

Articles about brain development

Please note that articles reported on the TTYB website are there to provide information on early years communication from a variety of sources. Whilst we do our best to ensure that these are of good authority and kept updated please be aware that these are purely for informative purposes rather than acting as a voice of authority on the subject.

- [The first years last forever](#) - at the 2009 TTYB conference, Robin Balbernie gave a key-note presentation about infant brain development (October 2009)
- [Your Baby is Smarter Than You Think](#) (16.08.09)
- [Here's looking at you, kid](#) - book review (08.08.09)
- [Reference points](#) (02.10.08)
- [Emotional Development](#) (January 2008)
- [Scan secrets of premature babies' brains](#) (06.08.06)
- [Just a thought](#) - the thinking power of young children (22.06.06)
- [How babies can read minds from age of one](#) (19.06.06)
- [TV experts' time-outs 'could turn your toddler into a bully'](#) (25.05.06)
- [Infants are brighter sparks](#) - research shows babies' ability to organise visual information (Nursery World, 11.05.06)
- [What we say and do](#) - an article about interacting with children (Nursery World, 06.04.06)
- [Just a thought](#) - stimulating children's thinking (Nursery World, 06.04.06)
- [What a loving home means to a child's wellbeing](#) (18.02.06)
- [Lack of cuddles in infancy may affect development of brain](#) (*The Guardian*, 22.11.05)
- [Brighter later](#) - how early life experiences define stress hormone levels in adulthood
- [Look at them before they leap](#) - Sue Palmer investigates the close interaction between parent and infant (*TES*, 19.08.05)
- [The secret life of babies - their young minds are far more grown-up than we thought](#) (*The Independent on Sunday*, 14.08.05)
- [Fish oil diet feeds brains of toddlers](#) (*Observer*, 17.07.05)
- [Give it some thought](#) - how to create the right conditions for effective interaction (*Nursery World*, August 2004)
- [Teach your Montessori Baby to think](#) (*Montessori International Journal*, August 2004)
- [Well connected](#) - loving and nurturing caregivers, along with positive play experiences, significantly affect the brain development of babies and young children (*Nursery World*, January 2003)
- [Love is all you need](#) - how affection shapes a baby's brain (*The Times*, 3.07.04)
- [Boost your baby's IQ](#) - Forget the flash cards! The best way to nurture a newborn's growing brain is with plenty of fun and games, and tender loving care.
- [A baby's magnificent brain](#) - talking to your baby literally

- [Is this any way to begin life?](#) Keeping premature babies in incubators away from their mothers could be damaging their development (*The Guardian*, 17.11.05)
- turns on brain cells, causing new links to develop between cells that support learning.
- [Eye contact detection in humans from birth](#) - the importance of eye contact

Your baby is smarter than you think

New studies show that babies know, learn, observe and explore much more than we thought possible, writes *The New York Times*. The article quotes a number of recent research projects which note amazing levels of intelligence in babies.

Research performed by Fei Xu and Vashti Garcia at the University of British Columbia found that babies could understand probabilities, and that they show surprise when offered a lower probability outcome during play. Research in Berkeley by the author of the article, Alison Gopnik, discovered that pre-schoolers use probability to learn how things work. Other research at Massachusetts University of Technology demonstrated that when children play with a toy they can figure out how it works simply by playing with it, and they are able to understand cause and effect.

This research highlights the importance of simply allowing children to explore and play, writes Gopnik. Very focused, planned playtime experiences are less useful for children under the age of five. Babies are drawn to anything new, unexpected or informative and should be encouraged to explore.

A reason for this is found in the baby brain, which is more 'plastic and flexible' than an adult's. Gopnik writes: "Baby brains have more neural connections than adult brains. But they are much less efficient. Over time, we prune away the connections we don't use, and the remaining ones become faster and more automatic... the prefrontal cortex... (that) controls the directed, planned, focused kind of intelligence, is exceptionally late to mature."

The mature brain is programmed by childhood experiences, and parents and caregivers can teach young children by simply paying attention and interacting with them naturally.

(*The New York Times*, 18 August 2009)

[Read more about the University of British Columbia Research](#)

Reference Points

Anne O'Connor, in *Nursery World*, describes the process of 'social referencing,' when babies emulate their parents' or carers' emotional responses to specific experiences. When babies look towards their carers for

a response to help them deal with a new experience, they need the adult to assess the situation and give them a positive or negative reaction, so that they know how to proceed.

This process is linked with a baby's growing abilities to share 'joint attention' and to 'read' facial expressions. Responsive carers instinctively exaggerate their emotional reactions to things and events around babies. This high level of expressiveness (positive or negative) means the baby is more likely to notice and pay attention. This affects the baby's reactions to things and in addition also helps to establish the meaning of the emotion.

O'Connor reminds us that though we do not need to hide our emotions or put on a false face of enthusiasm, we need to be constantly aware of the powerful impact that our behaviour has on the information babies' brains are processing as they make sense of the world and human reactions to it.

(Nursery World, 2 October 2008)

Emotional Development

An article in *Nursery World* explored emotional development in the early years. Highlighting the fact that feelings are vital to human 'connectedness' and relationships, the article noted that managing and understanding emotions goes through a developmental process.

As young children do not know how to manage emotions but are overwhelmed more easily, the need to support children in dealing with them is crucial. In addition an understanding of emotional development gives a greater insight into understanding behaviour, as it is the outward expression of emotions.

The article observed that the recognition of the importance of emotional well being is demonstrated as emotional and social development are becoming more prominent in the Early Years Foundation Stage.

Feelings were shown to have three key factors, helping humans to survive, connect and facilitate social interactions. As babies are born with various skills and abilities to help them relate to their parents (suck, grasp, cry, see and hear carers) they are completely reliant on attention from adults to survive.

It was noted that in responding to a baby's cries, a connection grows between those involved, and a baby's distress is replaced by a sense of security. Through these early interactions, babies begin to experience the basic range of emotions. A template is provided for future relationships.

(Nursery World, January 2008)

Scan secrets of premature babies' brains

Using a magnetic resonance imaging scanner adapted for a neonatal intensive care ward, doctors are studying the grey matter of the tiniest babies so that they can understand more about the brains of very premature infants and so advise parents on how to help the children later in life. By looking at the way in which the brain changes from having a smooth outer layer, the cerebral cortex, to developing its characteristic folds, doctors are learning more about why babies born very early may have cognitive or learning difficulties in later life. But the scans also show the astonishing rate of growth in a tiny brain in just 12 weeks, at a time when organs such as the heart and lungs are also under great strain.

A study by Imperial College has found that a baby born very early has a smaller brain surface area and less grey matter than one born at 40 weeks, even though the volume of the brain is the same. The cortex also appears to fold in a less complex and sophisticated way than it would in the womb.

"We know that being born prematurely somehow disrupts some of the growth in the human brain, and that affects their cognitive abilities. Some 40 per cent of the children will have cognitive impairment, such as reading or writing problems at school, or difficulty concentrating. We need to understand what these scans tell us about the developing brain's anatomy so that we can intervene at an early stage to minimise later problems," said Mary Rutherford, professor in perinatal imaging at Imperial College.

Two studies are planned to see if particular substances can encourage brain growth in very premature babies. The first will look at supplementing their milk with fatty acids, which are thought to encourage brain growth. The second will look at whether the chemical melatonin, which is normally associated with combating jetlag, can protect the brain against other harmful chemicals.

The brains of humans have evolved in such a way that more and longer connections of nerve cells are needed across large stretches of the cortex. In the last few weeks in the womb, the baby is bombarded by a range of hormones that seem to stimulate the connections even more.

But Rutherford and her colleagues are beginning to advise parents of very premature babies long before they can be sure they will suffer learning problems. She said that while scanning babies could predict major disabilities such as cerebral palsy, it was much harder to detect cognitive impairment.

"If an adult has suffered a stroke, for example, you can see it pretty quickly, but babies don't show any symptoms - yet we know that there is a high risk of them having later problems at school. What we try and say to parents is that they have to do as much as possible to encourage their children to sit still and concentrate, and to talk to them."

(Jo Revill, Health Editor, The Observer, 06.08.06)

Just a thought

The actions of the youngest children who have not developed verbal expression show what's on their minds, says Jennie Lindon.

It is easy for early years practitioners and parents to overlook the thinking power of very young children. The block is often the assumption that thoughts can only be expressed through recognisable words. However, babies, toddlers and two-year-olds will show observant adults that they are busy thinking about their familiar world.

The behaviour of under-threes, along with their sounds and later words and short phrases, lets us know what they have worked out about regular routines or daily events. Their deliberate actions, often repeated or with slight variations, show us that young children are active explorers and problem solvers. For example: Toddlers and two-year-olds often express surprise when they see their keyperson or childminder out of context. Their uncertainty, even amusement, shows they are thinking: "You're not in your normal place - what are you doing here?"

- Babies of six months and older show how they have learnt the pattern of familiar play exchanges and start to initiate a game such as 'I drop the toy and you pick it up'. Familiar toddlers and children just turned two are able to develop games of their own. We may find that a toddler has recalled the game of 'peep-bo' round the bush in the garden and is using deliberate actions to get her friend to play.
- Older toddlers and two-year-olds will concentrate on a task they have chosen, such as what kind of materials they can load into their wheelbarrow.

