

NCT Research overview: Parent-child communication is important from birth

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NCT's research overview series provides an evidence base to guide the practice of NCT and other transition to parenthood workers on topics of relevance during pregnancy, birth, parenthood and the care of babies and toddlers aged 0-2 years. Workers must decide how to apply the evidence in their practice but they can feel confident that the research overview provides an up-to-date, balanced and reliable summary and interpretation of the relevant research literature.

This overview examines the evidence for the importance of early communication between babies and their parents. It describes some of the processes of early communication and outlines ways in which language develops. It explores the impact of socio-demographic factors, the importance of the home learning and early communication environment and their influence on language development and a child's readiness for school.

The review follows the development of current knowledge built from the testing of theories through small-scale studies exploring particular aspects of communication and language to UK longitudinal studies of large cohorts of children exploring key influences on their life chances.

How does parent-baby communication and language develop?

The early development of human relationships and communication involves complex processes. The following sections introduce key theories and evidence from empirical research. The last decade has seen the emergence of a clearer picture showing how communication and language develop in babies and how a child's early experiences lay the foundations for their future development.

Attachment and attunement

A child's journey to language begins before birth, as babies in the womb hear clearly enough in the last few months of pregnancy to distinguish their mother's voice. From the sixth month of gestation

babies become sensitive to the particular qualities of their mother's voice and the rhythm of native language.¹ A study from Germany recorded and analysed the cries of 60 healthy babies at three to five days of age, recruited half and half from French-speaking and German-speaking families.² Analysis revealed clear differences in the shape and tone of the babies' cry melodies.

As the baby and the mother mutually seek communication, through the process described by Trevarthan as 'intersubjectivity',³ the beginnings of attachment behaviour are laid down. Bowlby's influential theory proposed that attachment is a biological instinct involving the development of a strong nurturing bond between mother and baby formed during early infancy.⁴ He contended that the way in which interaction takes place shapes the nature of the attachment and that the internalisation of these early interactions provides a prototype for later relationships. Others have considered the possibility of other attachment figures in a child's life⁵ and emphasised the dynamic nature of attachment security.⁶

A review of the clinical applications of attachment theory describes the major biobehavioural shifts that normally occur during the first two years.⁷ In the first two months the baby has limited ability to discriminate between caregivers though recognises the mothers' smell and sound. A shift between two and three months occurs with the emergence of increased social interaction including more eye contact, social smiling and responsive cooing. Gradually, during the period 2-7 months the baby becomes more able to discriminate between caregivers and, while intensely motivated to engage with them, generally doesn't have strong preferences between known carers and unknown others. A further shift occurs around 7-9 months with the emergence of selective attachment, shown by the onset of wariness of strangers and distress when anticipating separation. Between nine and 18 months a hierarchy of attachment figures becomes evident

with the baby varying between exploring and seeking comfort and security. A further shift occurs at 18-20 months with the emergence of pretend play and language as symbolic representation. From then until the age of three, children increasingly have preferences and their own goals that can conflict with those of others requiring compromise and negotiation.

The reciprocal process of turn taking is a necessary condition of communication development and, in particular, language. Stern describes parent-child communication as a synchronous 'dance' comprising periods of attunement (e.g. eye contact, smiles) followed by periods of disruption (e.g. turning away, withdrawal).⁸ The 'coming back together', following periods which are not focussed or attuned, is significant for the development of secure attachment relationships. Murray and Cooper's research review suggests that when a mother's capacity to attune is reduced and periods of disruption increase, for example, as can occur during postnatal depression, this is linked with a range of adverse social and emotional outcomes.⁹ More recently, Barrett and Fleming have progressed this idea, examining neural and psychobiological perspectives on mothering and some of the important factors which influence the way mothers mother.¹⁰ Risk factors associated with less than optimal mothering include depression and experience of psychosocial adversity in childhood.

