to remain in the chair until he accepted. Expelled food was represented, and he was rewarded after acceptance. Treatment for the three year old boy was slightly different. The procedure for him began with a dipped spoon. He was given the instructions that if he did not eat, he would be helped. Refusal resulted in gentle pressure being applied to his jaw, and the spoon being placed into his mouth. He was rewarded afterwards. The same procedure was used for the youngest child. Following the introduction treatment of the empty spoon condition, she began accepting other spoon volumes. Her mean level of acceptance was highest in the half spoon condition, so expelled food was represented this way. She was given physical guidance, contingent upon refusal, then rewarded afterwards. Treatment was effective in increasing acceptance for all children. However, although the children were observed during meals, and observers collected data on targeted behaviours, the observations were

more for therapeutic evaluations than for studying children's natural reactions to food. Also because the food was presented by a therapist, no observations could be made on the caretaker's interactions with the child.

The time-sampling method used by Stein et al. (1994) to code pre-defined behaviours is one of the best ways of collecting data during an observation, but as the study was concerned with mothers who had eating disorders, the pre-defined behaviours were mainly maternal behaviours. Also, the behaviours were not coded as they occurred, but were rated according to the extent of their occurrence. Two of the three child behaviours: vocal frequency, and level of activity, were rated from still to continuous. The third child behaviour: emotional tone, was rated from unhappy to happy. Ratings enable detailed recordings to be made, but they are open to more errors than coding behaviour directly.

Hoffmann (1992) also used the time-sampling method to code observations, and recorded both the child and the interactions of the caretaker, during the meal. However, the coding system was too complex to be recorded directly. Repeated measures were used at monthly intervals, but only approximately eight minutes of one meal was analysed for each child, during any one time, and this took observers about two hours. Each minute of observation took 15 to 45 minutes to analyse, so as well as being extremely time consuming, it was necessary for the meal to be video recorded. Also, some of the observations coded were subjective, such as the mother's tone, rhythm and modulation of voice. Although observations of this kind can emphasise meaning and give strong indications of the speaker's mood there are variations between people, so unless the speaker is well known to the observer errors can be made.

Reilly and Skuse (1992) did not use the time-sampling method or pre-coded behaviour categories in their study. They video recorded the meal and assessed the children's level of oral-motor dysfunction from the recording, supplemented by some direct ratings of behaviour that could not be easily seen on the video-film. Also, they used 24 hour dietary recall to estimated quantities of food, and these were based only on household measurements and notes made of spillage.

The observation of a meal was only a small part of the study by Mathisen et al. (1989). They also used data from a semi-structured interview on the infant's feeding behaviour, a 24-hour dietary recall, and a feeding assessment based on foods of different textures being presented to the child. Lunch was videotaped and notes were made of the place and position in which the infant was fed, and number of people present, etc., but no pre-defined behaviour categories were used, nor a time-sampling method.

Ramsey, Gisel and Boutry (1993) did not use a video recorder when observing non-organic and organic failure to thrive children during a meal, but they did not carry out the observation in the child's home environment either. The children were each observed by a team, through a one-way mirror at a clinic. Infants behaviour was graded into only three categories, and no observations were recorded of the caretaker interacting with the child. Also, the children were not compared with a control group.

Heptinstall et al. (1987) used the time-sampling method and pre-coded behaviour categories to observe growth retarded children and controls during the child's main meal. They also coded categories of the caretaker's interaction with the child during the meal, as well as categories of child behaviour, but their study was based on four year old children who would be

capable of speaking as well as understanding language. Also a lot of their data was taken from interviews, diaries kept by the mothers for three days, and 24-hour food recalls based on household measures.

Hutcheson, Black and Starr (1993) compared observations of non-organic failure to thrive children and the interaction of their caretakers with those of a control group, but the observations did not take place in the child's home environment. The child's caretaker was asked to feed the child in the usual way, with food provided or brought from home. However, the setting alone would make it unlikely for the caretaker to feed the child in the normal way. Even caretakers who spoon feed children rarely sit with them throughout the entire meal, and the novel environment could have affected the child's natural responses to food. Also, questionnaires were used to assess factors about the children and the caretakers, and the coding system was too complex to code directly, so the meal had to be recorded.

The studies by Dunn, Plomin, and Nettles (1985) and Drotar et al. (1990) were both home observations, but neither of them coded child observations. Also, Dunn, Plomin, and Nettles only recorded five minutes of a feeding situation, which in some cases was only a snack, and the study by Drotar consisted of six nine-point scales, which is subject to opinions.

Black et al. (1994) compared non-organic failure to thrive children with a control group, but this study was also in a set environment. Also, the analysis was very subjective, taking into account the moods of the children and the caretakers. The study by Connolly and Dalgleish (1989) was an objective analysis of the motor ability of young children during a meal, but it does not analyse the children's normal eating behaviour, and although the study by Kerwin et al. (1995) is informative in treating total food refusal, it

consists of only three case studies in a situation very different from the child's normal environment.

However, the main problem with all of these studies is the small amount of observation time given to analyse the children's eating behaviour. Few observational studies have been carried out on children feeding, and of these, the results of many of them are based on the observations of one meal, or part of a meal. It is important to schedule meals over a whole day, rather than just one meal, because children's appetites vary considerably between meals. A normally-growing child who eats a large lunch is less likely to eat a large evening meal than a normally-growing child who eats a small lunch. Similarly children who eat a lot of snacks between meals are less likely to eat large meals than children who eat few or no snacks.

1.4 Observations from meal to meal

Birch et al. (1991) observed 15 normal pre-school children, ranging from two to five years old, for three two-day periods. The children were offered three meals and three snacks, at fixed times, at quantities of approximately twice the child's daily requirements. Each child was allowed to choose the type and quantity of food he or she desired. Despite widely varying eating habits, the calorie counts revealed little variation on a day-to-day basis. They concluded that intake at individual meals was not independent. High calorie intake at one meal was often compensated for by low energy intake at the next.

Pollitt and Eichler (1976) used direct observations and open ended interviews during 7-10 home visits to compared the eating, sleeping, elimination, autoerotic and self-harming behaviours of 38 pre-school children (12-60 months). Nineteen of the children had heights and weights

below the 3rd centile of the Boston Growth Standard, and the other 19 children were matched on age, sex and ethnic group, but were growing normally for their chronological age. Data from the observations and interviews were recorded in a narrative form. This consisted of the child's response to food, and moods during eating, and the presence or absence of behaviours such as polydipsia, hiding food, or eating non-food substances. Notes were also made on the child's feeding history, medical history, toilet training, quality of suck as an infant, and dietary intake, from interviews alone. Also a 24-hour recall of food intake was established from data collected during each home visit. The average of these was used for comparisons. All information collected about a child's behaviour was entered onto index cards. There were approximately 70 cards for each child; 20 of which contained information about the child's sleeping, elimination, autoerotic, and self-harming behaviours. These were used to set up subcategories for analysis. They found that the most noticeable difference between the two groups was in the area of eating. The failure to thrive children had more feeding difficulties, skimpier, less regular meals, and had a poorer response to food, when rated on a five-point scale. Consequently, their daily caloric intake was lower.

Bentley et al. (1991) observed 40 children aged 4-36 months, drawn from the population of a rural Andrean village in Peru. Their aim was to measure the degree of effort the mothers applied to encourage their child to eat, and the acceptance of food by the children, during diarrhoea episodes, the immediate post-convalescent period, and subsequent days of good health.

Children were followed using twelve-hour in-home structured observations, during two to four days each of diarrhoea, convalescence, and health. A data sheet was designed to code observations of maternal feeding

behaviours and child acceptance. It contained three items for maternal feeding behaviour (i.e. verbal encouragement, verbal pressure, and physical force), and three items measuring child acceptance of food (i.e. rejects food, appetite level, and asks for food). All food was weighed before presentation. Breast milk consumption was measured by weighing the children immediately before and after breast feeding.

Scores for food acceptance were higher when children were presented with liquid or semi-liquid foods, compared to solids, regardless of the child's state of health. Results indicated that the mothers were more likely to encourage their children to eat during diarrhoea episodes compared to convalescence and to health. During episodes of diarrhoea, children appeared to have observable reductions in appetite, and more often rejected food. It seems logical that parents of failure to thrive children would similarly encourage their children to eat more often than parents of normally growing children.

Garcia, Kaiser and Dewey (1990a and b) studied the food intake of rural Mexican pre-school children, among whom growth stunting is common. Their observational studies consisted of 'child-following' rather than home visits, whereby a child was followed at an appropriate distance, for one whole day. All food eaten was recorded from the child awaking in the morning until bedtime. The average length of each observation was 12 hours 40 minutes ranging from 11 to 15 hours. Most typically, the child exhibited initial shyness at the beginning of the observation, then appeared to accept the stranger's presence, which is in accordance with Wright's (1960) review of observational child studies (Garcia, Kaiser and Dewey, 1990a).

The weights of food eaten away from home were estimated, but all food prepared in the home, and all portions served to, and consumed by, the child, were weighed. Also all gestures, movements, facial expressions and sounds related to food or eating were recorded.

Children made frequent requests for food, and nearly all requests were fulfilled. Foods most commonly requested were those high in sugar or fat. On average, children ate 13.5 times a day, with a range of 7-21. Those who ate more frequently, i.e. consumed more snacks, had a significantly higher energy intake than those who ate less than 13 times a day (1655 Vs 1395 kcal) and those who made more than nine requests for food consumed significantly more energy than those who made fewer. There was no relationship between energy intake and encouragement to eat by others. Finally, children who ate lower calorie density meals (<100 kcal/100g) consumed less energy at meal times, but consumed more from snacks, so their total energy intake did not differ.

During the observation it was noted that children often negotiated small sums of money from adults, usually relatives, for the purchase of snacks. When surveyed, mothers may underreport child food consumption because they do not see the snacks children find for themselves.

According to Garcia, Kaiser and Dewey, there was no indication of protein, calcium, thiamine, riboflavin or vitamin C deficiency, although iron and riboflavin intakes were marginal and niacin and vitamin A consumptions were low. They assumed the children had reduced linear growth due to lack of nutrition when they were babies, but although the children were not over thin, given their adequate energy and protein intakes, Garcia, Kaiser and Dewey were uncertain why catch-up growth had not occurred. They

proposed that non-nutritional factors, such as infection, had inhibited growth, or that factors such as protein quality or lack of zinc and other micro nutrients may have influenced the child's growth. Also, they pointed out that the sample was small (45 children) and data were collected for only one day per individual, at one time of year.

Although these studies contain lengthy observations of child's intake, the study by Pollitt and Eichler (1976) relies too much on recall, the study by Bentley et al. (1991) is too limited in the amount of coded observations used, and child following utilised by Garcia, Kaiser and Dewey (1990a and b) does not provide systematically analysable data. Some of the data collected by Pollitt and Eichler was from direct observation, but much was from open-ended interviews during 7-11 home visits, and all data was recorded in a narrative form. Notes were made on feeding history, medical history, toilet training, quality of suck and dietary intake from interview alone, which involved recall. Also the children's responses to food were rated on five point scales, so were subject to opinions. All data was entered onto cards, and 70 cards were made out for each child. Twenty of these cards concerned sleeping, elimination, autoerotic and self harming behaviours, which are not necessary for a study concerned with eating and related behaviours, but even without these there are too many categories to record directly.

The study by Bentley et al. (1991) on the other hand consists of too few categories for a study concerned with eating and related behaviours. They carried out 12 hour structured observations on each child for two to four days but their behaviour recordings consisted only of maternal encouragement, pressure or force, and children's food rejection, acceptation or requests.

Garcia, Kaiser and Dewey (1990a and b) recorded all food intake, gestures, movements, facial expressions, and sounds made by the child which related to food, for one whole day, but they used no pre-coded behaviour categories and they did not use a time-sampling technique to record their data. It is necessary to use systematically analysable data to observe the child's reactions to food, the caretaker's interaction with the child during feeding, and the consumption of food, when collecting data on children with feeding problems.

McKenzie et al. (1991) devised an integrated system for coding direct observations of children's dietary and physical activity behaviours, and related environmental events. The validity and reliability of the system was assessed by their observation of 42 healthy children, aged four to eight years, both in their homes and in school (or pre-school) one day each week, for eight consecutive weeks. The school observations took place during lunch (20 minutes maximum) and during the recess period (30 minutes maximum). The home observations took place on weekday evenings, during dinner, on prearranged days described as typical by the children's families. Home observations were videotaped.

Their system, known as BEECHES, consists of ten dimensions that simultaneously assess several variables in connection with children's eating and physical activity behaviours, i.e. environment, physical location, activity level, eating behaviour, interactor who participates with the child, physically or verbally, in connection with physical or eating activities, antecedents related to increasing or decreasing the child's eating or physical activity, prompted events of either physical activity or eating behaviour, the child's response to the prompt, the consequences associated with increased or

decreased eating and physical activity, and the type of eating or physical activity behaviour that received the consequences.

Observations were made by trained researchers who focused on each child for a period of 25s during observation, then coded and recorded the information into a computer during the following 35s completing each observe-record within one-minute. Child's physical activities were coded into five distinct categories: lying down, sitting, standing, walking, and very active. A second study was administered to validate this coding system and to evaluate the energy expenditure associated with each category. Nineteen pre-school children aged four to nine years, had their heart rates monitored with UNIQ Heart Watches while they participated in the five physical activity categories, then energy expenditure values were calculated from their heart rates using normal values for young children. The total estimated energy cost values were 0.029 kcal/kg/min. when lying, 0.047 kcal/kg/min. when sitting, 0.051 kcal/kg/min. when standing, 0.096 kcal/kg/min. when walking, and 0.144 kcal/kg/min. when very active. Heart rate and energy cost clearly increased with each activity category, thereby supporting the BEECHES activity coding system. Inter-observer reliability during live and videotaped observations was high, with the exception of the 'consequence' categories.

However, there were limitations with the BEECHES observation system. The 51 coding categories required approximately 30 hours of classroom training and at least ten hours of practice training before it could be used. The BEECHES system does not provide data on nutritional quality, and field observations proved to be unreliable. Intraobserver reliability was assessed for rating of both videotapes and field observations in the home, by mean percentage agreements and kappa coefficients. Ratings of the home

observations had mean percentage agreements ranging from 94% to 99% and median kappas from 0.71 to 1.0. However, the median kappas for both consequences and events resulting in them, which is a recording of positive, negative or no reinforcement associated with increased or decreased eating and physical activity, and the child's response, were 0.00. Both categories were observed in less than 1% of the intervals.

A less complex method of direct observation was utilised by Barr et al. (1988) in their assessment of infant cry and fuss behaviour. They limited their observations to six infant behaviour patterns, which were coded by symbols, then entered onto 'time rulers' by the child's guardian, as they occurred. In addition to the six behaviour patterns, type of feeding and bowel movements were recorded below the coded behaviour, at the corresponding times. The simplicity of this method resulted in mothers' seldom taking longer than five minutes to learn the coding system. However, although this method was based on direct observations of the child, the observations were not entered onto the time rulers immediately. They were entered when convenient to the caretaker, so they involved an element of recall. The time rulers were compared to tape recordings made using a voice activated recording system. All negative vocalisations on the tapes were transcribed by a single observer and intraobserver reliability was determined from four of these tapes randomly selected. High correlations ($r > .99$) were achieved with Pearson's product moment coefficient for both the frequency and the duration of negative vocalisations. However, correlations comparing the time rulers with the recordings were not so high. The correlation for crying and fussing combined was 0.66 and for crying alone was 0.67. There was no correlation for fussing alone. Parents missed on average 20% of the total duration of negative vocalisation. There was also a large discrepancy between the parents in their use of the cry and fuss

symbols. Therefore, the advantage of the simplicity of this method may have been counteracted by a loss in accuracy.

The studies by McKenzie et al. (1991) and Barr et al. (1988) both use systematically analysable data. In both studies the children are observed for more than one meal, and the data is recorded using the time-sampling technique and pre-defined behaviour categories. However, McKenzie et al. observed children aged four to eight years old, and their system consisted of ten dimensions that simultaneously assessed several variables connected with the child's physical activity behaviours as well as eating behaviours. Altogether they used 51 coding categories which required hours of training and practice before it could be used, as well as increasing the likelihood of errors occurring due to observing and entering so many behaviours in a limited period of time. It is not necessary to use so many categories when observing children aged six months to two years because they are far more limited in their behavioural capabilities.

The study by Barr et al. consisted of only six behaviour categories but these were selected to assess cry and fuss behaviour. Also the direct observations were not recorded either immediately, or by an independent observer. They were entered by the caretaker at a convenient time, so they relied on recall. The observation records were compared to tape recordings but approximately one-fifth of negative vocalisations were missed. Although the method was suitable for assessing cry and fuss behaviour it is not suitable for analysing any other type of behaviour.

1.5 Verbal communication

When children are approximately one year old they begin to speak, but there is considerable variability from one child to another. At approximately 18

months - the time when early word combination takes place - there is a rapid spurt of new words, followed by a large increase of word acquisition throughout the pre-school years (Rice, 1989). Children learn language from their own experiences. They must be able to hear it before they use it, and it must make sense and be important to them to give them the motivation to learn it. Sanders et al. (1993) found that food refusal significantly correlated with unclear parental instructions. Once learnt, toddlers use language to get attention from others and to request actions from others (Rice, 1989). The role of verbal communication between mother and child during mealtimes is important both for the mother to give effective cues to the child to encourage age-appropriate eating, and for the child to convey what he or she wants or does not want. Before children are able to speak, they use non-verbal communication such as crying, pointing and throwing food on the floor, which is very meaningful, but once language emerges it enhances meaning so it becomes an important tool in the communication of the child and the caretaker during mealtimes. The child is able to request specific foods and refuse non-desired foods and the caretaker is able to give children choices or offer alternatives, as well as give instructions and prompts to the child, which are understood.

Sanders et al. (1993) carried out one of the few observational studies comparing the eating behaviours of problem and non-problem eaters which included a comparison of speech, when they studied the extent to which coercive feeding practices occur in families of children with feeding problems. Nineteen children aged between 12 months and 6 years who had been medically assessed as having feeding problems without organic cause, were compared with 26 healthy, non-problem eaters who were also between 12 months and 6 years. The observations took place in a clinic room which was equipped with two wall-mounted video cameras, two ceiling

microphones, a child-sized table and chair, and a chair for the parent. The sessions began at the beginning of the child's lunch or evening meal - whichever was most convenient for the parent - and lasted for exactly 20 minutes, regardless of whether the child had finished or not.

The parents of children with feeding difficulties used more coercive control tactics than the parents of the control children. They gave more negative instructions, specific negative instructions, negative prompts, negative physical contact, negative eating comments, and negative social attention. Finally, food refusal significantly correlated with vague parental instructions, and playing with food correlated with negative physical contact, negative instructions (both specific and vague), negative eating comments, and negative social attention. Both chewing and complaining correlated with vague non-aversive instructions, i.e. verbal commands that are unclear and lack specific behavioural referent, but do not have the potential to cause pain or discomfort in the child.

Romski et al. (1989) carried out a study on nine school-aged children with moderate or severe learning disabilities and severe spoken language impairments, in order to explore communicative patterns. Live continuous observations were made of each child during six one-hour mealtime periods at the child's home, and six at school. The sessions at home included the child's evening meal, and the sessions at school included the child's midday meal. Non-participant observers were employed to record the communication as it naturally occurred, using an Epson HX200 notebook and a coding scheme designed to record the speech.

Four digits were entered into the notebook computer every time the child spoke, or was spoken to. The first digit indicated the type of

communication, and to whom it was directed, the second digit described the modalities used for the communication, the third digit indicated the function of the communication, and the fourth digit registered the success or failure of the communication, in terms of response.

The first code number could be any digit from one to four, depending upon whether the speech was an initiation by an adult, initiation by a peer, response by and adult, or response by a peer. The code number was followed by three zeros. The second code was one of eight letters, which represented the child's communication. The letters represented a spoken, intelligible word, a gesture, a vocalisation, physical manipulation (i.e. guide peer or adult, in some way, to gain outcome), word and gesture, vocalisation and gesture, physical manipulation and vocalisation, and physical manipulation and word. These code letters were preceded by a zero, and followed by two zeros.

The third code could be any of nine numbers, which represented imitation (i.e. repeating via speech or gesture), greeting, naming, requesting, attention directing (i.e. engaging adult towards self, or another person, object, or event), questioning, answering, affirming, negating. These numbers were preceded by two zeros and followed by one. The fourth code could be one of two letters which represented whether the outcome was successful (i.e. the adult responded) or unsuccessful. These letters were preceded by three zeros.

Results revealed that even without a formal spoken language, the children employed rich and varied communicative patterns to communicate successfully. This coding system could be used to record speech of

toddlers, but because of its complexity, the observer would have to pay full attention to speech at the expense of missing other important observations.

Singer et al. (1996) carried out an observational study on 141 infants and their mothers. Fifty-five of the infants had birth weights of less than 1500 g and also had developed bronchopulmonary displasia (BPD), 34 of the infants had very low birth weights (VLBW) but did not have BPD, and 52 were healthy term infants with birth weights of over 2500. In all three groups, the mothers had no known mental psychiatric illnesses or mental retardation, and had not been identified as taking drugs during pregnancy. They were assessed for vocabulary comprehension, and non-verbal intelligence. Mothers were recruited to be part of a longitudinal study seen at five assessment points until the infant was three years of age.

The feeding observation took place when the infant was approximately 40 weeks. They were videotaped, during feeding, with their mothers. Videotapes were rated by two observers, and scored for maternal and infant behaviours. The children were rated for sucks (i.e. visible sucking through lip/cheek movement), spits (i.e. any small amount of liquid that had been in the infant's mouth was visible outside the lip and chin area), non-feed/avoidance (i.e. any interval in which the child does not suck, or avoids sucking through turning head, crying, sleeping, or putting hands in mouth), gags (i.e. infant gags or chokes on food), emisis (expulsion of formula that appears involuntary), and cries/fussy (i.e. infant sobs or sheds tears for at least five seconds, or infant grimaces).

The caretakers were rated for verbal prompt (i.e. instructions to eat, open mouth, chew, swallow), physical prompt (i.e. feeder jiggles bottle, breast, or infant to facilitate sucking, or repositions infant for purpose of facilitating

feeding), verbal interaction (i.e. feeder talks to infant about things other than food/eating), verbal R+ (feeder verbally praises infant), physical R+ (feeder makes physical contact with child other than holding), punishment, (feeder reprimands, hits, frowns, etc.), and verbal/other (feeder verbally interacts with another person).

Meals were divided into 30s intervals, and the number of occurrences of each response was measured using a frequency per interval system for both maternal and child behaviours. The number of calories consumed were estimated from the amount of formula consumed, less an estimate of losses in emesis, based on the weight of the infant's bib.

The mothers of VLBW infants, both with and without BPD, spent more time prompting their infants to feed when they were not feeding, but their infants still consumed less than the healthy children. However, mothers of VLBW children who were anxious or depressed showed less verbal prompting, rather than more.

Because the children were so young in this study, the observational categories of child behaviour are very limited, and no verbal categories were necessary for the children. The parental categories are based entirely on prompting, but give no indication as to whether the prompts were successful in increasing food intake. However, Klesges et al. (1983) found significant correlations between children's relative weight and parental prompts to eat, parental food offers, and parental encouragement to eat, in their study of fourteen 12-36 month old children.

Werle, Murphy and Budd (1993) pointed out that intervention procedures for food refusal have included using specific prompts when presenting food,

praising the child or giving rewards for desired eating, pairing non-preferred food with preferred food, ignoring moderate disruptive behaviours, and also using physical guidance, time-out, or other negative consequences for the refusal or expulsion of food. Different combinations of these procedures had repeatedly reduced food refusal and improved eating in children. However, no direct observations had been carried out, within the child's home, to evaluate the effects of treatment of feeding behaviours. In order to comprehensively evaluate the effects of a behavioural parent training programme on parent and child feeding-related behaviours, they trained mothers to initiate regular offerings of previously rejected foods, and to provide contingent attention (i.e. prompts and positive reinforcement) to increase acceptance of non-preferred foods.

Three boys were referred by an outpatient psychology clinic because of chronic problems with selective food refusal. The parents had given up offering meals to the children, and instead offered high calorie snacks, and nutritional supplements. The boys and their mother were videotaped during mealtimes, until the child had finished eating, or until 30 minutes had lapsed, whichever was first. The investigator left the room, after turning on the recorder, but returned intermittently to check the equipment. The final coding of mealtime observations, after the disregard of categories that occurred at a low rate across all conditions, consisted of five parent behaviours, three child behaviours, seven food groups, and six food textures. The coded parental behaviours consisted of three responses in the category of prompt (i.e. food related comments, requests, and suggestions directed at eating) and two responses in the category of positive attention (i.e. approvals and rewards). The coded child's behaviours were acceptance of food, rejection of food, and other negative behaviours (i.e. cries, protests, and any physical or verbal behaviour other than refusals and expulsions, that

signal displeasure at food related events). The coded food groups were milk and dairy products, meat and meat alternatives, fruits, vegetables, grains, deserts and sweets, and other foods. The food textures were smooth, fine, lumpy, chunky, chewy, and crunchy.

Three investigators coded the behaviours, at the time they occurred, during continuous one-minute segments. Food was recorded in the same way. Food reliability was assessed by a parental record of everything eaten by the child during the videotaped session.

Parents were trained in contingent attention skills, which included providing clear, direct prompts, using verbal and physical praise or other rewards for co-operation, ignoring disruptive behaviours, and using mild corrective procedures for food expulsion or attempts to leave the table. Time out, which involved the mother leaving the table, or rotating the child's chair away from the table for 30-60 seconds was used only for continued disruptive behaviour.

All mothers increased offerings of target foods and use of specific prompts. Two mothers also increased their levels of positive attention. When treatment was initiated, temporary increase of food refusal occurred, but this declined as treatment continued, and all children increased their acceptance of target foods. Werle stated that systematic observations of feeding in the natural environment constitutes an important avenue for enhancing our understanding of feeding disorders and may provide clues about variables that maintain them.

1.6 The present study

A large number of theories have been proposed as possible causal factors of the failure-to-thrive syndrome, and any one of these, or any combination of them may contribute to the syndrome in some children, but most have been refuted as the sole cause. It is now reasonably well established that it is a nutritional deficit of unknown aetiology.

The six psychosocial categories and six possible causes of failure to thrive, listed by Homer and Ludwig (1968) in an attempt to categorise nonorganic failure to thrive, were all based on factors associated with social stress. Stress alone is likely to cause a decrease in food intake due to lack of appetite, but even without stress, causal factors such as parental neglect, parental ignorance, or parent-child dysfunction could cause a nutritional deficit due to the child's wants and needs not being met.

The nutritional deficit theory is strongly supported by the Whitten, Pettit and Fischoff (1969) study which demonstrated that even under social stress underweight children will gain weight when their calorie intake is sufficient for their ideal weight and height. The only two children not to gain weight in their first group 'low level of mothering in hospital, plus adequate calories' did not gain weight in the second group of high stimulation and adequate calories. The study is supported by the findings of Glaser et al. (1968) that the forty cases of nonorganic failure to thrive children they evaluated were unlikely to have been subjected to physical or emotional deprivation.

Many other studies support the nutritional deficit theory; some of which have been mentioned here. For example, Iwaniec, Herbert and McNeish (1985) found the 17 nonorganic failure to thrive they evaluated to have a

number of feeding difficulties. Pollitt (1975) found that control children consumed more calories, protein, iron, niacin, and ascorbic acid than children with failure to thrive. Olinto et al. (1995) found that of the 50 children they assessed, the underweight children had a significantly lower consumption of energy, fat, and protein than the controls. Pugleise et al. (1987) found that the 7-22 month old failure to thrive children they evaluated were consuming only 60-90% of their recommended intake for age and sex, which increased after parents were given nutritional counselling. So did the child's growth. Mathisen et al. (1989) did not compare food intake but they found oral-motor functioning to be developmentally delayed in failure to thrive children, and feeding time to be quicker, which in turn would lead to a nutritional deficit. Ramsey, Gisel and Bountry (1993) found failure to thrive children to have poor or no appetites. The children did not cry or demand food, they had delayed tolerance of food textures, and they had deviant feeding behaviours. Pollitt and Eichler (1976) found that the most noticeable difference in a comparison study of pre-school failure to thrive children and controls was in their eating behaviour. Failure to thrive children had more feeding difficulties, skimpier, less regular meals, and a poorer response to food. Sanders et al. (1993) found that the parents of twelve month to six year old children with eating problems gave more negative instructions, negative eating comments, negative social attention, and negative physical contact, all of which correlated with the child playing with food rather than eating it. Whether the parent's negative behaviour caused the child's behaviour, or vice versa, the outcome would be the same. The child would consume less calories. Werle, Murphy and Budd (1993) found that the three boys they studied with selective food refusal increased their intake when parents increased their offerings of target foods and use of specific prompts, after being trained in contingent attention skills. Singer et al. (1996) found that mothers of children with very low

birth weight, who were suffering from anxiety or depression, prompted their children to eat less often than control mothers of very low birth weight children. If prompting increases food intake in children with low food intakes, and mothers suffering from depression prompt their children to eat less often, this may be one reason why failure to thrive has been linked to mothers suffering from depression.