Actions and resources

It can become complicated to explain exactly how young children learn in all their areas of development. But, fortunately, what helps young learning is relatively simple in terms of adult actions and resources.

- First we need to realise that babies and toddlers are already learning and to set aside any definition of 'learning' that could be expected of three- and four-year olds.
- Then we need to appreciate that the best item of 'equipment' for learning is an attentive, kind and playful adult. One of the key principles of the *Birth to Three Matters* guidance is that, 'Learning is a shared process and children learn most effectively when, with the support of a knowledgeable and trusted adult, they are actively involved and interested'.
- An important part of the adult role is to create suitable opportunities for children to extend their understanding. Scotland's [Birth to Three](#) guidance stresses how 'early learning involves opportunities to play, interact, explore and problem solve'. It emphasises that the role of the supportive adult is to create a flexible learning environment, 'relationships that encourage children to participate actively' and 'opportunities for children to communicate their feelings and their thoughts through quiet one-to-one times with an important adult'.
- Babies and young children need and enjoy the company of other children of similar age than both younger and older and themselves. Supportive adults are essential to create the right atmosphere for the sort of learning they achieve by watching others.

(Extracted from an article by Jennie Lindon, Nursery World 22.06.06)

How babies can read minds from age of one

The birth of empathy and the ability to 'connect' with other people takes place within the first year of life, scientists have found - a discovery that could lead to an early test for autism.

Babies as young as one can predict the outcome of another person's actions as well as adults can, says a study that shows how this ability - the basis of all social skills - arrives earlier than originally thought.

Infants learn to predict the actions of others at around the time they learn to perform those actions themselves, said a team at Uppsala University, led by Prof Claes von Hofsten. "It is a bit unexpected that infants can predict other people's action goals," he said. "It suggests they assume that other people are like themselves. That such a system functions this early in life is very encouraging. It gives children a head start to social understanding."

The study by Prof von Hofsten, Dr Terje Falck-Ytter and colleagues has many implications, both practical and theoretical: among the former, it suggests a way to diagnose autism early in life, which is often diagnosed if it affects language by the age of three. The work also confirms the belief that 'mirror neurons' in the brain play a key role in our understanding of what others are doing. [...] Mirror neurons help people to understand the intentions of others - a key component to social interaction.

(Extracted from an article by Roger Highfield, Science Editor, Telegraph, 19.06.06)

TV experts' time-outs 'could turn your toddler into a bully'

Imposing strict discipline on naughty youngsters can turn them into bullies, a childcare expert warned yesterday. Professor Margot Sunderland claimed the 'naughty step', 'time-out' and 'sleep training' techniques seen on TV risk causing long-term emotional damage.

Jo Frost, Channel 4's 'Super-nanny', makes misbehaving children sit on the 'naughty step' where they are ignored by their parents for a fixed period of time. Dr Tanya Byron, of the BBC's Hour of Tiny Tearaways and Little Angels, shuts offending youngsters in a room for a 'time-out'. Gina Ford, author of *The New Contented Little Baby Book*, advocates letting babies cry themselves to sleep if they will not settle.

But Professor Sunderland, of the Centre for Child Mental Health in London, said children punished in this way could lack compassion for others and be more prone to angry outbursts. Leaving youngsters in distress for long periods can do more harm than good. 'Sleep training' and 'time-out' can affect the chemical balance of children's brains through raised stress levels, she claimed.

Her theory - based on a review of more than 800 studies - is contained in her new book, *The Science of Parenting*. Yesterday she said: "The risk of bringing up a bully or thug is largely determined by the kind of parenting a child receives. Well-meaning parents often do not realise that the techniques they use to parent their child may actually be changing emotional, chemical and stress-response systems in the child's brains. "If you ignore a crying child or over-use time-out, tell them to shut up or put them in a room of their own, you can cause serious damage to their brains on a level that can result in severe neurosis and emotional disorders later in life."

Professor Sunderland said 'time-outs' often became a 'formulaic and indiscriminate' technique instead of being used as a last resort. "Time-out isn't wrong as a discipline measure per se," she said. "The danger comes when we don't understand when to use it. I worry that a parent who sees the technique on a TV show may not fully appreciate when it is appropriate, and use it to discipline a child who is actually in distress and needs comfort not punishment."

She said children left in distress would be less able to develop ways of dealing with stress. In later life, they might over-react or suffer anxiety. Professor Sunderland said research showed that children denied parental sympathy show less compassion toward crying youngsters. Some will even try to 'shut them up' by humiliating or attacking them.

She has previously sparked controversy by claiming that children should be allowed to sleep in the same bed as their parents until the age of five.

(Sarah Harris, Education Correspondent, The Mail, 25.05.06)

Infants are brighter sparks

Babies aged four months are able to organise visual information in three different ways - by brightness, shape and proximity - new research shows. A study by psychologists at Reading and London South Bank Universities, funded by the Economic and Social Research Council, found that infants are more capable of categorising things they see around them than previously believed.

As well as progressing to object recognition, an infant's visual attention has implications for memory, motor skills and other development. Dr Emily Farran from Reading University said: "Our findings show that infants start to organise their visual world from a very early age."

Sixty-three infants were tested at two, four, six and eight months by being placed in front of a screen and presented with an array of circles in horizontal lines, some of which were light and some dark. When the babies stopped looking they were said to be habituated.

Dr Farran said: "Then, instead of showing them one image we showed them two, one depicting horizontal stripes and the other vertical stripes. What we were looking for was a preference. This shows that they recognised that the original image was organised into rows [of different brightness]."

Differentiating brightness was observed at just two months, which supports the belief that this visual awareness is present in newborns. Proximity grouping, measuring how close visual objects are to each other, and shape grouping, both occurred at four months.

See www.esrcsocietytoday.co.uk for details of the study.

(Laura Marcus, Nursery World, 11.05.06)

What we say and do

Interacting with children

Lev Vygotsky's work has made us aware of the importance of thinking and learning taking place in a social context. Children learn from one another, and practitioners play a key role in respecting, supporting and extending thinking. Effective interactions are based on conversations that you would have with a friend. The following approaches all play a part.

Tuning in. Skilled practitioners intuitively have all their antennae open to evidence of children thinking, listening carefully to what is being said, observing body language and what a child is doing.

Showing genuine interest. Young children know immediately when adults are merely pretending to be interested. Conversely, they blossom when given undivided attention and affirmation. Clear signals of real interest are also shown through eye contact, smiles and nods.

Respecting children's own decisions and choices. It is tempting to influence children to change their ideas because we know better, and we can see short cuts and other ways of achieving success. But growth in thinking can only occur through the children seeing things through, recognising cause and effect and learning from their errors.

Inviting children to elaborate. Children find it hard to resist when an adult demonstrates that they really want to know more about what they are doing. An enthusiastic request for more detail will usually receive a response.

Supporting sequencing of ideas. Children need to learn to organise their experience and can be encouraged to think along the lines of what happened first and then what happened.

Recapping. In the ferment of mental activity, children can find it difficult to express and hold on to ideas. It is helpful sometimes to rerun the thinking with them: "So Amil, you think that."

Clarifying idea. Similarly, an interaction may help to make the child's meaning clear while respecting his idea. "Right, Darren, now are you telling us that this stone will melt if I boil it in water?"

Reminding. The child may need help to hold on to his thought: "Don't forget, Darren, that you said that this stone will melt if I boil it."

Offering your own experience. Children will be more inclined to offer their thoughts and feelings if you offer yours: "I really like to listen to music when I cook supper at home. It makes me feel happy."

Suggesting. Offer suggestions in the spirit of helpfulness, not prescription: "You might like to try doing it this way."

Using encouragement to further thinking. Encouragement can be more effective than praise, particularly if it is specific: "You have really thought hard about where to put this door in the palace, but where will you put the windows?"

Offering an alternative viewpoint. As children become used to sharing their views, the adult can gently challenge thinking. For example, they may say: "Maybe Goldilocks wasn't naughty when she ate the porridge. After all, since the porridge was left on the table, perhaps she thought it had been left for her."

Speculating. By encouraging children to speculate, the practitioner is helping them to open their minds to other possibilities: "Do you think the three bears might have forgiven Goldilocks and asked her to come live with them in their house?"

Reciprocating. This involves a two-way interaction where both adult and child are on the same wavelength. Child: "I want to do some gardening." Practitioner: "What a great idea. I would like to do some as well. But what sort of gardening shall we do?"

Asking open questions. If we are to have good conversations with children, questions both open and closed should be used sparingly to avoid a child feeling under pressure. One or two open questions can be used effectively in the spirit of enquiry, for example: "How did you manage to make this balance so well?" Occasionally a closed question is useful when you actually need to know a fact. What is his name? Where does he live?

Modelling thinking. Young children need to understand how adults use their thinking: "After work I need to take my dog to the vet's, take my books back to the library and buy some food for supper. So I wonder what I should do first?"