Contingency and communication

Young children naturally reach out for interaction through babbling, facial expressions, and gestures. Adults respond with the same kind of vocalising and gesturing back, frequently repeating and extending the baby's communication through commenting on the babies' actions and vocalisations. This back-and-forth process, or 'serve and return' interaction, between children and significant adults in their lives serves to shape the architecture of the developing brain of a baby. It is known as contingency.

Contingency is the extent to which the intended recipient is fully sensitive and responsive towards receiving a form of communication from another person. In baby-parent communication this means the extent to which they are engaged in reciprocal activity. Research indicates the importance of contingency

both psychologically and cognitively, in order for babies to form secure attachments, and linguistically in terms of the child developing gestures, vocalisations, speech and syntax.

Evidence from detailed observational studies

Observational and experimental research with mothers and babies has shown the importance of mutual engagement and responsiveness. For example, in an American study of 62 mother-child dyads in which the families were white, the mother had completed high school and children were developing normally, Donovan et al observed and analysed their behaviour and interaction at intervals, from six to 24 months.¹¹ A number of tests and observations were carried out: the mother's 'sensory sensitivity' (responsiveness to signals of emotion) was assessed, the mother's and the child's behaviour and their emotional responses to each other were observed during free-play sessions and, at 12 months, the child's attachment status was assessed using the standardised Strange Situation procedure.⁵ This procedure involves observing the child's behaviour in a controlled setting while a sequence of planned and timed events occur involving the mother leaving her baby in a room with an unknown person, then returning after the separation. The findings showed that early maternal behaviour was predictive of later maternal behaviour. Sensory sensitivity to positive baby expressions at six months predicted the mother's behaviour at 24 months, and sensory sensitivity to both positive and negative expressions were associated with the later emotional responses of the mother to her baby. The nature of the baby's attachment predicted his or her temperament and behaviour as a toddler, and interaction with the mother at 24 months. This study both informs our understanding of early maternal responsiveness and demonstrates the importance of the quality of the mother-baby relationship in shaping later toddler behaviour.

Other studies have shown how high levels of contingent response by adults to a child (consistent positive responses to the child's action), helps babies gain an understanding of the rules of conversation and a sense of self during the first year of life. Games such as 'peek-a-boo' promote the learning of 'my turn, your turn'.¹² By the age of 12 months

babies are typically able to engage with adults in terms of showing them objects. Investment in engagement has been found to have positive outcomes for children's language. Joint-attention between child and parent at 14 and 15 months was found in Carpenter et al's study of 24 mother-child dyads, from middle class American families, to result in quicker language acquisition.¹³ Also, time spent in mother-child joint attention when the child was under 18 months was found to predict subsequent vocabulary growth.

Parents who frequently produce contingent replies to their baby's early verbalisations have children whose language structure develops more quickly.¹⁴ Thus it is evident that by responding to their baby's lead, and doing so in a positive and generally consistent way, parents promote their child's language skills.

The development of communication and language

A child's language development is very much an active and interactive process, rather than a passive one. This has been demonstrated by the theories and research evidence discussed already relating to attachment and attunement, communication and contingency. Gopnick and colleagues suggest that the brain can be thought of as a 'social brain', one which is developed through social interaction, particularly the relationship between parent and child.¹⁵ In *How babies think*, they present a synopsis of findings indicating that from birth babies can discriminate human faces and voices from other sensory stimuli and prefer them to other stimuli. Within a few days of birth babies are discriminating familiar people, such as their mother, from others. These kinds of abilities, and having opportunities to develop them, are considered an important part of babies' neurological development, referred to sometimes as 'building babies' brains'.^{11,16}

Gerhardt makes a strong case for the influence of social and emotional interaction. She contends that 'Being lovingly held is the greatest spur to development, more so even than breast-feeding'.¹⁶ As the baby develops, parents adapt their rhythm, tempos and intensity to the baby's level, with the parent's activity becoming an extension of the baby's activity. In essence, the

parent's activity gives meaning and significance to the baby's activity through a reciprocal process of comment, evaluation and reflection back. Thus, the child develops its sense of self.

