

2 Speech retardation: environmental and social factors

Introduction

The purpose of this chapter is to describe information obtained in a series of interviews with the mothers of speech retarded children. These interviews had a dual aim; first, to obtain information on the behaviour of the children (this information is incorporated in Chapter 4 and therefore will not be described further in this account), and, second, to obtain a broad descriptive picture of each child's environmental background and, in so doing, to investigate certain specific hypotheses.

The main hypothesis embracing this part of the investigation was that environmental factors affect the acquisition and early development of speech and language. For the purpose of this study 'environment' was seen as the present and past family and social background of the child, covering basic demographic factors and such variables as the amount of appropriate stimulation in the home, the attitude and expectations of the parents, especially the mother, the stability of the home and so on. It was thought that such factors were likely to be of as much importance in the development of speech of children with physical handicaps as they would be to the child not suffering from any gross disorder.

Review of literature relating to effects of environmental variables on the acquisition of speech

It is a common view that 'Man is born to talk' (Hebb *et al.*, 1971) and the present-day preoccupation with language is an acknowledgement that it is the pivot of man as a social and thinking being. The child who is deprived of the richness, flexibility and creativity of speech as a means of communication is indeed severely handicapped, and the conundrum of

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why a 'normal' child, surrounded by spoken and written language from birth, fails to develop a competence which is so essential to him is a matter of considerable interest. The contribution of environmental factors to speech and language development is a matter of controversy as are the reasons for the failure of these children to acquire speech normally. While theorizing currently widely exceeds empirical knowledge, some of the major theories have nevertheless generated valuable hypotheses capable of being scientifically tested.

In the past two decades the part played by environmental factors in the acquisition of speech has been played down on theoretical grounds by Chomsky. In 1957, Chomsky, who has emerged as one of the most creative linguists of this century, published a controversial article in opposition to the extreme empiricism of B. F. Skinner's *Verbal Behaviour* (1957). In this classic book, Skinner, by conceiving language as yet another learned skill, acquired by means of simple stimulus-response conditioning, inevitably placed the onus of successful learning upon environmental factors. Chomsky rejected the behaviouristic standpoint in relation to language development, stating, 'What evidence is now available supports the view that all human languages show deep-seated properties of organisation and structure. These properties—these linguistic universals—can be plausibly assumed to be an innate specific mechanism, a 'language-acquisition device' (LAD), which determines the structure of language' (Chomsky, 1965). The relevance of such complex and far-reaching theories to the problems of delay in the acquisition of speech is that delay must consequently be viewed as having a basis in structural, neurological deficit.

Lenneberg (1966) gives credence to this theory by adding neurological and observational support. He argues persuasively that the emergence of speech is most easily accounted for by maturational changes which are amazingly unaffected by abnormal factors in the child's environment, and which are independent of practice or needs. He and others have pointed out that children of deaf parents were found to babble appropriately and to develop speech adequately even though brought up in a grossly abnormal linguistic environment. Comparative studies of normal and defective children have shown speech development to be remarkably synchronized with motor milestones, and Lenneberg states, 'The preservation of synchrony between motor and speech or language milestones is, I believe, the most cogent evidence that language acquisition is regulated by maturational phenomena.' Morley's (1965) findings, in her classic longitudinal study of speech development, support this view by failing to find any association between adverse social factors, such as the mother's ability to cope and the child's failure to learn to talk.

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of the extreme nativists would itself suggest the acceptability of a middle-ground position, and theories acknowledging the interaction of innate and environmental characteristics are persuasive on common-sense grounds. According to Piaget, for example, the development of language is dependent upon diverse cognitive abilities which have arisen in the sensori-motor period (the first two years of life) as a result of the infant's innate tendency to exercise his reflexes and to organize his actions as a response to the need to adapt to the environment. It is essentially a theory of accretion, as is that of Bruner and his associates (1969), whose detailed studies have well illustrated the essentiality of the interaction between the child's innate behaviours such as seeing and pointing behaviours, and the mother-figures' responses. Bruner describes the extremism of Chomsky and Skinner as 'a miraculous theory on the one side and an impossible theory on the other'.

Similarly, Hebb *et al.* (1971) demolished the claims of extreme nativists by proposing 'a more moderate view in which learning cooperates with heredity in the child's mastery of language'. He states,

'We believe that how learning occurs, and what learning, is as much determined by the learner's heredity as by his environment. In behaviour that depends on perception and thought, the relation of constitution to experience is multiplicative rather than additive; to ask what is more important is like asking which contributes more to the area of a field—its length or its breadth. Both are of 100 per cent importance, even when one is a greater source of variance than the other, and their relation is such that one must understand both to understand either.'

His own theory stresses the importance of latent learning, involving perceptual learning (Gibson and Gibson, 1955), sensory pre-conditioning in which the association between two stimuli is learned by their being simultaneous (Brogden, 1947) and one trial learning. 'Latent learning without reinforcement is one of the facts of human behaviour, a normal consequence of perception.'

These cursory indications of the theories of Piaget, Bruner and Hebb are perhaps sufficient to show that, although essentially very different, they nevertheless have in common a stress on the interaction between heredity and environmental factors, and thus justify an examination of the impact of environmental factors and human communication.

Indeed, weighing up the evidence, it is unlikely that narrow extreme theories will prove to have more than moderate validity. Wider multi-factor theories are likely to explain much more than single factor theories (Werry, 1972; Kolvin *et al.*, 1973b). For instance, theories taking into consideration the relationship between intrinsic (biological) factors and extrinsic factors such as learning, social and psychological factors, are likely to be more credible and to have greater predictive validity. An examination of extrinsic influences upon the development of speech therefore is justified, though always bearing in mind the likelihood of such

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factors being tempered by their interaction with intrinsic factors. Taking an analogy from the theory of bladder control (Kolvin and Taunch, 1973), a mature biological substrate implies the potential for control of wetting but not necessarily the presence of control and needs to be complemented by an experiential or learning component. Such control can frequently be accelerated by the use of a conditioning technique. With regard to speech and language functioning two allied questions have to be tackled: first, can specific training and general enrichment or stimulation accelerate the rate of maturation of the biological substrate, leading to earlier vocalization, earlier onset of meaningful speech and quantitatively better syntactic and semantic development? Second, once the biological substrate is mature, can specific training and general enrichment in stimulation lead to significant, syntactical, semantic and cognitive gains; and, if so, can these gains be maintained?