(Extracted from an article by Marion Dowling, president of Early Education and an early years consultant, Nursery World, 06.04.06)

Just a thought

Why is there currently such a huge interest in young children's thinking? Possibly because early years professionals recognise that a heavy focus on content and assessing knowledge is not the way forward. We can plan and implement a Foundation Stage curriculum, but we cannot ensure that children learn unless they are actively engaged, exercising choices, making decisions and offering their thoughts and views.

When this happens, children are likely to be motivated and challenged, and so invest their energies in learning. The result is genuine intellectual growth and progress, as opposed to children simply knowing about things.

Good thinking in the early years is also fundamental to achievement later in school and in life. To learn to write clearly, children must be able to think clearly. Moreover, for adults, clear, hard thinking is required to take advantage of options in life and adopt a considered lifestyle.

The interest in children thinking is fuelled by national guidance and findings from recent research. *Curriculum Guidance for the Foundation Stage* highlights the need to provide a climate for using talk for thinking. For example, 'Use language to imagine and recreate roles and experiences' and 'Use talk to organise, sequence and clarify thinking, ideas, feelings and events' (p58).

Studies of the brain emphasise that the sensitive periods for neural development and children's thought processes start very early in life. The experiences that we offer young children can help them to form connections and so move forward in their thinking.

'The first higher brain capacities to develop are social, and they develop in response to social experiences. Rather than holding up flashcards to a baby, it would be more appropriate to the baby's stage of development to simply hold him and enjoy him' (Gerhardt, 2004, p38). The EPPE (Effective Provision of Pre-School Education) and REPEY (Researching Effective Pedagogy in the Early Years) studies suggest that in high quality settings, children improve their thinking skills. In the most effective settings, staff provide opportunities to sustain and challenge children's thinking and to encourage children to share their thinking with other children.

'Sustained, shared thinking' occurs when two or more individuals 'work together' in an intellectual way to solve a problem, clarify a concept, evaluate an activity, extend a narrative, etc. Both parties must contribute to the thinking and it must develop and extend the understanding (DfES, EPPE Project: final report, 2004, pvi).

As practitioners, we can gain insights into children's thinking and support that thinking through:

- The provision we make
- The environment we provide
- What we say and do ([read more](#))

Gaining insights

Persistent curiosity is a feature of young children growing up. They spend a great deal of their time trying to make sense of the world. But it's not always easy to recognise how and what they are thinking. What they say and do may seem bizarre and unconnected with what's going on. However, there is always a link.

Piaget was the first to suggest that young children's thinking is qualitatively different from adults'. Their logic is based on little life experience (around 36-48 months) and so their conclusions are different from those an adult might

make. However, they apply all that they know, extend it with new discoveries and imaginative leaps, and make incredibly sensible deductions from the little information they have. The following are some ways children reveal their thinking.

Pre-occupations or schemes of thought: Young children develop all-abiding interests from a very early age. As babies and toddlers, they can become absorbed by different patterns of movement. Later, these interests can extend in many ways to reflect their experiences. Children's play often appears random and sometimes quite unconnected to what you have planned. However, a child's preoccupation may provide a thread of thought that is woven through the different activities. [.]

Representations: Children will strengthen their interests and represent their understandings through the range of curricular activities and experiences made available to them - for example, dance, role play, constructing, modelling, painting and drawing. The broader the curriculum, the greater the extent for children to demonstrate their thoughts. [.]

Talk: When setting up their own activities and making decisions, children often reveal their thoughts to one another or in monologue. [.] Children will recall and use their previous experiences when involved in group role play. Occasionally they will appropriate or try out language when thinking through a role. [.] If we are alert to young children's behaviour, actions and talk, we can gain hugely valuable insights into their prime concerns. To understand what a child is thinking, practitioners need to listen, observe and then take an imaginative leap into the child's mind. Once this is achieved the adult is able to support the child in thinking further. [.]

Types of thinking

Young children start to understand their hopes and fears and the reasons for their behaviour. Different environments and experiences give scope to think in different ways. We may see children:

- Planning, predicting, thinking ahead and speculating
- Solving problems, working things out, finding solutions
- Reasoning using logic, explaining, making connections, noticing cause and effect
- Investigating, exploring, gathering and using information
- Imagining new situations, identifying with other people or creatures, fantasising, creating
- Reflecting, recalling, sorting out feelings

Although it is helpful to be aware of and provide opportunities for these different modes of thinking, in practice they overlap. A well-balanced and broad curriculum should provide for a good range of thinking. [.]

Climate

The way in which an early years programme is planned and organised reflects the practitioner's beliefs about the degree of responsibility to give children. If we look at extreme ends of the spectrum, settings can be organised as controlling or informational climates.

In the past, many settings adopted a predominantly controlling climate, with the practitioners firmly in charge and responsible for decision-making. In such a climate, children were expected to carry out prescribed activities, using materials and apparatus already selected for them. They were only able to respond and comply with the decisions made and so became dependent on the adult for their learning.

Today, as we understand the need for children to be actively engaged in thinking and learning, climates are more informational. Children are encouraged to make decisions about the activities they do and select resources for themselves. They take responsibility for themselves, make and learn from mistakes and discover the best way of doing things. The adult role is to facilitate learning and provide an ethos where all ideas are encouraged and valued.

Although, of course, there are times when practitioners need to take a leading role to inform children, teach knowledge and skills and set boundaries for social living together, an informational climate provides the seedbed for thinking (Deci, EL and Ryan, RM, 1985, p73).

(Extracted from an article by Marion Dowling, president of Early Education and an early years consultant, Nursery World, 06.04.06)

Lack of cuddles in infancy may affect development of brain

Depriving young children of cuddles and attention subtly changes how their brains develop and in later life can leave them anxious and poor at forming relationships, according to a study published today. Love and affection from parents and carers are vital to developing brain pathways associated with handling stress and forming social bonds, the researchers found.

Seth Pollak, a psychologist at the University of Wisconsin, and colleagues compared the progress of children being raised by their biological parents in America with children who had come from crowded orphanages in Russia and Romania and had been adopted by American parents. "When these [orphanage] children were babies there were so few adults around that there was rarely one available to respond to their needs," said Dr Pollak.

The children in the groups had an average age of 4.5 years and the orphans had been settled with their foster parents for two years and 10 months on average. Eighteen of 39 children studied were from orphanages. They were observed at home playing interactive games and sitting on their mother's lap.

Before and after this physical contact, the children provided a urine sample to measure levels of two hormones: vasopressin, thought to help us recognise familiar individuals and live in social groups; and oxytocin, the release of which makes us feel secure and protected, and lowers our stress level. Children from orphanages had lower baseline levels of vasopressin and, unlike children raised by their biological parents, their levels of oxytocin did not rise with cuddling. The study appears in the journal Proceedings of the National Academy of Sciences today.

"It is remarkable that the children's deficiencies in these affection hormones could still be detected now, after the children spent three years in loving adoptive homes," said Terrie Moffitt, a developmental psychiatrist at Kings College London. "An unanswered question is whether or not the hormonal deficiencies will result in any behavioural difficulties for the children in the long term."

The researchers suspect that if deprived of close adult contact soon after birth, children will never fully develop the pathways. "It used to be thought that the brain came all wired up, but now it seems that social experiences after birth are vital for opening up pathways and strengthening the connections in the brain for these hormones," said Dr Pollak. The group plans a follow-up study with the same children to see if this is the case. "It suggests we need to pay a lot more attention to children growing up in deprived environments," said Dr Pollak.

He also speculates that giving children plenty of cuddles at birth leads to an addiction to close relationships in late life. "The area of the brain that acts as the receptor for oxytocin is also the reward centre associated with drug addictions. It is possible that close relationships function like an addiction, making us go and seek them out in later life," he said.

(By Kate Ravillious, The Guardian, 22.11.05)

Is this any way to begin life?

Premature births have reached epidemic proportions in Britain with 18,000 babies a year spending their first weeks in an incubator. But pioneering doctor Nils Bergman claims in an interview with Emily Wilson in The Guardian that keeping them apart from their mothers damages their development.

When working as a doctor at a remote mission hospital in South West Zimbabwe, Bergman was first introduced to kangaroo care - skin to skin contact between mother and pre-mature baby. The mission hospital started using mothers as incubators, telling them to hold their babies to their skin day and night. They learned through trial and error but soon found they were saving small babies and that the babies seemed particularly well in themselves. Overall survival rates went up by around 50%.

Bergman's experiences in Zimbabwe and subsequent work in South Africa has led him to the conclusion that incubators - ubiquitous in rich countries since the 1940s - have led orthodox neonatal medicine up a blind alley. Bergman said: "Mother's skin, chest, is a far better place and safer place to stabilise a baby." He argues that it is the only place where a premature baby's brain can develop properly, where 'wiring defects' can be avoided.

(Adapted and extracted from an article by Emily Wilson, The Guardian, 17.11.05)

Brighter later

The stress hormone Cortisol plays a pivotal role in an adult's wellbeing, says Oliver James, but its levels are defined by our earliest life experiences.

At a dinner, back in the eighties, a consultant Neuropsychiatrist from the country's leading brain hospital told me that the fact that mentally ill and healthy people's brains are consistently different proved the causal role of genes. He had never even considered the alternative - that the brains could be made different by nurture and social environment, not nature.