Children begin to acquire language as they construct representations of the sounds they hear. These representations gradually acquire the characteristics of their native language.¹⁷ By three months cooing usually starts and a baby who vocalises, and then gets a response, will increase the vocalisation showing attunement and response to the parents' voice.¹⁸ A few months later, babbling (repeating the same sound over and over) begins to emerge in babies' behaviour, particularly when they are alone. Children generally use gesture to communicate before they use words, typically starting to produce their first gestures, such as, reaching, clapping and waving 'bye bye' between nine and 12 months of age. The gestures they produce are predictive of the early stages of spoken language development. The more the child gestures, the earlier they are likely to use language.^{19,20} By 12 months babies are typically able to babble strings of sounds and first words, such as 'ma-ma', 'da-da', emerge. Actions, such as gazing and pointing, are starting to become matched and referenced to the actions of those around them and children typically move on to point to objects, to engage with adults, following their lead and initiating shared attention.

As children start to link two words together, gesture continues to precede and to predict positive language outcomes. Interestingly, early gesture has been found to selectively predict later language learning. Rowe and Goldin-Meadow's longitudinal observational study of 52 children interacting with their caregivers at home found that the number of different meanings conveyed in gesture at 18 months (such as point at dog, flapping arms to represent flying, shaking the head for 'no') was a strong, positive predictor of scores on the Peabody Picture Vocabulary Test at 42 months.²⁰ In addition, the number of gesture plus speech combinations, particularly those conveying sentence-like ideas, produced at 18 months predicted sentence complexity at 42 months.

As language develops young children map words on to existing concepts or

cognitive structures. This enables them to organise language and knowledge about familiar objects and events. Through lexically rich and naturally occurring conversations, children's language skills develop.^{21,22} Increasingly, the body of evidence shows that language is most effectively learned when parents tune into their babies in a responsive and sensitive manner. In all languages, parents utilise a style of speech with babies known as infant-directed speech, or motherese ('baby talk') characterised by a higher-pitched intonation, shortened or simplified vocabulary, shortened sentences and exaggerated vocalisations or expressions. As babies' communicative abilities develop, the complexity and amount of their mothers' speech increases, so extending the child's communication.²³

During the early months of language development, before 19 months of age, more rapid language development has been observed in children where the mother follows, rather than attempts to redirect the focus of the child's attention.²⁴⁻²⁶ Building on studies carried out in the 1980s and 1990s, more recent longitudinal studies have provided further evidence of this.^{27,28} Markus, for example, followed 21 babies and their parents and found that language at 18 months, and improved scores in standardised language assessments at 21 and 24 months, was related to observed earlier differences in the frequency, responsiveness and duration of infant-caregiver joint attention episodes.²⁸

The emerging picture

It is becoming increasingly clear that the more babies experience shared talk and activity, the more effective they become as communicators. This has been understood by practitioners who work with parents and young children for some time and now research is able to demonstrate this, allowing the processes to be understood and the impact of different kinds of interaction to be quantified. A larger scale American study of 275 families of children aged 2-48 months recorded continuous periods of language which were then coded for analysis.²⁹ The analyses presented make a strong case for the importance of adult-child conversations in early child language development. The number of conversational turns that children had with adult caregivers was robustly and

positively associated with scores on the Preschool Language Scale indicating healthy language development.

Parents with children of all ages can enhance their children's language by talking about interesting events daily and encouraging children to do the same. An elaborative style (including varying intonation, information about causes and effects, peoples' motivations, descriptions of objects and actions) is important for language development and for enhancing children's understanding of emotion and mind. Both the amount and type of talk are important. In particular, reminiscing about events is a particularly effective way of helping young children understand, and use, words. This involves a context that is personally meaningful, elaboration by the parent, the use of questions and explanations. Four particular aspects of an effective reminiscing style include:

- Wh-questions (who, what, where, etc.)
- Associations (linking the event to the child's prior knowledge)
- Follow-ins (encouraging aspects of the conversation that the child is interested in)
- Evaluations (praise).