The evidence so far suggests that certain speech milestones are relatively independent of environmental influences. First, there is the onset of babbling even in the case of congenitally deaf children; second, there are only small social class differences in relation to the age at which children start to speak (see Chapter 1); and, finally, aspects of early language development of slum children as compared with controls do not appear to be significantly retarded (especially with regard to syntactic development). Even small differences may be called into question as they may partly be determined by cognitive and not social class effects alone.

It has been shown that the development of certain aspects of language ability in earlier years is sensitive to the amount and nature of the interaction of the child with parent figures (Ainsworth and Bell, 1974; Beckwith, 1971; Rheingold, 1960). This will be discussed later. If we narrow the field to vocal development, there is evidence that prebabbling behaviour seemingly related to later vocal development is susceptible to environmental stimulation. Trevarthen *et al.* (1975) showed, by analysing films of mother-baby interactions, that very young babies made specific mouth movements in response to their mothers' voices and, perhaps equally important, the mothers spontaneously imitated with vocalizations the movements of their infants' mouths.

There are numerous studies, comprehensively summarized by Rutter and Mittler (1972), which have shown that after babbling begins appropriate verbal and social reinforcements tend to increase the amount of vocalization (Todd and Palmer, 1968). Verbal enrichment with continuous reinforcement increases not only the quantity but also the type of vocalization (Routh, 1969; Rutter and Mittler, 1972). The importance of social interaction at this stage is underlined by Lenneberg's findings (1966) that, in deaf children, babbling develops at the normal age and continues for some time, but then begins to fade

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because of the lack of auditory stimulation. It is more likely to continue if the deaf child is able to see the adult who is speaking to him. (Rutter and Mittler, however, warn against the presumption that there is a necessary connection between babbling and later language development.)

We are therefore left with the question concerning whether general stimulation and specific training can significantly enhance syntactic, semantic and cognitive development. Some preliminary findings by Brown and Hanlon (1970) suggest that mothers in their children's early years are more likely to reinforce semantic and phonetic components of speech and language than to correct sentence construction. On the other hand, specific attempts to achieve syntactic correctness by repeating the child's utterances in a syntactically correct manner prove less effective than varied and informative interchange between parent and the child (Cazden, 1966; Brown *et al.*, 1969). The fact that attempts to 'reinforce' syntactic correctness have proved to be more effective than no training at all suggest that combinations of syntactic and semantic training are likely to have the best outcome. Such work is still in its early stages with workers exploring the use of such techniques to facilitate syntactic development (Jeffrey, 1971). However, in real life, middle class mothers are likely to provide their children with appropriate syntactic and semantic experience and, by the spontaneous use of social reinforcers, to condition appropriate responses.

Though there is obvious importance in a two-way verbal exchange after the emergence of true speech, the actual way in which learning occurs is by no means obvious. The role of such commonly accepted mechanisms as imitation is not clear-cut. Rutter and Mittler (1972) argue that 'imitation provides only a minor direct influence on syntactical development. However, it may well be more important in the learning of vocabulary or in articulation.' Nevertheless, children do imitate what is said to them, and Brown and Bellugi (1964) found that adults, too, in speaking to children simplify their speech and imitate the child's form of utterance. Imitation, too, can be viewed as a form of conditioning using the operant paradigm.

Studies of institutionalized children have thrown light upon the importance of appropriate verbal enrichment and stimulation and social reinforcement. Rheingold (1961) found that infants in institutions did not suffer in their development or social responsiveness up to about three months of age. Provence and Lipton (1962) indicated, however, that thereafter such infants quickly become less alert and less responsive. Goldfarb (1943) studied the language of children who spent their first three years in an institution, comparing their subsequent development with that of children who spent their first three years in foster homes. The children were tested throughout childhood and into adolescence, and the orphanage children were found to be retarded linguisti-

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cally and also failed to progress beyond very low levels of conceptual activity.

It has also been found that insufficiency of stimulation, as with prolonged institutional experience (Haywood, 1967; Lipton, 1969), has adverse effects on language development and verbal intelligence even in infancy (Brodbeck and Irwin, 1946; Provence and Lipton, 1962). Such adverse effects of insufficient stimulation are not confined to institutions but are demonstrable even with children living with their families where there is grossly inadequate verbal stimulation (Jones, 1954). In their penetrating analysis, Rutter and Mittler (1972) therefore emphasize quality of care (Haywood, 1967; Tizard, 1969) rather than whether or not the child remains at home with parents. For instance, in institutions where the quality of care is good there is little in the way of adverse effects (Yarrow, 1964; Tizard, 1971) and similarly Kibbutzim children are not affected (Kohen-Raz, 1968). It has now also become clear that a constant background of noise of people speaking is less than an optimum experience for language development. It is the quality of adult-child interactions (Rheingold, 1960, 1961) which is important either in the home or in an institution. A number of authors suggest that, in institutions, where there is a constant background of noise, it becomes difficult to distinguish relevant foreground stimuli from irrelevant background ones (Spradlin, 1968; Rutter and Mittler, 1972; Mittler, 1972). Such an explanation is supported by the finding of poorer verbal intelligence and vocabulary scores of children in large families (Douglas, 1964; Douglas *et al.*, 1968). Many workers agree (Douglas *et al.*, 1968; Rutter and Mittler, 1972) that the most likely explanation is that the elementary grammar and vocabulary of the pre-school child provides insufficient stimulation to other children, compared with adult-child interactions. However, another way of explaining this phenomenon is that it is not the richness (and often irrelevant noise) of environmental stimulation but rather the clarity and quality of the adult-child interactions that are important (Friedlander, 1971; Rutter and Mittler, 1972).