In the past ten years, the evidence that this is often so has become overwhelming. In particular, it is now clear that adult levels of the hormone Cortisol are profoundly affected by our care in the earliest years and even prenatally.

Cortisol is secreted to prepare us for fight or flight in dangerous situations. If a knife-wielding maniac hovers into view, we secrete or die. However, its set-point, the level to which it returns after the threat ends, varies. The level is like a thermostat, determined during pregnancy and infancy. Crucially, the concentration in our bloodstream is governed by early care, not by genes.

Levels of stress and Cortisol in mothers during pregnancy predict emotional and behavioural problems, and Attention Deficit Hyperactivity Disorder, in childhood. It seems the mother's stress is passed chemically into the foetus, continuing to affect its brain long after birth.

However, postnatal care is also vital. Maternal depression and alcoholism lead to abnormal Cortisol levels which endure even after she has recovered. Being left with strangers in daycare does the same (but care by familiar childminders does not). If an infant does not feel secure, its levels go haywire because of the sense of threat.

Either the cortisol thermostat gets jammed permanently on, with the smallest thing triggering secretion, or it simply shuts off. Abnormally low levels result if the baby gets so used to crises that its state is one of permanent danger and nothing can convince it of a need to react. Hence, the most aggressive boys at school tend to have low cortisol, dating back to chronic neglect or hostility from carers in infancy, from which they have distanced themselves.

As Sue Gerhardt chronicles in her important and very readable book, *Why Love Matters: How Affection Shapes a Baby's Brain*, high and low cortisol are associated in adulthood with most mental illnesses, from depression to eating disorders to alcoholism. She also records how early experiences set our baselines for serotonin (low levels of which are connected with depression; high levels with violence) and abnormal brainwave patterns in the frontal lobes. Even the size of parts of the brain are affected. Persistent high cortisol in early life, reduces the number of key brain receptors when the brain is developing very rapidly.

What would the neuropsychiatrist say if I met him now? There's a good chance he would be largely ignorant of the role parenting plays in shaping the brain. Unfortunately, professional loyalties seem to require that everyone stays in their box, ignoring contrary science by prefacing their prejudice with the dictum that 'it's a bit of both' nature and nurture.

Look at them before they leap

Sue Palmer investigates the close interaction between parent and infant.

Hobson [Peter Hobson, author of *The Cradle of Thought*] contends that the capacity to think requires a certain amount of nurturing. He admits human infants are born hard-wired for thought, just as they are hard-wired for language - to that extent, thinking is genetically predetermined. But, like language, this facet of nature also needs nurture before it can take its course: adults must provide some input. If babies get that input in the first year or so of life, they will be able to understand, think, communicate, learn. If they do not their human potential is damaged. The cradle in which Hobson claims thought begins is the deep emotional attachment that exists between parent and child. This allows them to form what he calls the 'triangle of interrelatedness' - parent is at one corner of the triangle, child at another, and the outside world at the third. Secure in the parent's presence, the child looks out at the world, then back at the parent; the parent looks at the world, then back at the child; their mutual gaze acknowledges a mutual experience - they have both seen the same bit of world.

Hobson argues that, through taking part in this emotionally embedded triangle of interrelatedness, children acquire three key insights.

First, there is the dawning realisation that they and their parent are separate beings, looking at the same bit of world from different viewpoints - the child is simultaneously attached to and separate from the parent. This is a supremely important insight because it is the beginning of empathy. If the mind-blowing discovery that other people have their own points of view is rooted in emotional security and pleasurable communication, the chances of the child later extending empathy to a widening range of people are much greater.

The next vital insight is the infant's recognition of his own personal perspective, different from parent's. The child thus becomes conscious of himself as a thinker, an intellectual self-awareness that underpins rational thought and behaviour.

Finally the realisation that it is possible to have more than one perspective on an object points children towards symbolic play. Soon they will delight in using dolls as symbols for babies, sticks for horses, cardboard boxes for cars. Symbolic play lays the foundation for understanding the many systems of symbols used in our culture, including numbers and letters. It is also critical for the development of imagination and creative problem-solving abilities.

What if a normal child isn't exactly neglected but the triangle isn't as good as it could be? What if opportunities for shared gazing and communication are limited? What if parents do not have time or simply do not know how important it is to interact with their babies? There is a growing body of neuroscientific research connecting successful early attachment with the development of neural networks in the prefrontal cortex of the brain - the area associated with rational thought, decision-making, social behaviour and self

control. If Hobson is right, the way we look after tiny children is profoundly important, not only for the children themselves, but for all of us. Yet the life we lead today does not exactly encourage parents to engage in the triangle of interrelatedness - in some ways, it positively discourages it.

(Extracted from an article by Sue Palmer, TES, 19.08.05 - the full article can be found at www.tes.co.uk)

The secret life of babies

Science has got used to thinking of the emotional life of a baby as a 'great, blooming, buzzing confusion'. But now a series of ground-breaking studies carried out by American psychologists has overturned conventional notions of what a baby understands and feels. According to the findings, babies as young as four months are highly sophisticated, both intellectually and emotionally.

The studies could even lead to doctors spotting disorders such as autism, depression and learning difficulties at a far earlier stage than ever before. By detecting symptoms sooner, doctors may be able to help children to cope with these disorders more effectively.

While much of the new research has relied on traditional methods of observing babies' behaviour, such as body language and facial reactions, scientists are increasingly turning to brain scans. Professor Robert Winston, whose BBC series *Child of Our Time* explores the behavioural patterns of a group of children as they grow up, said neuroscience could be the key to discovering how a baby's brain operates.

These findings could enable child psychologists to develop emotional milestones which babies should be expected to reach by certain ages, in a similar way to the physical milestones such as crawling, walking and talking.

Click [here](#) for more information on the research findings.

(The Independent on Sunday, 14.08.05)

Fish oil diet feeds brains of toddlers

The behaviour of pre-school children improves dramatically when given a daily dose of fish oils, according to the first study made into dietary supplements for young people under the age of three. After just six weeks of daily doses of Omega-3, parents reported a transformation in the behaviour and learning abilities of children as young as 20 months old.

The study has gained the attention of Professor Robert Winston from the Institute of Reproductive & Development Biology at Imperial College London who revealed in last year's BBC series, *Child Of Our Time*, how fish oils can calm disruptive children aged six and upwards.

"The data has been extremely impressive," said Winston, who will discuss the study tomorrow at a debate on the potential impact of Omega-3 on childhood development. "The evidence is getting ever stronger that children who have diets poor in Omega-3 are not achieving their natural potential."

Omega-3, polyunsaturated fats found in significant amounts only in oily fish and offal, make up a quarter of the grey matter of the brain and are vital to brain and eye development.

Research into the effect of fish oil supplements on older children, pregnant women and young offenders have all identified powerful benefits, but this is the first time the impact has been tested on pre-school children.

The Observer has seen interim results for the Durham-based study of 60 children aged between 20 months and three years, which was launched three months ago and is due to run for a year. The results reveal dramatic improvements in the performance of underachieving toddlers, many of whom had been disruptive and unable to concentrate.

Children were assessed for their motor skills, IQ, reading, spelling and behaviour, and the study identified a huge reduction in symptoms of the sort associated with attention deficit and hyperactivity disorder. The biggest improvements, however, were observed in the children's concentration and behaviour. "The performance of almost 60 per cent of the children involved has improved dramatically," said Dr Madeleine Portwood, educational psychologist for Durham local education authority and lead investigator at the Durham Sure Start trial. "We saw children whose learning skills went from being six months below their chronological age to absolutely normal in just three months.

"Some two-year-olds went from having a vocabulary of 25 single words to being able to use whole sentences, while others were able to sit down and concentrate for the first time in their lives."

Portwood, who is also speaking at the debate, believes it is vital to focus on helping children to reach their full potential before they get to school.

(Written by Amelia Hill, education correspondent, Observer, 17.07.05)

Give it some thought - how to create the right conditions for effective interaction

Contrary to the widely accepted belief that babies just cry, feed, sleep and move their limbs erratically, recent research into brain development in newborns and very young babies indicates that they also think and make decisions about how to respond to their environment.

The theory

This thinking process in babies is manifested in several ways, and healthy brain development depends on the extent of the adults' interaction and support.

Once practitioners, parents and carers become aware of babies' brain development and the crucial role that they play in stimulating young minds, they are more likely to exploit every opportunity that presents itself by responding positively and creatively to the baby's needs.

Information about early brain development is well explained in the book *How Babies Think*. This book makes understandable some complex scientific discoveries and offers helpful advice on how parents and carers can enjoy and support their children's developing brain. The authors also reveal how sophisticated babies are right from birth and how crucial it is for parents and carers to respect their babies' individuality and uniqueness.

The research emphasises that most babies appear to be pre-programmed to become social and communicating beings. The brain is the mechanism of control to achieve this end and the success of the progress of brain development depends principally on the supportive interaction of parents and carers. As with all other skills, thinking practice improves the baby's brain growth and the ability to learn, communicate and respond to experiences.