Aboutalebi et al carried out a study in Iran to evaluate the effect of a formal intervention to encourage conscious use of this approach. The intervention, designed for mothers of pre-school children, involved 40 mothers and their children aged 44-64 months. The procedure involved four stages: children's language pretests using the Wechsler Preschool and Primary Scale of Intelligence-Revised, maternal training using a video describing the elaborative conversational style and event memory pretests for children, mother-child play involving a camping activity and subsequent event memory assessments following delay intervals of one day and three weeks.³⁰ Compared with a control group of untrained mothers, the trained mothers used more Wh-questions and positive evaluations but there were no differences in follow-ins.

Exploring broader parental and social influences

Much of the evidence considered so far has come from small studies, sometimes observational and in other cases conducted in research laboratories, mainly with mother-baby dyads, as

researchers have sought to gain an understanding of the influences on children's communication and language development. In this section, we move on from the theory and small empirical studies to large population-based research. In particular, the focus is on the impact of social class, early years inequalities in the UK, and of the home learning and communication environment. A review of evidence focusing on school-aged children found that the extent and form of parental involvement is 'strongly influenced by family social class, maternal level of education, material deprivation, maternal psycho-social health and single parent status and, to a lesser degree, by family ethnicity'.³¹ However, parental involvement in the form of 'at-home good parenting' had a 'significant positive effect on children's achievement and adjustment' after all other factors shaping attainment had been taken into account.³¹

A useful guide for parents including developmental milestones for communication and language is available at www.wordsforlife.org.uk.

The Talk To Your Baby campaign of the National Literacy Trust offers information and support for practitioners. (www.talktoyourbaby.org.uk) .

Impact of social class on language development and access to books

Classic research on social class differences in language acquisition was conducted by Hart and Risley in America.³²⁻³⁴ Collecting longitudinal data (2.5 years of sequential monthly hour-long observations) on 42 families they concluded that by the age of three, children from privileged families had heard 30 million more words than children 'on welfare'. By comparing the vocabulary scores with their observations of each child's home life, they concluded that the size of each child's vocabulary correlated most closely to a single factor: the number of words the parents spoke to the child (see Table 1). Follow-up data indicated that measures at age three predicted third grade school achievement and, thus, that the early advantage that professional parents were giving their child influenced achievement at school.

Table 1: Families' language across income groups when the children were 34-36 months.

Measures & scores	Professional (n=13)		Working class (n=23)		Welfare (n=6)	
	Parent	Child	Parent	Child	Parent	Child
Average utterances per hour	487	310	301	223	176	168
Recorded vocabulary size	2,176	1,116	1,498	749	974	525
Average different words per hour	382	297	251	216	167	149

Parent utterances and different words were averaged over 13 - 36 months of child age. Child utterances and different words were averaged for the four observations when the children were 33 - 36 months old.

Children from lower socio-economic groups are known to have less exposure to books as well as to the kinds of parental language and spontaneous conversations associated with language development. There has been extensive research that supports the importance of the relationship between children's exposure to books, experience of book reading at home and their pre-school language abilities. The number of picture books in the home has been positively linked to children's receptive and expressive language.³⁵ Also, familiarity with story books has been associated with young children's vocabulary and reading skills.³⁶

A particular influence on young children's acquisition of language is the effect of shared book reading with adults. A research synthesis by Trivette et al examined 21 studies including 1,275 toddlers and young children 12 to 42 months.³⁷ Findings show that early expressive language development was facilitated by joint reading strategies that engaged, supported and promoted children's active participation in the book reading opportunities. The longer a child stayed engaged in the book reading episode, and the more an adult encouraged the child's active participation by expanding on what a child says, or by asking open-ended questions, the greater the effect the reading experience had on the child's language development.³⁷