The above considerations are particularly well illustrated in working class families. Furthermore, working class school children show inferior language performance (Templin, 1957; Lawton, 1968), vocabulary knowledge and verbal intelligence (Douglas *et al.*, 1968). As already discussed, social class influences appear to be selective, as the differences are small in relation to certain speech and language milestones, but are broad in relation to language usage and educational performance. Rutter and Mittler (1972) point out that such differences are less marked in relation to language competence and more marked in relation to abstract language functions and the way in which the latter are used.

The question now arises as to the type of mechanisms by which such

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enhanced abstract language functioning is achieved. Specificity appears to be important, as middle class mothers are more specific and informative in talking to their children and answering questions, and middle class children are more specific in their language usage than in the case of the working class (Hess and Shipman, 1965; Rackstraw and Robinson, 1967; Brandis and Henderson, 1970).

These aspects have been elaborated by Bernstein (1958) who described differences in language usage when comparing middle class children with working class children. Bernstein distinguished different forms of communication codes—*public*, later called *restricted*, which is mainly used by the working classes, and *formal*, later called *elaborated*, which is mainly used by the middle classes. Some workers have interpreted Bernstein's concept in terms of a clear-cut distinction between the codes, but such an absolute distinction was never intended. Indeed, it is best thought of as a continuum which at its elaborated end is characterized by a wide syntactical repertoire which is used to express ideas, and in complex grammatical sentences of good syntactical construction, with a wide use of adverbs and adjectives and a varied and flexible use of conjunctions, and so on. The understanding of a statement in restricted code is often dependent upon the knowledge of the listener, the use of non-verbal communication, such as gesture, and the social context in which it is used. There is evidence to indicate that general usage of the restricted code does not indicate that the speaker is totally unable to use the elaborated code, but that the potential for usage of certain aspects of the elaborated code is retained to be used in certain limited situations (Robinson, 1965). However, incorporated in the theory is the implication that insufficient use of the elaborated code could impair its development.

So far our discussion has confined itself to the development of language and verbal intelligence. For the sake of completeness some comment on cognitive development is needed. While the influence of certain institutional experiences and social class effects is particularly important to the development of vocabulary and higher order language functions involving abstraction and conceptualization, non-verbal cognitive behaviour is less affected by such influences. Furthermore, the well-known association of verbal IQ and family size does not hold to the same extent for performance IQ. Thus performance IQ appears to be relatively independent of such environmental influences.

In the USA theories stressing social class differences in language and cognitive development were given formal recognition and financial support with the inauguration of the massive State-supported Head-Start Programme. In a rush of ideological enthusiasm, compensatory language programmes were designed nationwide for the 'culturally deprived child'. Initially, results seemed to show unbelievable gains in

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the children's linguistic and cognitive abilities, and euphoria reigned. Cultural and environmental influences had apparently at last been confirmed as important agents in a child's mastery of language and the development of his cognitive abilities. But the euphoria was short-lived. Long-term follow-up assessments showed that the intellectual gains dissipated if nothing more was done for the child. However, some of the better programmes which had involved the parents or the elementary school did report more durable IQ and language gains, so the pendulum was not allowed to swing right back to pure nativism. Instead it was recognized that children's cognitive abilities were not entirely plastic but that, nevertheless, within certain limits their abilities could be improved by appropriate stimulation as long as this was continued. As a result, Parent-Child Development Centres have been set up by the State Officer of Child Development where the emphasis is more upon educating the parent to be an educator rather than directly stimulating the child. It is too early for firm conclusions but there are indications that such mother-directed intervention has more durable effects upon the child's competence.

Conclusions

There is compelling evidence that environmental factors influence vocal abilities, from babbling to the mastery of adult speech, and that deprivation leads to less than full achievement of potential. But can any real-life situations be so devoid of appropriate stimulation that the 'normal' child, the subject of our original problem, is, as a result, slow to acquire speech, regardless of how far that speech might be from what we regard as most culturally acceptable? Everyday observations would lead us to question this assumption. The middle class mother might provide the 'required' stimulation by involving her child more in one-to-one conversations, reading to her child and so on, but the working class child is frequently immersed in the greater stimulation of the hurly-burly of life in larger families, where the mother is less isolated from her friends and relatives, and where, perhaps, the father participates more in verbal exchanges because of the flexibility of his employment pattern or indeed because of his unemployment. Any research project involving home visits to children from different social backgrounds leads one to question which background is, in fact, the most 'deprived'. Labov (1970) underlines the illogicality of the view that lower class children come from verbally deprived backgrounds, saying of the research in such areas:

'We see a child battered in verbal stimulation from morning to night. We see many speech events which depend upon the competitive exhibition of verbal

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skills: singing, acting and oratory—a whole range of activities in which the individual gains status through his use of language. Even though we might accept that speech patterns vary with social class, the concept of "verbal deprivation" is subtle and complex, and creates class-barriers.'

Accordingly, in the research described here attempts were made, which proved only partially successful, to control for social class in order that such environmental influences, and hence differences, would be kept to a minimum (see Chapter 3).

Method

The interviews were carried out with the mothers. Where there was no mother at home because of death or separation (four cases) then basic 'hard' information was obtained from the father or parent substitute, but naturally all mother-dependent ratings such as those concerned with mother's attitudes, relationship between mother and child and assessments of mother's speech were inapplicable in these cases. (As this was well under 5% of our data we considered that our analysis was in no way invalidated.)

Initial communication with each family was by a letter which introduced the study by explaining that we were attempting to investigate the development of a random group of children, and that someone would call to see them to explain the nature of the research with a view to enlisting their co-operation. In this subsequent visit our interest in child development in general was explained but no mention was made of any particular interest in speech. As all of these families remembered that their children had been studied in the first few years of life as part of the 1962 Newcastle Child Development Study, it seemed logical that there should be a follow-up of their children at about seven years of age. Face-to-face contact reduced initial anxiety and eventually most families co-operated fully (see Chapter 1).

An important part of the research design was that the interviews were conducted blind; the interviewer did not know at the time of interview to which group a child belonged, this information being solely in the hands of the organizing secretary. Nevertheless, it usually became apparent early in the interview whether or not the child belonged to the pathologically deviant group, but it was rarely apparent whether or not he came from the Residual Speech Retarded Group or the control group. After the major part of the environmental, attitudinal and maternal speech information had been collected, general questions about the early development of the child and finally his speech development were asked. It is interesting to note that, in subsequent analysis, it was found

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that almost half of the parents in the Residual Speech Retarded Group denied any delay in their child's acquisition of speech, whereas 14% of the control group did think that their child had had a speech disorder. Thus, the mothers' memory lapses lessened possible control versus experimental bias in ratings.