Initial strong attachment and good bonding with parents and carers creates the ideal conditions for babies to become socially responsive and to stimulate their interest in learning about the world around them. For this reason, the role of the adult is not only to protect, but also to communicate at every opportunity with the baby. This responsibility should be taken seriously because it involves a great deal of commitment and understanding. So, the task of caring for small babies should be regarded as one of the most important and difficult jobs to tackle and one that requires qualified and experienced practitioners.

The first positive step for practitioners is to ask parents about their baby to show interest in its personality, likes and dislikes and its daily routine at home. Always listen carefully to what parents tell you because they have the greatest knowledge about their baby and are likely to feel emotional strain at the thought of leaving their baby with new carers.

Use the information provided to inform your initial planning. Try not to alter significantly the baby's daily routine, as a consistent approach will be less likely to upset and confuse the young mind.

During daily routines

Use daily routines to engage or disengage attention, depending on whether you want the baby to rest or interact with you and other people.

- During wakeful periods the baby will be playful and seek attention and confirmation from adults. This should take the form of lots of one-to-one interaction, eye contact, touching and conversation. In dialogue give sufficient time for the baby to respond to you. Show interest and delight in the efforts made to communicate to you and

always indicate with your eyes and your facial movements that you are involved fully in this interchange.

- Nappy changing, washing and feeding create excellent opportunities for individual attention and dialogue. Practitioners should ensure that they value these moments of interaction and stimulate the baby's interest. This may be by singing to the baby, or explaining what you are doing and describing the objects you are using and telling the baby what will be happening later.

Habitual experiences of this kind help build consistency and expand memory as the baby's understanding of vocabulary and meaning increases.

Outdoors

You should promote learning and interactive experiences with the baby both indoors and outdoors:

- Place the wakeful baby in a bouncy, lay-back seat from where it can observe the natural environment. Babies usually love the company of other children from whom they learn a great deal about how to behave and how to enjoy themselves.
- Hang objects such as cones, feathers, used envelopes and scarves from washing lines, or the branches of trees, so that the baby can watch them blow in the breeze.
- Take the baby for walks and engage in conversation about where you are going and what you will be doing together when you get there.
- Go to the park where you can participate with the baby in exhilarating physical sensations on slides, roundabouts and swings.

The baby's brain will be stimulated by the variety of sensations offered together with thoughtful adult support. The baby can read and enjoy your expressions of excitement as conveyed through your verbal and physical reactions. The baby will wish to copy these physical expressions in their own way.

Adult approval is crucial to confirm the baby's sense of what is right and wrong to enjoy. Babies will learn apprehension of experiences, fears that will become imprinted on its memory. This is the way in which the brain programmes and organises the information it receives. The brain makes connections and expands its repertoire through positive experiences. However, developmental growth is restricted by negative or limited experiences.

Resources

Babies seem programmed to respond to facial features and expressions. From birth, babies gaze with interest at their parents and carers and are able to begin to copy some of the movements that they see. For example, even a few minutes after birth, a baby can copy facial expressions such as a tongue pushing slowly in and out of the mouth.

Experiments using shapes and designs that resemble faces have supported the theory that babies are most interested in observing and learning from human expressions. The attention span of babies has been measured to

discover how long they focus on facial images compared with other sorts of patterns.

Results conclude that babies have natural pre-dispositions to enjoy and to concentrate for the longest periods on images of faces. So practitioners should try to display and show pictures of people in the baby's immediate environment.

- Hang mobiles over cots and play areas with faces of people from all over the world.
- Make books with the help of parents: "Baby-on-a-string" books can be created by taking photographs of familiar rooms and objects related to the baby's daily routine. Glue these photos on to cardboard, cover them with sticky back plastic and make a small hole in the top right hand corner of each one to attach them together with ribbon.
- Similarly, mount an image of the baby that has been cut from a photograph. Thread a longer piece of ribbon through its top corner and attach it to the rest of the book. Now you should be able to share the book with the baby and move its own picture from one photograph to another so that it appears that it is in each of the settings portrayed. Talk about each aspect of the photo as you move the baby from one familiar space to another and remind the baby what it does in each of these rooms. This will give the baby a sense of belonging and will stimulate links with past experience and the ability to remember visual and social activity.
- Create "lollipop" faces. Collect interesting photographs of faces from magazines. Mount them on card and cover them with sticky back plastic. Attach each photograph firmly to the back of a wooden spoon. Show these to the baby and encourage the baby to hold them. Make comments about the faces and the expressions illustrated in the photos.

Also, make your own images of faces using simple materials such as buttons and felt, which can be cut to form features such as noses, eyebrows and mouths. Create different expressions to suggest surprise, fear or fright. Cover these with clear sticky back plastic and attach them to wooden spoons in the same way.

Babies learn to differentiate between expressions and, with adult support, begin to empathise with different feelings and emotions.

From "Give it some thought", Lena Engel, *Nursery World*, 5 August 2004

A baby's magnificent brain

Even before a woman may know that she is expecting, the first of 100 billion brain cells begin to multiply frantically inside the tiny embryo she is carrying. This is because a baby's brain begins to develop nerve cells, or neurons, just three weeks after conception.

We now know that a baby does not arrive in this world with a fully assembled brain. Beginning shortly after birth, a baby's brain begins to undergo magnificent changes. During the first years of life, it will actually double in weight and use twice as much energy as an adult brain. This is not because of new cell growth, but because of the trillions of connections, or pathways, that develop between the cells. These connections enable the baby to think and learn.

Babies simply do not receive enough genes from their mother and father to make all of these pure, unprogrammed connections work. Scientists now know that what a child sees, hears, touches, and feels before the age of three strengthens and shapes the trillions of finer connections that will work together to foster her learning throughout life. However, at different times during a baby's development, some of the pathways that have not been used and reinforced by learning experiences in the outside world may be shed and lost forever. If a baby is provided with a lot of stimulation, however, the connections are strengthened and may remain active forever.

Think of a baby's brain as a forest with many trails going through the thick brush. Like a baby's brain pathways, the trails that are frequently travelled are always ready for passage and remain ready forever. The trails that aren't used become overgrown with brush and then can never be used.

[Scientists stress that stimulating a young child's brain can be done through simple acts, like playing with her, talking to her, naming things, singing songs and reading together for at least ten minutes a day.]

Talking and a baby's brain

Babies learn to talk by listening. Research tells us that the more words babies hear, the faster they learn to talk. This is because frequent daily exposure to words helps the brain pathways that foster language learning to develop more fully. However, only "live" language, not television, helps children develop language skills. Experts feel this is because children need to hear language in relation to what is happening around them or it just becomes noise. It must be delivered by an engaged human being, and the child must focus on the speaker and environment.

According to research conducted by Janellen Huttenlocher, the actual size of a toddler's vocabulary is strongly correlated with how much her mother talks to her. Dr Huttenlocher found at twenty months old, the children of chatty mothers averaged 131 more words than the children of mothers who didn't speak much. At two years of age, the gap more than doubled to 295 words.

Other researchers have found that talking to children a lot not only affects their vocabulary, but also their intelligence. Betty Hart, PhD, and Todd R. Risley, PhD, observed how parents interacted with their one- and two-year-old children. At age three, the ones who scored the highest on intelligence quotient (IQ) and language tests were the ones who had heard the greatest number of words at one and two.

Even though your baby may be surrounded by conversation from birth on, it is important that you talk directly to her before she can talk back to you. You don't need to ask her a lot of questions or require her to respond. Your

purpose is to build her understanding of language to help enhance her expression of language.

Taken from the chapter "How Babies Learn to Talk", in *How To Talk To Your Baby*, Dorothy P. Dougherty, Avery, 1999.

Love is all you need

It's a gloriously sunny morning. From my desk, I have a wonderful view of a children's play-ground, so I often watch parents engaging lovingly with their babies and toddlers as they come and go. All seems right with the world. But the loving behaviour that I enjoy observing has more than a transitory impact. It is laying the foundations of future emotional behaviour in these children, in part by shaping their brains. Everyday looks and smiles don't just provide a happy morning for the children outside my window, but are also helping to nourish the growth of the social brain and the systems that will manage their emotional lives in the future.

How can love possibly affect a child's brain? Surely it is too vague a concept to have an impact on its physical structure? Recent research in the neurosciences and in biochemistry suggests otherwise. Using new technology, such as brain scans, to investigate how the nervous system develops and responds to emotional stimuli, a much clearer picture is emerging of how and when emotional intelligence develops. This research suggests that babyhood plays a crucial part in our emotional lives, and the kind of parenting we get makes a big difference to the kind of brain we end up with.

This is partly because a baby is born with a remarkably unfinished brain. It needs to be built up through stimulation. But this isn't the kind of stimulation we have been urged to provide in the past. I am not referring to the playing Mozart kinds of stimulation. No, where emotional development is concerned, you need emotional stimulation; i.e. loving encounters.