Early years inequalities in the UK

The evidence is stacking up that the early years are important in determining future life outcomes and stark inequalities are evident early in life. There have been four national birth cohort studies in Britain tracking all children born in a

particular time period. The size and quality of these studies, and the multidisciplinary nature of the research team has enabled rigorous analysis of variation in language development, and the long-term impact of early learning, social class and the home environment. The most recent is the Millennium Cohort Study which collected information from 14,000 children born in 2000-02 across the UK. Sweeps of children were conducted at nine months, three, five and seven years of age with a further sweep planned for 2012. At nine months girls were more advanced in their communicative gestures than boys. For example, 45.3% of girls waved goodbye on their own when someone left, in comparison with 29.9% of boys. Interestingly, the research report notes 'that the development of communicative gestures seems to be more advanced among children from wards with high minority ethnic populations than among other children. Furthermore children living in wards designated as 'disadvantaged' also appear to be more advanced in their communicative gestures than children living in advantaged wards'.³⁸

At age three the children's expressive language skills were assessed in their own home using the Naming Vocabulary Subtest of the British Ability Scales and mothers were asked about any concerns they had about their child's development. Overall, 13.4% of mothers reported concerns about their children's speech and language development; there was more concern among mothers of boys (17.1%) than girls' (9.6%). The high rates of gesture seen at nine months in some of the more disadvantaged groups did not correlate with a similar degree of language advantage at age three, as

there were marked differences in language development between children from advantaged and disadvantaged backgrounds. In addition, better cognitive scores were achieved by children from families with two working parents who were highly educated and had higher incomes. The vocabulary assessment revealed that girls had marginally better expressive language skills than boys (by about three months).³⁹

Further assessment at age five found that parents with lower qualification levels engaged in educational activities, such as reading to their children, less frequently than parents with higher qualification levels. On the naming vocabulary test there was over a year's delay behind the average for the most disadvantaged groups.⁴⁰ These findings raise questions about the causality and the association between social variables, such as parental education and income level. The following section focuses particularly on the effects of disadvantage and aspects of the home learning environment, assessing the impact of different factors.

'The more a parent talks with, listens, and responds to a child the greater the child's language development.'

Home learning environment

The Effective Preschool and Primary Education Project (EPPE 3-11) is a large, high-quality, study that has investigated links between social variables and parents engagement with their children. Involving over 3,000 children recruited at age three from 100+ pre-school centres in 1997/8 and followed to the age of 11 years, the study assessed the development and attainment of children, controlling for a range of child and family influences (e.g. birth weight, income, language, family SES, parents' qualification levels and 'home learning environment').⁴³ The report focused in particular on children from ethnic minorities, from impoverished backgrounds, disadvantaged boys and children with English as an additional language (EAL), making recommendations for ways in which services or institutions could be changed to improve opportunities for these groups of children.⁴¹

Table 2: Effect sizes for socio-economic status (SES), mother's and father's education, and home learning environment (HLE) on 5, 7 and 10 year outcomes.

	5-year olds		7-year olds		10-year olds	
	Literacy	Numeracy	Reading	Maths	Reading	Maths
High versus Low group						
SES	0.29	0.43	0.37	0.39	0.26	0.32
Mother's education	0.35	0.23	0.33	0.33	0.46	0.27
Father's education	NS	NS	0.19	0.16	0.25	0.23
Earned income	0.31	0.28	0.15	0.15	0.24	0.23
HLE	0.73	0.65	0.60	0.50	0.49	0.45

NS = non significant Source: Department for Education. EPPE findings <http://eppede.ioe.ac.uk/eppede/eppefindings.htm>⁴¹

Parents, usually the child's mother, were interviewed about aspects of the 'home learning environment' (HLE) when children were aged three. The particular activities indicating a strong home learning environment that linked to children's school readiness and attainments as listed below.