The first interview consisted wholly of semi-structured open-ended questions: the data to be collected was clearly specified and the method of questioning was partially specified; nevertheless the interviewer was allowed to diverge from the formal layout at her discretion. The areas covered comprised:

- 1 Basic demographic, descriptive data of the family, and also detailed measures of such features as interaction between child and mother, and intellectual activities in the home.
- 2 An assessment of the child's emotional behaviour and temperamental characteristics by means of a behaviour (Kolvin *et al.*, 1975) and a temperament questionnaire (Garside *et al.*, 1975).
- 3 An assessment of the mother's speech by means of a strict quantitative analysis and, in addition, a subjective assessment by the interviewer.
- 4 Assessment of mother's sociability by means of the Wallin's Neighbourliness scale (1954).
- 5 Assessment of the mother's reported behaviour in disciplining situations and when answering the child's questions, by means of a technique developed by Robinson and Rackstraw (1967) and Robinson (1969).

The second interview was similarly semi-structured and consisted of the collection of further demographic and descriptive data of the family and child; in addition, at the end of the interview the following questionnaires and tests were administered:

- 1 The Eysenck Personality Inventory (1964)
- 2 The Maryland parental Attitude Questionnaire (Pumroy, 1966)

In assessing the contribution of social, family and other environmental factors to the acquisition of speech we were faced with the problem of the complexity of the relationship between the variables studied. We examined a large number of features, many of which appeared to contribute towards a small number of broad themes. In such circumstances we decided to sum the measures to provide an index of the particular adverse factor (theme) under consideration, arbitrarily giving the constituent variables equal weighting. This was achieved by studying the distribution of scores on a particular measure, deciding on an extreme cut-off, and a score above the extreme was given a weighting of 1 for that measure. There are obvious advantages in summing scores

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which appear to be meaningfully related. First, the summed score will be more reliable than its constituent variables, and second, it greatly simplified the analysis and hence the description of the findings. Such summed scores are referred to in the text as indices.

A different aspect of the problem of analysis was the probable multiplicative rather than purely additive relationship between some of the background factors and outcome. This is considered elsewhere in this book (Chapter 7).

Findings

1 Perinatal and developmental factors

Perinatal risk index

Ten extreme perinatal obstetric experiences or complications were all given equal weightings (of 1). These were summed to give the 'perinatal risk index'. These included such factors as antenatal complications, toxæmia of pregnancy, complications of delivery, foetal distress, etc. There were no significant differences between the three groups studied. The constituent items were also studied but few significant differences were found.

Early infancy illness score (Table I)

This was an index of illness leading to hospitalization, infectious disorders, fits, convulsions, etc. All these were given equal weighting (of 1) but meningitis or encephalitis were given a double weighting (of 2). This is, in fact, a non-specific type of illness index. There were no significant differences between the controls and the Residual Speech Retarded Group, but a highly significant difference between controls and pathological deviants. This indicates that some of these illnesses are likely to be of aetiological significance in the case of a subgroup of the pathological deviant group.

An analysis of the constituent items revealed that the only individual item for which there were significant differences between the groups was the higher incidence of convulsions amongst the pathological deviant group.

Developmental difficulties index (Table I)

This was a measure based on developmental delays of the child in areas other than speech. Evident difficulties or delays in sucking, swallowing,

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Table I Indices of adverse physical, development or environmental factors

	a = Controls	b = RSR ^a	c = PD ^b	Significance	
				5%	1%
(a) Development difficulties index score					
families with index of 0	69	45	3	a vs c	
families with index of 1	25	26	8		
families with index of 2 or more	7	9	7		
(b) Early infancy illness score					
families with index of 0	51	37	9	a vs c	
families with index of 1	29	29	2		
families with index of 2 or more	22	15	7		
(c) History of speech disorder					
families with index of 0	88	49	14	a vs b	
families with index of 1	12	27	3		
families with index of 2 or more	2	7	1		
(d) Family developmental risk index					
families with index of 0	88	51	11	a vs c	a vs b
families with index of 1	12	22	7		
families with index of 2 or more	2	7	0		
(e) Adverse family experience index					
families with index of 0	58	33	5	a vs b	a vs c
families with index of 1	23	22	2		
families with index of 2	12	14	5		
families with index of 3 or more	9	11	6		
(f) Structural defects of language					
families with index of 0	79	50	9	a vs b	
families with index of 1	19	22	6		
families with index of 2	3	5	1		
(g) Language literacy index of mother					
families with index of 0	37	14	1	a vs b	
families with index of 1	32	27	7		
families with index of 2	28	29	7		
families with index of 3 or more	3	7	1		
(h) Social environment risk index: risk score					
families with index of 0	40	17	1	a vs b	
families with index of 1	33	20	3		
families with index of 2	14	14	7	a vs c	
families with index of 3 or more	15	30	6		
Maximum n =	102	83	18		

^a RSR = Residual Speech Retarded Group

^b PD = Pathological deviant group

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taking solids and walking were each again given equal weightings. These were summated to give the developmental difficulties score. The only significant difference was between the pathological deviant group and the controls. A study of the constituent items revealed that only the pathological deviant group showed significant differences on some of these as compared with the control group.

Summary

The Residual Speech Retarded Group did not differ in any way from the controls either in terms of perinatal experiences or early physical development. As expected, there were many significant differences between the controls and the pathological deviant group.

2 Evidence of developmental difficulties in the family (Table 1)

Family developmental risk index

Historical evidence of developmental speech delays in either parent was given a weighting of 1; with a similar weighting for evidence in sibs. Left-handedness in either parent was given a weighting of 1, and again, left-handedness in any sib was given a similar weighting. The maximum score per case was therefore 4 and the minimum 0. It will be seen that there is a very evident excess of such characteristics in the Residual Speech Retarded Group.