Warm smiles and eye contact, feeling noticed and cared about, generate pleasurable feelings and release hormones in the brain - in particular, in various parts of the pre-frontal cortex. This is the area (roughly speaking, behind our eyes) which plays a crucial role in social behaviour, noticing social cues, holding back emotional impulses, directing attention and eventually enabling conscious awareness of feelings. It is not fully functional at birth but develops rapidly in the first couple of years afterwards. A richly connected, well-developed pre-frontal cortex is the result of lots of positive social interaction, which stimulates these brain connections and nourishes them with the hormones that are released by loving attention. Unfortunately, that also means that if you are born into an unhappy family, where you experience a lack of attention, your brain will be tailored accordingly. Such people often end up with an over or under-sensitive stress response; they are liable to overreact to small upsets, either with too much aggression or depression.

The social consequences of this are worrying. Adults who have had a bumpy ride in infancy are much more liable to create social costs for us all, in the form of bills for antidepressants, psychiatric treatments or criminal justice, or

just poor emotional relationships. This is a lot to hold babyhood responsible for, and of course babyhood can't be the whole story. Some people find a way to develop their emotional intelligence as they go through life, making use of whatever opportunities they get for more positive relationships. All the same, babyhood is crucial because it sets up the basic tool kit for managing emotions and relating to others. We form expectations of others and these affect the way in which they, in turn, treat us.

For example, children who have experienced a lot of hostility from others, often react to their classmates or teachers as if they are hostile even when they aren't. What has been less obvious, until recently, is that their brains may be wired differently as a result of their early experience.

On the positive side, new information opens up the possibility of new solutions. We can and should provide better conditions for parenting in the first two years. Psychotherapeutic support for parents in difficulty can make a huge difference to their children. Community facilities can help to overcome the isolation of parenting. Greater flexibility in working practices also becomes imperative. There are many creative ways forward, so long as we are willing to put resources into prevention rather than mopping up the consequences of misery.

Written by Sue Gerhardt for *The Times*, 3.07.04. Sue's book *Why Love Matters: How Affection Shapes a Baby's Brain*, published by Brunner-Routledge, is available in bookstores for £9.99.

Boost Your Baby's IQ

Are you worried that your son isn't brilliant because he doesn't like Baby Bach? Do you lose sleep over your daughter's stubborn disinterest in the alphabet? Relax -- the secret to smarts isn't what you think. While a complex mix of genetic and environmental factors helps determine your little one's IQ, the most important influence is something that you control: the quality of the care you give your baby. Loving and nurturing your infant are crucial for optimal intelligence, says Robert G. Voigt, M.D., a developmental pediatrician at the Mayo Clinic, in Rochester, Minnesota. It's also important to engage your child in brain-stimulating activities, like the ones listed below. Luckily, they're as fun for you as they are for him!

1. Chat him up

"There is a correlation between the number of words a child hears as a baby and his verbal IQ," says Lise Eliot, Ph.D., author of *What's Going On in There? How the Brain and Mind Develop in the First Five Years of Life*. The more you talk to him, the richer a vocabulary he'll develop. Keep your subjects simple, because he thinks in concrete terms. Talk about his truck or blanket, for instance, instead of your upcoming vacation. And if he attempts to communicate with you, elaborate on it ("Oh, you want your bottle!").

2. Hit the books

Reading stories together helps you forge an emotional bond with your child and helps her learn too. "She'll begin to grasp the basics of literacy from your reading sessions -- that there are letters and words on the pages and that you

read from left to right," says Linda Acredolo, Ph.D., a professor of psychology at the University of California, Davis. And the pictures will allow your child to see things she otherwise might not, like tall ships and tigers. When you reach the end of a book, find the patience to read it again. Each time you do, your baby sharpens her memory skills, and it's a delight for her when she can predict what's on the next page.

3. Let your fingers do the talking

Use sign language to communicate with your baby before he ever speaks. You'll be lending his intelligence a helping hand too: "Scientific data show that sign language has a positive effect on IQ and language development," Dr Acredolo says. According to a study conducted at the University of California, Davis, babies who learned about 20 signs talked earlier and had higher IQs than those who didn't. For additional information, visit Dr Acredolo's Website at babysigns.com, or read the book she co-authored, *Baby Signs*. Other resources include *Baby Sign Language Basics: Early Communication for Hearing Babies and Toddlers*, by Monta Z. Briant, and the Website signingtime.com.

4. Try to nurse

Kids who were breastfed as babies outperform their formula-fed peers on mental-development tests, Dr Eliot says. And the longer babies breastfeed during the first year, the higher their IQ tends to be. Still, if you choose formula, don't fret. Studies have found that the ultimate IQ difference is just a few points, on average. If you're using formula, the American Academy of Pediatrics recommends an iron-fortified one for your baby's first year. A University of Michigan study found that children who had chronic, severe iron deficiency in infancy scored lower than their peers on cognitive and motor tests in their teens.

5. Give her time alone

If you wave toys under your baby's nose every minute she's awake, you'll wear her out before boosting her brainpower. And you certainly won't help her develop her attention span, which is crucial for academic achievement. "There is a philosophy that kids need entertainment around the clock, but they need some downtime to amuse themselves, play with toys, or crawl," Dr Eliot says.

6. Snuggle up!

Once your baby knows that you'll always meet his needs in a loving and reliable way, he'll have the drive to explore on his own. So carry and cuddle him, and make plenty of eye contact. "One thing that motivates children to learn to talk is wanting to connect with other people," Dr Acredolo says. That's why little kids want to show Mommy a flower or point out the stars to Grandma. They want to create a bond. With plenty of playing and snuggling, you'll do just that -- and you'll both reap benefits far beyond brain development.

By Julie Weingarden Dubin for www.parents.com

Teach your Montessori baby to think

Montessori is a way of life, a philosophy about how human beings might live their lives and treat one another; it is an attitude of respect and encouragement. Newborn babies come into our lives lacking the ability to be independent; it is the role of the adults caring for them to nurture and protect them and to help them to think for themselves and do things independently.

Imaginative and creative thinking distinguishes humans from animals and defines us as Homo sapiens. What it means to have thoughts, and what gives us the remarkable capacity to think, have been subjects of debate for centuries.

To develop fully, babies' brains need:

Good nutrition

A prevailing opinion on the acquisition of thought and language is that babies are born with pre-programmed modules in the brain; this may be too narrow and too simplistic an explanation. Genetics play an enormous role, but whatever potential or predispositions babies inherit from their parents, these will only be fulfilled if babies are allowed to develop normally. A child who is malnourished in the first six years of life, or who suffers a devastating disease or physical injury, will normally develop much less of his or her potential than a child who enjoys good health.

Active use

Equally important is the child's early education, because the brain only develops through active use; this is especially true in the years of infancy and early childhood. Maria Montessori recognised that with suitable stimulation, babies' and young children's ability to concentrate, absorb and master new skills and formulate ideas and concepts increases, and that the earlier a programme of intellectual, physical, sensory and artistic education begins, the more dramatic the impact on children's ability to think.

High quality exchanges with other people

Recent research suggests that a baby's facility for thinking is enhanced by the quality of his or her exchanges with other people over the first eighteen months of life, and, that during the second year of life an intellectual revolution takes place in a baby's brain as the child achieves new insights into the minds of itself and others. Human thought, language, and self-awareness are developed in a cradle of emotional engagement between infant and caregiver; consequently, social contact has vital significance for mental development:

"Most of us think of thinking as something we do in our own heads, . (but) the fact that we become able to reflect in such an abstract way, all by ourselves, does not mean that it was all by ourselves that we acquired the ability to think in the first place. The tools of thought are constructed on the basis of an infant's emotional engagement with other people."

Peter Hobson, *The Cradle of Thought: Exploring the Origins of Thinking*.

How and when do babies learn to think?

How does a child develop the capacity to think? How does it develop a sense of self, of the existence of other persons with minds of their own, and of its relationship to these others? The most important factor is the quality of the child's emotional relationships within its early learning environment. Very early

engagement with other people fosters the child's emergent growth throughout infancy into the realm of human thought and culture.

Human thought, language, and self-esteem and self-awareness are developed through the emotional engagement between infant and caregiver; consequently, social contact has vital significance for mental development.

From birth

During the first three months of life a baby needs to bond closely to someone; normally this will be with the mother. Although unfashionable in many quarters, then as now, Montessori maintained that the best place for a newborn infant was with its mother. Without this attachment, the child will later have difficulty developing and sustaining normal loving relationships with other people. A child deprived of a familiar voice, physical closeness, skin-to-skin contact and a reminder of the warm feeling in the uterus, tends in later life, to have a hard time caring about other people and feeling compassion. There is evidence that many criminals and people displaying aggressive behaviour began this pattern during infancy.

From the age of two months

From the age of two months, and often earlier, a baby begins to realise when an adult is attuned to him (or not); he develops strategies for attracting the attention of others, becomes stimulated, bored or tired and is able to bring an end to the interaction. At this stage babies learn to concentrate not only on a person or an object, but also on people and objects together. The purpose of the object is to provide a focus for interaction between the baby and the person and the baby watches and learns from the reactions of those around her. During the first months babies refine their ability to move their heads and control eye movements. As babies begin to make sense of what's happening, they are increasingly able to affect their environment, for example, by using their hands, facial gestures and other body language to indicate whether they want to be involved.