- The frequency with which the child plays with letters/numbers at home was linked with attainment in all measures.
- Parents' drawing children's attention to sounds and letters was linked to literacy skills, early number skills and non-verbal attainment.
- The frequency with which parents reported reading to their child was associated with higher scores in all outcomes.
- The frequency of library visits showed a positive association with language, literacy and early number attainment at school entry.
- The frequency with which parents said they taught their child songs or nursery rhymes showed a significant positive impact on language scores at school entry controlling for other factors.

Social class and levels of education of parents were related to child attainment in literacy and numeracy (see Table 2), however, the early years HLE was more important than family socio-economic status, parental occupation and income effects. This demonstrates that what parents do has a major impact and can be more important than who they are. A high HLE score was also associated with increased co-operation/conformity, peer sociability and confidence, lower antisocial and worried/upset

behaviour and higher cognitive development scores. There were strong effects of the pre-school HLE at age five, seven and ten years, though the independent influence of the HLE declined somewhat as the children got older.⁴¹

Interestingly, the HLE was only moderately associated with SES and parents' educational levels (correlations = 0.28 – 0.32). This indicates that low SES homes sometimes scored highly and, conversely, high SES homes at times scored poorly on the HLE measure.^{41,42}

Another longitudinal cohort study, the Avon Longitudinal Study of Parents and Children (ALSPAC) which has followed over 10,000 children born April 1991 - December 1992 to mothers living in and around Bristol has investigated mothers' reported language development and children's educational outcomes.⁴³ Data was collected from mothers at 32 weeks gestation, 21 months, at six months and 24 months, and from children's schools at school entry to create the outcome measure.

Data was collected on characteristics of the home environment in which children learned to communicate (including activities undertaken with children, the mother's attitude towards her baby, and the wider support available to the family) and analysed by assessment of the child's 'readiness for school' at the time of entry. The concept of the 'communication environment' was developed within the context of home learning, defined as:

1. What parents do to promote the communication skills of their child, e.g. aspects of the mother's activity

- and interaction with the child.
2. What parents feel in terms of the support they receive, specifically, the mother's feelings, attitudes and sense of wellbeing.
3. What parents have in terms of the materials goods resources which are available to facilitate the child's communication.

The findings indicate that while there is a strong association between a child's social background and their readiness for school, the child's language and communication environment also have a strong influence. The child's communication environment is a more dominant predictor of early language than social background. In turn, language development at the age of two years predicts children's performance on entry to school. So, what the mother did (in terms of activities and interaction with her child), had (in terms of resources) and felt (in terms of feeling supported and sense of wellbeing) in the first two years of her child's life was shown to be important when children started school.⁴³

Conclusions

Evidence is now both established and growing every year to show that mothers who are attuned to their baby promote their attachment and communication skills. The home learning environment, and in particular the communication environment, for babies and toddlers during the first 24 months influences their language acquisition and their performance at school entry. This in turn is associated with their later educational attainment. The communication environment is influenced by the socioeconomic context of the family, with children in more disadvantaged families having fewer opportunities for language development.

Research shows that what parents do with their children before they are three years old plays an important part in their development, having more of an effect, even than social background, on a child's readiness for school.⁴¹

It is important that practitioners and parents are aware of the impact of parent-child communication and, in particular, the influence of the home learning and communication environment in the early years.

Key points

1. Language development is influenced by the child's communication environment. Parents give their babies and young child an advantage when they talk with them, read with them, listen and respond to their babbles, gestures and words. More conversations increase the advantage for children in terms of their language development.
2. Children's language development at the age of two (their understanding and use of vocabulary and two or three word sentences) is very strongly associated with their performance on entering primary school.
3. There is a strong association between a child's social background and their readiness for school as measured by their scores on school entry assessments. However, the communication environment is a more dominant predictor of early language than social background. Therefore, aiming to improve the home learning and in particular the communication environment for young children in less advantaged social groups through support for parents is considered an important strategy for addressing social inequalities in educational attainment.