As it has been accepted that failure to thrive is caused by a nutritional deficit of unknown aetiology, more information is needed about the eating behaviour and other related activities of young children, such as how often they eat, what kind of meals and snacks they eat, and the length of time they spend eating, as well as how often they are offered food or prompted to eat by their caretakers. In order to carry out a comparison of the eating patterns of children who fail to thrive and appropriate controls, it is necessary to have an observational plan that is suitable for measuring the eating patterns of children in the relevant age range. In this study the age range of children from six months to two years was chosen to be studied. Children of other age ranges, as well as some old people, suffer from nonorganic failure to thrive, but this is the range from when most children have been introduced to solids to when they should be able to eat the same variety of foods as adults.

Questionnaires and interviews are a quick and easy way of collecting data. They enable a large and varied range of details to be collected, including information about a child's early history. The disadvantage of this method is that recall is unreliable, and questionnaires and interviews with the children's parents rely on recall (Olinto et al. 1995, Zuckerman et al. 1994, Vitzhum, 1994). Ratings of behaviour are also useful. They are the only way of collecting some kinds of data, but characteristic variations can cause difficulties in coding accurately. However, coding direct behaviour is very

time consuming, making it necessary to place a greater restriction on the number of subjects to be observed. There is also a need to limit the behavioural categories due to the time limitation in which to record; due to a greater risk of errors in a complicated system, and due to the kind of observations that can be noticed in a short period of time. Parents are better able to advise on a child's habits, likes and dislikes. A further problem when recording behaviour directly is that there is a risk of changes in recording observations due to practice.

Both methods have their uses but there is a greater need for direct observations of children eating, due to a lack of this kind of data. Also the kind of information that is needed about these children, such as what they eat and how long they spend eating can be collected easily using this method. The length of time taken to collect data is not a problem because it is possible to observe enough children to test the observational plan. Also by keeping the observation categories simple and by varying the order in which children from each age group were observed, the risk of changes in recording due to practice should be minimal.

Of the few observational studies which have been carried out on children's eating most observe children during one meal only. The studies of Birch et al. (1991) and Garcia, Kaiser and Dewey (1990a and b) demonstrate how important it is to observe children's food and drink intake both during meals and between them. It is also important that the observational studies of children during mealtimes are carried out in the child's natural environment. It has been suggested (Drotar and Crawford, 1987; Frank and Zeisel, 1988) that home observational studies are best for assessing interaction patterns, and these are important when assessing feeding disorders.

The aim of this study was to devise a plan that would measure eating patterns, basic levels of activity, and some relevant aspects of caretaker-child interaction during food and drink intake of normally-growing babies and toddlers. Barr's method of using time rulers to code direct observations of infant's cry and fuss behaviour was adapted and used as the basis for an observational method. Children's cry and fuss behaviour was still included, but only as one of 14 pre-coded observations that could be simultaneously recorded. The method focused on collecting the kind of data recorded by Pollitt and Eichler (1976) and Garcia, Kaiser and Dewey (1990a and b), but in a more systematic way that allowed more objective analysis. It also drew on the study by McKenzie et al. (1991). Both this method and the one by McKenzie et al. contain basic measures of physical activities but whereas the one by McKenzie contains five measures suitable for four to eight year old children, this study contains only three measures, suitable for younger children. Also a one minute time sampling technique was used in both this study and the one by McKenzie et al., but due to the 51 coding categories used by McKenzie, 35s of that time was used for recording and only 25s for observation. The less complicated coding system of this study enabled recordings to be entered during observation. The measurement and analysis of the caretaker's speech similar to that used by Sanders et al. (1993), Singer et al. (1996) and Werle, Murphy and Budd (1993) was also incorporated in the observational method, but without the inclusion of subjective measurements based on moods, tones of voice, and gestures. The technique of child following used by Garcia, Kaiser and Dewey (1990a and b) was utilised, to enable continuous observation.

This study assesses the practicality of the method; compares males and females, and compares 6, 12, 18, and 24 month old children in seven

behaviour categories related to eating and drinking. It also compares the caretakers of these groups of children in seven behaviour categories which relate to those of the child. In addition, a study of speech used by the mother was carried out, as well as a reliability study of a coding system for use with speech. Comparisons were made of the numbers of verbally offered food and drink and verbal prompts to the child to eat or drink more, in relation to the amount of caretaker's speech. The comparisons of males and females, and the comparisons of the children of different ages are important for a method to investigate failure to thrive children, as any group of cases will be of both sexes and various ages, as the condition is not common.

CHAPTER 2

DESCRIPTION OF THE OBSERVATIONAL PLAN

2.1 Design

Thirty-two children were observed individually, in their own homes, on three separate occasions. There were four girls and four boys in each of four different age groups: 6-8 months, 12-14 months, 18-20 months and, 24-26 months. Children were selected from the age of six months because by then their eating behaviour is generally established; they rely less on breast and formula milk for nourishment, and eat purees, semi-solids, and solid foods. According to the nationally representative Infant Feeding Survey, 1990, 99 percent of infants in Great Britain had been introduced to solid foods by the age of six-months, (White et al. 1990).

During the first two years eating behaviour changes rapidly as teeth erupt and children become more skilled and eat a larger variety of foods. In order to capture these changes, it was necessary to observe groups of children who differed in age by only a few months, so age groups were set every six months, from birth to two years of age. An equal number of boys and girls were selected, so that they could be compared for similarities or differences.

The observational method used by Barr et al. (1988) was utilised, but was adapted to be used by an observer and to focus mainly on feeding and drinking. This method uses data sheets containing time rulers at one minute intervals, on which codings of direct observations could be recorded. The

rulings enabled observations of children to be entered easily and systematically, within each one-minute interval. They also enabled observations of caretakers to be recorded at the same time. The one minute records were supplemented by a continuous 'Running Record' of speech and supplementary behaviour descriptions, made in shorthand. In addition the technique of child following, used by Garcia et al. (1990a and b) was employed. This consisted of keeping the index child within sight, i.e. following the child outside, or into a different room, if necessary. This ensured that the child's behaviour could be constantly observed, and everything consumed was noticed and recorded.

2.2 Subjects

Some of the children were recruited at a clinic by a health worker. When children were taken to the clinic for routine health checks, she asked caretakers of apparently healthy children, who were within the appropriate age groups, if they would be willing to allow their child to be observed for research purposes. They were told that the research concerned the activity and feeding behaviour of normal healthy children. Caretakers who agreed were given a letter of introduction (appendix A) and the health worker made a note of the child's name, age, and sex, the caretaker's name and address, and telephone numbers of those who had them. These details were sent to the observer, who contacted the caretakers by telephone, if possible, or by visiting the caretaker at home, if not. When the caretakers were contacted, the observer discussed the research in more detail, answered any questions the caretakers asked, and arranged times and dates of the observation

periods. This proved to be a slow form of recruitment, with only about 20% consenting at the clinic, and some of those cancelling.

The other children were recruited by the observer approaching caretakers directly. She collected a list of mother and toddler groups, from a local library. then began to visit as many local groups as possible. She approached the play-group organisers first, to introduce herself, and ask which caretakers had children within the age groups she required. Next she approached the caretakers to explain her research and ask if they would be willing to participate, by allowing their child to be observed. Any caretaker who showed an interest was given a letter of introduction (appendix A), and any questions raised were answered. Observation sessions were arranged with those who agreed to participate, and the sessions were arranged according to the times and dates suitable to both caretaker and observer. Hence the order of the sessions was varied. Most of sessions were arranged to take place very soon after consent had been given, but if a child was a little too young, or the caretaker had other commitments preventing the sessions to take place imminently, the observer contacted the caretaker a second time, at a later date, to confirm the prior arrangements.

All of the children observed lived in the Newcastle upon Tyne areas of Kenton, Gosforth, Sandyford, Denton, Heaton, or Tynemouth. One female child, whose mother gave birth to another child after two observation sessions, was not seen for her third session until she was 28 months old, but all other children were observed for all three sessions within the three months of the age group they were assigned to.

2.3 Materials

During the observation sessions, headphones were worn, attached to a one-minute bleeper, to assist accurate timing of the activities while observing the child. These did not prevent the observer from hearing the speech of the child or caretaker.

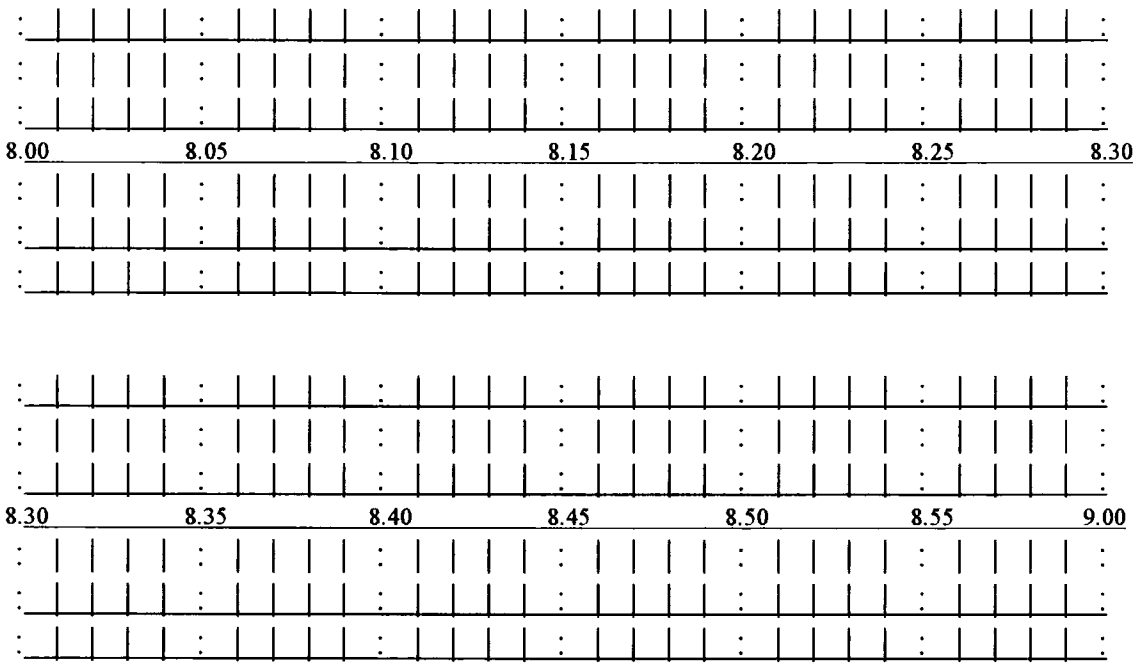
Both the child's activities, and the caretaker's activities as they related to those of the child, were recorded on Day Records (Fig 1), in one-minute intervals. The periods of time when food or drink was available to the child were also recorded on this data sheet. In addition a 'Running Record' was made of any verbal or non-verbal behaviour relating to food or drink, as well as the time at which the behaviour occurred.

The child's activities were divided into seven categories, and each was recorded by an activity code (Fig 2). The category of sleeping is self-explanatory. Passivity signifies standing or sitting, whereas activity signifies running, crawling, walking or climbing. Children six months old are recorded as active if they make any strenuous attempts to crawl or sit up, etc.

CHILD'S DAY RECORD

Child's name: ..... Child's age: ..... Date: .....
Caretaker: .....

One Minute Record



Running Record

Fig 1. Data sheet used to record child observations, and the relevant caretaker observations.

CHILD OBSERVATIONS	CARETAKER OBSERVATIONS	AVAILABLE FOOD OR DRINK
|__S__| sleeping	|__C__| care	|__F__| food
|__P__| passive	|__T__| talking	|__D__| drink
|__A__| active	|__H__| holding/carrying	
|__C__| crying	|__B__| breast feeding	
|__T__| talking	|__F__| formula feeding	
|__F__| feeding	|__S__| solid feeding	
|__D__| drinking	|__D__| drinking	

Fig 2. Codes used for recording child observations, caretaker observations as they related to those of the child, and the presence of food and drink available to the child.

The category of crying indicates crying or fussing (Barr et al., 1988), which may or may not be continuous. Talking signifies speaking or attempting to speak. In order to distinguish between attempts of speech and grunts or exclamations of joy, undefinable vocalisations are only recorded if there is little doubt that the child is trying to use speech, such as looking at someone or pointing to an object, when vocalising. Feeding consists of the consumption of solid foods, soup, formula milk or breast milk. Drinking consists of the consumption of any liquid, except a liquid medicine, not included in the feeding category.

Caretaker observations, as they relate of those of the child, were also divided into seven categories, and recorded by activity codes (Fig. 2). The category of 'care' is attention to any of the child's domestic needs such as dressing, bathing and cleaning, as well as placing the child on a seat, in a push-chair or in a high-chair, etc. 'Talking' signifies any speech which is directed to the index child. The category of 'holding' is either holding or carrying the child. Breast feeding and formula feeding are self-explanatory. Solid feeding is the offer of solid food or soup to the child, and drinking is the offer of any liquids to the child other than a medicine or liquids included in the feeding category. If the caretaker spoon-fed or hand-fed the index child, each portion was recorded as an offer

Consumables available to the child were divided into only two categories, and recorded by availability codes (Fig. 2). The category of 'food' indicates that at least one type of food is available to the child. The

category of 'drink' indicates that at least one type of drink is available to the child.

The child observation codes of sleeping (S), passive (P), and active (A) are mutually exclusive. This means that only one of these codes can be recorded on the data sheet within each one-minute interval. At the beginning of each minute, when the tone is emitted by the one-minute bleeper, the code that signifies the child's behaviour at that time was immediately entered on line one, i.e. the top row of boxes on the data sheet, above the appropriate time.

The child observation codes of crying (C), talking (T), feeding (F), and drinking (D) are not mutually exclusive. All of these codes, to a maximum of one of each can be entered on the data sheet, within a one-minute interval. These codes are entered on line two, i.e. the second row of boxes on the data sheet, as they occur, above the time at which they occur.

The caretaker observation codes are not mutually exclusive. Up to one of each code is entered on the third line of the data sheet, i.e. the third row of boxes, as they occur, below the time at which they occur, during each one-minute period.

Any food or drink available to the child is recorded on the fourth line of the data sheet, i.e. the bottom row of boxes. There are only two categories, and hence, two observation codes: food (F) and drink (D). These codes are not mutually exclusive, so up to one of each is recorded during each one-minute

period, and recorded again every minute, until the food and drink cease to be available.

A consumable is classed as available if it is in the same room as the index child, and is visible. This may consist of food or drink given specifically to the child, which has not been consumed by, or removed from him or her, or food or drink which is already in the room before the child enters, or food or drink brought into the room after the child enters, for purposes other than consumption by the child. Breast milk is not recorded.

The Running Record is entered on the Child's Day Record (Fig l) below recordings of the activity codes. It consists of:

1) The time food or drink is offered to the index child, or requested by the child.
2) The types of food and drink available to the index child.
3) The type of food and drink offered to the index child. If the offer is verbal, a record is made of exactly what the caretaker said. Otherwise a record is made of what the caretaker gives to the child.
4) The responses of the child, to offers of food and drink. If the response is verbal a record is made of exactly what the child said. If the response is gestural a record is made of the gesture.
5) All prompts to encourage the index child to eat or drink more.
6) All requests for food or drink made by the index child. If the request is verbal a record is made of exactly what the child says. If the request is gestural a record is made of the gesture.
7) The approximate proportion of food and drink that the index child has consumed by the time the consumable became unavailable.

8) A record of any vomiting or other excretions that occur.

9) A record of any drugs or medicine given to the index child, during the period of observation.

The caretaker's offer of food or drink can either be verbal, by asking the child if he or she would like the consumable, or visual, by presentation of the consumable to the child. Both verbal and visual offers were recorded in the Running Record, but only visual presentation of food or drink was recorded in the caretakers' section of the one minute record. Verbal offers and other speech was entered using the talking code.

2.4 Procedure

Prior to embarking on the main study, twelve children below the age of three were observed for three hours each. These observations were used to test the observation plan, and amend it where necessary, and they allowed the observer some practice before recruitment for the observation proper began.

For the observation proper the observer contacted as many caretakers as possible, by telephone, on receipt of details forwarded by the health worker of those willing to participate in the observation. Those who did not have telephones were visited in their own homes. After preliminary introductions, and brief discussions about the research, the observation sessions were arranged.

The caretaker arrived at the home of the index child a few minutes before the first observation session was about to begin. She was invited inside and asked to take a seat, although all caretakers were aware that once the observation began the observer needed to walk around their home, in order to keep the child in sight. Most of the index children had seen the observer before, and although some were initially shy, they soon accepted her presence. The observer spoke as little as possible, in order to draw as little attention to herself as possible. She took out a pen, and the child's day sheets, for that session, and placed the headphones on. At the beginning of the observation, she turned on the one-minute bleeper, and immediately began to enter the observation codes, and to make entries, in shorthand, in the running record.

The three observational periods lasted for three hours each, totalling nine hours, over three separate days (800 hours to 1100 hours, 1100 hours to 1400 hours, and 1400 hours to 1700 hours).

2.5 Data analysis

The running record was translated and typed after each observation session, using Word for Windows, Version 6.0. The children were numbered from one to 32 according to their age group and sex, and the sessions were listed from 'A' for the one beginning at 8.00 a.m., to 'C' for the one beginning at 2.00 p.m. File names were all the same, except for the child's number and session letter.

CHAPTER 3

ANALYSIS OF THE DURATIONS OF CHILDREN'S EATING AND RELATED BEHAVIOURS, AND RELEVANT CARE-GIVING BEHAVIOURS

Details of the children's families were obtained by information given by the caretakers. They were kept in note form then entered into a table after all data had been collected (see Table 1).

Index Child's Age Group: (months)		6-8	12-14	18-20	24-26
Number of Siblings					
Males	2(+)	0	1	1	1
	1	3	2	1	3
	0	1	1	2	0
Females	2(+)	0	0	1	1
	1	0	1	1	1
	0	4	3	2	2
Details of Mother					
Mother married or living with partner		8/8	8/8	7/8	7/8
Mother pregnant		0/8	1/8	1/8	3/8
Mother employed		1/8	1/8	1/8	0/8

Table 1. Details of Children's families The first part of the table shows the number of siblings of the male and female index children in each of the four age groups. The second part of the table shows details of their mothers.

To maintain confidentiality, 6-8 month old girls are referred to as children 1-4; 6-8 month old boys, as children 5-8; 12-14 month old girls, as children 9-12; 12-14 month old boys, as children 13-16; 18-20 month old girls, as children 17-20; 18-20 month old boys, as children 21-24; 24-26 month old girls, as children 25-28, and 24-26 month old boys, as children 29-32.

All child observation codes and caretaker observation codes were entered into Excel worksheets, in binary form, i.e. as '1' if the behaviour occurred during a one minute duration, and as '0' if it did not occur. A separate worksheet was used for each child and each caretaker. Each worksheet consisted of 180 lines, i.e. one line for each minute of the three-hour observation session.

S.P.S.S. for windows was used to carry out all analysis of variance, and to calculate Pearson r correlations for reliability tests. All figures were produced using Excel charts. Backup files were kept in duplicate, on floppy disks.

The data takes the form of one minute intervals, in each of which behaviour was coded as present or absent. Counts were made for each child, and these are referred to as durations. For example, a child with 'sleeping' coded in 105 one-minute intervals is referred to as sleeping for 105 minutes. Totals for each child over nine hours (540 minutes) are recorded for:

(i) sleeping
(ii) waking behaviour - passive and active
(iii) crying, talking, feeding and drinking.

These are shown in tables 2a to 2d. Group means are shown in Table 3.

The total waking time of each child was calculated by deducting the child's total sleeping time (i.e. total number of one-minute durations during which the child was recorded as sleeping) from the total observation time of 540 minutes (see Table 4).

Table 2a. Totals of observations of 6-8 month old children, over three, three-hour sessions.

Child 1	Sleeping	Passive	Active	Crying	Talking	Feeding	Drinking
A	44	130	6	14	3	20	0
B	21	155	4	10	2	15	10
C	40	133	7	16	0	24	0
	105	**418**	**17**	**40**	**5**	**59**	**10**

Child 2	Sleeping	Passive	Active	Crying	Talking	Feeding	Drinking
A	29	120	31	2	2	29	0
B	18	153	9	19	2	20	9
C	50	111	19	13	1	18	7
	97	**384**	**59**	**34**	**5**	**67**	**16**

Child 3	Sleeping	Passive	Active	Crying	Talking	Feeding	Drinking
A	0	135	45	9	7	24	10
B	20	138	22	3	2	22	6
C	25	146	9	5	5	20	7
	45	**419**	**76**	**17**	**14**	**66**	**23**

Child 4	Sleeping	Passive	Active	Crying	Talking	Feeding	Drinking
A	75	105	0	12	0	18	0
B	6	174	0	18	0	19	2
C	31	149	0	13	0	12	0
	112	**428**	**0**	**43**	**0**	**49**	**2**

Child 5	Sleeping	Passive	Active	Crying	Talking	Feeding	Drinking
A	42	136	2	3	20	7	10
B	69	105	6	6	4	16	0
C	0	178	2	30	0	12	0
	111	**419**	**10**	**39**	**24**	**35**	**10**

Child 6	Sleeping	Passive	Active	Crying	Talking	Feeding	Drinking
A	27	152	1	23	0	26	0
B	64	110	6	12	0	16	10
C	26	151	3	36	0	21	4
	117	**413**	**10**	**71**	**0**	**63**	**14**

Child 7	Sleeping	Passive	Active	Crying	Talking	Feeding	Drinking
A	35	142	3	28	0	21	7
B	97	83	0	17	0	21	3
C	32	140	8	19	0	6	0
	164	**365**	**11**	**64**	**0**	**48**	**10**

Child 8	Sleeping	Passive	Active	Crying	Talking	Feeding	Drinking
A	0	147	33	6	25	0	2
B	70	90	20	8	0	36	2
C	0	148	32	13	2	44	6
	70	**385**	**85**	**27**	**27**	**80**	**10**

Table 2b. Totals of observations of 12-14 month old children, over three, three-hour sessions.

Child 9	Sleeping	Passive	Active	Crying	Talking	Feeding	Drinking
A	25	93	62	2	53	0	5
B	28	109	43	3	63	17	8
C	0	110	70	2	107	2	2
	53	**312**	**175**	**7**	**223**	**19**	**15**

Child 10	Sleeping	Passive	Active	Crying	Talking	Feeding	Drinking
A	54	55	71	8	6	21	3
B	72	35	73	4	11	5	10
C	0	68	112	3	3	24	17
	126	**158**	**256**	**15**	**20**	**50**	**30**

Child 11	Sleeping	Passive	Active	Crying	Talking	Feeding	Drinking
A	0	129	51	20	21	33	31
B	77	74	29	8	10	28	25
C	2	108	70	2	20	7	19
	79	**311**	**150**	**30**	**51**	**68**	**75**

Child 12	Sleeping	Passive	Active	Crying	Talking	Feeding	Drinking
A	57	66	57	12	31	3	47
B	10	112	58	16	18	22	44
C	0	101	79	19	36	0	36
	67	**279**	**194**	**47**	**85**	**25**	**127**

Child 13	Sleeping	Passive	Active	Crying	Talking	Feeding	Drinking
A	0	114	66	9	13	7	18
B	6	127	47	26	5	5	14
C	52	87	41	5	23	13	14
	58	**328**	**154**	**40**	**41**	**25**	**46**

Child 14	Sleeping	Passive	Active	Crying	Talking	Feeding	Drinking
A	108	61	11	18	1	0	14
B	44	89	47	5	4	25	15
C	46	81	53	26	7	1	31
	198	**231**	**111**	**49**	**12**	**26**	**60**

Child 15	Sleeping	Passive	Active	Crying	Talking	Feeding	Drinking
A	0	140	40	9	10	24	4
B	51	108	21	18	10	24	8
C	56	96	28	26	6	18	13
	107	**344**	**89**	**53**	**26**	**66**	**25**

Child 16	Sleeping	Passive	Active	Crying	Talking	Feeding	Drinking
A	0	136	44	10	53	26	5
B	90	55	35	12	8	19	10
C	0	124	56	2	39	43	4
	90	**315**	**135**	**24**	**100**	**88**	**19**

Table 2c. Totals of observations of 18-20 month old children, over three, three-hour sessions.

Child 17	Sleeping	Passive	Active	Crying	Talking	Feeding	Drinking
A	32	98	50	2	100	21	8
B	50	99	31	2	89	24	5
C	69	72	39	4	62	21	3
	151	**269**	**120**	**8**	**251**	**66**	**16**

Child 18	Sleeping	Passive	Active	Crying	Talking	Feeding	Drinking
A	0	93	87	15	37	3	14
B	0	132	48	24	17	14	11
C	3	116	61	10	27	34	10
	3	**341**	**196**	**49**	**81**	**51**	**35**

Child 19	Sleeping	Passive	Active	Crying	Talking	Feeding	Drinking
A	34	82	64	4	116	12	13
B	42	89	49	17	96	17	2
C	0	119	61	1	132	20	6
	76	**290**	**174**	**22**	**344**	**49**	**21**

Child 20	Sleeping	Passive	Active	Crying	Talking	Feeding	Drinking
A	0	126	54	2	84	30	12
B	0	147	33	2	91	19	13
C	20	140	20	2	58	18	3
	20	**413**	**107**	**6**	**233**	**67**	**28**

Child 21	Sleeping	Passive	Active	Crying	Talking	Feeding	Drinking
A	0	118	62	4	17	9	14
B	81	77	22	2	9	44	10
C	0	83	97	16	11	14	18
	81	**278**	**181**	**22**	**37**	**67**	**42**

Child 22	Sleeping	Passive	Active	Crying	Talking	Feeding	Drinking
A	0	109	71	11	31	12	11
B	0	127	53	11	42	33	22
C	0	112	68	16	23	35	6
	0	**348**	**192**	**38**	**96**	**80**	**39**

Child 23	Sleeping	Passive	Active	Crying	Talking	Feeding	Drinking
A	0	142	38	11	74	22	56
B	81	64	35	29	20	3	33
C	0	78	102	9	64	5	41
	81	**284**	**175**	**49**	**158**	**30**	**130**

Child 24	Sleeping	Passive	Active	Crying	Talking	Feeding	Drinking
A	0	119	61	15	43	16	9
B	80	88	12	1	11	19	1
C	67	58	55	8	17	10	3
	147	**265**	**128**	**24**	**71**	**45**	**13**

Table 2d. Totals of observations of 24-26 month old children, over three, three-hour sessions.