From the age of four months

As children reach four to six months, their bodies are beginning to change. The underlying cause is myelination, the process by which a baby's brain and nerve cells gain a fatty coating of 'myelin', which serves as insulation and keeps the electrical impulses transmitted by the brain moving in the correct pathway along the nervous system. This is crucial to the child's ability to coordinate movement. Movement develops from the head down as the process of myelination proceeds; babies further refine and control eye movements, and they can focus on moving objects. They spend a lot of time observing, and because they are not yet mobile they become people watchers.

From the age of six months

Babies learn to roll, shuffle and sit, usually by six months; crawling follows at about eight months and most children toddle with assistance before they are twelve months. This is the most critical stage for movement development, which enhances myelination; i.e. it is especially important in the second six months of a baby's life to provide every opportunity for him to explore, to refine large and small muscle movements and strengthen the correct neural pathways for healthy brain development. Playpens, cribs, walkers, baby bouncers and child carriers all hamper the growing child's opportunities to

explore and hence infants miss out on the brain developing activities of yesteryear, such as emptying the contents of the saucepan cupboard onto the kitchen floor, banging with wooden spoons, fitting saucepan lids, tipping and pouring whilst parent or carer is busy with their own work. For here lies the clue to developing babies thinking skills; in the same way that boys and girls are fully absorbed in their work in Montessori settings, and that work is respected and encouraged in a prepared learning environment, babies also need a 'climate' of respect and opportunity to carry out their work, as they choose, touch, explore, practice, listen and reflect.

From the age of twelve months

By the age of twelve months babies understand the world also has meaning for others, and that the meaning it has for someone else can affect the meaning it has for the baby itself. For example, a baby who repeatedly drops his spoon from his highchair will learn that his carer's displeasure gives him displeasure also (or maybe not!) In any event, the child will learn from the interaction and modify his behaviour by either stopping or continuing with the 'game'; this understanding will influence how he acts in similar circumstances on future occasions.

By twelve months children are experimenting with their voices, imitating sounds and generally saying a few words. It is crucial that adults talk and listen to the child, and provide language materials such as books, objects and pictures for naming.

Why is talking to babies so important?

In order to develop speech and language, there are a number of skills that all children need to develop first: attention, discrimination, listening, processing.

These skills enable children to be aware of the world and the language around them, and to gradually distinguish between different aspects of speech, language and communication. Difficulties with one or more of these areas can result in children having problems with

Focusing attention

Children may not adequately filter out extraneous noise, thoughts or visual information.

Discriminating between sounds

Children may not be able to discriminate between sounds they need to listen to, for example speech, and background noise such as a heating system or cars driving past. They may also have problems identifying different speech sounds.

Listening

Listening requires a combination of the above skills. When one or more areas are impaired, having the ability and indeed motivation to listen may be significantly affected.

Processing Information

Children may take longer to process the information they are hearing. They may experience difficulties remembering and/or sequencing what they have heard. This will result in them being unable to retain the spoken information

for long enough in order to process it fully, and to make sense of what they are hearing.

Babies developing thinking skills are reflected in what they do and what they say.

Twenty percent of pre-school children have difficulties with speech, language and/or communication. Over one million children in the UK have some kind of speech, language or communication difficulty (SLCD). These difficulties often have a significant impact on a child's on-going language, learning, social and emotional development.

Problems with literacy are founded on problems with even more elementary communication skills, and go right back to a child's earliest years.

There are serious indications that the prevalence of speech, language and communication difficulties, and the rise in behavioural and social problems are directly related to changes in modern lifestyles and poorer quality social interactions during early childcare.

The National Literacy Trust commissioned academic research; they visited many places where adults interact with young children. For example, at one school in Richmond, South London, the head teacher voiced her concerns about the lack of communication when parents arrive at school to collect children:

"They came wearing earplugs (for personal stereos). They pushed buggies that faced forwards, so they couldn't really speak to the children. Often, they spoke to each other in monosyllabic, 'texting language'; 'Shops?' 'Yeah'; 'Ten?' 'Sure' etc."

Liz Attenborough, Talk To Your Baby Manager, National Literacy Trust

The Times Educational Supplement analysed 350 Ofsted reports; inspectors had concerns about the speaking and listening skills of half of the four and five year olds starting school.

"A lot of primary head teachers say that youngsters appear less well prepared for school than they have ever been before."

David Bell, HMCI for Schools

The Montessori approach to nurturing thinking skills

In the past, people have pictured children's minds as blank slates, or empty bowls, waiting to be written on or filled with the contents of 'education'. Maria Montessori demonstrated that both concepts are inaccurate. The young child's mind is more like that of an acute observer or scientist, eager to learn, explore, try new things and master new skills:

"Human beings are formed slowly. Each of us is 'worked by hand' and each individual is different from every other, having his own distinctive spirit, as if he were a natural work of art. The process takes many years. The inner life of the child is an enigma. The only thing we know about him is that he could be anything, but nobody knows what he will be or what he will do."

"The secret of good teaching is to regard the child's intelligence as a fertile field in which seeds may be sown, to grow under the heat of laming imagination. Our aim therefore is not merely to make the child understand, and still less to force him to memorise, but so to touch his imagination as to enthuse him to his inmost core."

Maria Montessori, 'To Educate the Human Potential'

Montessori - education through movement

Montessori education is essentially an education through movement; all the activities designed for nursery education involve the education of individual senses and individual muscle movements. Many of the multi-sensory, hands-on didactic materials from traditional Montessori early learning areas such as practical life, sensorial language, music, language and mathematics can be easily adapted for use with very young children.

Practical Life for Infants

Babies can participate in caring for themselves by helping with a bath sponge; they can hold their own spoon and practice eating independently; they can play very basic matching games, for example putting socks into a low draw.

Fine Motor Control

Infants love to discover cause and effect by shaking and banging things to make a noise; when the pincer grip develops around nine months of age, a baby can finger feed himself with tiny morsels of food, and practice bringing a tiny lidless cup to his mouth. This is always messy and we must resist the temptation to feed the baby and get the meal over, when baby is at the 'sensitive period' of wanting to do it by himself.

Sensorial Development

All of an infant's senses are functioning at birth; they grow more acute over the years from birth to three. Provide her with rattles, bells, music and lots of singing and talking for listening; mobiles and mirrors for visual stimulation; varied textures and plenty of cuddles for touching.

Toddlers are beginning to discriminate textures, colours and sounds, and so simple matching activities, such as sorting socks of two colours, will help to strengthen early classification skills and have an inbuilt Montessori-type control of error in that the child cannot fail. The trick is not to over stimulate the child, but to encourage limited choice, for example between two flavours of yoghurt.

Toddlers especially love the sensorial experiences of outdoors; sand, water, soil, leaves, snow, sounds of birds, wind and rain and the feeling of the sun or wind on their skin.

Language Development

Babies hear their mother's voices before birth and they listen and watch mouth movements intently from birth. They gain understanding long before they can speak and need to be exposed to language with the adults around them explaining to them what is happening. Adults should assume that babies understand them and not use 'baby talk'. In addition, provide language materials such as books, objects and pictures for naming.

Montessori teaching and learning uniquely offers a whole child approach. The focus of a prepared Montessori early learning environment, whether at home or in a childcare setting, is to promote the development of children's cognitive skills, social skills, emotional growth and physical coordination.

The holistic activities, offered under the guidance of a Montessori parent or teacher, provide babies and young children with imaginative opportunities to enjoy the process of learning as they develop skills, knowledge and understanding and build their unique personalities.

On January 6th 1907, when Dr Maria Montessori was aged thirty-six and an established scientist and academic of distinction, she had a unique opportunity to study the thinking and learning skills of young children in the very first Casa dei Bambini which opened in the tenement at 58 Via dei Marsi in Rome. Dr Montessori developed a method of education and designed specific pieces of learning apparatus to help children, including children who learn differently and who have special learning needs, to develop naturally and individually. Now, in 2004, the principles behind the Montessori educational philosophy are again at the cutting edge of the current UK educational reforms for inclusion and diversity.

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Written by Wendy B. Fidler for the *Montessori International Journal*, August 2004.

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Well connected - the critical influence of parents and caregivers on brain development

Parents have always recognised the newborn's basic need for safety, nourishment, warmth and nurturing. Now science has added stunning

revelations about human development from birth to age three, confirming the critical influence of parents and other adult caregivers.

The importance of the first three years of life lies in the pace at which a child is growing and learning. In no other period do such profound changes occur so rapidly: the newborn grows from a completely dependent being into one who walks, talks, plays and explores. The three-year-old is learning and, perhaps more important, is learning how to learn.

What research tells us

Scientists have now proven, beyond reasonable doubt, what many parents and early childhood educators have believed for years - that loving and nurturing caregivers, along with positive play experiences, significantly affect the brain development of babies and young children.

At birth, a baby's brain contains 100 billion neurons. Few of these neurons are connected at birth. As the child experiences life and makes attachments to parents and carers, the connections among the neurons form. These connections are known as synapses, and the brain's 'wiring' is a complex network of these synapses. Everything you do and say as a parent or carer can help to 'wire' a child's brain - for thinking, feeling, moving and learning.