References

1. Karmiloff K, Karmiloff-Smith A. *Pathways to language: from fetus to adolescent*. Harvard University Press; 2001.
2. Mampe B, Friederici AD, Christophe A, et al. Newborns' cry melody is shaped by their native language. *Current Biology* 2009;19(23):1994-7.
3. Trevarthen C. The foundations of intersubjectivity: the development of interpersonal and cooperative understanding in infants. In: Olson DR, editor. *The social foundations of language and thought: essays in honour of J.S. Bruner*. New York: WW Norton; 1980.
4. Bowlby J. *A secure base*. New York: Basic Books; 1988.
5. Ainsworth MD, Blehar MC, Waters E et al. *Patterns of attachment: a psychological study of the strange situation*. Hillsdale, NJ: Lawrence Erlbaum; 1978.
6. Thompson RA. The legacy of early attachments. *Child Dev* 2000;71(1):145-52.
7. Zeanah CH, Berlin LJ, Boris NW. Practitioner Review: Clinical applications of attachment theory and research for infants and young children. *J Child Psychol Psychiatry* 2011;52(8):819-33.
8. Stern DN. *The interpersonal world of the infant: a view from psychoanalysis and developmental psychology*. New York: Basic Books; 1985.
9. Murray L, Cooper PJ. Postpartum depression and child development. *Psychol Med* 1997;27(2):253-60.
10. Barrett J, Fleming AS. Annual Research Review: all mothers are not created equal: neural and psychobiological perspectives on mothering and the importance of individual differences. *J Child Psychol Psychiatry* 2011;52(4):368-97.
11. Donovan W, Leavitt L, Taylor N, et al. Maternal sensory sensitivity, mother-infant 9-month interaction, infant attachment status: predictors of mother-toddler interaction at 24 months. *Infant Behav. Dev* 2007;30(2):336-52.
12. Bruner JS. *Child's talk: learning to use language*. New York: WW Norton; 1983.
13. Carpenter M, Nagell K, Tomasello M, et al. Social cognition, joint attention, and communicative competence from 9 to 15 months of age. Serial No. 255. *Monographs of the Society for Research in Child Development* 1998;63(4):i,iii,v-vi,1-174.
14. Snow CE, Perlmann R, Nathan D. Why routines are different: toward a multiple-factors model of the relation between input and language acquisition. In: Nelson KE, van Kleeck A, editors. *Children's language*. Volume 6. Hillsdale, NJ: Lawrence Erlbaum; 1987. pp. 65-98
15. Gopnik A, Meltzoff A, Kuhl P. *How babies think: the science of childhood*. London: Weidenfeld & Nicholson; 1999.
16. Gerhardt S. *Why love matters: how affection shapes a baby's brain*. Hove, East Sussex: Brunner-Routledge; 2004.
17. Handel G editor. *Childhood socialization*. 2nd edition New Jersey: Aldine; 2006.
18. David T, Gouch K, Powell S et al. Birth to three matters: a review of the literature. *Research Report RR444*. London: Department for Education and Skills; 2003.
19. Iverson JM, Goldin-Meadow S. Gesture paves the way for language development. *Psychol Sci* 2005;16(5):367-71.
20. Rowe ML, Goldin-Meadow S. Early gesture selectively predicts later language learning. *Dev Sci* 2009;12(1):182-7.
21. Dickinson DK, McCabe A. Bringing it all together: the multiple origins, skills, and environmental supports of early literacy. *Learning Disabilities Research and Practice* 2001;16(4): 186-202.
22. Weizman ZO, Snow CE. Lexical input as related to children's vocabulary acquisition: effects of sophisticated exposure and support for meaning. *Dev Psychol* 2001;37(2):265-79.
23. Henning A, Striano T, Lieven EV. Maternal speech to infants at 1 and 3 months of age. *Infant Behav. Dev* 2005;28(4):519-36.