Child 25	Sleeping	Passive	Active	Crying	Talking	Feeding	Drinking
A	0	115	65	5	102	22	6
B	0	133	47	6	115	37	2
C	0	111	69	2	95	21	9
	0	**359**	**181**	**13**	**312**	**80**	**17**

Child 26	Sleeping	Passive	Active	Crying	Talking	Feeding	Drinking
A	0	103	77	16	10	10	10
B	0	93	87	13	63	37	4
C	10	116	54	20	44	20	9
	10	**312**	**218**	**49**	**117**	**67**	**23**

Child 27	Sleeping	Passive	Active	Crying	Talking	Feeding	Drinking
A	0	116	64	0	41	15	32
B	0	102	78	8	79	30	17
C	11	123	46	13	104	12	26
	11	**341**	**188**	**21**	**224**	**57**	**75**

Child 28	Sleeping	Passive	Active	Crying	Talking	Feeding	Drinking
A	0	133	47	1	55	39	0
B	0	78	102	5	63	13	9
C	0	88	92	13	61	22	3
	0	**299**	**241**	**19**	**179**	**74**	**12**

Child 29	Sleeping	Passive	Active	Crying	Talking	Feeding	Drinking
A	0	94	86	2	83	35	12
B	0	120	60	12	34	32	5
C	47	78	55	8	50	49	10
	47	**292**	**201**	**22**	**167**	**116**	**27**

Child 30	Sleeping	Passive	Active	Crying	Talking	Feeding	Drinking
A	46	53	81	16	40	21	8
B	8	123	49	14	35	23	34
C	0	125	55	10	51	35	4
	54	**301**	**185**	**40**	**126**	**79**	**46**

Child 31	Sleeping	Passive	Active	Crying	Talking	Feeding	Drinking
A	38	106	36	4	55	9	8
B	59	81	40	6	40	25	0
C	31	91	58	10	49	17	14
	128	**278**	**134**	**20**	**144**	**51**	**22**

Child 32	Sleeping	Passive	Active	Crying	Talking	Feeding	Drinking
A	0	146	34	5	108	12	14
B	0	111	69	0	137	17	3
C	65	80	35	8	45	33	3
	65	**337**	**138**	**13**	**290**	**62**	**20**

Table 3. Means and standard deviations of durations of child behaviour during three, three-hour sessions of observations

Sex	Age (mths)	Sleeping Mean	SD	Passive Mean	SD	Active Mean	SD	Crying Mean	SD	Talking Mean	SD	Feeding Mean	SD	Drink Mean	SD
Girls	6-8	89.75	30	412.25	19	38.00	35	33.50	12	6.00	6	60.25	8	12.75	9
Boys	6-8	115.50	38	395.50	25	29.00	37	50.25	21	12.75	15	56.50	19	11.00	2
		102.63		**403.88**		**33.50**		**41.88**		**9.38**		**58.38**		**11.88**	
Girls	12-14	81.25	32	265.00	73	193.75	45	24.75	18	94.75	90	40.50	23	61.75	50
Boys	12-14	113.25	60	304.50	50	122.25	28	41.50	13	44.75	39	51.25	31	37.50	19
		97.25		**284.75**		**158.00**		**33.13**		**69.75**		**45.88**		**49.63**	
Girls	18-20	62.50	67	328.25	64	149.25	43	21.25	20	227.25	109	58.25	10	25.00	8
Boys	18-20	77.25	60	293.75	37	169.00	28	33.25	13	90.50	51	55.50	22	56.00	51
		69.88		**311.00**		**159.13**		**27.25**		**158.88**		**56.88**		**40.50**	
Girls	24-26	5.25	6	327.75	27	207.00	28	25.50	16	208.00	82	69.50	10	31.75	29
Boys	24-26	73.50	37	302.00	25	164.50	34	23.75	12	181.75	74	97.00	28	28.75	12
		39.38		**314.88**		**185.75**		**24.63**		**194.88**		**83.25**		**30.25**	

Table 4. Total waking time of each child

Child	Sex	Age (months)	Obs. Time (minutes)	Sleeping Time (minutes)	Waking Time (minutes)
1	F	6-8	540	105	435
2	F	6-8	540	97	443
3	F	6-8	540	45	495
4	F	6-8	540	112	428
5	M	6-8	540	111	429
6	M	6-8	540	117	423
7	M	6-8	540	164	376
8	M	6-8	540	70	470
9	F	12-14	540	53	487
10	F	12-14	540	126	414
11	F	12-14	540	79	461
12	F	12-14	540	67	473
13	M	12-14	540	58	482
14	M	12-14	540	198	342
15	M	12-14	540	107	433
16	M	12-14	540	90	450
17	F	18-20	540	151	389
18	F	18-20	540	3	537
19	F	18-20	540	76	464
20	F	18-20	540	20	520
21	M	18-20	540	81	459
22	M	18-20	540	0	540
23	M	18-20	540	81	459
24	M	18-20	540	147	393
25	F	24-26	540	0	540
26	F	24-26	540	10	530
27	F	24-26	540	11	529
28	F	24-26	540	0	540
29	M	24-26	540	47	493
30	M	24-26	540	54	486
31	M	24-26	540	128	412
32	M	24-26	540	65	475

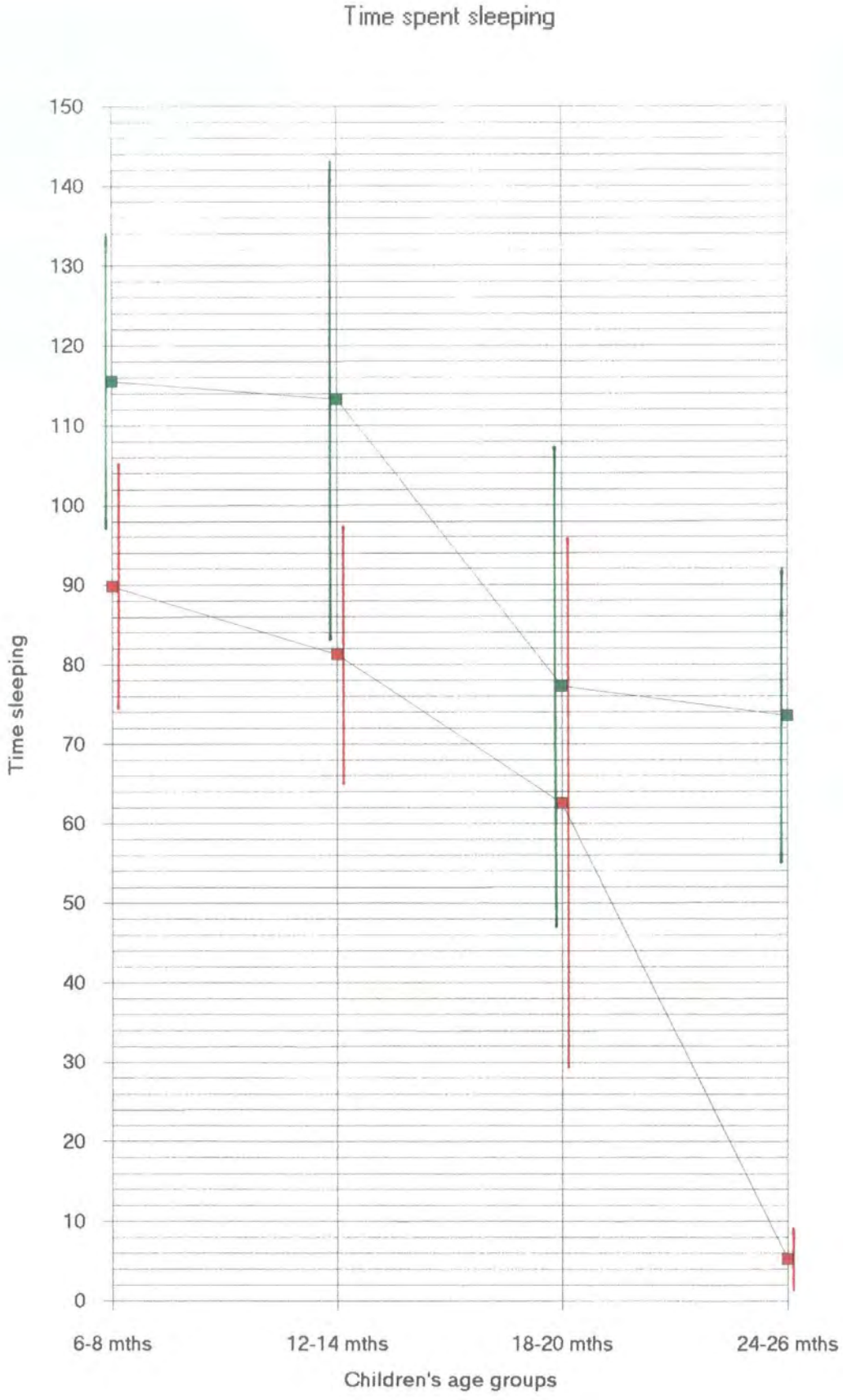
Figure 3 shows the mean time spent sleeping at each age. Older children slept progressively less than younger children, and boys slept consistently more than girls. At 6-8 months there was a sex difference of almost 25 minutes in nine hours. At 24-26 months there was almost 70 minutes difference between the boys and the girls, with girls averaging just over five minutes sleep and boys over 70 minutes during the nine hours of observations.

A 2 x 2 ANOVA of the individual totals of the children confirms that there were both age and sex differences at 5% levels of significance. Overall, older children slept less than younger ones, $F(3,31)=3.274$, $p<.05$, and boys slept more than girls, $F(1,31)=4.802$, $p<.05$, during the nine hours of observations (see Table 5).

Table 5. Durations of child sleeping

Source of Variation	Sum of Squares	DF	Mean Square	F	Sig of F
Main Effects	30167.625	4	7541.906	3.656	.018
AGE	20262.344	3	6754.115	3.274	.038
SEX	9905.281	1	9905.281	4.802	.038
2-Way Interactions	3220.094	3	1073.365	.520	.672
AGE SEX	3220.094	3	1073.365	.520	.672
Explained	33387.719	7	4769.674	2.312	.059
Residual	49508.750	24	2062.865		
Total	82896.469	31	2674.080		

As there is no significant age by sex interaction, and the relationship with age is reasonably linear, the data can be summarised as the linear regression of sleeping time on age, with sex as a covariate.



Mean (+/- standard error) of time spent sleeping during 540 minutes of observation. Girls are shown in red, boys in green.

Fig. 3

The regression equation is: $\hat{y} = 114.0 + 35.0\ (x1) - 3.6\ (x2)$, where $\hat{y}$ is the predicted (average) sleeping time in minutes, per nine hours observation, x1 is sex (0 = female, 1 = male) and x2 is age in months. The F-ratio is 7.7 which, with 2 and 29 degrees of freedom, is significant at $p < 0.01$. On average, boys sleep four minutes per hour (35.0/9) more than girls, or 48 minutes in a 12 hour working day.

Analysis of the durations of 'passive' and 'active' indicates that the girls' sleeping less was associated with more time spent 'active'. ANOVAs of individual scores revealed that there was no significant sex difference in durations of 'passive', but girls were more 'active' than boys, $F(1,31)=4.261$, $p<.05$ (see Table 6). The mean duration of 'passive' was 333 for the girls and 324 for the boys. The mean duration of 'active' was 147 for the girls and 49 for the boys.

Table 6. Durations of child activity

Source of Variation	Sum of Squares	DF	Mean Square	F	Sig of F
Main Effects	117214.625	4	29303.656	23.425	.000
AGE	111884.344	3	37294.781	29.813	.000
SEX	5330.281	1	5330.281	4.261	.050
2-Way Interactions	9448.844	3	3149.615	2.518	.082
AGE SEX	9448.844	3	3149.615	2.518	.082
Explained	126663.469	7	18094.781	14.465	.000
Residual	30023.250	24	1250.969		
Total	156686.719	31	5054.410		

Further comparisons between the behavioural records of children of different age groups and sex were based on the times during which the children were

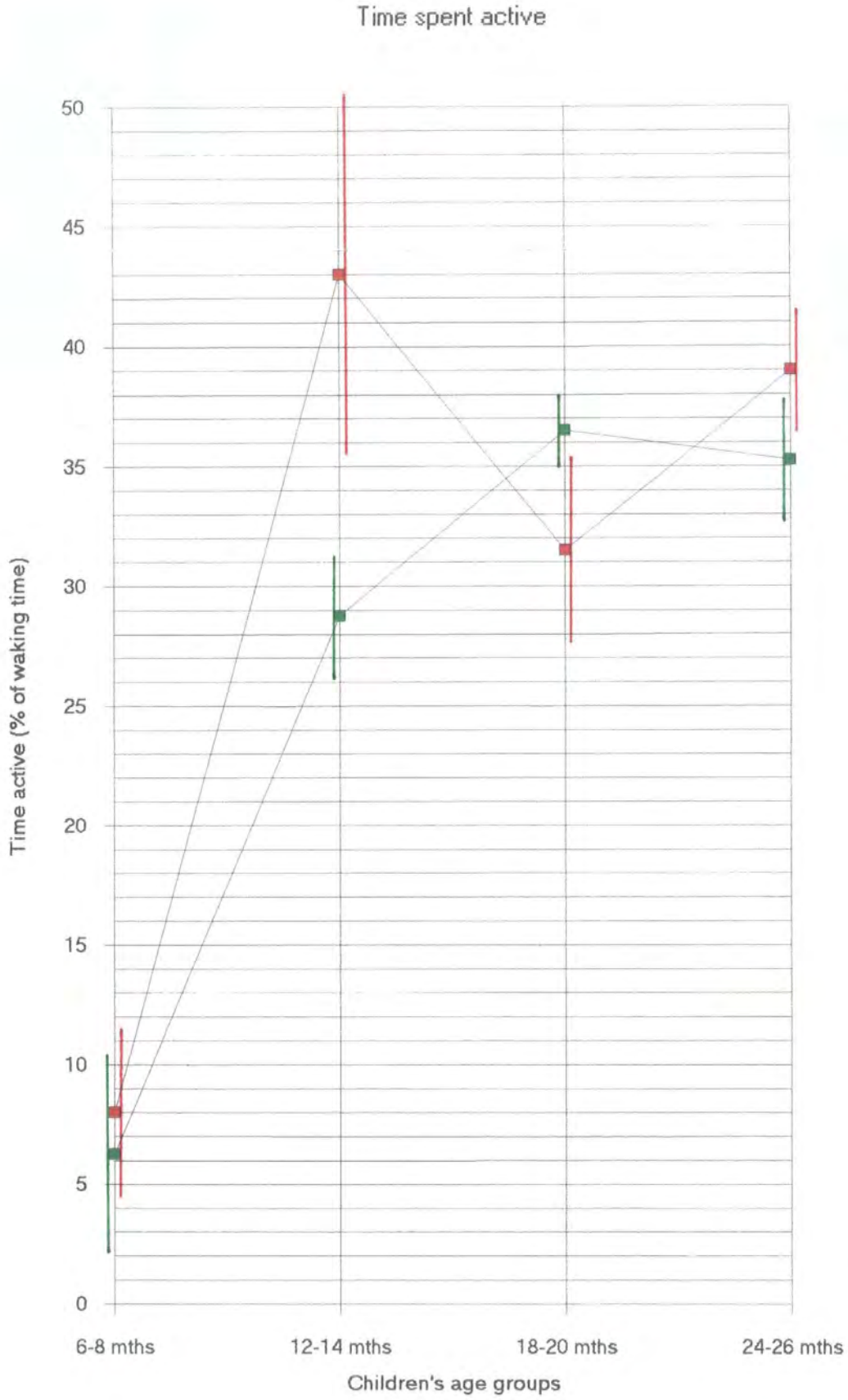
awake. The counts of the behaviour codes were divided by the child's waking time counts and expressed as a percentage (see appendix B).

To examine the extent to which these children's behaviours varied between the age groups and sex, 2 x 2 ANOVAs were carried out on the waking time percentages of activity, talking, crying, feeding and drinking. As the child was recorded as active or passive (mutually exclusive) within each minute and both totals are now expressed as percentages of the child's waking time, the sum of these equals 100%. Analyses were therefore restricted to the 'active' percentages. Graphs show the size and direction of differences.

A 2 x 2 ANOVA of the individual activity scores as percentages of waking time showed an age effect, but no significant sex difference, nor an age by sex interaction (see Table 7). The results indicate that the reason girls were observed to be significantly more active than boys, during the total time of 540 minutes, was because they were awake longer, rather than because they were more active when awake (Figure 4).

Table 7. Durations of child activity, as a percentage of waking time

Source of Variation	Sum of Squares	DF	Mean Square	F	Sig of F
Main Effects	5036.125	4	1259.031	23.456	.000
AGE	4927.344	3	1642.448	30.599	.000
SEX	108.781	1	108.781	2.027	.167
2-Way Interactions	381.594	3	127.198	2.370	.096
AGE SEX	381.594	3	127.198	2.370	.096
Explained	5417.719	7	773.960	14.419	.000
Residual	1288.250	24	53.677		
Total	6705.969	31	216.322		



Mean (+/- standard error) of time spent active during 540 minutes of observation, expressed as % of waking time. Girls are shown in red, boys in green.

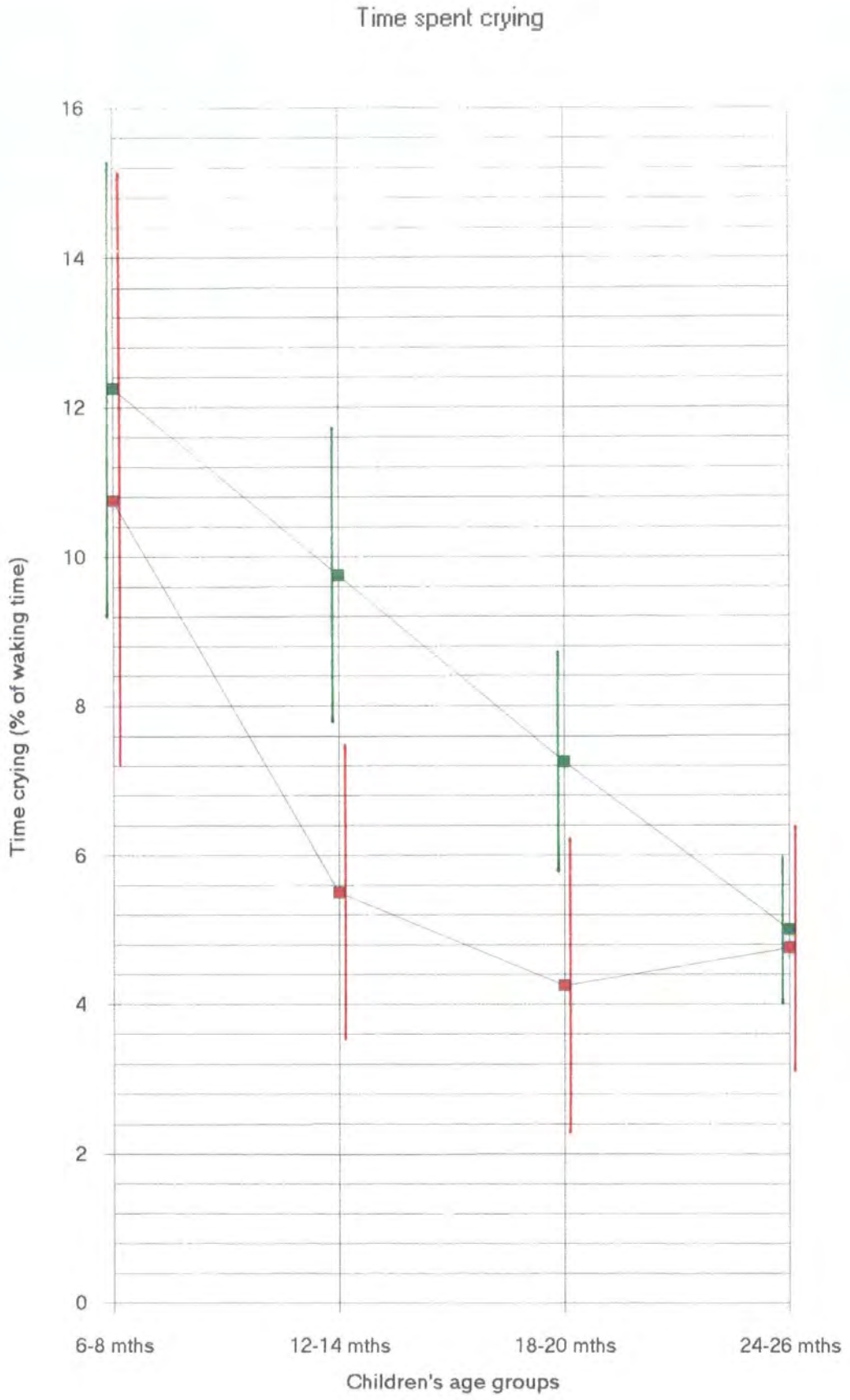
Fig. 4

As expected, older children were more active than younger ones, as a proportion of their waking time, with the same high level of significance as with raw totals $F(3,31)=30.599$, $p<.001$.

We now consider crying and talking. At the age of 6-8 months, group totals reveal that boys spent approximately 12 percent of their waking time crying, and girls almost 11 percent (see Fig. 5). These percentages decreased steadily, with age, to approximately six percent for all children at the age of 24-26 months. A 2 x 2 ANOVA showed that the difference between boys and girls in the percentage of their waking time spent crying was not statistically significant (see Table 8) but a difference was found between the different age groups. Younger children cried significantly more than older children, $F(3,31)=3.435$, $p<.05$. There was no significant age by sex interaction.

Table 8. Durations of child crying, as a percentage of waking time

Source of Variation	Sum of Squares	DF	Mean Square	F	Sig of F
Main Effects	248.125	4	62.031	3.079	.035
AGE	207.625	3	69.208	3.435	.033
SEX	40.500	1	40.500	2.010	.169
2-Way Interactions	18.250	3	6.083	.302	.824
AGE SEX	18.250	3	6.083	.302	.824
Explained	266.375	7	38.054	1.889	.116
Residual	483.500	24	20.146		
Total	749.875	31	24.190		



Mean (+/- standard error) of time spent crying during 540 minutes of observation, expressed as % of waking time. Girls are shown in red, boys in green.

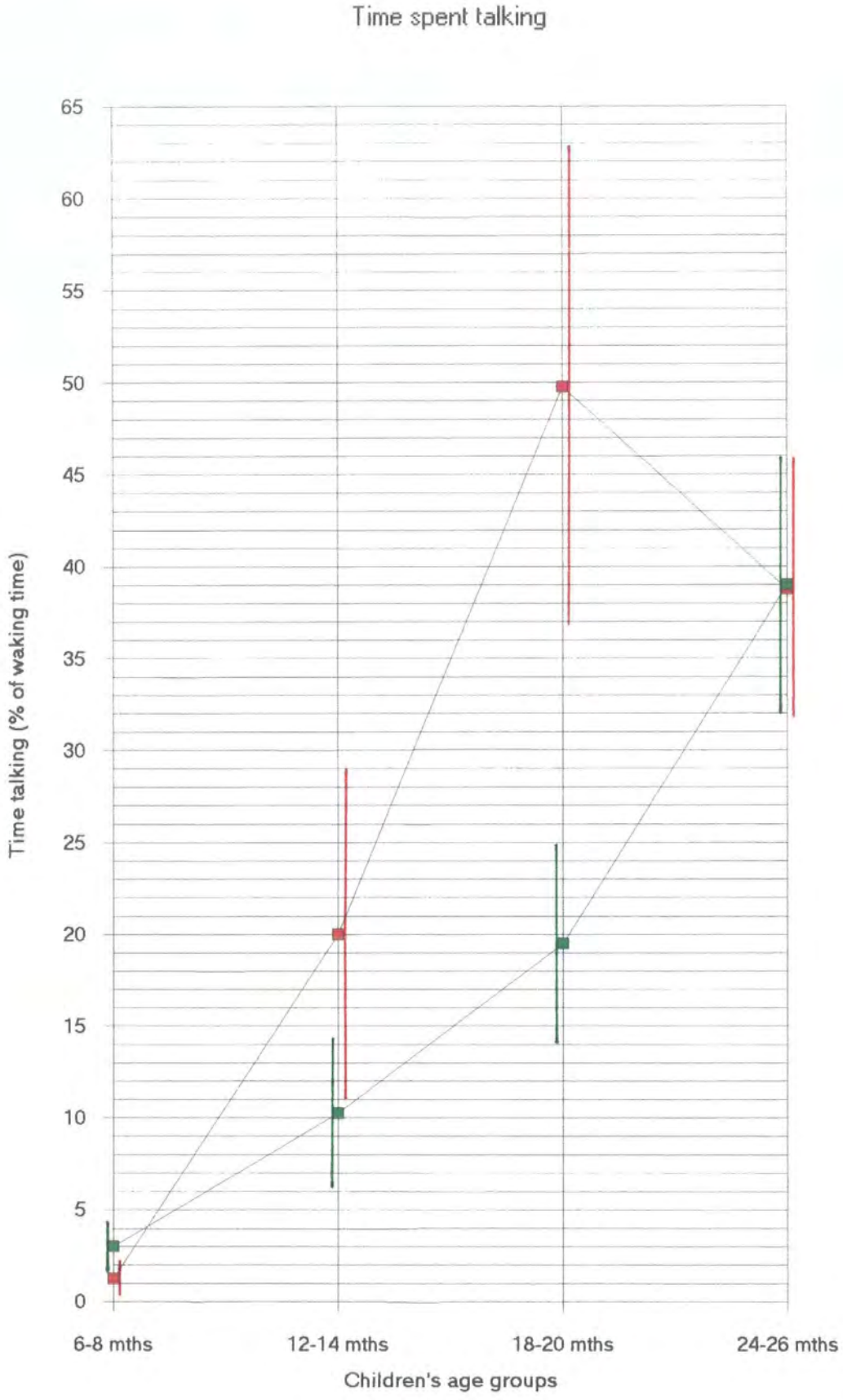
Fig. 5

At the age of 6-8 months, the children spent little time talking (see Fig. 6). As expected, however, there was a highly significant age difference in time spent talking, $F(3,31)=11.300$, $P<.001$. There is some indication in the data that girls talk more at an earlier age, though a 2 x 2 ANOVA shows that neither the sex difference nor the age by sex interaction are significant (see Table 9).

We consider next feeding and drinking behaviours. Group totals show that both boys and girls spent approximately 13 percent of their waking time feeding at the age of 6-8 months (see Fig 7). This percentage changed only slightly with age. Boys remained the same until 18-20 months then increased to just over 16 percent of their waking time at the ages of 24-26 months. Girls decreased to about nine percent at the age of 12-14 months, then reverted back to approximately 13 percent at 18-20 months, and remained fairly constant.

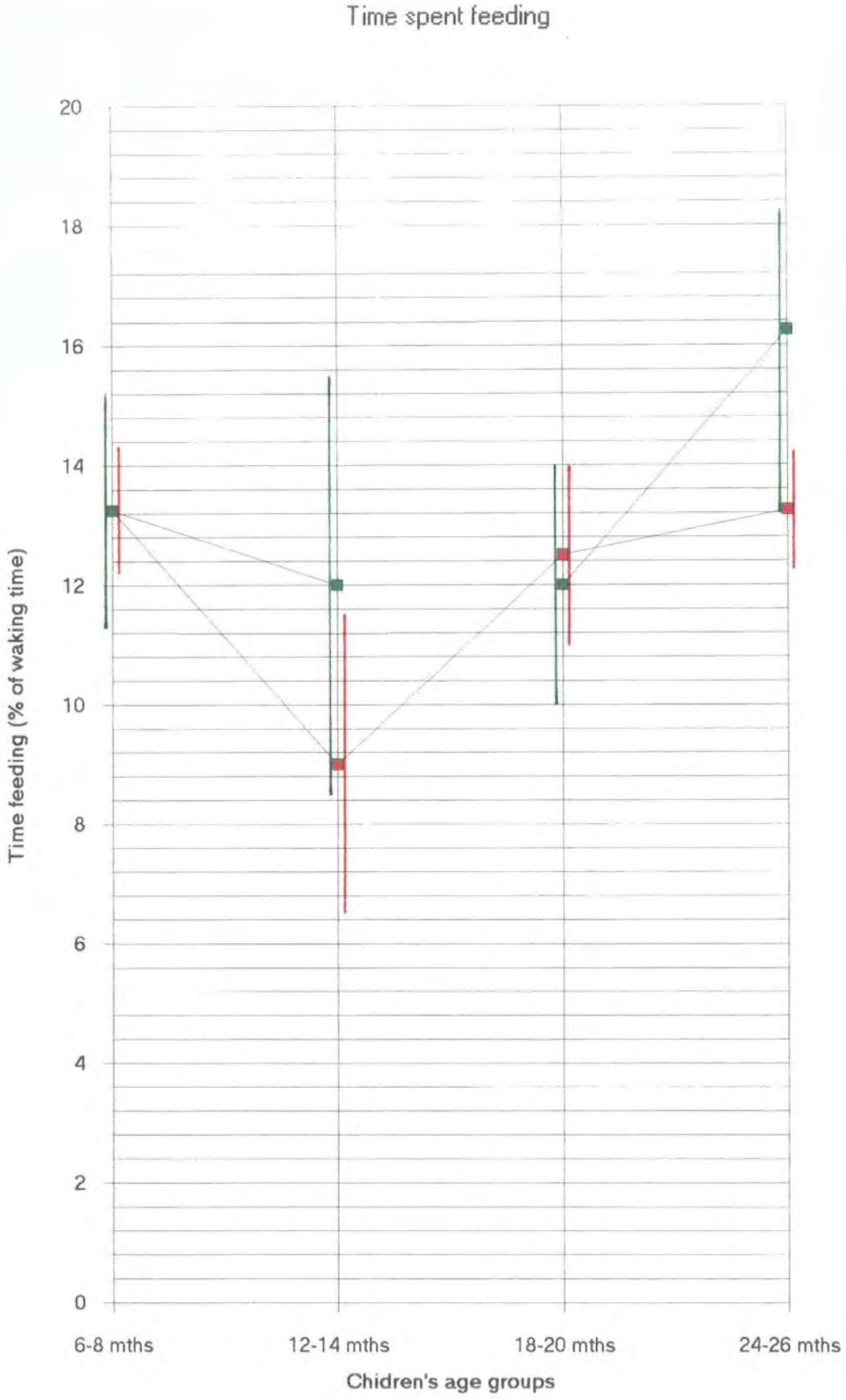
Table 9. Durations of child talking, as a percentage of waking time

Source of Variation	Sum of Squares	DF	Mean Square	F	Sig of F
Main Effects	7798.375	4	1949.594	9.339	.000
AGE	7076.375	3	2358.792	11.300	.000
SEX	722.000	1	722.000	3.459	.075
2-Way Interactions	1304.500	3	434.833	2.083	.129
AGE SEX	1304.500	3	434.833	2.083	.129
Explained	9102.875	7	1300.411	6.230	.000
Residual	5010.000	24	208.750		
Total	14112.875	31	455.254		



Mean (+/- standard error) of time spent talking during 540 minutes of observation, expressed as % of waking time. Girls are shown in red, boys in green.