Family history of speech disorders

This was an index of historical evidence of speech disorder. We requested information about delays in speech development and stutters or stammers. If parents provided affirmative evidence in the case of mother, father or any sibling then the family was given a weighting of 1 for each of the two disorders. Thus the theoretical maximum score for a family was 6. There was a highly significant excess of such disorders in the Residual Speech Retarded Group as compared with the controls.

Summary

Members of the families of children in the Residual Speech Retarded Group clearly have suffered from more developmental difficulties than were found in families of control children.

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3 Social factors

Social class

Social class was rated for each family according to the breadwinner's occupation, or last occupation if not currently employed. As has previously been described (Chapter 1) in matching the speech retarded children with controls an attempt had been made to control for social class by selecting children from the same areas of the city. In spite of this, however, the speech retarded children showed a downward social class gradient compared to the controls, but this did not prove to be significant (see also Chapter 3). Other aspects of social disadvantages were also studied.

The social-environmental risk index (see Table I)

The social/environmental risk index was obtained, by summing weighted scores on the following items:

- (i) Type of housing
- (ii) State of home
- (iii) Person/room ratio
- (iv) Number of children born to mother (5+ children = 1)
- (v) Poor work record of breadwinner
- (vi) Mother working when child three years old
- (vii) Contact with social agencies

There was a highly significant difference between the control group and both criterion groups, denoting an excess of social inadequacy in both the latter groups. Six of the seven constituent items in this index were significant in their own right and merit further analysis.

Housing (see Table II)

The 'state of the home' item was designed to assess the quality of cleanliness, order and repair in the home, and, as such was a reflection of the family's ability or inability to cope. The homes of children in both speech retarded groups were in a very significantly poorer condition than were the homes of the controls. There was also significantly more overcrowding in the houses of both speech retarded groups. Finally, the mothers in these groups had significantly more children.

Work patterns of parents (see Table II)

Fathers in both speech retarded groups were more likely to have unsatisfactory work patterns when compared with those in the control

Table II Social factors

	a = Control group	b = Residual Speech Retarded Group	c = Pathological deviant group	Statistical test	Significance	
					5%	1%
State of home						
good	80	48	9	chi-squared	a vs b	a vs b
fair or poor	20	34	9		a vs c	a vs c
Person/room ratio—mean	1.04	1.19	1.31	f-test	a vs b	a vs c
No. of children born to mother—mean	3.37	4.35	4.75	f-test	a vs c	a vs b
Work pattern of father						
satisfactory	72	48	5	chi-squared	a vs b (almost)	a vs c
unsatisfactory	30	36	13			
Mother working when child 3 years old						
no	92	65	15	chi-squared	a vs b (almost)	a vs c
yes	10	16	3			
Mother working when child 8 years old						
no	60	55	8	chi-squared	a vs c	a vs b
yes	42	26	9			
Contact with social agencies						
no	95	63	13	chi-squared	a vs c	a vs b
yes	7	19	4			

Control group $n = 102$ (reduces to 100 for certain comparisons).
 Residual Speech Retarded Group $n = 84$ (reduces to 81 for certain comparisons).
 Pathological deviant group $n = 18$ (reduces to 17 for certain comparisons).

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group. The global rating of unsatisfactory work pattern was defined as the breadwinner having lost at least two months' work in the last year due to illness, unemployment or malingering, or having changed jobs at least three times in an occupation where this is not likely to be acceptable. The fathers in the pathological deviant group had a significant excess of unsatisfactory work patterns. Though there was a similar trend for the fathers in the Residual Speech Retarded Group, the difference did not quite reach significance levels.

There was a tendency for more mothers in both speech retarded groups to work during their children's pre-school years (RSR almost significant at $p = 0.05$; PD $p < 0.01$). It is interesting to note that this trend was not continued, and that by the time the child was eight years old a greater percentage of mothers in the control group were working than mothers in the Residual Speech Retarded Group, though *not more* than in the pathological deviant group. The difference, however, was not quite significant. Many explanations, all speculative, can be offered for such findings. Perhaps in the Residual Speech Retarded Group there were early pressing economic needs for the mothers to work, whereas the control group mothers' return to work could be postponed to a more convenient time, such as when the children were at school. At this time the control group mothers were *more* able to take advantage of the work opportunities than the Residual Speech Retarded Group, perhaps because there was less likelihood of younger children being in the home. Once again, in the work pattern of both parents in the early years, the speech retarded groups are seen as being in a socially disadvantageous position. Later we offer an alternative explanation for the high percentage of mothers of the pathological deviant group going to work when their children were of school age.

Contact with social agencies (see Table II)

This rating was designed to assess the number of contacts the family had with various social agencies in the year prior to the child's birth, the assumption being that inability to cope with social problems would result in a greater than average number of contacts. (This information had been collected at birth as part of the Newcastle Child Development Study—Neligan *et al.*, 1974.) Contact with the following agencies was counted: National Assistance Board; Probation Service; National Society for Prevention of Cruelty to Children; Women's Voluntary Service; Red Cross; Church Social Services; School Welfare Officer; Citizen's Advice Bureau. Both speech retarded groups had a significantly higher number of contacts with social agencies, a clear indication that these families were already subject to increased social stresses at the time of the child's birth.

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Summary

Despite attempts to control occupational social class differences between groups by matching the control group with the speech retarded groups in terms of the local neighbourhood (postal district) we found that according to occupational social class ratings (Registrar General) there was still a trend towards a downward gradient of the two study groups compared with the controls (see Chapter 1). We have previously advanced the hypothesis that even within the same urban area or neighbourhood there is a relationship between social factors and child handicap. Occupational social class, however, is a relatively crude index of social disorganization or malaise. We consider our social environment risk index a more sensitive measure for assessing or reflecting adverse social environmental factors. Indeed, on this index significant differences were found, with both speech retarded groups having higher risk scores than the controls. In common with findings in similar investigations of other handicapped groups, these social factor differences were compounded of a multitude of social problems and poorer coping ability as shown by impaired employment patterns, poor housing and increased contacts with social agencies. In conclusion, our attempts to control for social class factors were only partially successful; such factors, therefore, cannot be totally discounted when interpreting our various findings.