24. Akhtar N, Dunham F, Dunham PJ. Directive interactions and early vocabulary development: the role of joint attentional focus. *J Child Lang* 1991;18(1):41-9.
25. Harris M, Jones D, Brookes S, et al. Relations between the non-verbal context of maternal speech and rate of language development. *British Journal of Developmental Psychology* 1986;4(3):261-8.
26. Tomasello M, Farrar MJ. Joint attention and early language. *Child Dev* 1986;57(6):1454-63.
27. Morales M, Mundy P, Delgado CE, et al. Responding to joint attention across the 6- through 24-month age period and early language acquisition. *Journal of Applied Developmental Psychology* 2000;21(3):283-98.
28. Markus J, Mundy P, Morales M, et al. Individual differences in infant skills as predictors of child-caregiver joint attention and language. *Social Development* 2000;9(3):302-15.
29. Zimmerman FJ, Gilkerson J, Richards JA, et al. Teaching by listening: the importance of adult-child conversations to language development. *Pediatrics* 2009;124(1):342-9.
30. Aboutaleb M, Tahmasian K. Training mothers of preschoolers in elaborative conversational style. *International Journal of Innovation, Management and Technology* 2010;1(4):427-31.
31. Desforges C, Abouchaar A. *The impact of parental involvement, parental support and family education on pupil achievements and adjustment: a literature review. Research Report RR433*. London: Department for Education and Skills; 2003. Available from: http://www.bgfl.org/bgfl/custom/files_uploaded/uploaded_resources/18617/Desforges.pdf
32. Hart B, Risley TR. *Meaningful differences in the everyday experience of young American children*. Baltimore: Brookes Publishing Co; 1995.
33. Hart B. A natural history of early language experience. *Topics in Early Childhood Special Education* 2012;20(1):28-32.
34. Hart B, Risley TR. The early catastrophe: the 30 million word gap by age 3. *American Educator* 2003;27(1):4-9.
35. Payne AC, Whitehurst GJ, Angell AL. The role of home literacy environment in the development of language ability in preschool children from low-income families. *Early Childhood Research Quarterly* 1994;9(3-4):427-40.
36. Senechal M, LeFevre JA, Hudson E, et al. Knowledge of storybooks as a predictor of young children's vocabulary. *Journal of Educational Psychology* 1996;88(3):520-36.
37. Trivette CM, Dunst CJ, Gorman E. Effects of parent-mediated joint book reading on the early language development of toddlers and preschoolers. *Centre for Early Literacy Learning (CELL) Reviews* 2010;3(2):1-15.
38. Dex S, Joshi H. *Millennium Cohort Study First Survey: a user's guide to initial findings*. London: Centre for Longitudinal Studies Bedford Group for Lifecourse & Statistical Studies Institute of Education, University of London; 2004.
39. Hansen K, Joshi H. *Millennium Cohort Study Second Survey: a user's guide to initial findings*. London: Centre for Longitudinal Studies; Bedford Group for Lifecourse and Statistical Studies; Institute of Education, University of London; 2007. Available from: <http://www.cls.ioe.ac.uk/text.asp?section=0001000200010012>
40. Hansen K, Joshi H. *Millennium Cohort Study Third Survey: a user's guide to initial findings*. London: Centre for Longitudinal Studies, Institute of Education, University of London; 2008. Available from: http://www.cls.ioe.ac.uk/core/documents/download.asp?id=1083&log_stat=1
41. Department for Education. EPPE findings (last accessed 16.1.12). Available from: <http://eppe.ioe.ac.uk/eppe/eppefindings.htm>



Mothers and babies at North Craven children's centre (see p5)