Fig. 6



Mean (+/- standard error) of time spent feeding during 540 minutes of observation, expressed as % of waking time. Girls are shown in red, boys in green.

Fig. 7

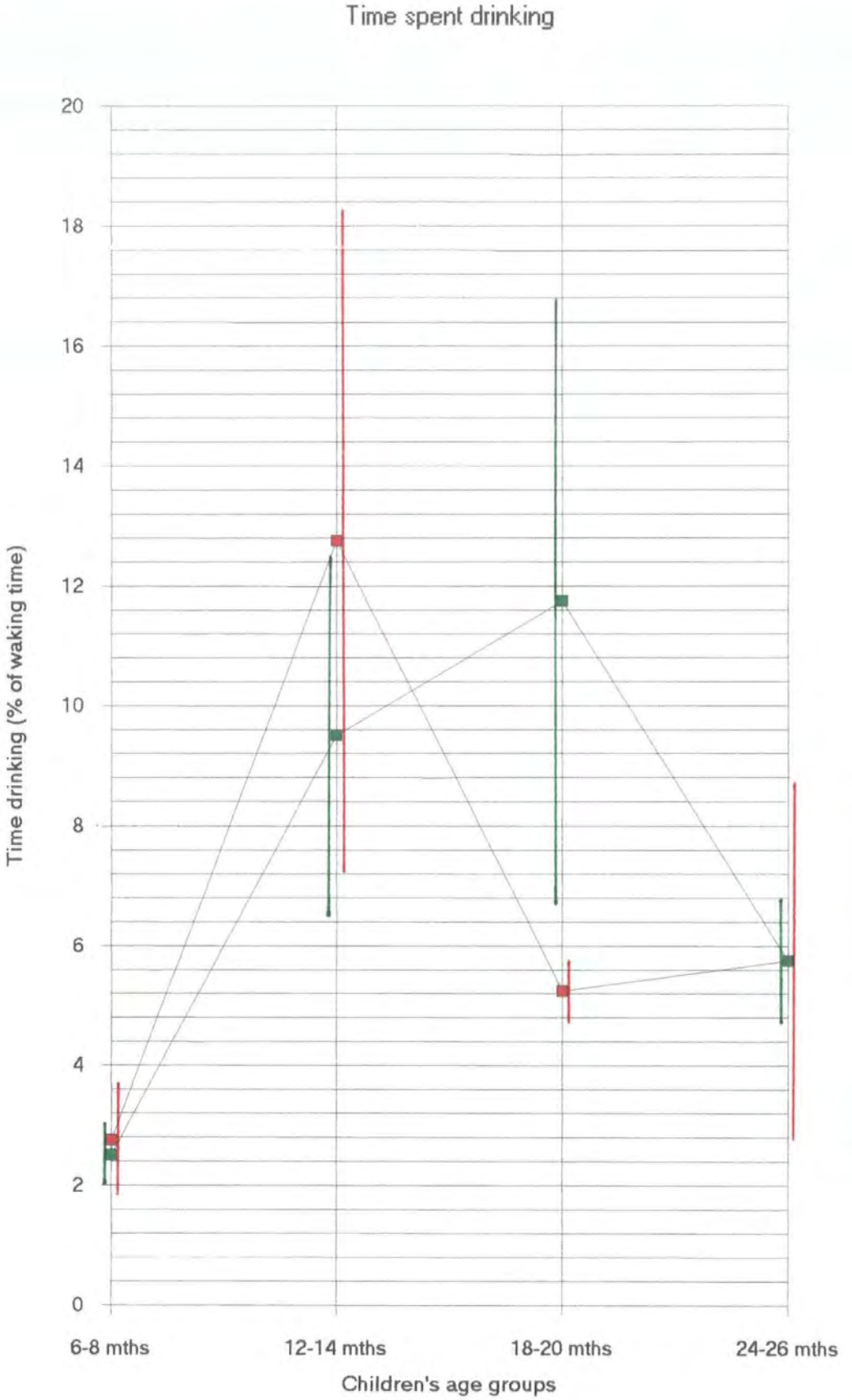
A 2 x 2 ANOVA of the individual child observation scores (as percentages of their waking time) showed that there was no statistically significant age or sex differences in the percentage of time children spent feeding.

At the age of 6-8 months children spent just over two percent of their waking time drinking liquids other than formula milk (see Fig. 8). This increased rapidly for both boys and girls at the ages of 12-14 months. By the age of 24-26 months all children had decreased to spending approximately six percent of their waking time drinking liquids. A 2 x 2 ANOVA showed that there were no significant age or sex differences in the times spent drinking liquids.

That concludes the data on the child measures. We now turn to the recordings of the observations of each caretaker interacting with the child.

Totals for each caretaker over nine hours (540 minutes) are recorded for care, holding, talking, breast feeding, formula feeding, solid feeding, and the giving of drinks. These are shown in tables 10a to 10d. Group means are to be found in Table 11. As before these totals are considered in analyses as a proportion of the child's waking time (see appendix C).

Group means show that caretakers spent approximately ten percent of the waking time of 6-8 month old children attending to them (see Fig. 9). This remained fairly constant after that. There was very little difference in the amount of care given to the boys and the girls. A 2 x 2 ANOVA revealed that there was a significant age difference in the amount of care given to the children, $F(3,31)=5,69$, $p<.01$. There was no significant sex difference.



Mean (+/- standard error) of time spent drinking during 540 minutes of observation, expressed as % of waking time. Girls are shown in red, boys in green.

Fig. 8

Table 10a. Totals of observations of caretaker interactions with 6-8 month old children, during three, three-hour sessions.

Child 1	Care	Talking	Holding	Breast	Formula	Solid	Drinking
A	9	120	53	0	8	7	0
B	18	95	42	0	0	9	10
C	9	93	53	0	10	6	0
	36	**308**	**148**	**0**	**18**	**22**	**10**
Child 2	Care	Talking	Holding	Breast	Formula	Solid	Drinking
A	18	122	52	0	13	16	0
B	23	121	62	0	3	17	13
C	6	91	70	0	0	19	9
	47	**334**	**184**	**0**	**16**	**52**	**22**
Child 3	Care	Talking	Holding	Breast	Formula	Solid	Drinking
A	37	113	35	0	0	14	8
B	20	84	22	0	0	9	5
C	19	85	18	0	0	12	2
	76	**282**	**75**	**0**	**0**	**35**	**15**
Child 4	Care	Talking	Holding	Breast	Formula	Solid	Drinking
A	6	31	25	0	5	0	1
B	19	72	74	0	15	9	2
C	8	34	24	0	9	12	0
	33	**137**	**123**	**0**	**29**	**21**	**3**
Child 5	Care	Talking	Holding	Breast	Formula	Solid	Drinking
A	16	67	45	0	6	11	0
B	10	34	38	0	6	10	0
C	10	58	16	6	0	7	0
	36	**159**	**99**	**6**	**12**	**28**	**0**
Child 6	Care	Talking	Holding	Breast	Formula	Solid	Drinking
A	31	32	14	0	12	14	0
B	9	23	5	0	0	17	10
C	28	36	25	0	16	8	4
	68	91	44	0	28	39	14
Child 7	Care	Talking	Holding	Breast	Formula	Solid	Drinking
A	12	45	29	0	8	19	6
B	9	32	14	0	1	21	3
C	14	28	62	0	9	0	0
	35	105	105	0	18	40	9
Child 8	Care	Talking	Holding	Breast	Formula	Solid	Drinking
A	17	79	25	0	4	17	4
B	6	51	7	0	7	16	2
C	11	86	22	0	2	32	5
	34	216	54	0	13	65	11

Table 10b. Totals of caretaker interactions with 12-14 month old children, during three, three-hour sessions.

Child 9	Care	Talking	Holding	Breast	Formula	Solid	Drinking
A	11	61	18	0	0	0	2
B	14	87	4	0	0	11	1
C	6	56	9	0	0	2	1
	31	204	31	0	0	13	4
Child 10	Care	Talking	Holding	Breast	Formula	Solid	Drinking
A	6	86	19	0	0	6	1
B	2	71	13	0	0	5	2
C	13	105	4	0	0	23	2
	21	262	36	0	0	34	5
Child 11	Care	Talking	Holding	Breast	Formula	Solid	Drinking
A	21	121	41	0	0	13	9
B	8	84	19	0	0	9	1
C	10	111	27	0	0	6	2
	39	316	87	0	0	28	12
Child 12	Care	Talking	Holding	Breast	Formula	Solid	Drinking
A	1	32	47	0	0	0	33
B	5	67	49	0	0	12	28
C	2	68	60	0	0	1	29
	8	167	156	0	0	13	90
Child 13	Care	Talking	Holding	Breast	Formula	Solid	Drinking
A	11	90	22	0	0	7	8
B	9	98	53	0	0	5	18
C	0	43	12	0	0	17	3
	20	231	87	0	0	29	29
Child 14	Care	Talking	Holding	Breast	Formula	Solid	Drinking
A	2	35	5	0	0	0	4
B	11	84	5	0	0	23	12
C	5	57	10	0	0	1	5
	18	176	20	0	0	24	21
Child 15	Care	Talking	Holding	Breast	Formula	Solid	Drinking
A	6	34	41	0	0	3	3
B	8	48	41	0	0	7	5
C	7	35	19	0	0	13	3
	21	117	101	0	0	23	11
Child 16	Care	Talking	Holding	Breast	Formula	Solid	Drinking
A	28	124	22	0	0	13	1
B	8	54	14	0	0	13	3
C	15	112	20	0	0	17	3
	51	290	56	0	0	43	7

Table 10c. Totals of caretaker interactions with 18-20 month old children, during three, three hour sessions.

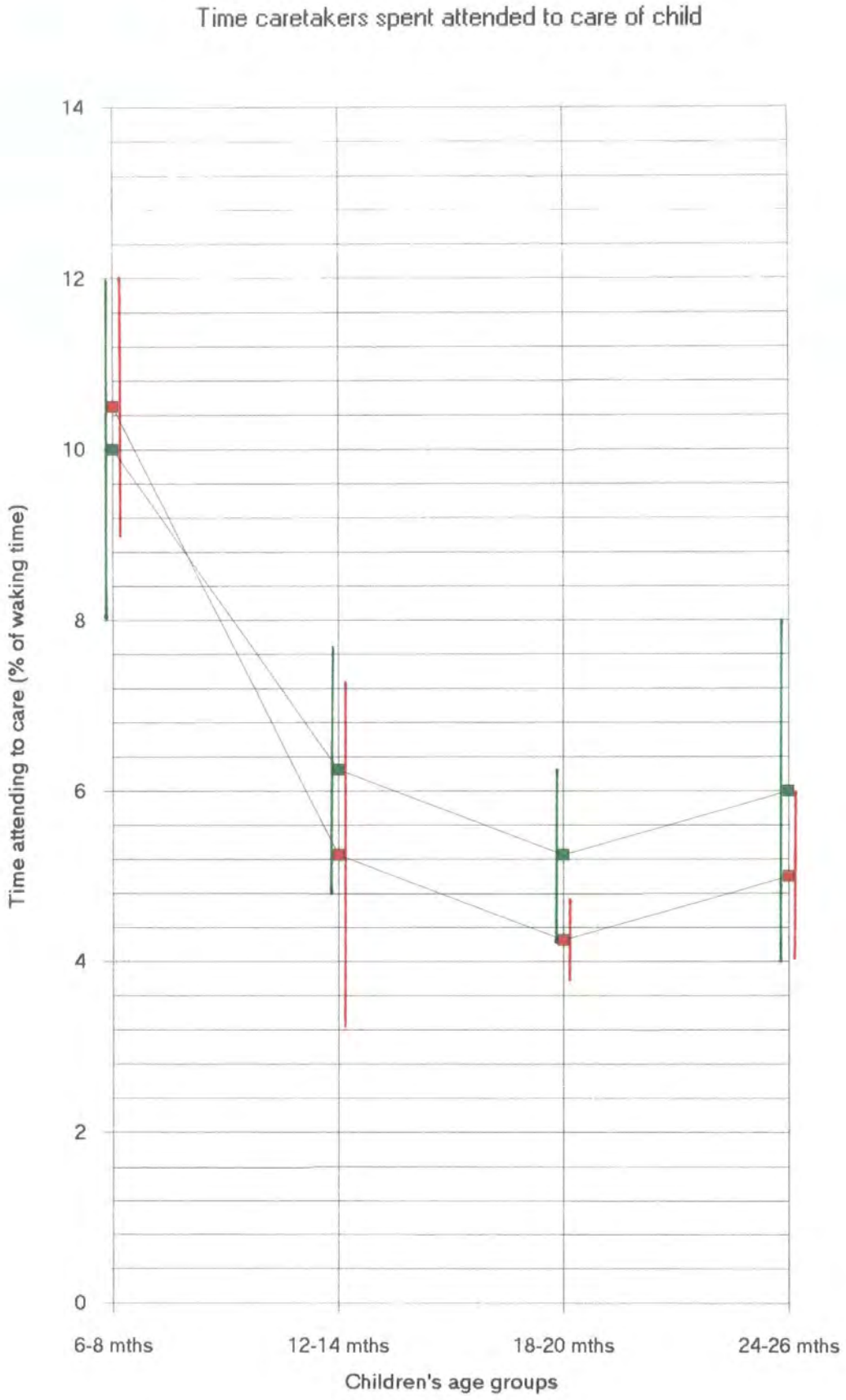
Child 17	Care	Talking	Holding	Breast	Formula	Solid	Drinking
A	8	55	1	0	0	7	3
B	11	61	14	0	0	6	1
C	0	43	8	0	0	4	1
	19	159	23	0	0	17	5
Child 18	Care	Talking	Holding	Breast	Formula	Solid	Drinking
A	6	87	34	0	0	1	4
B	3	70	11	0	0	15	3
C	8	43	24	0	0	16	2
	17	200	69	0	0	32	9
Child 19	Care	Talking	Holding	Breast	Formula	Solid	Drinking
A	6	113	0	0	0	1	2
B	4	80	0	0	0	4	2
C	10	121	6	0	0	6	1
	20	314	6	0	0	11	5
Child 20	Care	Talking	Holding	Breast	Formula	Solid	Drinking
A	12	116	40	0	0	8	4
B	8	93	44	0	0	4	7
C	7	82	36	0	0	3	6
	27	291	120	0	0	15	17
Child 21	Care	Talking	Holding	Breast	Formula	Solid	Drinking
A	16	52	1	0	0	5	6
B	2	34	0	0	0	3	2
C	1	114	8	0	0	2	2
	19	200	9	0	0	10	10
Child 22	Care	Talking	Holding	Breast	Formula	Solid	Drinking
A	11	71	27	0	0	3	3
B	14	62	4	0	0	5	6
C	16	70	22	0	0	4	2
	41	203	53	0	0	12	11
Child 23	Care	Talking	Holding	Breast	Formula	Solid	Drinking
A	10	94	10	0	0	5	4
B	2	49	1	0	0	3	3
C	1	99	24	0	0	2	3
	13	242	35	0	0	10	10
Child 24	Care	Talking	Holding	Breast	Formula	Solid	Drinking
A	14	115	24	0	0	14	4
B	5	56	15	0	0	14	3
C	3	74	30	0	0	4	2
	22	245	69	0	0	32	9

Table 10d. Totals of caretaker interactions with 24-26 month old children, during three, three-hour sessions.

Child 25	Care	Talking	Holding	Breast	Formula	Solid	Drinking
A	6	119	5	0	0	6	4
B	5	125	36	0	0	4	1
C	0	103	11	0	0	9	5
	11	347	52	0	0	19	10
Child 26	Care	Talking	Holding	Breast	Formula	Solid	Drinking
A	11	57	9	0	0	2	3
B	14	108	28	0	0	20	2
C	9	70	20	0	0	3	2
	34	235	57	0	0	25	7
Child 27	Care	Talking	Holding	Breast	Formula	Solid	Drinking
A	12	69	27	0	0	2	2
B	11	150	41	0	0	4	2
C	12	131	47	0	0	2	2
	35	350	115	0	0	8	6
Child 28	Care	Talking	Holding	Breast	Formula	Solid	Drinking
A	4	62	26	0	0	4	1
B	13	61	3	0	0	4	2
C	10	78	8	0	0	3	1
	27	201	37	0	0	11	4
Child 29	Care	Talking	Holding	Breast	Formula	Solid	Drinking
A	15	83	2	0	0	3	3
B	7	50	19	0	0	9	2
C	17	63	6	0	0	5	6
	39	196	27	0	0	17	11
Child 30	Care	Talking	Holding	Breast	Formula	Solid	Drinking
A	5	51	23	0	0	4	3
B	0	42	84	0	0	3	3
C	0	47	6	0	0	2	3
	5	140	113	0	0	9	9
Child 31	Care	Talking	Holding	Breast	Formula	Solid	Drinking
A	17	79	7	0	0	14	2
B	4	39	1	0	0	3	4
C	1	51	1	0	0	4	2
	22	169	9	0	0	21	8
Child 32	Care	Talking	Holding	Breast	Formula	Solid	Drinking
A	28	70	13	0	0	3	0
B	6	73	2	0	0	13	2
C	13	50	2	0	0	3	1
	47	193	17	0	0	19	3

Table 11. Means and standard deviations of durations of different caregiving behaviours, during three, three-hour sessions of observations

Sex	Age (mths)	Care Means	SD	Talking Means	SD	Holding Means	SD	Breast Means	SD	Formula Means	SD	Solid Means	SD	Drink Means	SD
Girls	6-8	48.00	20	265.25	88	132.50	46	0	0	15.75	12	32.50	14	12.50	8
Boys	6-8	43.25	17	142.75	57	75.50	31	1.50	3	17.75	7	43.00	16	8.50	6
		45.63		204.00		104.00		0.75		16.75		37.75		10.50	
Girls	12-14	24.75	13	237.25	65	77.50	58	0	0	0	0	22.00	11	27.75	42
Boys	12-14	27.50	16	203.50	74	66.00	36	0	0	0	0	29.75	9	17.00	10
		26.13		220.38		71.75		0		0		25.88		22.38	
Girls	18-20	20.75	4	241.00	74	54.50	51	0	0	0	0	18.75	9	9.00	6
Boys	18-20	23.75	12	222.50	24	41.50	26	0	0	0	0	16.00	11	10.00	1
		22.25		231.75		48.00		0		0		17.38		9.50	
Girls	24-26	26.75	11	283.25	77	65.25	34	0	0	0	0	15.75	8	6.75	3
Boys	24-26	28.25	19	174.50	26	41.50	48	0	0	0	0	16.50	5	7.75	3
		27.50		228.88		53.38		0		0		16.13		7 25	



Mean (+/- standard error) of time spent attending to child care during 540 minutes of observation, expressed as % of waking time. Girls are shown in red, boys in green.

Fig. 9

in the observed amount of care, during a child's waking time, or a significant interaction between the two (see Table 12).

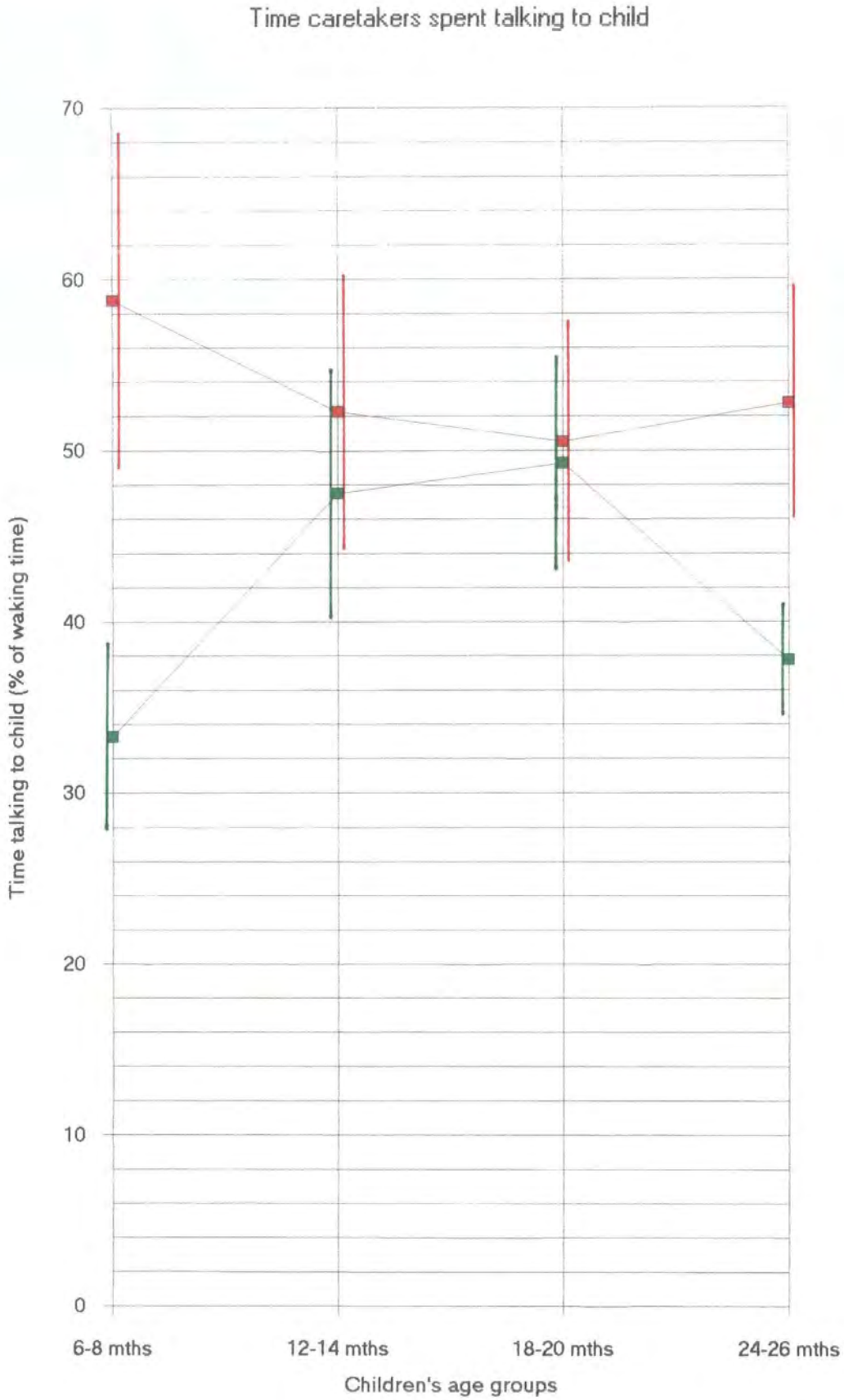
Table 12. Caretaker durations of care, as a percentage of child's waking time

Source of Variation	Sum of Squares	DF	Mean Square	F	Sig of F
Main Effects	152.500	4	38.125	4.357	.009
AGE	149.375	3	49.792	5.690	.004
SEX	3.125	1	3.125	.357	.556
2-Way Interactions	3.375	3	.125	.129	.942
AGE SEX	3.375	3	1.125	.129	.942
Explained	155.875	7	22.268	2.545	.041
Residual	210.000	24	8.750		
Total	365.875	31	11.802		

We now consider speech directed to the index children. Figure 10 shows that caretakers spent more of a child's waking time talking to girls than to boys. A 2 x 2 ANOVA showed that age differences were not significant but there was a small sex difference, $F(1,31)=5.596$, $p<.05$. (see Table 13).

Table 13. Caretaker durations of talking, as a percentage of child waking time

Source of Variation	Sum of Squares	DF	Mean Square	F	Sig of F
Main Effects	1227.875	4	306.969	1.589	.210
AGE	146.750	3	48.917	.253	.858
SEX	1081.125	1	1081.125	5.596	.026
2-Way Interactions	717.625	3	239.208	1.238	.318
AGE SEX	717.625	3	239.208	1.238	.318
Explained	1945.500	7	277.929	1.439	.236
Residual	4636.500	24	193.188		
Total	6582.000	31	212.323		



Mean (+/- standard error) of time spent talking to child during 540 minutes of observation, expressed as % of waking time. Girls are shown in red, boys in green.

Fig. 10

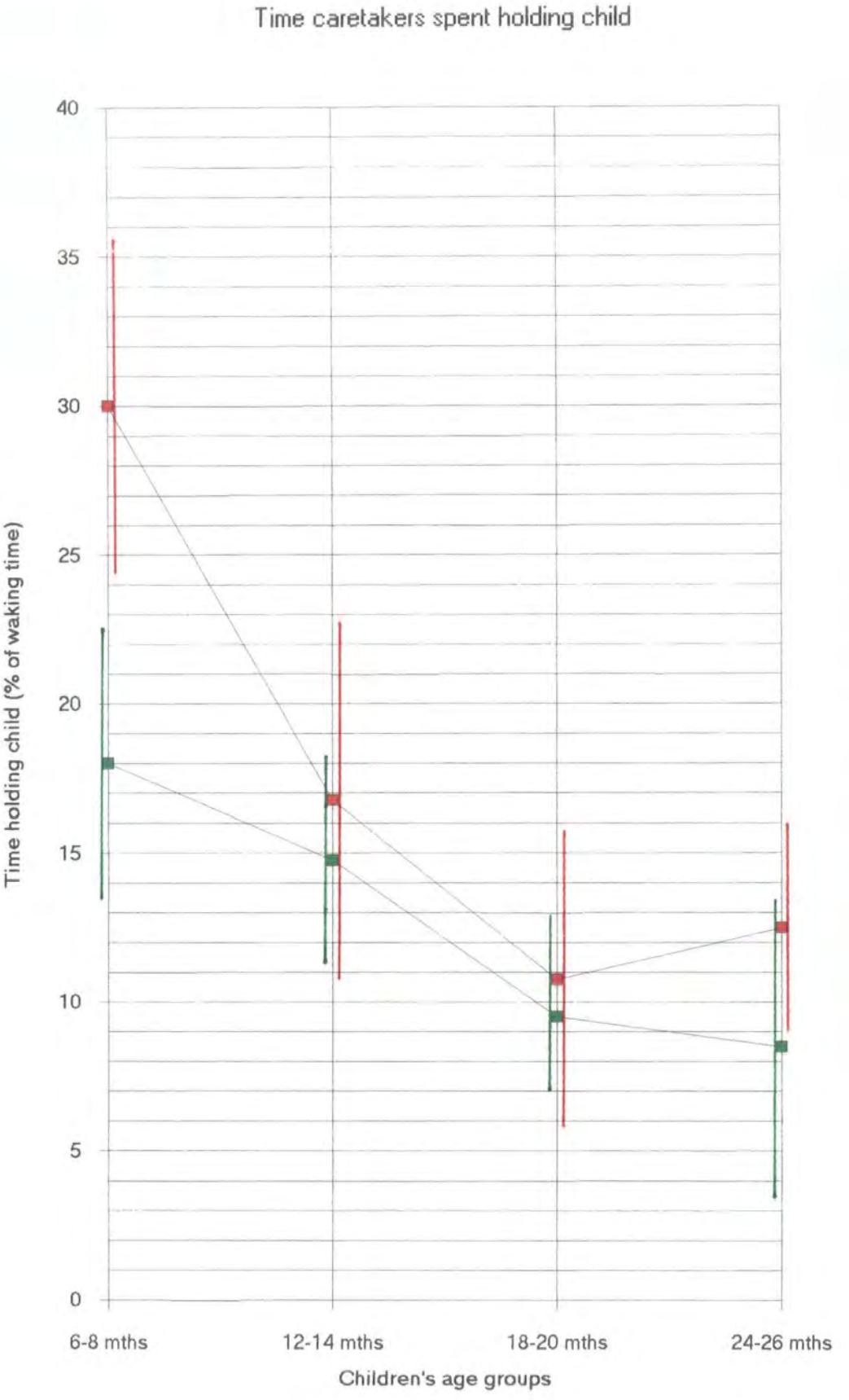
Next we consider holding the index child. Figure 11 shows the mean waking time the caretakers spent holding their children. A 2 x 2 ANOVA showed that caretakers hold younger children more than older children, $F(3,31)=3.921$, $P<.025$, but there was no significant sex difference, nor an age by sex interaction (see Table 14).