*4 Psychological tensions and stress in the home**The adverse family experience index (Table I)*

This was a summated score which was intended to indicate the amount of emotional and behavioural disturbance within the home during the child's lifetime. It was composed of weightings of items (using the same method as before) which indicated stress or poor coping behaviour of individual members of the family. Such items included poor sociability of the mothers; the total length of separation of the child from its mother; the child living with neither parent; the civil state of the parents; whether the parents had ever separated; any psychiatric treatment of the father, the mother or the siblings and stress during pregnancy. On this summated score the families in both speech retarded groups showed significantly more evidence of psychological stress. An analysis of the constituent items reveals the following.

Sociability of mother A self-rating inventory (Wallin, 1954) assessed the amount of social contact that the mother enjoyed; mothers in both speech retarded groups showed a tendency to be less sociable than the mothers in the control group.

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Separation of child from parents While all the control group children lived with at least one of their parents at the time of interview, four of the children belonging to the Residual Speech Retarded Group were not living with either parent. Furthermore, there was a trend for children in the Residual Speech Retarded Group to have been separated from their mothers for a greater length of time in the first five years of life than had the control children. It was not valid to draw comparisons with the pathological deviant group because of the greater likelihood of these children having been in an institution.

Civil state of parents and separation of parents There was no difference between the groups in relation to marital state, but there was suggestive evidence of marital tension in the two speech retarded groups in that there was a tendency for the parents of these children to have experienced more temporary separation as the result of marital conflicts.

Psychiatric treatment of family members Information was obtained about psychiatric treatment given to fathers, mothers and siblings. Only with regard to the mothers were there any interesting differences between the groups. There was a tendency for the mothers in both speech retarded groups to report that they had received more help of a psychiatric nature during pregnancy than had the mothers of the control group, and this was particularly marked for mothers in the pathological deviant group (Table III). Subsequently, there was a similar tendency for mothers in both speech retarded groups to seek help from their family doctor for more minor psychological problems and, again, this occurred more frequently in the case of the pathological deviant group (but the differences were not statistically significant). Information was also obtained from the mothers about more serious psychological problems meriting attendance at psychiatric clinics subsequent to the birth of the child; the pattern contrasts markedly with the above picture—in no instance did a mother from the pathological deviant group report attendance at such a clinic whereas ten of the mothers of the Residual Speech Retarded Group had done so (Table III).

The interpretation of these findings is made difficult by the interaction of the stress caused by caring for a handicapped child with the stresses related to adverse social factors. Nevertheless, we consider that the higher rates of more minor psychological problems reported by mothers in both the study groups is likely to be related to their socially disadvantageous backgrounds. A similar explanation can be offered for the high rates of the more serious psychological problems reported by the mothers in the Residual Speech Retarded Group. However, if psychiatric disturbance is brought on or exacerbated by the additional burden of caring for a handicapped child, we would have predicted that the mothers of the pathological

Table III Psychological background factors in relation to mothers

	a =		b =		c =		Statistical test	Significance	
	Control	Residual Speech Retarded Group	Pathological deviant group	Statistical test	5%	1%			
Mothers attending psychiatric departments	100	70	18	chi-squared			a vs b		
no	2	10	0						
yes									
Psychiatric disorder in pregnancy	87	64	12	chi-squared			a vs c		
no	14	16	6						
yes									
Social disturbances in first year after birth	95	65	15	chi-squared			a vs b		
no	7	16	3						
yes									
Time before mother felt back to normal self (in months)	8.99	16.99	18.78	t-test			a vs b		
Mother's reading index	36	44	Not applicable	chi-squared			a vs b		
no	65	37							
yes									
Assessment of mother's speech	98	72	13	chi-squared					
adequate	4	9	3						
inadequate									

Control group maximum $n = 102$.
 RSR maximum $n = 84$ (reduces to 80 for certain comparisons).
 PD maximum $n = 18$ (reduces to 16 for certain comparisons).

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deviant group would have been more likely to be in need of treatment from a psychiatrist than would mothers of the Residual Speech Retarded Group. This was not so, however, and we can only speculate as to the reasons. From Table II it will be noted that more of the mothers of the pathological deviant group were working when the children were of school age, despite the severity of handicap of their children. Clearly this was facilitated by the day or residential/institutional care made available to their children. We can only suggest that this work experience may have had a moderating influence on the emotional stress which results from having to cope with a seriously handicapped child.

It is also difficult to know what to make of the findings of the differences of psychiatric disturbance in pregnancy, described above, because of the tendency of certain mothers of seriously handicapped children to provide distorted accounts of perinatal experiences—almost as if they were looking for something in their pregnancy which could have been responsible for their child's disorder.

Two related scores, which were not included in the social environment risk index, throw more light upon the social factor which might have affected the mother's psychological state. First, mothers were questioned about any disturbing factors in the environment in the first year of the child's life which might have been expected to have had a deleterious effect upon the relationship between mother and child. The factors considered were any events which might reasonably have been expected to affect the psychological well-being of the mother, such as violence in the home, acute financial difficulties, death or severe illness in the family, though factors which were directly attributable to the psychiatric state of the mother herself were naturally not counted. The Residual Speech Retarded Group suffered significantly more social disturbances than the control group (Table III).

The second score was simply a count of the length of time in months before each mother felt that she was back to her normal self again after the birth of her child. The mothers in both speech retarded groups tended to take longer, but the difference was only significant for the Residual Speech Retarded Group. Whilst such a finding is to be expected, perhaps, in relation to the mothers in the pathological deviant group, who had to cope with the stress of an often severely handicapped child, the significance of the finding in the Residual Speech Retarded Group, taken in conjunction with our findings relating to disturbance in the first years of life, would suggest increased tension and stress which was not directly attributable to factors within the child himself. Such stress, we feel, might reasonably have been expected to have led to impairment in the mother's maternal role, but this is purely speculative.