By about the age of three, the brain has made many more connections than it will ever need. Just as you might cut back the branches from a tree so that the roots grow stronger, the brain gets rid of the connections that are rarely used. This is known as pruning. The brain keeps only the important connections.

In the early years, the child's synapses are formed and reinforced to become permanent connections in the brain. Therefore, stimulating experiences for young children are needed to develop the brain fully, making many of the synaptic connections permanent. If no stimulation occurs, some connections may never be formed.

Scientists tell us that there are times when certain parts of the brain can learn new information more easily than at other times. These times are known as 'windows of opportunity.' Some windows open and then close during the first few years of life. For example, the window of opportunity for motor development is from birth to 24 months, with enhancement opportunities from ages two to five years. After a child reaches five, enhancement ability decreases with age.

Other windows remain open longer, but learning is easier at certain times. These are known as sensitive periods. For example, the first five years are the prime time for learning language. This does not mean that children will know all there is to know about language by the age of five. Learning continues to take place throughout life. Rather, the child is structuring the brain for language, with maximum receptivity up to the age of five and progressive building of brain connections based on stimulation from the environment until adolescence. By that time, the brain structuring for language is nearly complete and learning new language structures becomes arduous - as any learner of a new language in high school will attest.

Support for early learning

The research into early brain development has confirmed how the actual

practice of crawling, handling, looking and communicating builds the neural connections in young brains.

- Once they are independently mobile, older babies and toddlers engage in a great deal of physical play and experience joy in using their skills.
- Practice in physical skills firms up those vital connections in the brain. Children need to be able to move in comfort, with pleasure - and to be safe enough. They do not need to be hurried or bullied into sitting 'nicely' being 'quiet' or told to 'stop fidgeting'.
- Babies and toddlers learn through doing and need plenty of opportunity to use their physical abilities and to apply their ideas. The clear preference of very young children for 'doing it again!' is ideal for their learning.
- Brain connections get made and become firm because very young children have had plenty of hands-on practice. They have been able to experiment with their current skills with varied play materials.

Considerations

Health and nutrition

The health and nutrition of even the youngest baby should always be considered. The need for high-quality foods and a positive sleep and rest plan should go hand in hand with regular visits to a designated health care team. Safety should be considered before introducing the young child to any new area of experience.

Communication

Young children need to realise that your communication with them is driven through care and love. It is not enough to only communicate to pass on knowledge and information; it should be in order to create an intimate bond with each child. This will offer them security and the confidence to respond in a warm and happy way.

Talk, sing and read

Learning to use language is a difficult process, and the more we interact, the more we will support and enable the youngest children to develop his listening, concentration and talking skills. Listening and speaking to him in a positive way will encourage him to initiate conversation, express his feelings and enjoy using his language.

Routines

Having established bonds with an adult the young child should be offered consistency of care and nurturing relationships through the routines of his day. A child thrives in being able to predict his environment without too many 'obstacles.'

Play

Playing with very young children should always be enjoyed in a relaxed, calm manner. While the adult is there to become involved as appropriate, they should never be tempted to dominate, lead or stretch the play.

Touch

Demonstrate your enjoyment through the verbal and body language you use.

Gentle strokes are often more appropriate with very young children. A hand placed on the shoulder of a toddler who is 'busy' lets him know he is being supported and cared for.

Space

No matter how young or small a baby, toddler or young child, they need space to explore. Creating an interesting area to roll, crawl, toddle and explore offers many opportunities for learning to take place.

Cues

Watching and listening to young children and sharing time with them allows the adult to identify the skills a child already has. This in turn allows the adult to select suitable resources and activities. For example, Robert, a child who does not enjoy 'waking up', was placed on a small 'pillow mountain' to allow him to come around in his own time. When ready, he started to use the pillows to gain attention from the adults by hiding items under the pillows. Then other children joined the 'mountain of giggles.' It was obvious that Robert thoroughly enjoyed this experience, so the adult followed this up by asking all staff to bring in pillows for him - with the result that the next day, 48 large pillows wrapped in fabric, jumpers, jeans and skirts appeared. Bells, herbs, spices and so on were hidden inside. Robert had set his own curriculum, which was planned by the staff member and enjoyed by all.

Understanding

Take time to listen to a young child babbling, to allow him to lead you around, to tune in to his communication. Always attempt to identify the object of his communication, as this will help you understand where his is going next.

The way forward

It is important to acknowledge that over-stimulation of the under-threes can be harmful. Early experience does matter; babies and young children really benefit from developmentally appropriate experiences. However, we must recognise what the research into early brain development has not said. There are some serious misunderstandings and misuse of the information, especially coming from the United States, and from commercial sources which are far more interested in marketing resources than in the genuine well-being of young children.

In many ways, the task of early years practitioners is to resist inappropriate pressures over how to plan and spend the days with very young children. Early years practitioners, advisors or college tutors need to highlight what really matters for children's well-being and what will get in the way of learning and even harm them. Under threes, and even more so under-twos, do not need a colour table, shape of the week or topic-based learning. Opportunities to actively explore and experiment with colours and shapes are much more relevant. Avoid any sense of 'fast tracking' the younger children in the setting. They are not getting ready for pre-school. Plan their days and activities around what, and how, they are ready to learn now.

From 'Well Connected', Kevin Kelman and Alice Sharp, *Nursery World*, 9 January 2003

Eye contact detection in humans from birth

***Eye contact detection in humans from birth*, Teresa Farroni, Gergely Csibra, Francesca Simion, and Mark H. Johnson.** Making eye contact is the most powerful mode of establishing a communicative link between humans. During their first year of life, infants learn rapidly that the looking behaviours of others convey significant information. Two experiments were carried out to demonstrate special sensitivity to direct eye contact from birth. The first experiment tested the ability of two to five-day-old newborns to discriminate between direct and averted gaze. In the second experiment, we measured four-month-old infants' brain electric activity to assess neural processing of faces when accompanied by direct (as opposed to averted) eye gaze. The results show that, from birth, human infants prefer to look at faces that engage them in mutual gaze and that, from an early age, healthy babies show enhanced neural processing of direct gaze. The exceptionally early sensitivity to mutual gaze demonstrated in these studies is arguably the major foundation for the later development of social skills.

For more information visit www.pnas.org

(Extracted from the Proceedings of the National Academy of Sciences, 09.07.02)

Proust and the Squid: the story and science of the reading brain **Maryanne Wolf (2008) Icon Books Ltd**

Proust and the Squid is a fascinating study of the science of reading, highlighting how recently, in evolutionary terms, our brains have needed to adapt to allow us to decipher the written word. Reading is described as an unnatural process that has to be learnt by each individual child, in a short space of time, and the book covers linguistics, archaeology, history, literature and neuroscience as well as education to give a full picture of what this study involves. By looking at dyslexia the author is able to highlight different brain developments, and she worries about the future of reading and our thinking processes as the technological age delivers words and information in different ways. The author highlights the importance of an early familiarity with words and books: "Children who begin kindergarten having heard and used thousands of words, whose meanings are already understood, classified, and stored away in their young brains, have the advantage on the playing field of education. Children who never have a story read to them, who never hear words that rhyme, who never imagine fighting with dragons or marrying a prince, have the odds overwhelmingly against them." (p 20)

Supporting young children's sustained shared thinking: an exploration **Marion Dowling, Early Education**

Marion Dowling managed the project that produced these useful training materials and wrote the supporting booklet. The set includes a DVD, 19-page explanatory booklet and an A4 version that can be photocopied. The booklet highlights how alert practitioners can tune into young children's ability to investigate, reason and solve problems. There are also many pointers to how practitioners can behave in ways that will create the opportunities for 'sustained shared thinking' - the practical concept described in the EPPE and REPEY research. The DVD provides five examples of interaction between children and an adult and also between children themselves. The range encompasses an under-threes nursery unit, primary school Foundation Stage unit, a childminder, a nursery school and a Year 1 class.

The resources are intended to be used in training workshops and the booklet

offers brief suggestions for running the sessions. I think they could also work for in-house team development. Marion Dowling offers possible discussion activities, pointers for reflection and questions to stimulate discussion. This valuable resource could really help fine-tune practice to benefit young children. (Review by Jennie Lindon, psychologist and early years consultant, *Nursery World*, 03.08.06)

Why Love Matters: How Affection Shapes a Baby's Brain
Sue Gerhardt (Brunner-Routledge, 2004)

A lively interpretation of the latest findings in neuroscience, psychology, psychoanalysis and biochemistry explains why love is essential to brain development in the early years of life. The author vividly shows how early interactions between babies and their parents have lasting and serious consequences for emotional well being.

Useful websites

www.aimh.org.uk - **The Association for Infant Mental Health** brings together practitioners from a wide field who work with young children and focuses on the mental and emotional health of young children.

www.developingchild.net - **The National Scientific Council on the Developing Child**, based at Harvard University, focuses on the science of early childhood, early brain development and the impact of this on public decision making. Five working papers on brain development are of particular interest. [Read more about the working papers](#)

www.zerotothree.org/ is a nonprofit organization, based in the US, that informs, trains and supports professionals, policymakers and parents in their efforts to improve the lives of infants and toddlers.