Table 14. Caretaker durations of holding, as a percentage of child's waking time

Source of Variation	Sum of Squares	DF	Mean Square	F	Sig of F
Main Effects	1189.625	4	297.406	3.483	.022
AGE	1004.344	3	334.781	3.921	.021
SEX	185.281	1	185.281	2.170	.154
2-Way Interactions	145.844	3	48.615	.569	.641
AGE SEX	145.844	3	48.615	.569	.641
Explained	1335.469	7	190.781	2.234	.067
Residual	2049.250	24	85.385		
Total	3384.719	31	109.184		

We now consider breast feeding, formula feeding, and solid feeding. Breast milk was only offered to one of the observed children, and for only one percent of his waking time, so the individual totals of the offer of breast milk and formula milk were added together and classed as feeding milk.

After the age of 6-8 months, none of the caretakers was observed to offer their children milk. Group totals indicate that 6-8 month old girls were offered milk for approximately 3.75 percent of their waking time. Boys at this age were offered milk for approximately 4.5 percent of their waking time. A t-test was carried out on the results at 6-8 months, but a significant sex difference was not obtained ($t=0.60$, df 6, $p>0.5$).



Mean (+/- standard error) of time spent holding child during 540 minutes of observation, expressed as % of waking time. Girls are shown in red, boys in green.

Fig. 11

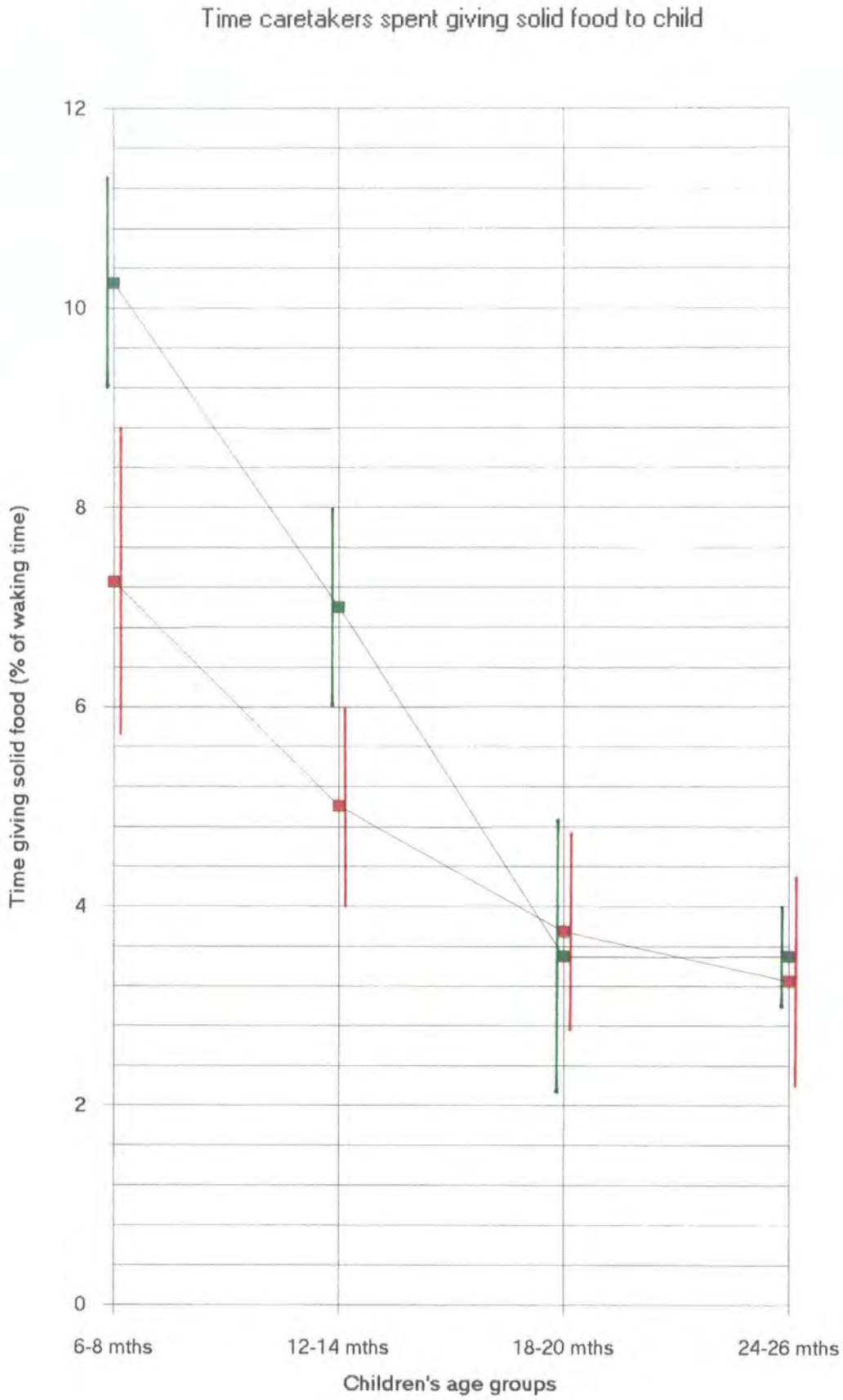
With children aged 6-8 months, caretakers spend slightly more of a child's waking time offering solid foods to boys than to girls (see Fig. 12). The offers of solid foods to all children steadily decreased to approximately four percent of their waking time, at 18-20 months, then remained constant at 24-26 months.

A 2 x 2 ANOVA, of the individual percentages of waking time children were offered solid foods, showed that caretakers spent more time offering solid foods to younger children. The difference attained a very high level of statistical significance, $F(3,31)=8.669$, $p<.001$ (see Table 15). There was no significant sex difference, nor an age by sex interaction.

Table 15. Caretaker durations of solid feeding, as a percentage of child's waking time

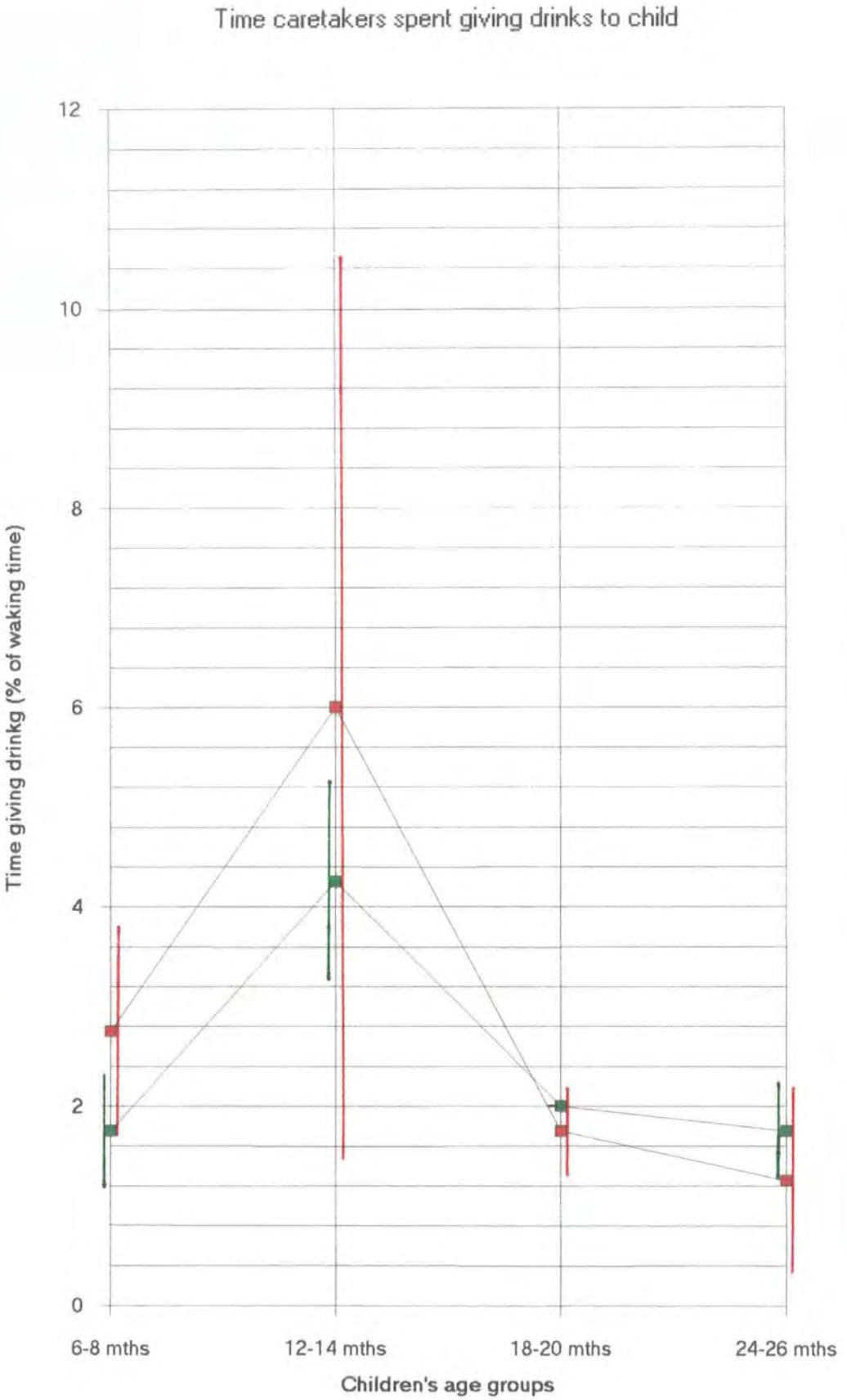
Source of Variation	Sum of Squares	DF	Mean Square	F	Sig of F
Main Effects	163.125	4	40.781	7.041	.001
AGE	150.625	3	50.208	8.669	.000
SEX	12.500	1	12.500	2.158	.155
2-Way Interactions	13.750	3	4.583	.791	.511
AGE SEX	13.750	3	4.583	.791	.511
Explained	176.875	7	25.268	4.363	.003
Residual	139.000	24	5.792		
Total	315.875	31	10.190		

Finally, we consider drinks. Figure 13 shows the mean waking time caretakers gave drinks to their children. The percentage increased from between two to three percent at the age of 6-8 months old, to over four percent for boys and just under six percent for girls, at 12-14 months of age. This corresponds with the rapid increase in the percentage of waking time children spent drinking liquids at this age, and with the children no longer



Mean (+/- standard error) of time spent giving solid food to child during 540 minutes of observation, expressed as % of waking time. Girls are shown in red, boys in green.

Fig. 12



Mean (+/- standard error) of time spent giving drinks to child during 540 minutes of observation, expressed as % of waking time. Girls are shown in red, boys in green.

Fig. 13

being given formula milk. The offers declined for both groups of children to between one and two percent of their waking time at 24-26 months. The percentage of waking time drinks were offered to the observed children follow the same pattern for both the boys and the girls. No significant age or sex differences were found by a 2 x 2 ANOVA of the individual percentages of waking time children were offered drinks (see Table 16)

Table 16. Caretaker durations of giving drinks, as a percentage of child's waking time

Source of Variation	Sum of Squares	DF	Mean Square	F	Sig of F
Main Effects	67.625	4	16.906	1.570	.215
AGE	65.625	3	21.875	2.031	.136
SEX	2.000	1	2.000	.186	.670
2-Way Interactions	6.750	3	2.250	.209	.889
AGE SEX	6.750	3	2.250	.209	.889
Explained	74.375	7	10.625	.986	.464
Residual	258.500	24	10.771		
Total	32.875	31	10.738		

The analyses presented in this chapter assume that variability is constant across groups. However, where proportions are analysed the variability of scores is often related to the mean, and with data if this kind an Arc sine transformation is often used to stabilise the variance across groups (Everitt, 1995). The Arc sine transformation of a proportion, p, is $\sin^{-1}\sqrt{p}$.

The Arc sine transformation on the durations of children drinking shows that there was a statistically significant age difference at a level of 5% (see Table 17). Overall, older children drank more liquids than younger children, $F(3,31)=3.311$, $p<.05$.

Table 17. Durations of children drinking, as a percentage of their waking time

Source of Variation	Sum of Squares	DF	Mean Square	F	Sig of F
Main Effects	.128	4	.032	2.577	.063
AGE	.123	3	.041	3.311	.037
SEX	.005	1	.005	.376	.546
2-Way Interactions	.016	3	.005	.440	.727
AGE SEX	.016	3	.005	.440	.727
Explained	.144	7	.021	1.661	.167
Residual	.298	24	.012		
Total	.442	31	.014		

Each of the other ANOVAs reported in this chapter was checked using an Arc sine transformation and, with the exception of the durations of children drinking the outcomes were not altered (i.e. statistically significant differences remained statistically significant and non significant differences remained non significant).

Finally, in order to assess if there were any changes in recording observations as a result of practice, frequencies were analysed in relation to the time the data was collected. All raw totals of child activity were correlated, within each age group, with the rank order of the date the first observation of each child took place. Crying of the 24-26 month olds was significant at $.75=p<.05$. All other correlations were not significant. As seven variables were correlated with rank order at each age we expect 1.4 to be significant by chance at $p<0.05$, so there is no evidence here for order effects.

CHAPTER 4

DIETARY ANALYSIS

Consumables eaten by the children during the observation sessions were divided into groups similarly to those itemised in the Infant Feeding Survey (1990). The Survey collected lists of food that thousands of children up to nine months of age had been introduced to. These were separated into four sections; each consisting of five food groups. In this study the classification of foods is slightly different because it consists of the records of only 32 children and their ages range from six months to twenty-six months. Also, the average number of portions of each type of food eaten by each child was analysed because this study was concerned with the frequency at which foods were given to the children, as well as the age at which caretakers are willing to give a certain type of food.

The five groups classified in the first section of the Infant Feeding Survey were rice cereal, other cereal, rusk, dried baby food, and tinned or jarred baby food. In this study cereals were all grouped together. The group consisted of rice cereal, other breakfast cereal, rusk, and dried baby cereal such as Milupa or Farley's. Tinned or jarred baby food and child meals were separately grouped under the heading of child meals. This group also included jars of baby deserts, as in the Infant Feeding Survey.

The five groups of food itemised in the second section of the Infant Feeding Survey consisted of home-made food, other food, yoghurt, fresh fruit, and other deserts. Home-made foods, which were given by two of the 32 caretakers, were not grouped separately in this study because the focus was on what the meals consisted of rather than the way they were cooked. Nor

was it necessary, with such a small sample, to group any consumable under 'other foods'. Yoghurts and fromage frais were grouped together. Deserts, which consisted of creamed rice, mousse, tinned fruit salad, and custard, were similarly grouped. Fruit was divided into two groups: fresh fruit, and an additional group of salad fruits such as tomatoes, peppers and cucumber.

The third section of food groups in the Infant Feeding Survey were eggs, cheese and dairy products, meat, fish, and potatoes. The same food groups were used in this study but other dairy products were not included in the cheese group, and an additional group of chips and ketchups, i.e. fried portions of potato containing ketchup, was included for the older children. These were not eaten by any child in this study under fourteen months. The meat group consists of tinned meat, processed meat, salted meat, and meat products which consists of foods such as sausage-rolls and pies, but all types of meat were analysed together. No child was given freshly cooked meat, and no child under 24 months was given meat products. The fish group consists of tinned tuna, fishcakes, fish fingers, crab-sticks, and fish in parsley sauce, which contains no bones. No child was given fresh fish.

The fourth section of food groups in the Infant Feeding Survey were other vegetables, casserole or stew, soup, bread, and other foods. Other vegetables in this study were divided into fresh vegetables, and tinned or processed vegetables such as tinned peas, baked beans and pease-pudding. No child consumed casserole or stew but food groups were included for both soup and bread. Other foods were divided into seven groups, i.e. pizza, pasta, crisps, cakes and biscuits, spreads such as peanut butter, chocolate or marmite, sweets which included chocolate, nuts and ices, and finally, fresh milk drinks.

Food groups were listed in the same order as those in the Infant Feeding Survey (1990). Foods consumed by children in each of the four age groups were entered on separate sheets, each showing the number of portions of each type of food consumed by every child in the group during the observations (see appendix D1 to D4). A portion consists of a variable quantity of a consumable, given to a child at any one time. For example if a child was given carrots and peas at one meal and sweetcorn at another meal, the child would have been given three portions of vegetables. Similarly, if a child was given chips with a meal, then later given a second helping of chips at the same meal, this would consist of two portions.

The number of children in each age group who consumed at least one portion of a type of food was divided by eight and multiplied by 100, in order to calculate the mean percentages of children in each age group who had eaten each type of food at least once, during the observation sessions. These are shown in Fig. 14. At the age of 6-8 months children's solid food intake was very limited but they were, nonetheless, able to consume or attempt to consume a wide range of foods. However, all the children except one were offered formula milk to supplement at least one of their meals, and one child was offered only formula milk for breakfast. Seven of the children in this age group ate cereal, i.e. 87.5 percent, which is similar to the findings of the Infant Feeding Survey. The percentage of nine-month old children introduced to rice and other cereal, in 1990, was 86, and the percentage of children introduced to rusk was 24. Presumably there would be an overlap in these figures. However, the percentage of nine month old

Percentage of children of each age group who consumed at least one portion of each of the food groups listed

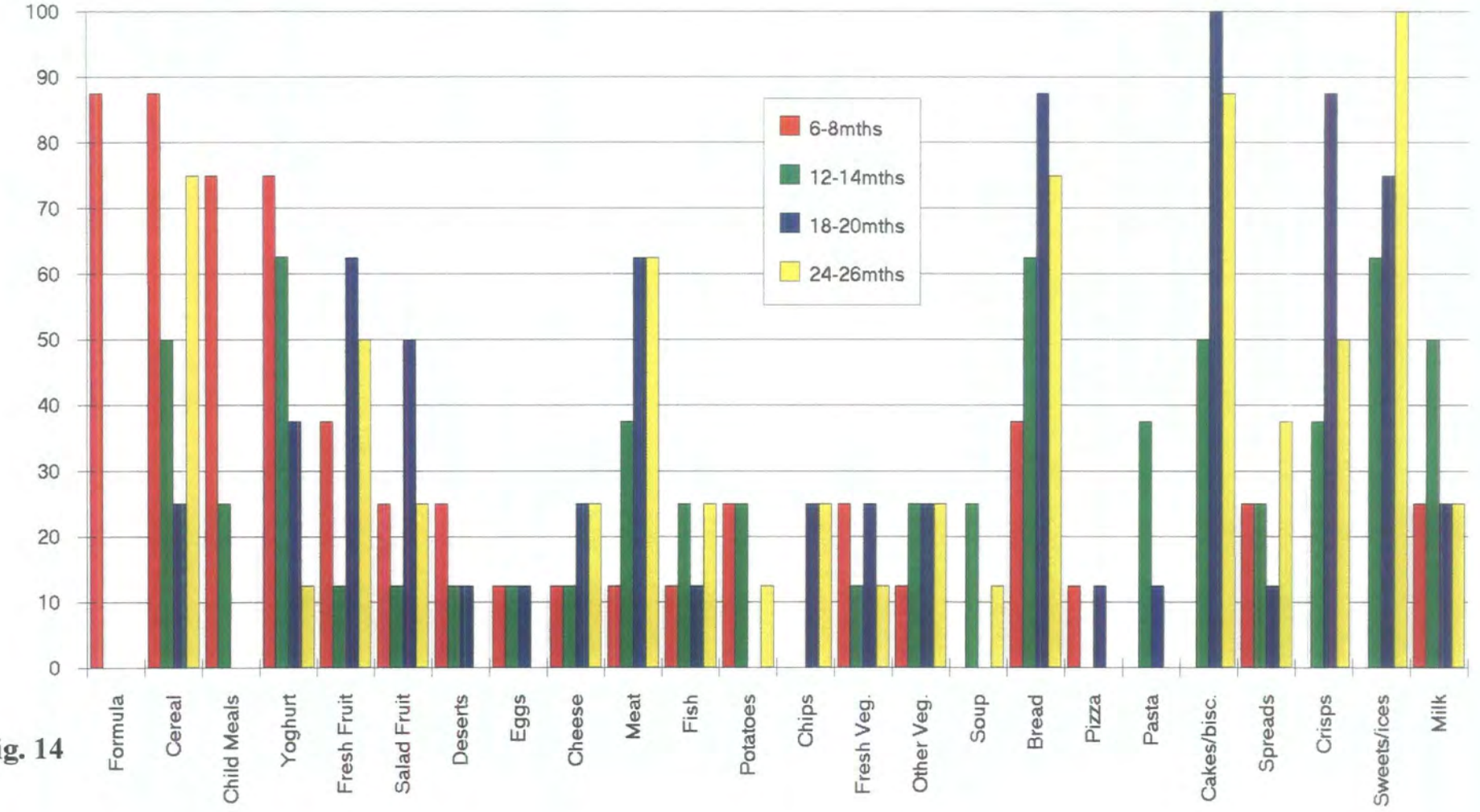


Fig. 14

children introduced to dried, tinned, or jarred baby food (62 percent) was slightly less than the percentage of 6-8 month old children who ate child or baby meals during the observation sessions (75 percent).

More of the 6-8 month old children were observed to eat both yoghurt (75 percent) and fresh fruit (37.5 percent) than the Infant Feeding Survey found nine month olds to have been introduced to in 1990, i.e. 24 percent and 26 percent respectively. Whereas, other deserts were eaten by about 25 percent of the children in both studies.

Eggs, cheese, meat, and fish were eaten by 12.5 percent of the 6-8 month old children in this study. The percentage of cheese eaten was approximately the same as the Infant Feeding Survey found nine month olds to have been introduced to, and the percentage of meat eaten was less, i.e. 31 percent in the 1990 survey. However, both eggs and fish were eaten more often. Only eight percent of children in the survey had been introduced to eggs, and nine percent to fish. The other items listed in the survey, i.e. potatoes, vegetables, soup and bread, had slightly lower percentages in this study.

From these results it seems that once cereal is introduced to a child, it becomes a staple part of their diet. The lower percentage of children who ate meat, potatoes, vegetables, soup and bread is unimportant because no-one consistently eats everything they have been introduced to, and the difference in the percentages of baby food, fresh fruit, eggs and fish is negligible because each of these differs by only one extra child eating them in this study. Also, in the 1985 Infant Feeding Survey, eggs had been given to 21 percent of children aged nine months. The decrease may have been due to a salmonella scare, which caretakers are beginning to become less

concerned about. However, the percentage of children who consumed yoghurt in this study is interesting. The number of nine month old children given yoghurt decreased by two percent between the 1985 and 1990 surveys but was given to over 50% more of children, aged between six and eight months in this study. Perhaps yoghurt has become more popular during the last few years.

At the age of 12-14 months no child consumed formula milk, and baby foods were largely replaced by other convenience foods (see appendix D2). Crisps, biscuits, sweets and chocolate became a large addition to the children's diet. The number of children who ate cereal decreased to 50 percent in this age group, then further decreased to 25 percent of the 18-20 month old children, but three of the 12-14 month old children had eaten breakfast before 8.00 a.m., and seven of the 18-20 month old children had eaten breakfast before the observation period began. Only two of the 24-26 month old children ate breakfast before 8.00 a.m. and the percentage children who ate cereal increased to 75 percent.

The percentage of children who ate yoghurt gradually decreased after 6-8 months and the percentage of children who ate deserts also decreased, which coincides with the introduction of crisps, biscuits, cakes and sweets. There was little difference between age groups in the percentage of children who ate at least one portion of the other foods, with the exception of a gradual increase in the consumption of meat, with age, and the introduction of chips at 18-20 months.

The number of portions of food eaten by the children was also considered. The portion numbers of each type of food were accumulated for each age

group, then divided by eight in order to calculate the mean number of portions eaten by each child in each age group. These are shown in Fig. 15.

Caretakers gave 6-8 month old children more formula milk than any other food. On average the children consumed almost two portions of formula milk each, during the observation sessions. Next to formula milk the foods consumed most were yoghurt, fresh fruit and fresh vegetables (1.25 portions). These were closely followed by bread (one portion) then by cereal and child meals (0.875 portions). The children in this group were not given chips, crisps, or sweet snacks but otherwise their diets were very similar to the older children. They were given less than half a portion each of all other foods offered.

Milk beverages were given to children aged 12-14 months twice as often as they were given to children in any other age group (one portion each, on average). The number of portions would possibly have been higher but one of the children had a milk intolerance and could only consume milk in food. Only four of the children in this age group drank milk beverages. One of these drank semi-skimmed and the other three drank full-cream milk. It is possible that some caretakers may have given children milk beverages as a replacement for formula milk. The children in this age group did not eat anything excessively. The foods eaten most were bread, and cakes and biscuits, of which they ate 1.25 portions each, on average. These were followed by sweets and milk beverages, then by yoghurts. As many of these foods are not classed as 'healthy' it seems than the child's ability to choose may have played a part in their food intake. Two of the 12-14 month old children did not have a meal during the 2.00 p.m. - 5.00 p.m. observation

Mean portions of food consumed by children of each age group

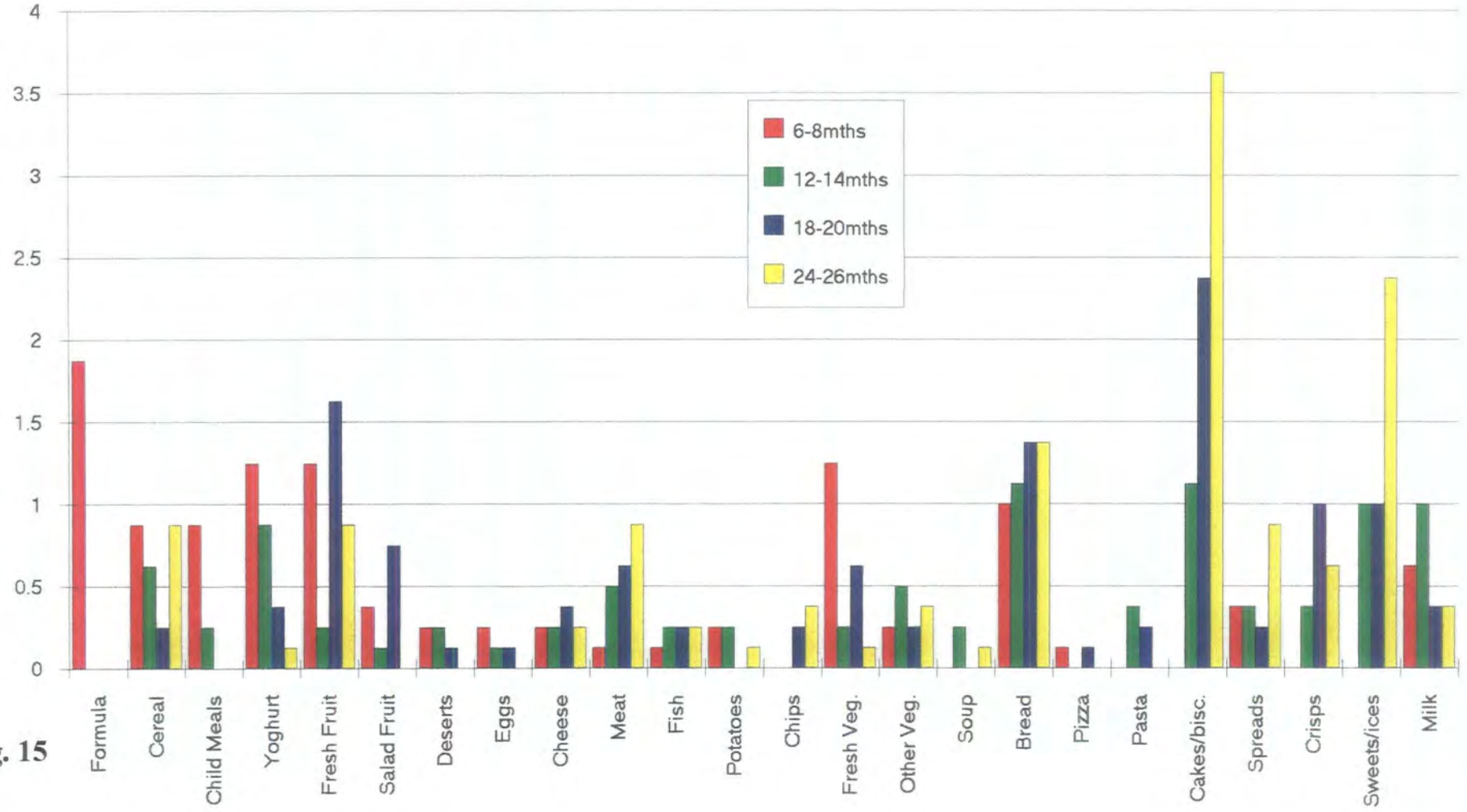


Fig. 15

sessions, but the average portion sizes of the other foods are so low that these meals are unlikely to have altered the outcome.