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Summary

There was more evidence of tension and stress in the families of both speech retarded groups which manifested itself in a tendency to increased temporary marital separations, significant increased social disturbance in the first year of the child's life and also in minor psychological disturbance of the mothers. Though the mothers of the children in the pathological deviant group might well have been expected to be under increased psychological stress because of the severity of their children's handicap, such an explanation would seem to be insufficient to account for the fact that the mothers of children in the Residual Speech Retarded Group showed equivalent levels of minor psychological disturbance when their children's handicaps were, in the main, so much less severe. It seems reasonable to assume that the disturbances in the latter group were less likely to be attributable to the child's handicap, but were more a reflection of tensions associated with the greater loadings of adverse social factors already described. Furthermore, despite the social and psychological burdens which the mothers of the pathological deviant children had to carry, not one had described the presence of more serious psychological disturbance. We offer the explanation that opportunities for special schooling or care, giving rise to greater opportunities for work, constitute protective influences.

5 Speech, language, literacy and social factors

Innumerable studies have shown that the language abilities of the child who has already acquired speech can be influenced by environmental verbal stimulation. In this study an attempt was made to investigate whether the acquisition of speech can be affected in a similar manner. Various assessments were made of the quality of the verbal/literacy stimulation which the children currently received, working on the assumption that this is likely to reflect the level of verbal stimulation which the child received in the early years of its life when speech is normally acquired.

Quantitative assessment of mother's speech

Tape recordings were made of the interviews with the mothers. Though the greater part of the interview was semi-structured, mothers were at one point asked four set questions. Their replies to these four questions were subjected to a detailed quantitative grammatical analysis similar to the Templin/McCarthy system we used in the assessment of children's

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speech, with modification suggested by the work of Hess and Shipman (1965). (A more detailed account is available from S.G.).

It was originally intended to rate the total replies to the four set questions. However, as the system we used involved a straight count of various categories of parts of speech, a simple quantitative analysis might give a higher, and hence better, score to a more garrulous response, and a lower score to a precise, clear and brief response. We therefore had two alternatives. The first was to rate the response not only qualitatively but quantitatively as well. The second was to prune redundant words, which are those used in falterings of fluency, stammers, unnecessary repetitions and unfinished sentences, and then to assess the first 100 non-redundant words. When less than 100 non-redundant words were used in reply to the four set problems, then the mother's reply to questions in another specified section were included. The above decision proved to be correct, as length of utterance correlated inversely with sentence complexity.

The analysis fell roughly into three areas. First, there was a straight count of the number of words which fell into various grammatical categories, such as verbs, nouns, prepositions, co-ordinating conjunctions, subordinate conjunctions, etc. In children's speech such quantification gives an indication of the structural complexity and hence the maturity of the individual child's speech. It was assumed that this would apply to adult speech, too. However, whilst the scores in a few grammatical categories did appear to differentiate slightly between the groups, the differences were not significant and at times proved to be in opposite, inconsistent directions. The second procedure involved scores of complexity derived from an analysis of the clause and phrase structures of the sentences, but again these failed to differentiate between the groups.

Whether our failure to find differences between the groups with these first two techniques was due to a lack of sensitivity of the assessment instruments or to a real lack of differences between the groups is difficult to say. One could hypothesize that if there had been a familial tendency to delayed speech, this was likely to improve spontaneously with maturation and hence the negative result. On the other hand, Hess and Shipman did report that this kind of analysis differentiated successfully between adults from different social groups. However, we may have been expecting more from this crude approach than it could really achieve. It needs to be emphasized that there were no between-group social class differences measured in the traditional way. In other words, the social discrepancies between the various groups studied may not have been sufficiently great (compared to those encountered by Hess and Shipman) for any differences to emerge.

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Structural defects of language (Table I)

Whatever may have been the reason, syntactical quantification did not succeed in reflecting differences between these groups and it was decided, therefore, to concentrate mainly on our third group of categories, which were those designed to measure 'errors' of speech. These were combined into a cumulative index which we named 'structural defects of language'. This was composed of the following sub-categories:

- (i) Incomprehensible sentences. These were sentences which were nonsensical either in structure or in subject matter, or were rendered meaningless by their being grossly unintelligible. Two or more of such sentences were given an adverse score of weighting of 1.
- (ii) Total number of redundant words. Redundant words were those which hindered the clear expression of the mother's thought and fell into the following categories: falters in fluency; stammers; verbal tics and unfinished sentences. A score of 20 or more redundant words was given an adverse weighting of 1.
- (iii) Total number of grammatical errors. This was a simple count of grammatical errors, and two or more were given an adverse weighting of 1.
- (iv) Total number of incomplete sentences. These were sentences which were both structurally and functionally incomplete. (A sentence which is not structurally complete can nevertheless be seen as functionally complete if it is meaningful in the context of the sentence spoken before or after by the speaker himself or by the interviewer.) Two or more functionally incomplete sentences were given an adverse weighting of 1.

The distribution of scores of the three groups on this index is shown in Table I, where it is seen that the mothers of the children in the Residual Speech Retarded Group had a significantly higher structural defect score than had the control group. The distribution of scores of the mothers of the pathological deviant group suggested that there might be differences, but the sample size was too small to allow such differences to emerge. Analysis of the sub-categories themselves showed that the mothers of the two speech retarded groups consistently scored less than the controls, but the differences were not always significant.

Language literacy index of mothers (Table I)

This was a broad category covering the types of experiences which theoretically could directly or indirectly influence the child's speech and

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language development. It included six items covering literacy, reading, assessment of the mother's speech, grammar and syntax. There were significant differences between the mothers of the controls and the Residual Speech Retarded Group. There were also differences between the groups on some of the constituent items.

(i) *Mother's reading index* (Table III) This was an assessment of the number of times a mother spent listening to her child read (only those children at home). It was originally intended to be a rating of the number of sessions the mother spent reading with her child in the last typical week, but so many mothers failed to read at all with their children that a simple dichotomous rating of whether or not the mother read with her child at least once per week was substituted. The mothers of the Residual Speech Retarded Group were significantly less likely to read with their children, even though the nature of the child's reading handicap would mean that he would be less likely to read by himself without help from his mother. We would have expected, therefore, an increased index rather than the reverse, but in fact 54% of the mothers failed to read with their children. This finding could be interpreted as due to either the mother's lack of appreciation of and concern for the child's needs, or due to the child's unwillingness to read. Either way, the child most in need of help actually received less.

(ii) *Mother's literacy* We assessed the mother's literacy by simply recording whether the mothers could read sufficiently well to complete proformas such as the Maryland Attitude Questionnaire, etc. with little or no help, or whether the proformas had to be read out to them for completion. Ten mothers in the Residual Speech Retarded Group and two in the pathological deviant groups needed help. Again, this may just reflect the weight of adverse social circumstances or poorer social origins of these mothers.

(iii) *Assessment of mother's speech* (Table III) The interviewer made a subjective judgement as to whether the mother had adequate or impoverished speech. Impoverished speech was defined as having limited use of vocabulary, reliance on intonation and gesture, short incomplete utterances, constant recourse to useless interjections, and a repetitive use of words resulting in a marked overall difficulty in conveying meaning and in understanding questions. (The reliability was assessed by two independent ratings of a sample of 20 speech extracts and a correlation of 0.74 was achieved.) There was a non-significant excess of mothers with impoverished speech in the Residual Speech Retarded Group. However, the absolute numbers are not impressive.

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While quantitative assessment of mother's speech revealed no major differences between the groups, assessment of structural defects of language did reveal differences. Our results demonstrated that the mothers in both speech retarded groups were more likely to be deficient in speech and literacy.

Again, it is difficult to interpret these findings. They may reflect the loadings of adverse social factors present in families in the two experimental groups. Alternatively, they may represent a syndrome of minimal impairment of speech and language present in a subgroup of the Residual Speech Retarded Group; the features of such a syndrome could be the residual sequel of a more evident but spontaneously resolving speech retardation which has a familial basis. It is important to note that these differences are not readily observable and only become evident when relevant constituent items are summated to produce an index of a structural defect of language.

In addition to assessing the verbal stimulation received from the mother directly, we measured other environmental factors which might have influenced the child's verbal ability. These were:

- (i) Presence of television in the home
- (ii) Television programme watched
- (iii) Regular newspapers and magazines purchased
- (iv) Child's membership of library
- (v) Child's purchase of comics

Not one of these variables significantly differentiated between the Residual Speech Retarded Group and the controls. Although the last two variables did differentiate between the pathological deviant group and the control group, this was of no significance because of the severity of the children's handicaps.

Nursery school

Various studies (e.g. Randall *et al.*, 1974) have indicated that attendance at nursery school has a marked beneficial effect on language development. In this study no differences were found between the Residual Speech Retarded Group and the controls in terms of attending Local Authority nursery schools or private nursery schools.

Speech therapy and elocution lessons

It was surprising that very few children had remedial speech help. No child had elocution lessons. One child in the control group had speech

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therapy (lasting at least two months), but 11 in the Residual Speech Retarded Group and four in the pathological deviant group did so as well.

Mother's strategies in disciplining and their ways of coping with their children's questions

An analysis was undertaken of the content of mother's speech when faced with situations requiring explanations, as when they answered their children's questions, or responded to their children's misdemeanours. This followed closely the very detailed and extensive studies undertaken by Robinson, Cook and Rackstraw (Robinson, 1969), which had as their impetus the theories of Bernstein mentioned earlier. Briefly, mothers in the study were asked how they would reply to various set questions if they were asked by their children. Their answers were analysed in terms of accuracy, and type and amount of information made available to the child. In addition they were asked what they would say to their children in six situations in which they might consider the child in need of discipline. Different modes of action they could take were analysed (e.g. physical punishment, verbal punishment, avoidance of action, reparative acts, supportive strategies). A detailed analysis was also made of the reasons given to the child for the necessity of changing his behaviour. (For a full account of this analysis the reader is referred to the original papers by Robinson, Cook and Rackstraw (Robinson, 1969) or to the present authors.)

This data was analysed in various ways—in terms of differences between groups on individual items, summations of similar items and by principal component analyses. While some differences were in the expected direction, few significant meaningful differences emerged between the groups. In brief, mothers in the two criterion groups were less likely to give meaningful comprehensive answers to questions and were more likely to discipline without explanation. However, as the differences were small we are of the opinion that they can be discounted, as they were unlikely to make any significant contribution to the children's poor speech development. The reasons for the lack of importance of such factors in our study is probably the result of matching for neighbourhood and hence cultural factors. The slight increase of negative strategies which we found in our criterion groups are probably related to the social class gradient which in fact was not statistically significant.

Conclusions

We have demonstrated the importance of the contribution of perinatal

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factors and early infancy illness factors in relation to the pathological deviant group. On the other hand, a family history of developmental delays occurred more frequently in the case of the Residual Speech Retarded Group and this confirms an often reported association. This gives rise to the hypothesis that there may be a familial developmental component in at least a subgroup of the Residual Speech Retarded Group.

Despite controlling for social class a significant excess of adverse social factors was found in both study groups. This is probably a manifestation of the fact that even within the same neighbourhood there is a gradient of social factors, with a tendency to a clustering of adverse social experiences where there is demonstrable evidence of child handicap.

Quantitative grammatical and syntactical analyses of mothers' speech revealed no significant difference between the groups. However, there was a significant excess of developmental speech delays and associated problems in the families of the study groups but the distribution of such problems in the control group is unexpectedly high.

Again, the language literacy index, which can be considered a measure of the cultural-educational stimulation, reveals the presence of less of such stimulation in the Residual Speech Retarded Group. We have already postulated that this finding is simply a reflection of the slightly lower social class distribution of the study groups. It is interesting to note that this social class gradient is not reflected in the mothers' coping and disciplining strategies. We again suggest that an even steeper social class gradient may be necessary for such differences to emerge.

We advance the view that the accumulation of adverse social factors (index) found in our criterion group is likely to adversely affect their speech, language and cognitive impairment. Therefore it is important to note that the correlation between this index and the children's communication code is only 0.15 and their score on the English Picture Vocabulary Test is only 0.22. However, with such low correlations we must conclude that adverse social factors appear to have less important effects than the literature has led us to expect. The correlations of the mother's language literacy index with a global measure of the child's language and a global measure of cognition are 0.11 and 0.23, which again are not impressive. Both are lower than correlations of these global measures with social class, which are 0.29 and 0.35 respectively.