The most outstanding changes in the diet of the 18-20 month old children are the increases in their average portion sizes of cakes and biscuits (2.375 each) and fresh fruit (1.625 each). Salad fruits and crisps also increased, and chips replaced potatoes. Child meals were no longer given to children after 12-14 months of age . The average number of portions of cakes and biscuits given to children at 18-20 months increased further in the 24-26 month age group (3.625 each) and the average number of portions of sweets more than doubled (2.375 each) which coincides with the children's better grasp of vocabulary. Fresh fruit, on the other hand, decreased by half.

Within groups, the children's diets varied most in their consumption of fruit, fresh vegetables, and sweet snacks. Some children were given none of these, whereas others were given a large number of portions. In the 6-8 month age group one child was given seven portions of fresh fruit and seven portions of fresh vegetables, whereas five children were given neither. Seven of the 12-14 month old children were also given no fruit or fresh vegetables, but half of the older children were given fresh fruit, and three out of sixteen were given fresh vegetables. Sweet snacks, on the other hand, were given to seven of the children in the 12-14 month age group, and to all of the older children. However, the number of portions given to each child varied considerably. Four children were only given one portion each; three were given seven portions each, and the other children were given something in between.

Overall, the diets of the children varied little. Children of all age groups were given cereal, yoghurt, fresh fruit, cheese, meat, fish, fresh vegetables,

other vegetables, bread, spreads, and milk. All children except 6-8 month olds were given cakes, biscuits, crisps, sweets and ices. Child meals were given only to children in the youngest two age groups, and chips were given only to children in the oldest two age groups. In this study potatoes were given to all children except those aged 18-20 months; salad fruit, deserts and eggs were given to all children except those aged 24-26 months; pizza was given only to children aged 6-8 months and 18-20 months; pasta was given only to children aged 12-14 months and 18-20 months, and soup was given only to children aged 12-14 months and 24-26 months.

Formula milk was given to 6-8 month olds more than any other food, averaging two portions per 9 hour period to each child. This was followed by yoghurt, fresh fruit, and fresh vegetables, averaging 1.25 portions of each; bread, one portion each; cereal and child meals, 0.875 portions of each. The average portion of milk beverages given to each child was 0.625, and they were given less than half a portion of all other foods.

Bread and cakes or biscuits were given to 12-14 month old children more than any other food. They were given an average of 1.25 portions of each. These were followed by sweets and milk beverages, one portion of each; yoghurt, 0.875 portions each, then cereal 0.75 portions each. The children were given half a portion of both meat and other vegetables, and less than half a portion of all other foods.

Cakes or biscuits were given to children aged 18-20 months more than any other food. They were given an average of 2.375 portions of each. These were followed by fresh fruit, 1.625 portions each; bread, 1.375 portions each; then crisps and sweet or ices, one portion of each. They were given

0.75 portions of salad fruits each, 0.625 portions of both meat and fresh vegetables each, and less than half a portion of all other foods.

Cakes or biscuits were also given to children aged 24-26 months more than any other food. They were given an average of 3.625 portions each. Next was sweets or ices, 2.375 portions each; bread, 1.275 portions each; cereal, fresh fruit, meat, and spreads, 0.875 portions of each; crisps, 0.75 portions each, and less than half a portion of all other foods.

In summary the children of all age groups ate a varied diet, which was low in fresh vegetables and high in sweet snacks, especially among the older children. The diets of the children were very similar within groups, as well as between them. The average number of portions of meat increased gradually with age, sweet snacks increased excessively with age, and formula milk, child's meals, chips and sweet snacks were only consumed by children of certain ages.

CHAPTER 5

ANALYSIS OF CARETAKER'S VERBAL BEHAVIOUR RELATING TO FOOD AND DRINK CONSUMPTION

Many of the children observed in this study were too young to speak, so analysis of speech was limited to that of the caretaker. Caretaker's food and drink related speech was analysed for both offers and prompts. A verbal *offer* was defined as the caretaker asking the child directly if he or she would like to be given food (or drink). The food could be absent or present at the time of the offer. The offer could be a whole meal, three biscuits presented to the child at the same time, or a small piece of cheese. Quantity was not important. If, for example, the caretaker offered the child another piece of cheese, after having already offered the child a piece of cheese, this was classed as a separate offer, regardless of whether the child had finished eating the first piece.

A verbal *prompt* was defined as the caretaker encouraging the child to eat or drink more of a previously presented food. It was necessary for the food to be present at the time of the prompt. If the caretaker presented a food to the child for the first time, this was always coded as an offer rather than a prompt.

Before the caretaker's food and drink related speech was analysed, duplicate files were made of the running records, and all non-verbal material, with the exception of food being presented, consumed or removed, was deleted from the copies. These copy files were printed in duplicate and one set was retained by the observer for rating offers and prompts.

In order to carry out a reliability test on the identification of offers and prompts by the observer, the children's records were randomly assigned to four groups, each with two from each age group. Two independent raters were each randomly assigned one of the four groups of running records, for practice ratings. They were each given two lists. One contained a definition of verbal offers, and examples of subcategories of specific, general, and indirect offers (see appendix E). The other containing a definition of verbal prompts categorised into seven different groups, and examples of each (see appendix F). Offers classed as 'specific' were direct questions asking the child if he or she would like a particular food, e.g. "Would you like an apple?" Offers classed as general were those asking the child if he or she wanted something to eat without referring to any food, e.g. "Do you want your dinner?" Indirect offers were usually spoken by the caretaker to herself because they required more than a one word answer which most of the children were unable to give. An example of an indirect offer is "What am I going to give you?"

Verbal prompts in the first category, i.e. prompts to eat or drink, were used by caretakers in all age groups. Some examples of prompts of this kind, used by caretakers during the observation sessions are: "Get your fingers out"; "Eat it all up, now"; "Turn around and eat your dinner"; "Have another bit of cheese"; "Open your mouth properly"; "Now make sure you eat it all up; not just the cheese off the top."

Verbal prompts in the second category, i.e. prompts to draw attention to food the caretaker is offering, were used by caretakers hand-feeding or spoon-feeding their child, so they were directed mainly to children in Group 1 and Group 2. Examples of prompts used to attract attention to food are: "This way"; "What's this"; "Oh, ...will you come here please and eat this";

"Come and get your pudding." The most commonly used prompts, in this category were , 'Come on' and the use of child's name.

Verbal prompts in the third category, i.e. encouragement to finish a consumable were also used only by caretakers hand-feeding or spoon-feeding their child. These prompts were rarely used on children after the age of 8 months. Examples of prompts used in this category are: "About five spoonfuls more"; "Nearly finished"; "Last one"; "Just a little bit left."

Prompts encouraging self-feeding, category four were directed at children in all age groups. Some examples of prompts used in this category are: "Will we put some more on your spoon"; "Are you going to help yourself to some more of this?"; "Do you want Mammy to do it for you? Let's put some more on."

Prompts to draw attention to unfinished food, category five, were directed at children in all four age groups. Some examples of these prompts, used during the observation sessions, are: "Do you want this, or not?"; "Are you finished with that now?" "Are you going to have the rest of this?"; "Have you had some pizza?"; "Have another chip"; "You haven't finished, man!"

Prompts in category six, i.e. bribes and threats, were also directed at children in all age groups. Examples of this kind of prompt used during the observation sessions are: "You'll not get a yoghurt mind, if you don't eat your dinner"; "Quick, go and get your sausage, 'coz your Dad's going to eat it"; "You can have a chocolate mousse, if you eat all your dinner."

Prompts to drink, i.e. category seven, were the same as prompts in the other six categories with the exception that they referred to drinks not food.

Therefore, examples are similar to those in the other six categories. Appendix G gives a more comprehensive list of verbal prompts.

To simplify the differentiation between first time offers, and prompting children to eat more, the observer highlighted in the transcript all consumables that were presented to a child for the first time, and highlighted all food and drinks that were fully consumed by a child, or removed from him or her by the caretaker. The wording of some prompts and offers were identical, but if the consumable had not been presented to the child, it was identified as an offer. If, however, the child had already been presented with the consumable, the identification would depend on whether the child had fully consumed what had been given, or not.

The observer sat with the independent raters when they first began to identify offers and prompts, until they were familiar with the identification. They then continued the identification on their own. The practice ratings, and the observer's ratings were compared and discussed. When the independent raters could confidently identify the offers and prompts in the group they were given, they were each given groups they had not seen before. One of them rated three of the groups and the other rated the fourth by making a note of identified offers and prompts in the margin.

After offers and prompts had been identified and totalled by the observer and by the two independent raters, interrater reliability of the raw totals of offers and prompts identified (see appendices G and I) was estimated using Pearson's Product-Moment Correlation Coefficient. These can be seen in Table 18.

Table 18. Ratings of the raw totals of offers and prompts identified for each child, and their correlation coefficients

Offers of food	Mean	Range	SD	r
Observer	5	14	4	.98
Independent Raters	5	13	4	

Prompts to eat	Mean	Range	SD	r
Observer	12	37	9	1.00
Independent Raters	12	38	9	

Offers of drinks	Mean	Range	SD	r
Observer	2	9	2	.99
Independent Raters	2	9	2	

Prompts to drink	Mean	Range	SD	r
Observer	4	15	4	1.00
Independent Raters	4	14	4	

To ensure that the numbers of offers and prompts identified by the raters were independent of the amount of caretaker's speech, a reliability test was carried out on the offers and prompts after the total numbers identified for each child had been divided by the total number of words in the caretaker's food and drink related speech then multiplied by 100 (appendices H and J). Correlations of offers and prompts identified by the observer and those identified by the independent raters in each of the four sections can be seen in Table 19.

Each group consists of two children from each of the four age groups. Rater 1 identified offers and prompts in groups 1, 2, and 4; Rater 2 identified offers and prompts in group 3. The total ratings of the independent raters were also correlated with those of the observer The reliability proved to be high with correlations of .94 or greater for the total ratings. These rating of offers and prompts, modified to be independent of the caretakers speech, are only slightly lower than the levels of significance obtained from analysing the raw totals of prompts and offers, which had coefficients of between .98 and 1.00.

Table 20 shows correlations of each of the seven categories of prompt, identified by each rater, after the total numbers for each child had been divided by the number of words in the caretakers speech then multiplied by 100. Three of these correlations were very low, i.e. .02, .15, and .35, but all others were above .7 and most were above .9. The classification of prompts in this study was used mainly as an aid to help identify the total number of prompts, so the three low correlations are not important.

Table 19. Correlations of offers and prompts identified by the observer and the independent raters, after the total numbers identified for each child had been divided by the number of words in the caretakers food and drink related speech, then multiplied by 100.

Independent Raters	Offers of food	Prompts to eat	Offers of drink	Prompts to drink
Rater 1: Group 1	.76	1.00	1.00	.99
1: Group 2	.83	.98	.93	1.00
1: Group 4	.99	1.00	.99	.97
Rater 2: Group 3	.99	1.00	1.00	1.00
Combined totals of Raters 1 and 2	.94	.99	.98	.98

Section 1 consists of children numbered 1, 2, 9, 13, 19, 20, 26, 27.
Section 2 consists of children numbered 3, 4, 15, 16, 18, 21, 30, 31.
Section 3 consists of children numbered 5, 7, 10, 11, 17, 22, 29, 32.
Section 4 consists of children numbered 6, 8, 12, 14, 23, 24, 25, 28.

Table 20. Correlations of the different groups of prompt identified by the observer and the independent raters, after the total numbers identified for each child had been divided by the number of words in the caretakers food and drink related speech, then multiplied by 100.

Independent Raters	P1	P2	P3	P4	P5	P6
Rater 1: Group 1	.99	.97	.99	none	.90	1.00
1: Group 2	.97	1.00	.99	.35	.94	.78
1: Group 4	.93	1.00	.15.0	.84	.98	.97
Rater 2: Group 3	.85	1.00	1.00	.02	.99	.79
Combined totals of Raters 1 and 2	.92	1.00	.98	.63	.96	.84

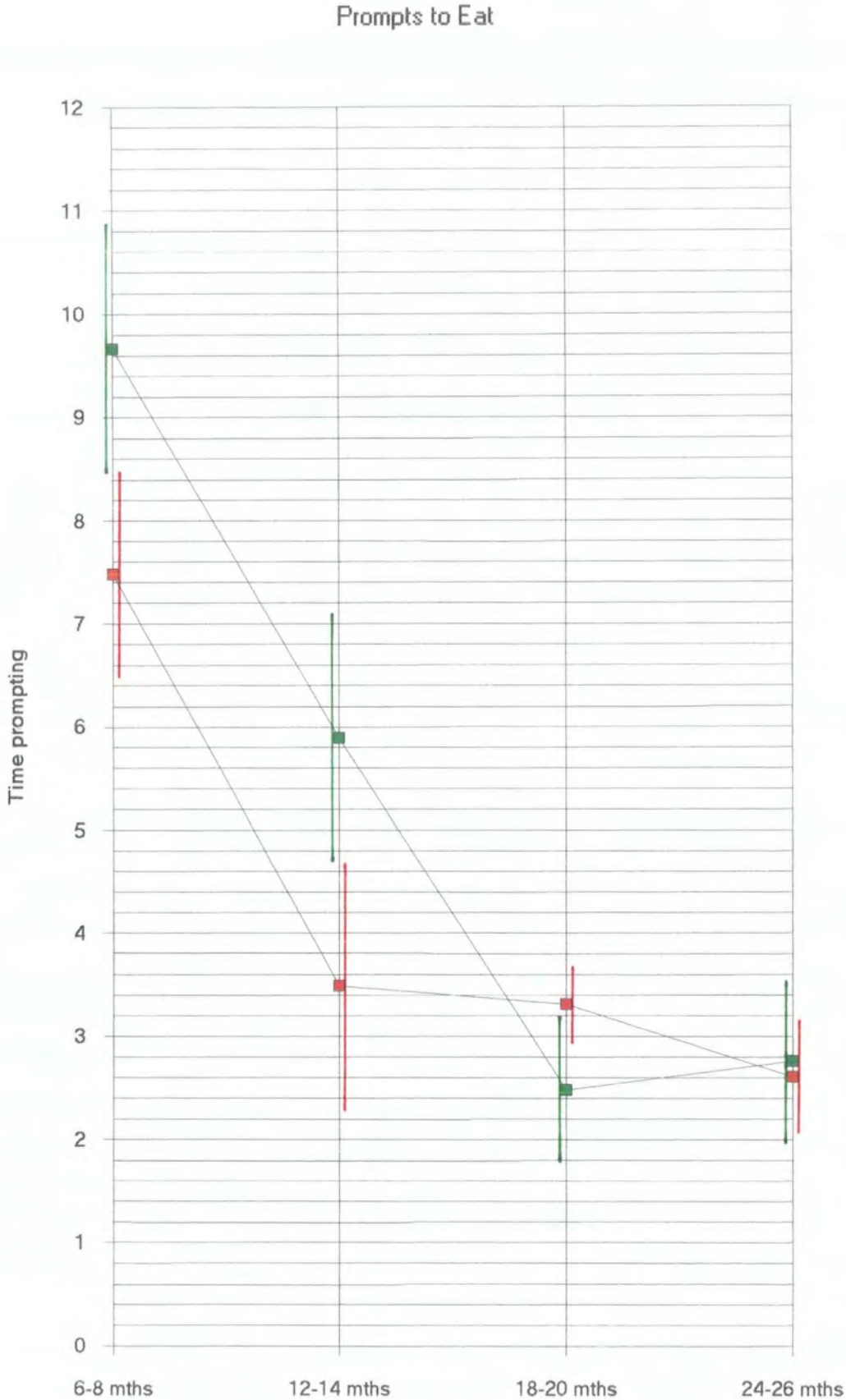
Section 1 consists of children numbered 1, 2, 9, 13, 19, 20, 26, 27.
Section 2 consists of children numbered 3, 4, 15, 16, 18, 21, 30, 31.
Section 3 consists of children numbered 5, 7, 10, 11, 17, 22, 29, 32.
Section 4 consists of children numbered 6, 8, 12, 14, 23, 24, 25, 28.

ANOVAs were carried out on the numbers of prompts to eat, prompts to drink, offers to eat and offers to drink, after totals had been modified to be independent of the amount of caretaker's speech. No significant sex difference was found in the number of prompts to eat. Nor was there an age by sex interaction, but there was a significant age difference, $F(3,31)=F5.619$, $p<.01$ (Table 21).

Table 21. Prompts to eat, independent of caretaker's food and drink related speech

Source of Variation	Sum of Squares	DF	Mean Square	F	Sig of F
Main Effects	185.609	4	46.402	4.394	.008
AGE	178.014	3	59.338	5.619	.005
SEX	7.595	1	7.595	.719	.405
2-Way Interactions	14.861	3	4.954	.469	.707
AGE SEX	14.861	3	4.954	.469	.707
Explained	200.470	7	28.639	2.712	.032
Residual	253.457	24	10.561		
Total	453.927	31	14.643		

Figure 16 shows the mean numbers that girls and boys were prompted to eat, in each age group, after the totals had been modified to be independent of caretakers speech. It can be seen that there is a steady decrease with age, from the 6-8 month age group to the 18-20 month age group, then there appears to be a levelling off. The decrease from 6-8 months to 18-20 months of age coincides with the increase in the children's vocabulary and mobility, which gives them a little independence, as well as the appearance of thriving. It may be one or both of these thing that contribute to the decrease in the numbers of prompting children to eat more at these ages.



Mean (+/- standard error) number of prompts to eat divided by number of words in caretaker's speech. Girls are shown in red; boys in green.

Fig. 16

Age and sex differences in the numbers of prompts to drink, or in the numbers of offers to eat or drink were not significant. Nor were there any age by sex interactions.

CHAPTER 6

REVIEW OF THE OBSERVATIONAL METHOD USED IN THIS STUDY, AND THE OUTCOME

The direct observational method used in this study has allowed a detailed description of the eating behaviours and related activities of normal healthy babies and toddlers, without reliance on recall by the mothers or caretakers. A total of nine hours of observation was carried out on each child, from 8.00 a.m. to 5.00 p.m. This allowed the observer to watch most of the children during their three main meals, but also between them. Some of the children began breakfast before 8.00 a.m. and some had not started or had not completed their third meal before the observation period ended, but all children were observed at identical times and for the same duration of time.

Nevertheless, data collected over three separate days, that accumulate to less than the duration of one day, is only a relatively small sample of the child's behaviour. Birch (1993) demonstrated that children's energy intake varied between meals by approximately 33 per cent, whereas their total energy intake for the day varied by about 10 per cent. Unfortunately, due to the length of time it takes to collect this data, and the inconvenience it causes to caretakers, multiple observation periods of the same children would not be practical. Moreover, due to a reliance on volunteers, it was necessary to obtain a non-random sample. If the number of observations for each child had been increased, the number of volunteers would have decreased, thereby making the sample even less typical.

The analysis of the coded child observations, as percentages of their waking time, showed that there were no significant sex differences in activity,

crying, talking, feeding or drinking. Older children were more active, they cried less, and they talked more. They also drank fluids more, but this result was not evident until an Arc sine transformation was carried out on the totals to stabilise the variance across the groups. Older children did not have significantly higher measurements in the durations of time spent eating, but presumably this was because they were able to eat more quickly than younger children, not because they consumed the same amount. In a study of the effect of food texture on the development of chewing of children between six months and two years of age, Gisel (1991) found that increasing eating efficiency is marked by a decrease in chewing duration. As children got older, fewer cycles were needed to chew a standard sized bite of food. For viscous textures there were significant decreases in cycles of small pieces between six to eight months, and between ten to twelve months. For the solid textures there were significant decreases from ten to twelve months and from twelve to eighteen months. There is a rapid increase in the drinking of fluids from 6-8 months to 12-14 months. This corresponds with children no longer being offered formula milk.

Analysis of the coded caretaker observations, as percentages of the child's waking time, showed that caretakers attended significantly more to the care of younger children, they held younger children more, and they gave younger children solids more. No significant age differences were obtained in measurements of caretaker speech to the children, nor in giving drinks to them. Analysis was not carried out to measure the difference between age groups in children's durations of breast or bottle feeding because breast milk was only consumed for a few minutes by one 6-8 month old child, and formula milk was not consumed by any child over the age of eight months.

Only one statistically significant sex difference was found in the measurements of coded child and caretaker observations. The analysis of the caretakers durations of talking showed that the caretakers in this study talked more to female children than to male. ANOVAs carried out on the raw observation totals rather than as percentages of the children's waking time showed that although there were no sex differences in levels of passivity, boys slept more than girls and girls were more active than boys. Considering that the caretakers talked more to girls than to boys during their waking time (mean time of speech to girls was 59, 52, 51, and 53, and to boys was 33, 48, 49, and 38, from 6 months to 24 months respectively) and girls in all four age groups were awake longer than boys, then caretakers must have talked substantially more to girls.

It is possible that the caretakers talked more to girls, during their waking time, because, as a result of being awake and active longer than boys, they had a better understanding of language. However, in order to analyse this, it would be necessary to analyse the children's non-verbal communication as well as verbal because children often understand language before they are able to speak it. There is no explanation, however, of why the girls in this study slept less than the boys.

The only other difference that occurred between the analysis of the raw observation totals and the analysis of the totals as percentages of the children's waking time was that the age difference found to be significant in the measurement of crying as a percentage of waking time, was not found to be significant in the analysis of the raw totals. Therefore, the children in the older age groups did not cry less than children in the younger groups, they just had longer intervals between crying during their longer waking time.

Younger children cried more when they were awake, but they spent less of the observation time awake than the older children.

Analysis of totals of prompts and offers, adjusted to be independent of the amount of caretakers speech, showed that caretakers prompted younger children to eat significantly more often than they prompted older children to eat. No sex or age differences were found in measurements of prompts to drink or in measurements of offers to eat or drink. Caretakers often repeat things when talking to younger children, so an offer of a single consumable can be recorded twice. The fact that there was no significant difference between the number of verbal offers may be because the repetitions did not make a large enough difference to be significant or because older children were verbally offered more consumables. Overall, results of the caretaker observations show that younger children were given more consumables than older children, therefore they were offered more food and drink non-verbally.

Reliability tests were not carried out on any of the pre-coded behaviours because, all observations were carried out by one observer and the children were not video recorded. Most of the observational studies referred to in the introduction were video recorded, which enabled more than one observer to code the observations, and inter-rater reliability checks to be carried out. Only four of the researchers who observed a single meal did not use recorders. The children observed in the Ramsey, Gisel and Boutry (1993) study were observed by a team of researchers, in a fixed location, through a one-way mirror. Observations were marked on a check-list by the observers, and could easily be correlated. The studies by Drotar et al. (1990) and Kerwin et al. (1995) were carried out by more than one observer. The authors of the Drotar study do not refer to the way their interreliability

tests were carried out, but presumably more than one observer rated each child or some of the children during direct observations in the children's homes. Heptinstall et al. (1987) used the same method as the one used in this study, i.e. an interval sampling technique using set codes of pre-determined food-related behaviours expected to be relevant at mealtimes. They carried out a reliability test on the child's nutritional intake by comparing data of the direct observations with diaries of the child's food intake, recorded by the mothers, but they do not refer to a reliability test of the coded behaviours, so they probably did not do one.

The 1988 study by Barr et al., on which the method of this study was based, carried out a reliability test by attaching a small voice activated recording system to the child's garment and comparing the recordings to observations marked in the parental diaries. However, as mentioned previously, their study focused only on the cry and fuss behaviour of the children, so they only needed to analyse vocalisations, which were a relatively small part of the child's behaviour in this study. Four other researchers referred to in this study observed more than one meal, without the use of a video recorder, i.e. Pollitt and Eichler (1976), Bentley et al. (1991), Garcia, Kaiser and Dewey (1990a and b) and Romski et al. (1989) but other than using more than one observer there seems to be no reasonable way of carrying out an interrater reliability test on the coded observations of a study of this kind. It would be impracticable to have two observers attending all observations in a study as time consuming as this one, but a second observer could attend and make recordings of the first hour of any one of the three observation sessions with each child, then leave soon afterwards, preferably at a time when as little distractions as possible is caused. Another way of carrying out an interrater reliability test on the coded observations would be to have two observers

attending different observation sessions of each child, then correlating results.

Although a reliability test was not carried out on the coded observations in this study, due to the simplicity of the recording system, the observer was able to record all observations easily and within plenty of time. Also because most of the recordings were coded, time that was taken to enter them was minimal, and the observer was constantly aware of even slight movements of the child during writing, so if a reliability test had been carried out it would probably have had high correlation scores.

The verbal analysis, on the other hand, was more difficult to rate, but one hundred percent reliability tests were carried out on the analysis and almost all had high correlation coefficients. Two independent raters coded all the verbal offers and verbal prompts caretakers made to their children, during the entire study. These were correlated with those of the observer's ratings. Only two correlations were found to be low and both of these were identifications of specific prompts to eat. The ratings of Independent Rater 1 and the observer of prompt 3, i.e., encouragement to finish a consumable, had a correlation of .15, and the ratings of Independent Rater 2 and the observer of prompt 4, i.e. prompts to encourage self-feeding, had a correlation of .02. However, the lowest correlation of the combined ratings of Raters 1 and 2, and the observers rating was .63 for prompt 4, and all other correlations were above .8. The majority of the correlations were above .9.

None of the children studied had seen the observer prior to the first observation, except perhaps for a few minutes at a mother-and-toddler group. Some of the older children were shy at the beginning of the first

observation, but this did not appear to last long. This replicates the findings of Garcia, Kaiser and Dewey (1990a and b) during their observational study of rural Mexican pre-school children. The fact that in both this study and in the one by Garcia, Kaiser and Dewey, the observers used limited speech and did not stare at the child during the observations, may have contributed to the child's acceptance or forgetfulness of the observer. Of perhaps greater concern than shyness were the children who found the presence of an observer a novelty, a curiosity, or an intrusion. Some of the older children wanted to know why the observer was present, and what she was writing, but as with shyness, this curiosity did not last.

A few of the children in the three eldest age groups became aware that the observer was following them, but appeared to accept it without question. One little girl who had been aware from the first observation that she was being followed, walked into a hallway, waited for the observer, then, being unaware that her reflection could be seen in the door, walked back into the room, waved at the observer, and walked back out again. However, the presence of the observer only seemed to affect two children during mealtimes, and only on one occasion each. One child refused several offers of breakfast because she wanted to show the observer all of her toys; the other child objected to having a stranger present in the kitchen and, at first, refused to eat her lunch.

Another problem caused by the observer's presence was the effect it had on older siblings. These children tended to be more inquisitive and a lot more verbal than the children being studied, and although the caretakers constantly reprimanded their children for talking to the observer, the children did not control their curiosity. However, the distraction caused to the observer was minimal, and unlikely to have had any affect on the

observations made. Also, during mealtimes, the siblings tended to be more interested in what they were given to eat than in what the observer was doing.

The main problem caused by the observer's presence was probably due to the effect on the caretakers. Even with the very best of intentions, it must be extremely difficult to behave naturally in the presence of a stranger who is constantly taking notes. This problem was probably increased by the fact that all caretakers knew the observations were largely concerned with the child's food intake. It is likely that some of the caretakers were more concerned with what their child ate during the observation period than throughout the rest of the day, so arranged the meals accordingly. However, it was necessary to inform the caretakers that the research largely concerned food intake because otherwise some of the caretakers might have arranged all of their child's mealtimes outside of the observation periods. Also if this observational plan is used to compare failure to thrive children with normal healthy children, the caretakers of the failure to thrive children would expect the observations to be, at least partly, concerned with the child's intake so it would be necessary for the caretakers of the normal healthy children to have the same expectations.

Apart from the possibility that the observer's presence may have affected the caretaker's choice of meals offered to the child during the observation periods, it is likely that the presence of the observer affected the caretaker in other ways. One caretaker mentioned, after the final observation, that she was aware she had been talking to her child more and encouraging him to eat more than was usual during mealtimes. She said that on an average day she was much too busy to sit with her child until he finished eating but

because she had set aside the time for the observations, she had more free time than usual.

Throughout the observations, the same person recorded all of the children. There was an emphasis on simplicity during recording, and consequently there was no dependence on recall. The emphasis on simplicity during the recordings, extended to an emphasis on simplicity in analysing the data. Gestures, movements and facial expressions, during the presentation or offer of food were entered into the running record, but because that there was a possibility that some of the visual occurrences were missed while the observer was writing, all non-verbal data was ignored. Verbal offers and verbal prompts were analysed, but verbal requests and verbal responses were not because the youngest children were unable to talk and many of the older ones were limited in their speech. Those who could speak were selective in the offers they responded to, and often chose to ignore them or respond to them non-verbally. Rice (1989) noted that children of one-year of age do not answer direct questions. Even the oldest children in this study (24-26 months) all chose to ignore some of the verbal offers. However, the lack of verbal responses to offers did not seem to be important in affecting the quantity of food and drink given to a child, following an offer. All caretakers except one treated their speaking children in the same way as those of non-speaking children. If the verbal offer was not accompanied with visual presentation, and the child did not answer, the caretaker presented the offer visually soon afterwards. Being vocal did, however, enable children to be more selective in their choice of food, and they were able to show preferences in likes and dislikes by their requests and refusals. This information could be valuable in a comparison study of normally-growing children and failure to thrive children.

In this study, 37.5% of the children could not talk, and many of the others were very limited in their speech. If non-verbal communication was analysed, as well as verbal, the likes and dislikes of all children could be analysed by their reactions to food.

Romski (1989) found that school age children with learning difficulties and language impairments employed rich and varied communicative patterns which enabled them to consistently, and most successfully, convey messages to their parents, despite their absence of formal independent means of communication. It is likely, therefore, that young children who can understand language but do not have fully developed vocal cords will do the same. Mathisen et al. (1989) found, in a comparison study of failure to thrive children and normally-growing children, that nine to fifteen month old infants were fully capable of signalling their needs during feeding by use of gestures, vocalisations, body postures, and facial expressions. However, failure to thrive children used significantly less non-verbal communication than normally-growing children.

In the 1990b study by Garcia, Kaiser and Dewey, a non-verbal action was determined to be a request if a child pointed at a food item, whined while looking at a sibling's snack, held out a hand towards food, or performed some similar action. These actions would be very easy to identify when observing children.

The running record contains an abundance of data indicating a child's interest or lack of interest in food and drink, some of which could be regarded as requests. For example, if the data on child 1 is looked at in detail, the child appeared to show interest in food and drink in the following ways. At 8.00 a.m. she began to kick her feet at the sight of her mother

bringing her breakfast into the room, and she began to eat immediately. At 8.02 a.m. she tried to grasp the spoon to direct it to her mouth. At 8.05 a.m. the child cried when the empty bowl was removed. At 8.06 the crying stopped when offered her bottle, and she tried to grasp it herself. At 8.41 a.m. the child began to cry at the sight of the caretaker eating toast, and stopped immediately when she was given a small piece. At 11.38 a.m. the child began to cry, when sitting in her highchair waiting for lunch, and stopped immediately when a bottle of juice was placed in front of her. She attempted to pick the bottle up herself. At 11.42 a.m. the child began to cry, but stopped when presented with a meal. At 11.43 a.m. the child began to laugh as she was being fed. At 11.44 a.m. she seemed to show a lack of interest in her meal by putting her fingers in her mouth, but she ate when prompted, and finished the meal. At 11.47 a.m. the child showed an interest in food again by opening her mouth extremely wide when given fromage frais. At 11.48 a.m. she began to wave her hands, while waiting for another spoonful, and she cried when the fromage frais was finished. At 2.15 p.m. an apparent lack of interest in food occurred when the child showed no reaction when given a small piece of toast. However, when prompted she ate some and at 2.16 p.m. appeared to like the taste of the toast by trying to put too much into her mouth at once. At 2.23 p.m. she appeared to show interest in her food again, by crying when the caretaker removed the toast because it had become mushy. At 3.44 p.m. the child twisted her face when offered mashed banana but she ate immediately and quickly. At 3.45 she showed a lack of interest by looking to the side, but she responded to a prompt, and laughed and smiled when eating. At 3.46 p.m. the child spat some banana out but then continued eating and began to cry when she finished the banana at 3.48 p.m. At 3.49 p.m. she stopped crying when offered formula milk, and began to drink immediately. At 3.55 p.m. the

caretaker removed the bottle because the child coughed, but the child appeared to show interest again by reaching for the bottle and grunting.

Other records are very similar to this one. Nonorganic failure to thrive is linked to inadequacy of nutrition and feeding difficulties. Studies such as Whitten, Pettit and Fischoff (1969) have shown that the cause of nonorganic failure to thrive is not always due to the child, but other studies such as Pollitt and Eichler (1976) and Ramsey, Gisel and Boutry (1993) have shown nonorganic failure to thrive children have poor or no appetites. Lack of interest in food is a direct sign of lack of appetite. If non-verbal communication was taken into account, interest in food could be identified by a child beginning to eat immediately, finishing a consumable, appearing to show excitement at the sight of food, smiling or laughing when eating, self-feeding or attempting to self-feed, crying when food is finished or removed, and refraining from crying at the presentation of food. A lack of interest could be identified by the refusal to open the mouth, holding food in the mouth, turning the head away when presented with food, spitting food out or throwing it away, grimacing when being presented with food, crying at the sight or offer of food, trying to get out of the highchair, and having to be prompted more than once within a one minute duration.

A problem in differentiating between a child showing interest or lack of interest in food is that children are offered different quantities and different, kinds of food. Inappropriate foods served in inappropriate amounts are likely to play a large role in the amount of interest, or lack of it, a child shows in food. One way of overcoming this would be to have standardised meals in standardised quantities but that would defeat the purpose of the study which is to obtain data on children's natural feeding behaviour and consumption. Also this may have a counteracting effect in that children who

are familiar with the standardised meals may find them more enjoyable than children who are unfamiliar with them. According to Birch (1993) children's food likes and dislikes are powerfully shaped by their early learning experiences. They will often initially reject new foods but after approximately ten exposures to it, without any ill effect such as nausea or vomiting, the food gradually becomes accepted. This 'learned safety' is known as neophobia. It would be possible to plan the diets prior to the observation sessions by issuing the caretakers with a checklist of food items

and asking her to rate the child's preference of like or dislike on a five-point scale, then selecting foods according to their rating similarities and calorie contents, but this would also be deviating from the child's natural feeding behaviour. Therefore, it is necessary that all foods given to the child are described in detail, as well as all foods refused by, or left unfinished by the child. Although it is not possible to accurately assess quantity by looking at food, it is possible to make good estimates, so any large differences between children's food consumption would be noticeable.

A video recorder would aid the detection of non-verbal communication and all observations could be checked, but video recorders can be very intrusive and would create a number of problems. It would not be possible to use a recorder and simultaneously make records of the child. It would be more difficult to follow a child while recording. The recorder would draw attention and probably raise the curiosity of the index child, so the observer would be more conspicuous. It would be necessary for caretakers to arrange for all meals to be eaten by the child in the home, whereas in this study some children ate at mother-and toddler groups, and one child ate in a cafe. Also, the caretaker is more likely to be affected by an observer with a video recorder than by an observer without one. Dunn, Plomin and Nettles (1985)

noted that videotapes more typically captured the "best" exchanges between mother and child. In addition, the prospect of being recorded may cause more caretakers to refuse to participate in a study of this kind, so it may be more difficult to find volunteers. Therefore, for this type of study, the positive uses of a video recorder are outnumbered by the negative.

CHAPTER 7

DISCUSSION OF THE OBSERVATIONAL PLAN AS A METHOD FOR COMPARING NORMALLY-GROWING CHILDREN WITH FAILURE TO THRIVE CHILDREN

The observational plan proved to be useful in that observations were able to be recorded easily and quickly, and analysing the data caused no problems.

In a comparison study between normally growing children and failure to thrive children the basic child measurements of sleeping, passivity, activity, crying, talking, feeding and drinking, and the caretaker measurements of attending to the care of the child, talking, holding, breast feeding, formula feeding, and offering solid foods and drink could be compared in the same way as they were in this study. The verbal analysis of the caretakers' speech could also be compared in the same way. Also, because no sex differences were found in this study, with the exception of caretakers talking more to female children, it would not be necessary to match failure to thrive children aged between six months and twenty-six months with control children of the same sex. Nor would it be necessary to match them strictly with age when comparing the durations of eating because although quantities of food are likely to differ with age, eating durations did not. Failure to thrive can prevail for many years. Pollitt et al. (1975) found that of the nineteen children they studied, ranging from 12 months to 60 months, over 50 percent of their mothers reported having difficulties feeding them during the first 12 months of life. Heptinstall et al. (1987) confirmed this in their study. Of the 24 four year old children they studied, growth retardation had began in the first year in all but one. Due to the difficulty in finding volunteers to participate in such a time consuming observational study, and

the lack of failure to thrive children available for study, lowering the restrictions in matching the children could be advantageous.

As nonorganic failure to thrive is linked to inadequacy of nutrition and feeding difficulties, the analysis of non-verbal communication could be very useful in determining whether the problem of under eating is due to a lack of appetite. Requests for consumables could be analysed, and hence, caretakers treatment of requests could be analysed, i.e. compliance, refusal, or the offer of a substitute. Also a child's desire or dislike of food could be analysed by his/her non-verbal response to the sight and taste of it. In addition analysis could be carried out to find whether normally-growing children accept more offers of food, and to compare positive and negative eating-related comments of the caretaker's about the two groups of children.

APPENDICES

Letter given to caretakers who participated in research

University of Durham
Science Laboratories
South Road
Durham
DH1 3LE

Tel: (091) 374 2000

Observational Research

I am carrying out some research into the feeding behaviour and activity levels of normal children up to the age of two-years, and would like to observe individual children, in their own homes, for periods of three hours, on three separate occasions (i.e. 800 hrs to 1100 hrs, 1100 hrs to 1400 hrs, and 1400 hrs to 1700 hrs).

My work will consist of recording and timing your child's activities, including crying, talking, feeding and drinking, and recording your activities, as they relate to these. The data I collect will be kept confidential, and will not be shown to anybody outside the research team, except in an anonymised form.

There are groups of children whose feeding and drinking are giving cause for concern and we need more information about normal children to enable us to help them. We have not chosen to ask your family to take part for any special reason - just as an ordinary child and parent with no special problems. You are, of course, free to take part or not, as you wish; if you do agree to take part you are free to withdraw from the study at any time.

If you would like more information, I would be happy to discuss this research with you personally, in more detail.

Doreen Leck

Appendix A

Behaviour counts in 6-8 month children, as a percentage of their waking time.

CHILD	SEX	WAKING	PASSIVE	ACTIVE	CRYING	TALKING	FEEDING	DRINKING
1	F	435	418	17	40	5	59	10
		%	**96**	**4**	**22**	**1**	**14**	**2**
2	F	443	384	59	34	5	67	16
		%	**87**	**13**	**8**	**1**	**15**	**4**
3	F	495	419	76	17	14	66	23
		%	**85**	**15**	**3**	**3**	**13**	**5**
4	F	428	428	0	43	0	49	2
		%	**100**	**0**	**10**	**0**	**11**	**0**
5	M	429	419	10	39	24	35	10
		%	**98**	**2**	**9**	**6**	**8**	**2**
6	M	423	413	10	71	0	63	14
		%	**98**	**2**	**17**	**0**	**15**	**3**
7	M	376	365	11	64	0	48	10
		%	**97**	**3**	**17**	**0**	**13**	**3**
8	M	470	385	85	27	27	80	10
		%	**82**	**18**	**6**	**6**	**17**	**2**

The code number of each child is shown in the first column, the child's sex in the second, and the child's total waking time in the third. The following columns denote the total number of recordings of each child, during the nine hours of observations. Recordings of the children, as percentages of their waking times, are listed below these totals, in bold print.

Appendix B (1)

Behaviour counts in 12-14 month children, as a percentage of their waking time.

CHILD	SEX	WAKING	PASSIVE	ACTIVE	CRYING	TALKING	FEEDING	DRINKING
9	F	487	312	175	7	223	19	5
		%	**64**	**36**	**1**	**46**	**4**	**1**
10	F	414	158	256	15	20	50	30
		%	**38**	**62**	**4**	**5**	**12**	**7**
11	F	461	311	150	30	51	68	75
		%	**67**	**33**	**7**	**11**	**15**	**16**
12	F	473	279	194	47	85	25	127
		%	**59**	**41**	**10**	**18**	**5**	**27**
13	M	482	328	154	40	41	25	46
		%	**68**	**32**	**8**	**9**	**5**	**10**
14	M	342	231	111	49	12	26	60
		%	**68**	**32**	**14**	**4**	**8**	**18**
15	M	433	344	89	53	26	66	25
		%	**79**	**21**	**12**	**6**	**15**	**6**
16	M	450	315	136	27	100	88	19
		%	**70**	**30**	**5**	**22**	**20**	**4**

The code number of each child is shown in the first column, the child's sex in the second, and the child's total waking time in the third. The following columns denote the total number of recordings of each child, during the nine hours of observations. Recordings of the children, as percentages of their waking times, are listed below these totals, in bold print.

Appendix B (2)

Behaviour counts in 18-20 month children, as a percentage of their waking time.

CHILD	SEX	WAKING	PASSIVE	ACTIVE	CRYING	TALKING	FEEDING	DRINKING
17	F	389	269	120	8	251	66	16
		%	**69**	**31**	**2**	**65**	**17**	**4**
18	F	537	341	196	49	81	51	35
		%	**64**	**36**	**9**	**15**	**9**	**7**
19	F	464	290	174	22	344	49	21
		%	**63**	**38**	**5**	**74**	**11**	**5**
20	F	520	413	107	6	233	67	28
		%	**79**	**21**	**1**	**45**	**13**	**5**
21	M	459	278	181	22	37	67	42
		%	**61**	**39**	**5**	**8**	**15**	**9**
22	M	540	348	192	38	96	80	39
		%	**64**	**36**	**7**	**18**	**15**	**7**
23	M	459	284	175	49	158	30	130
		%	**62**	**38**	**11**	**34**	**7**	**28**
24	M	396	265	128	24	71	45	13
		%	**67**	**33**	**6**	**18**	**11**	**3**

The code number of each child is shown in the first column, the child's sex in the second, and the child's total waking time in the third. The following columns denote the total number of recordings of each child, during the nine hours of observations. Recordings of the children, as percentages of their waking times, are listed below these totals, in bold print.

Appendix B (3)

Behaviour counts in 24-26 month children, as a percentage of their waking time.

CHILD	SEX	WAKING	PASSIVE	ACTIVE	CRYING	TALKING	FEEDING	DRINKING
25	F	540	359	181	13	312	80	17
		%	**66**	**34**	**2**	**58**	**15**	**3**
26	F	530	312	218	49	117	67	23
		%	**59**	**41**	**9**	**22**	**13**	**4**
27	F	529	341	188	21	224	57	75
		%	**64**	**36**	**4**	**42**	**11**	**14**
28	F	540	299	241	19	179	74	12
		%	**55**	**45**	**4**	**33**	**14**	**2**
29	M	493	292	201	22	167	116	27
		%	**59**	**41**	**4**	**34**	**24**	**5**
30	M	486	301	185	40	126	79	46
		%	**62**	**38**	**8**	**26**	**16**	**9**
31	M	412	278	134	20	144	51	22
		%	**67**	**33**	**5**	**35**	**12**	**5**
32	M	475	337	138	13	290	62	20
		%	**71**	**29**	**3**	**61**	**13**	**4**

The code number of each child is shown in the first column, the child's sex in the second, and the child's total waking time in the third. The following columns denote the total number of recordings of each child, during the nine hours of observations. Recordings of the children, as percentages of their waking times, are listed below these totals, in bold print.

Appendix B (4)

Behaviour counts in caretakers of 6-8 month children, as a percentage of the child's waking time.

CHILD	SEX	WAKING	CARE	TALKING	HOLDING	BREAST	FORMULA	SOLID	DRINK
1	F	435	36	308	148	0	18	22	10
		%	**8**	**71**	**71**	**0**	**4**	**5**	**2**
2	F	443	47	334	184	0	16	52	22
		%	**11**	**75**	**75**	**0**	**4**	**12**	**5**
3	F	495	76	282	75	0	0	35	15
		%	**15**	**57**	**15**	**0**	**0**	**7**	**3**
4	F	428	33	137	123	0	29	21	3
		%	**8**	**32**	**29**	**0**	**7**	**5**	**1**
5	M	429	36	159	99	6	12	28	0
		%	**8**	**37**	**23**	**1**	**3**	**7**	**0**
6	M	423	68	91	44	0	28	39	14
		%	**16**	**22**	**10**	**0**	**7**	**9**	**3**
7	M	376	35	105	105	0	18	40	9
		%	**9**	**28**	**28**	**0**	**5**	**11**	**2**
8	M	470	34	216	54	0	13	65	11
		%	**7**	**46**	**11**	**0**	**3**	**14**	**2**

The code number of each child is shown in the first column, the child's sex in the second, and the child's total waking time in the third. The following columns denote the total number of recordings of each caretaker, during the nine hours of observations. Recordings of the caretakers, as percentages of their child's waking times, are listed below these totals, in bold print.

Appendix C (1)

Behaviour counts in caretakers of 12-14 month children, as a percentage of the child's waking time.

CHILD	SEX	WAKING	CARE	TALKING	HOLDING	BREAST	FORMULA	SOLID	DRINK
9	F	487	31	204	31	0	0	13	4
		%	**6**	**42**	**6**	**0**	**0**	**3**	**1**
10	F	414	21	262	36	0	0	34	5
		%	**5**	**63**	**9**	**0**	**0**	**8**	**1**
11	F	461	39	316	87	0	0	28	12
		%	**8**	**69**	**19**	**0**	**0**	**6**	**3**
12	F	473	8	167	156	0	0	13	90
		%	**8**	**35**	**33**	**0**	**0**	**3**	**19**
13	M	482	20	231	87	0	0	29	29
		%	**4**	**48**	**18**	**0**	**0**	**6**	**6**
14	M	342	18	176	20	0	0	24	21
		%	**5**	**51**	**6**	**0**	**0**	**7**	**6**
15	M	433	21	117	101	0	0	23	11
		%	**5**	**27**	**23**	**0**	**0**	**5**	**3**
16	M	450	51	290	56	0	0	43	7
		%	**11**	**64**	**12**	**0**	**0**	**10**	**2**

The code number of each child is shown in the first column, the child's sex in the second, and the child's total waking time in the third. The following columns denote the total number of recordings of each caretaker, during the nine hours of observations. Recordings of the caretakers, as percentages of their child's waking times, are listed below these totals, in bold print.

Appendix C (2)

Behaviour counts in caretakers of 18-20 month children, as a percentage of the child's waking time.

CHILD	SEX	WAKING	CARE	TALKING	HOLDING	BREAST	FORMULA	SOLID	DRINK
17	F	389	19	159	23	0	0	17	5
		%	**5**	**41**	**6**	**0**	**0**	**4**	**1**
18	F	537	17	200	69	0	0	32	9
		%	**3**	**37**	**13**	**0**	**0**	**6**	**2**
19	F	464	20	314	6	0	0	11	5
		%	**4**	**68**	**1**	**0**	**0**	**2**	**1**
20	F	520	27	291	120	0	0	15	17
		%	**5**	**56**	**23**	**0**	**0**	**3**	**3**
21	M	459	19	200	9	0	0	10	10
		%	**4**	**44**	**2**	**0**	**0**	**2**	**2**
22	M	540	41	203	53	0	0	12	11
		%	**8**	**38**	**10**	**0**	**0**	**2**	**2**
23	M	459	13	242	35	0	0	10	10
		%	**3**	**53**	**8**	**0**	**0**	**2**	**2**
24	M	393	22	245	69	0	0	32	9
		%	**6**	**62**	**18**	**0**	**0**	**8**	**2**

The code number of each child is shown in the first column, the child's sex in the second, and the child's total waking time in the third. The following columns denote the total number of recordings of each caretaker, during the nine hours of observations. Recordings of the caretakers, as percentages of their child's waking times, are listed below these totals, in bold print.

Appendix C (3)

Behaviour counts in caretakers of 24-26 month children, as a percentage of the child's waking time.

CHILD	SEX	WAKING	CARE	TALKING	HOLDING	BREAST	FORMULA	SOLID	DRINK
25	F	540	11	347	52	0	0	19	10
		%	**2**	**64**	**10**	**0**	**0**	**4**	**2**
26	F	530	34	235	57	0	0	25	7
		%	**6**	**44**	**11**	**0**	**0**	**5**	**1**
27	F	529	35	350	115	0	0	8	6
		%	**7**	**66**	**22**	**0**	**0**	**2**	**1**
28	F	540	27	201	37	0	0	11	4
		%	**5**	**37**	**7**	**0**	**0**	**2**	**1**
29	M	493	39	196	27	0	0	17	11
		%	**8**	**40**	**5**	**0**	**0**	**3**	**2**
30	M	486	5	140	113	0	0	9	9
		%	**1**	**29**	**23**	**0**	**0**	**2**	**2**
31	M	412	22	169	9	0	0	21	8
		%	**5**	**41**	**2**	**0**	**0**	**5**	**2**
32	M	475	47	193	17	0	0	19	3
		%	**10**	**41**	**4**	**0**	**0**	**4**	**1**

The code number of each child is shown in the first column, the child's sex in the second, and the child's total waking time in the third. The following columns denote the total number of recordings of each caretaker, during the nine hours of observations. Recordings of the caretakers, as percentages of their child's waking times, are listed below these totals, in bold print.

Appendix C (4)

Consumables of 6-8 month olds, including number of portions

Child No.	1	2	3	4	5	6	7	8
Sex	F	F	F	F	M	M	M	M
Formula	2	1		3	2	2	2	3
Cereal	1	1	1		1	1	1	1
Child/baby meals	1	1		4	1	2	1	
Yoghurt/from. frais	1	2	2		2	1		2
Fresh fruit	1	2						7
Salad fruit			2					1
Deserts					1		1	
Eggs								2
Cheese			2					
Meat		1						
Fish								1
Potatoes		1						1
Chips/ketchups								
Fresh veg.		3						7
Tinned/proc. veg.								2
Soup								
Bread	2		3					3
Pizza			1					
Pasta								
Cakes/biscuits								
Spreads			2					1
Crisps								
Sweets/ices								
Fresh milk drinks		3	2					

Appendix D (1)

Consumables of 12-14 month olds, including number of portions

Child No.	9	10	11	12	13	14	15	16
Sex	F	F	F	F	M	M	M	M
Formula								
Cereal			1		2		1	1
Child/baby meals		1				1		
Yoghurt/from. frais			2	1		2	1	1
Fresh fruit							2	
Salad fruit							1	
Deserts		2						
Eggs								1
Cheese							2	
Meat	2		1		1			
Fish			1	1				
Potatoes	1		1					
Chips/ketchups								
Fresh veg.							2	
Tinned/proc. veg.			3		1			
Soup		1						1
Bread	3	1	1				2	2
Pizza								
Pasta		1		1			1	
Cakes/biscuits			1	4		1		3
Spreads			1				2	
Crisps		1				1	1	
Sweets/ices		2	2		1		2	1
Fresh milk drinks	2				3		2	1

Appendix D (2)

Consumables of 18-20 month olds, including number of portions

Child No.	17	18	19	20	21	22	23	24
Sex	F	F	F	F	M	M	M	M
Formula								
Cereal	1							1
Child/baby meals								
Yoghurt/from. frais	1	1						1
Fresh fruit	3	1		5			2	2
Salad fruit	1	3		1				1
Deserts						1		
Eggs								1
Cheese		1						2
Meat	1			1	1	1	1	
Fish		2						
Potatoes								
Chips/ketchups			1	1				
Fresh veg.		4		1				
Tinned/proc. veg.	1		1					
Soup								
Bread	1	2	2	2		2	1	1
Pizza			1					
Pasta		2						
Cakes/biscuits	1	1	6	3	2	4	1	1
Spreads						2		
Crisps	1	1	1	1	2	1	1	
Sweets/ices			1	1	1	2	2	1
Fresh milk drinks			2					1

Appendix D (3)

Consumables of 24-26 month olds, including number of portions

Child No.	25	26	27	28	29	30	31	32
Sex	F	F	F	F	M	M	M	M
Formula								
Cereal	1		1	1		1	1	2
Child/baby meals								
Yoghurt/from. frais	1							
Fresh fruit	2	3	1	1				
Salad fruit								
Deserts								
Eggs								
Cheese				1				1
Meat	1		1		1	3		1
Fish	1			1				
Potatoes	1							
Chips/ketchups					1	2		
Fresh veg.	1							
Tinned/proc. veg.					2	1		
Soup					1			
Bread		2	1	1	2		1	4
Pizza								
Pasta								
Cakes/biscuits	4	2	5		2		6	
Spreads		2					1	4
Crisps		1	1		2		1	
Sweets/ices	2	3	2	4	3	3	1	1
Fresh milk drinks						1		2

Appendix D (4)

VERBAL OFFERS

A verbal offer is defined as the caretaker asking the child directly if he/she would like to be given a consumable. The consumable may be absent, or presented to the child at the time of the offer. An offer can be a whole meal, three biscuits, presented to the child at the same time, or a small piece of cheese. Quantity is unimportant. If, for example, the caretaker offers the child another piece of cheese, after having already offered the child a piece of cheese, this is classed as a separate offer, regardless of whether the child has finishes eating the first piece, and regardless of how much cheese was in the room at the time of the first offer.

Specific Offers

Do you want ...?
Would you like ...?
Will I get you ...?
Will I make you ...?
Do you want another ...? (only taken as an offer if child has finished the consumable)
Would you like some more ...? - do -

General Offers

Do you want your dinner?
Would you like some dinner?
Are you going to have some breakfast?

Indirect Offers

What will I make you?
What am I going to give you?

Questions with similar meanings, to the examples given, are also classed as verbal offers. The question: "Are you hungry", is not classed as a verbal offer because it refers to a physical sensation rather than a substance, and is often followed by the question: "Would you like ...?"

The distinction between specific, general, and indirect offers, is used only as an aid to help identify verbal offers. After identification, offers to each child are totalled, regardless of their classification.

Appendix E

VERBAL PROMPTS

A verbal prompt is defined as the Caretaker encouraging the child to eat or drink more of a previously presented consumable. The consumable must be present, at the time of the prompt.

If the Caretaker is presenting a consumable to the child for the first time, this is regarded as an offers, rather than a prompt, because prompting the child may not have been necessary, to encourage eating/drinking, if the consumable has been readily available.

1) Prompts to Eat or Drink (P1)

Eat ...
Drink ...
Try some ...
Have some ...
You'll like this
Open wide
Open your mouth
Shift your fingers

2) Prompts to Draw Attention to Food Caretaker is Offering (P2)

What's this?
This way.
Over here.
Look.
Come on.
Come back.
Come and get ...
Child's name.

3) Encouragement to Finish Consumable (P3)

Nearly finished.
Last one.
One more/two more, etc.
Just a little bit left.

4) Prompts Encouraging Self-Feeding/Drinking (P4)

Do you want to do it?
Do you want to try to ...
Will I help you?
Help yourself ...

5) Prompts to Draw attention to Unfinished Food/Drink (P5)

Do you want ... (Only taken as a prompt if child had not finished)
Do you need ... - do -
Would you like ... - do -
Have you had enough ... - do -
Have you finished ... - do -
You haven't finished ...

Finish your ...
Have you eaten ...
You're not eating
Are you going to eat/drink ...
Are you going to have some more ...
Here's your (consumable)
There's your (consumable)
Where's your (consumable)
Find your (consumable)
Go and get your (consumable)
Your (consumable) is ...
See if you want ... (consumable)

6) *Bribes and Threats (P6)*

Eat this and you can have ...
If you don't eat this (I will eat it/Dad will eat it etc.)

7) *Prompts to Drink (P-drink and P-drink water)*

A drink is any liquid except soup, formula milk and breast milk, which are classed as food, and medicine, which is not categorised. Prompts to drink water, which contains no calories, are asterisked.

CATEGORIES

Abbreviations, or words with similar meanings to any of the prompts listed, are also classed as prompts. For example, "Want some?" would be classified as a prompt in the fifth category: 'Do you want some' and "Juice?" would be interpreted as 'Do you want some juice?' hence, similarly classified.

Some prompts do not fit neatly into categories, e.g. "Would you like to try some more?" could belong to the first category or the fifth. Prompts of this kind are classified by the former part of the sentence, rather than the latter, hence the above prompt would be categorised by the words, "Would you like" (prompt 5), rather than "try some" (prompt 1). However, if the former part of the sentence is merely to draw attention, such as, "Come on, eat your dinner", the prompt would be classified by the main clause, "eat your dinner" (prompt 1) rather than "Come on" (prompt 2).

On some occasions caretakers have prompted a child to eat more than once without time lapses between them, but only the first prompt is identified, within a sentence. Any others are disregarded.

Appendix F

Numbers of identified offers to eat and drink

Child	Age	Sex	Offers	O-Drink	Offers	O-Drink	Words in Caretakers Speech
			Observer		**Independent Raters**		
1	6-8 mths	F	2	0	2	0	**479**
2	6-8 mths	F	2	1	2	1	**278**
3	6-8 mths	F	10	5	10	5	**336**
4	6-8 mths	F	0	2	1	2	**101**
5	6-8 mths	M	3	0	3	0	**74**
6	6-8 mths	M	0	0	0	0	**76**
7	6-8 mths	M	5	1	5	1	**183**
8	6-8 mths	M	10	2	10	2	**472**
9	12-14mths	F	2	3	0	3	**97**
10	12-14mths	F	6	1	6	1	**396**
11	12-14mths	F	11	1	11	1	**476**
12	12-14mths	F	5	4	5	3	**85**
13	12-14mths	M	3	9	4	9	**310**
14	12-14mths	M	0	0	0	0	**161**
15	12-14mths	M	1	4	1	4	**148**
16	12-14mths	M	5	1	6	1	**161**
17	18-20mths	F	11	2	10	2	**291**
18	18-20mths	F	1	2	3	1	**118**
19	18-20mths	F	2	0	2	0	**292**
20	18-20mths	F	9	2	9	2	**342**
21	18-20mths	M	4	5	4	4	**336**
22	18-20mths	M	10	1	11	1	**182**
23	18-20mths	M	6	6	7	6	**243**
24	18-20mths	M	9	2	8	2	**338**
25	24-26mths	F	14	3	13	3	**550**
26	24-26mths	F	7	1	6	1	**210**
27	24-26mths	F	1	0	2	0	**435**
28	24-26mths	F	2	3	2	3	**159**
29	24-26mths	M	11	1	11	1	**449**
30	24-26mths	M	3	0	3	0	**145**
31	24-26mths	M	4	3	4	3	**233**
32	24-26mths	M	9	1	9	1	**174**

Appendix G

Offers to eat and drink, after totals identified for each child were divided by the number of words in the caretakers speech and multiplied by 100.

Child	Age	Sex	Offers	O-Drink	Offers	O-Drink
			Observer		**Independent Raters**	
1	6-8 mths	F	0.42	0.00	0.42	0.00
2	6-8 mths	F	0.72	0.36	0.72	0.36
3	6-8 mths	F	2.98	1.49	2.98	1.49
4	6-8 mths	F	0.00	1.98	0.99	1.98
5	6-8 mths	M	4.05	0.00	4.05	0.00
6	6-8 mths	M	0.00	0.00	0.00	0.00
7	6-8 mths	M	2.73	0.55	2.73	0.55
8	6-8 mths	M	2.12	0.42	2.12	0.42
9	12-14mths	F	2.06	3.09	0.00	3.09
10	12-14mths	F	1.52	0.25	1.52	0.25
11	12-14mths	F	2.31	0.21	2.31	0.21
12	12-14mths	F	5.88	4.71	5.88	3.53
13	12-14mths	M	0.97	2.90	1.29	2.90
14	12-14mths	M	0.00	0.00	0.00	0.00
15	12-14mths	M	0.68	2.70	0.68	2.70
16	12-14mths	M	3.11	0.62	3.73	0.62
17	18-20mths	F	3.78	0.69	3.44	0.69
18	18-20mths	F	0.85	1.69	2.54	0.85
19	18-20mths	F	0.69	0.00	0.69	0.00
20	18-20mths	F	2.63	0.58	2.63	0.58
21	18-20mths	M	1.19	1.49	1.19	1.19
22	18-20mths	M	5.50	0.55	6.04	0.55
23	18-20mths	M	2.47	2.47	2.88	2.47
24	18-20mths	M	2.66	0.59	2.37	0.59
25	24-26mths	F	2.55	0.55	2.36	0.55
26	24-26mths	F	3.33	0.48	2.86	0.48
27	24-26mths	F	0.23	0.00	0.46	0.00
28	24-26mths	F	1.26	1.89	1.26	1.89
29	24-26mths	M	2.45	0.22	2.45	0.22
30	24-26mths	M	2.07	0.00	2.07	0.00
31	24-26mths	M	1.72	1.29	1.72	1.29
32	24-26mths	M	5.17	0.58	5.17	0.58

Appendix H

Numbers of prompts identified by observer

Child	Age	Sex	P1	P2	P3	P4	P5	P6	P7	Words in Caretakers Speech
1	6-8 mths	F	6	5	6	0	4	0	4	**479**
2	6-8 mths	F	1	8	7	0	9	3	12	**278**
3	6-8 mths	F	1	3	0	1	7	0	15	**336**
4	6-8 mths	F	1	7	3	0	1	0	1	**101**
5	6-8 mths	M	0	0	1	0	4	0	0	**74**
6	6-8 mths	M	3	2	0	0	4	0	2	**76**
7	6-8 mths	M	0	20	0	0	5	0	1	**183**
8	6-8 mths	M	4	6	0	3	13	1	9	**472**
9	12-14mths	F	0	0	0	0	0	0	4	**97**
10	12-14mths	F	6	24	0	0	4	3	2	**396**
11	12-14mths	F	5	0	1	2	14	0	12	**476**
12	12-14mths	F	0	2	0	0	1	0	0	**85**
13	12-14mths	M	3	7	0	0	6	0	6	**310**
14	12-14mths	M	0	3	0	0	1	0	9	**161**
15	12-14mths	M	2	0	0	1	4	0	2	**148**
16	12-14mths	M	10	2	3	0	3	0	6	**161**
17	18-20mths	F	2	0	0	0	2	1	0	**291**
18	18-20mths	F	1	1	0	0	1	0	3	**118**
19	18-20mths	F	16	0	0	0	6	0	3	**292**
20	18-20mths	F	0	0	0	0	5	0	7	**342**
21	18-20mths	M	1	0	0	0	5	0	3	**336**
22	18-20mths	M	2	0	0	0	3	0	3	**182**
23	18-20mths	M	0	0	0	0	1	2	2	**243**
24	18-20mths	M	7	0	0	2	5	0	7	**338**
25	24-26mths	F	0	0	1	1	6	0	10	**550**
26	24-26mths	F	2	0	0	0	5	0	3	**210**
27	24-26mths	F	8	0	0	0	8	1	1	**435**
28	24-26mths	F	0	0	0	0	2	0	0	**159**
29	24-26mths	M	2	0	0	0	8	0	1	**449**
30	24-26mths	M	0	0	0	0	0	0	1	**145**
31	24-26mths	M	3	2	0	0	9	2	0	**233**
32	24-26mths	M	1	0	0	1	1	0	1	**174**

Appendix I (1)

Numbers of prompts identified by independent raters

Child	Age	Sex	P1	P2	P3	P4	P5	P6	P7	Words in Caretakers Speech
1	6-8 mths	F	6	5	5	0	4	0	4	**479**
2	6-8 mths	F	2	9	7	0	7	3	11	**278**
3	6-8 mths	F	0	2	1	0	9	0	14	**336**
4	6-8 mths	F	1	7	3	0	1	0	1	**101**
5	6-8 mths	M	0	0	1	0	4	0	0	**74**
6	6-8 mths	M	3	2	0	0	4	0	1	**76**
7	6-8 mths	M	0	20	0	0	5	0	1	**183**
8	6-8 mths	M	3	6	0	2	14	1	9	**472**
9	12-14mths	F	0	0	0	0	0	0	4	**97**
10	12-14mths	F	5	24	0	0	6	3	2	**396**
11	12-14mths	F	5	0	1	1	15	0	12	**476**
12	12-14mths	F	0	2	0	0	1	0	0	**85**
13	12-14mths	M	2	6	0	0	7	0	5	**310**
14	12-14mths	M	0	3	1	0	0	0	8	**161**
15	12-14mths	M	1	0	0	1	5	0	2	**148**
16	12-14mths	M	5	1	4	1	2	1	5	**161**
17	18-20mths	F	0	0	0	0	3	2	0	**291**
18	18-20mths	F	1	1	0	0	1	0	3	**118**
19	18-20mths	F	15	0	0	0	7	0	3	**292**
20	18-20mths	F	0	1	1	0	3	0	8	**342**
21	18-20mths	M	1	0	0	0	4	0	3	**336**
22	18-20mths	M	1	0	0	0	3	1	3	**182**
23	18-20mths	M	0	0	0	0	2	1	2	**243**
24	18-20mths	M	2	0	0	4	7	0	7	**338**
25	24-26mths	F	0	0	1	2	5	0	10	**550**
26	24-26mths	F	2	1	0	0	4	0	3	**210**
27	24-26mths	F	5	2	0	0	9	1	1	**435**
28	24-26mths	F	0	0	0	0	2	0	0	**159**
29	24-26mths	M	2	0	0	2	8	0	1	**449**
30	24-26mths	M	0	0	0	0	0	0	1	**145**
31	24-26mths	M	2	2	0	0	10	2	0	**233**
32	24-26mths	M	1	0	0	0	2	0	1	**174**

Appendix I (2)

Prompts identified by observer, after the totals identified for each child were divided by the number of words in the caretakers speech and multiplied by 100.

Child	Age	Sex	P1	P2	P3	P4	P5	P6	P7
1	6-8 mths	F	1.25	1.04	1.25	0	0.84	0	0.84
2	6-8 mths	F	0.36	2.88	2.52	0	3.24	1.08	4.32
3	6-8 mths	F	0.30	0.89	0	0.30	2.08	0	4.46
4	6-8 mths	F	0.99	6.93	2.97	0	0.99	0	0.99
5	6-8 mths	M	0	0	1.35	0	5.41	0	0
6	6-8 mths	M	3.95	2.63	0	0	5.26	0	2.63
7	6-8 mths	M	0	10.93	0	0	2.73	0	0.55
8	6-8 mths	M	0.85	1.27	0	0.64	2.75	0.21	1.91
9	12-14mths	F	0	0	0	0	0	0	4.12
10	12-14mths	F	1.52	6.06	0	0	1.01	0.76	0.51
11	12-14mths	F	1.05	0	0.21	0.42	2.94	0	2.52
12	12-14mths	F	0	2.35	0	0	1.18	0	0
13	12-14mths	M	0.96	2.26	0	0	1.94	0	1.94
14	12-14mths	M	0	1.86	0	0	0.62	0	5.59
15	12-14mths	M	1.35	0	0	0.68	2.70	0	1.35
16	12-14mths	M	6.21	1.24	1.86	0	1.86	0	3.73
17	18-20mths	F	0.69	0	0	0	0.69	0.34	0
18	18-20mths	F	0.85	0.85	0	0	0.85	0	2.54
19	18-20mths	F	5.48	0	0	0	2.05	0	1.03
20	18-20mths	F	0	0	0	0	1.46	0	2.05
21	18-20mths	M	0.30	0	0	0	1.49	0	0.89
22	18-20mths	M	1.1	0	0	0	1.65	0	1.65
23	18-20mths	M	0	0	0	0	0.41	0.82	0.82
24	18-20mths	M	2.07	0	0	0.59	1.48	0	2.07
25	24-26mths	F	0	0	0.18	0.18	1.09	0	1.82
26	24-26mths	F	0.95	0	0	0	2.38	0	1.43
27	24-26mths	F	1.84	0	0	0	1.84	0.23	0.23
28	24-26mths	F	0	0	0	0	1.26	0	0
29	24-26mths	M	0.45	0	0	0	1.78	0	0.22
30	24-26mths	M	0	0	0	0	0	0	0.69
31	24-26mths	M	1.29	0.86	0	0	3.86	0.86	0
32	24-26mths	M	0.57	0	0	0.57	0.57	0	0.57

Appendix J (1)

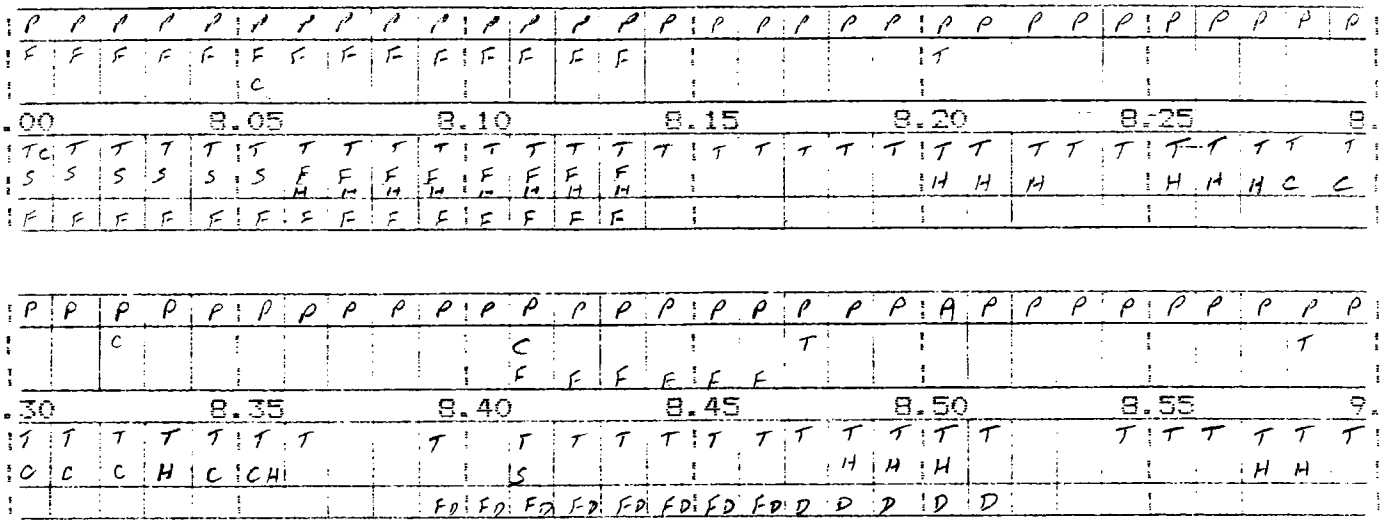
Prompts identified by independent raters, after the totals identified for each child were divided by the number of words in the caretakers speech and multiplied by 100.

Child	Age	Sex	P1	P2	P3	P4	P5	P6	P7
1	6-8 mths	F	1.25	1.04	1.04	0	0.84	0	0.84
2	6-8 mths	F	0.72	3.24	2.52	0	2.52	1.08	3.96
3	6-8 mths	F	0	0.60	0.30	0	2.68	0	4.17
4	6-8 mths	F	0.99	6.93	2.97	0	0.99	0	0.99
5	6-8 mths	M	0	0	1.35	0	5.41	0	0
6	6-8 mths	M	3.95	2.63	0	0	5.26	0	1.32
7	6-8 mths	M	0	10.93	0	0	2.73	0	0.55
8	6-8 mths	M	0.64	1.27	0	0.42	2.97	0.21	1.91
9	12-14mths	F	0	0	0	0	0	0	4.12
10	12-14mths	F	1.26	6.06	0	0	1.52	0.76	0.51
11	12-14mths	F	1.05	0	0.21	0.21	3.15	0	2.52
12	12-14mths	F	0	2.35	0	0	1.18	0	0
13	12-14mths	M	0.65	1.94	0	0	2.26	0	1.61
14	12-14mths	M	0	1.86	0.62	0	0	0	4.97
15	12-14mths	M	0.68	0	0	0.68	3.38	0	1.35
16	12-14mths	M	3.11	0.62	2.48	0.62	1.24	0.62	3.11
17	18-20mths	F	0	0	0	0	1.03	0.69	0
18	18-20mths	F	0.85	0.85	0	0	0.85	0	2.54
19	18-20mths	F	5.14	0	0	0	2.40	0	1.03
20	18-20mths	F	0	0.29	0.29	0	0.88	0	2.34
21	18-20mths	M	0.30	0	0	0	1.19	0	0.89
22	18-20mths	M	0.55	0	0	0	1.65	0.55	1.65
23	18-20mths	M	0	0	0	0	0.82	0.41	0.82
24	18-20mths	M	0.59	0	0	1.18	2.07	0	2.07
25	24-26mths	F	0	0	0.18	0.36	0.91	0	1.82
26	24-26mths	F	0.95	0.48	0	0	1.90	0	1.43
27	24-26mths	F	1.15	0.46	0	0	2.07	0.23	0.23
28	24-26mths	F	0	0	0	0	1.26	0	0
29	24-26mths	M	0.45	0	0	0.45	1.78	0	0.22
30	24-26mths	M	0	0	0	0	0	0	0.69
31	24-26mths	M	0.86	0.86	0	0	4.29	0.86	0
32	24-26mths	M	0.57	0	0	0.	1.15	0	0.57

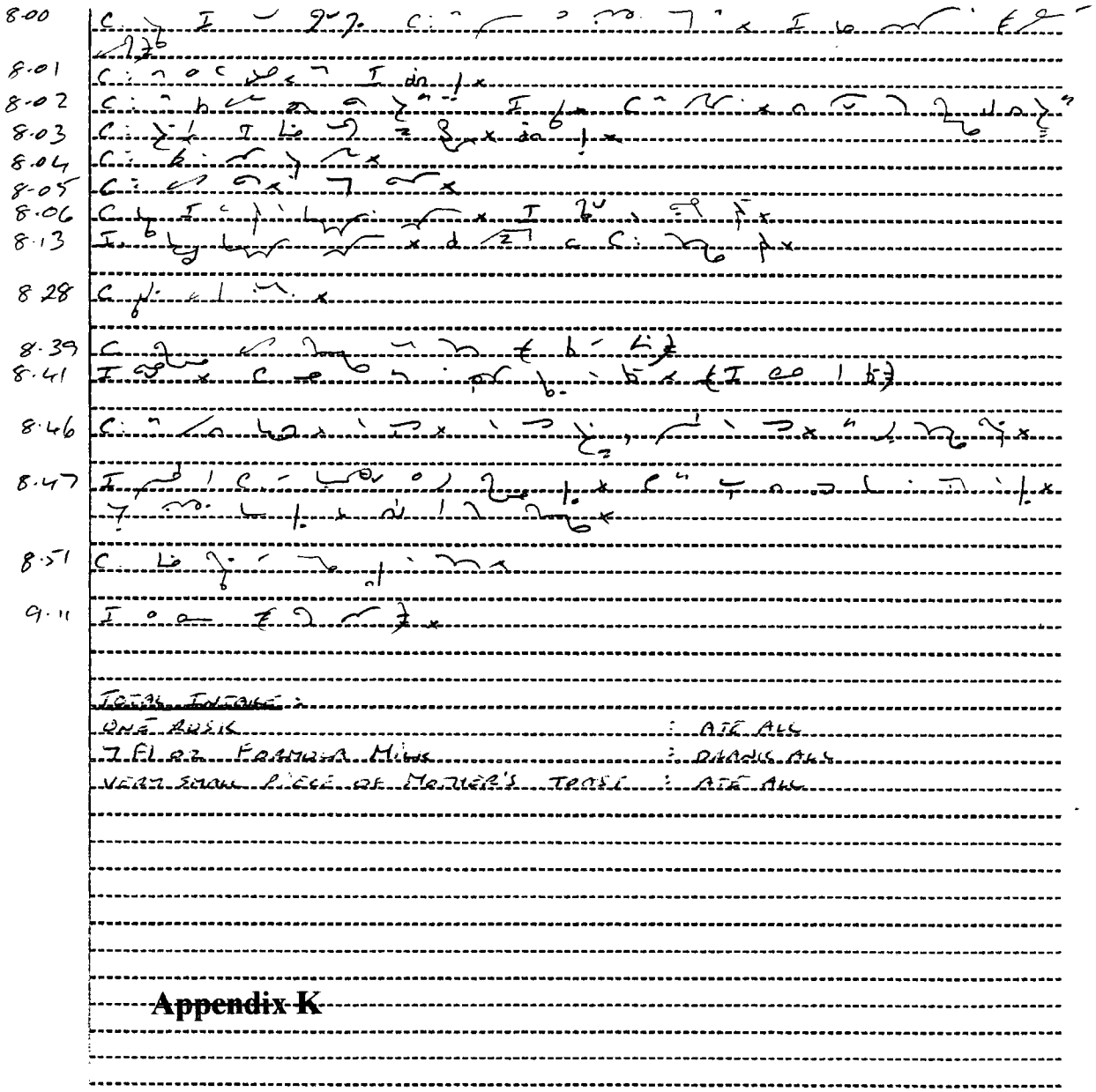
Appendix J (2)

ild's name: ... ... Child's age: 6 YRS..... Date: 22.7.?-
retaker: ...MOTHER/SUSAN..... DATE OF BIRTH:

CHILD'S DAY RECORD



NNING RECORD

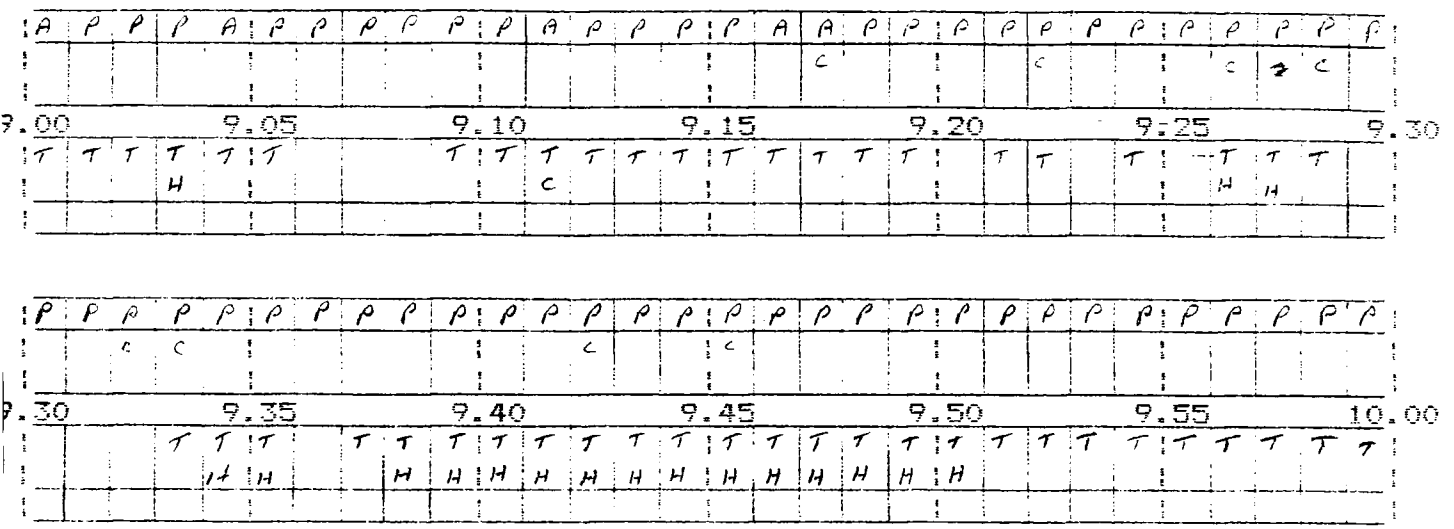


Appendix K

Child's name: [illegible] Child's age: 6 MONTHS Date: 24.1.94

Caretaker: MOTHER Date of Birth:

CHILD'S DAY RECORD

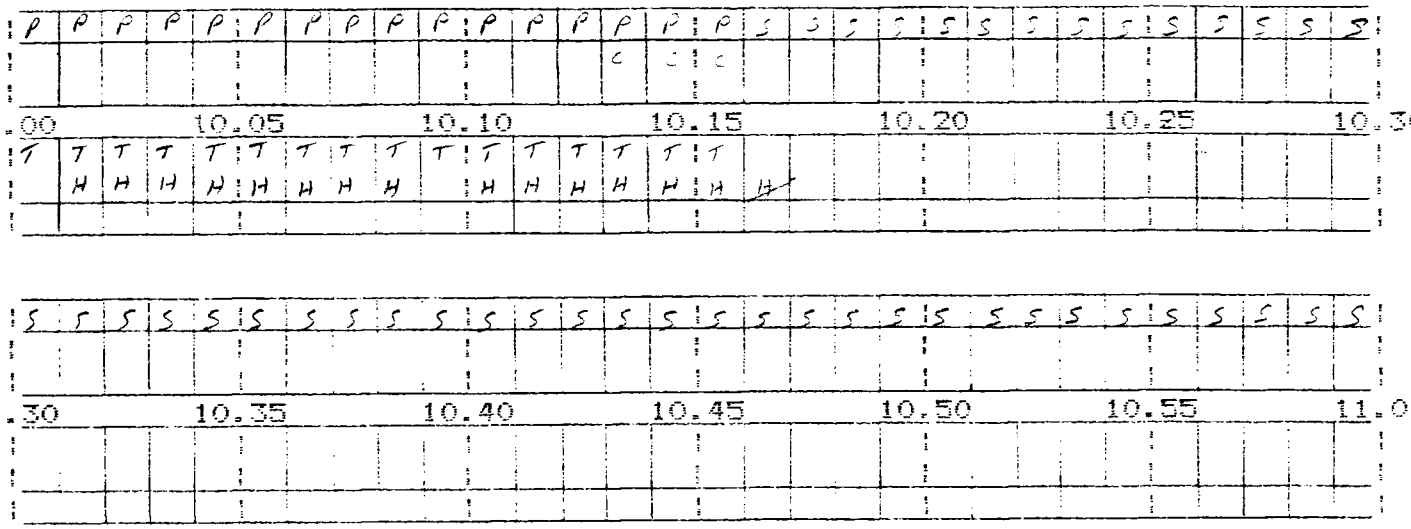


RUNNING RECORD

9.11 Ian to work

ild's name: ... Child's age: 6 months ... Date: 24.1.94
retaker: Mother ... Date of Birth:

CHILD'S DAY RECORD



NNING RECORD

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