

five to thrive

The things you do every day that
help your child's growing brain



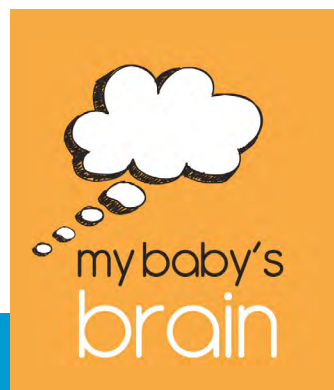
an annotated guide

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about this guide

This booklet accompanies the illustrated 'My Baby's Brain' guide for parents and carers. It includes all the text from the guide, along with note boxes (like those on the right) and a commentary on the theory and research (like the box below).

At full-term birth the average baby brain weighs about 400–500 grams. By one year old, the average brain weighs 800–1000 grams.

Adult brains on average weigh about 1.3–1.5 kilograms.

Brain cell development

There are two types of brain cells, neurons and glia.

Neurons transmit and receive information as electrical impulses. Communication between neurons takes place when these signals cross the gap between the cells by way of chemicals called neurotransmitters.

We have about one hundred billion neurons, and nearly all of them are in place at birth, but with very few connections in place between these cells. The brain is formed, but it is not yet functioning.

When experiences are repeated, pathways develop in the brain as the neurons that are communicating with each other to create the experience become firmly connected.

Glia are even more numerous than neurons, helping to form the architecture of the brain. Glia provide support and nourishment for neurons.

One type of glial cell gradually enables established pathways in the brain to work more efficiently by producing a fatty sheath called myelin that coats the axon – the main body of the neuron – to enable the electrical impulse to pass much more quickly. Other glial cells destroy and remove dead neurons, cleaning up the brain as it changes and grows.

As adults interact with babies, the neurons the child is using grow strong and work quickly, developing pathways in response to the interaction. These pathways then become coated with myelin forming stable structures. So the things that adults do as they soothe and stimulate the baby shape the growing brain.

Neurons that are not used die away. So the things that adults *don't* do (whether through choice or lack of capacity) also shape the brain, with unused possibilities being pruned away.



Further resources are available at
www.hertsdirect.org/mybabysbrain

Childhood Support Services
Because childhood matters

The brain is amazing...

In the first year of life the brain doubles in size. By the first birthday the brain is two thirds the size of an adult brain. If babies grew in height like this, they could be four feet tall when they were one year old!

The brain is not like any other part of the body. Nearly all the cells of the brain are in place when we are born – about a hundred billion of them. But they are not yet working. The brain grows when connections are made between the cells in response to what is happening to us. These connections are forming all the time all through our lives. What happens to us shapes our brains.

In the first three years of life the brain is growing and changing faster than it ever will again. At times during the first year of life a million connections are forming every single second in your baby's brain.

So what happens to your baby shapes their brain. And the most important thing that happens to your baby is you! Everything you do when you are with your baby sparks connections in their brain, turning connections into pathways that the child can use again.

five to thrive

Your child's body grows better when you give the child good food. Your child's brain grows better when you do five simple things that feed the growing brain:

Respond • **Cuddle** • **Relax** • **Play** • **Talk**

These are your child's daily 'five to thrive' – the building blocks for a healthy brain. A healthy brain will help your child be happy in themselves, make friends and enjoy their family, as well as being the best start for learning once they go to school. And every day will bring many opportunities to give your baby's brain what it needs to grow well.



My brain grows better when you respond to me...

“ From the moment I was born I needed you. If you hadn’t made sure I was looked after I would not have survived. I couldn’t do much, but everything I did, the sounds and the movements I made, were for you. I was asking you to respond to me so that I could live.

I feel very scared if I get no response from you. When you look at me with love in your eyes I feel safe. Your voice helps me to feel safe. Being close to you helps me to feel safe.

When you look at me I am interested in your face, and I look at you. This helps my eyes to work together. My brain builds connections for looking at other people and understanding them.

When you copy the expression on my face, this helps me to understand what I am feeling. Then I copy you, and this builds connections in my brain for understanding and managing my feelings.

When you move I copy your movements. This helps my brain to grow connections that make it possible for me to manage my own body, and to use my body to communicate with other people.

My brain works very slowly at first. But when you respond to me in the same way over and over again the connections you are helping to build grow strong. Then they can carry messages between the different parts of my brain much more quickly.”

some suggestions

- Try to guess what your baby’s crying means and meet their basic needs – warmth and comfort, food, a clean nappy, sleep.
- Copy the sounds or facial expressions your baby makes and see how they react.
- Help your baby to see something if they show you they want to look at it.
- Pass your baby objects they are interested in (if they are safe), especially if they are brightly coloured or have interesting shapes, textures or sounds.

remember

- Everyone takes time to learn how their baby communicates.
- Crying doesn’t always mean your baby is ‘upset’. It’s the only noise they know how to make to get your attention. Sometimes they may just be singing or talking to you!
- When your baby has your full attention, their whole brain is working. When you are watching TV, texting or talking on the phone, they don’t get this benefit.
- As children get older they begin to sort out their own problems as well as asking you for help. So sometimes ‘wait and see’ is a good response for older children.



Attachment theory

John Bowlby's theory of attachment is the most integrative theory of child development available to us. Attachment is a survival mechanism to ensure the protection and survival of the otherwise helpless child. The baby produces and then uses attachment behaviours that engage their parent; the baby is then in control of, and absolutely dependent upon, the parent.

Two key processes take place in the interaction between the parent and the baby that contribute to brain development: soothing and stimulation. These processes change the body chemistry of the baby, having a direct impact on the developing brain.

Across the first three years of life the attachment process can be seen as having five key steps that shape the baby brain:

- claiming
- physical attunement
- emotional attunement
- pre-cognitive patterning
- regulatory patterning

Baby brains process information about sixteen times more slowly than adult brains. This is why it takes time for the baby to respond to stimulation.

Claiming and attunement

In the first weeks of life, the deepest and most primitive areas of the brain are developing. These parts of the brain will control all the basic functions of the body such as sleeping and waking, appetite, and temperature control. When the parent responds to the baby's attachment behaviours such as crying, back-arching, and chaotic arm and leg movements the baby feels safe. Stress hormones have an adverse effect on this early brain development.

Interaction that matches the needs of the baby produces pleasure hormones in the parent such as oxytocin and endorphins. Close physical contact between the parent and the baby then triggers production of pleasure hormones in the baby. These hormones provide the best possible environment for brain growth.

A mnemonic for the processes of claiming is ABCD:

- attention
- bonding
- control
- dependency

To survive, babies must gain the attention of their parents. Parents and babies bond together through scent, taste, touch, sound and parental gaze. To feel safe, babies must gain control of their parents so that they can feel safe. However, once the baby does feel safe this need to control will be replaced by a healthy dependency.

Responding is the beginning of 'mind-mindedness' or 'mindfulness', the ability to give attention to the young child as a creative mind with an inner world of their own. Mindfulness is one of the key attributes of parenting for developing infant mental health.

respond

My brain grows better when you cuddle me...

“ Before I was born I was more aware of touch than of any other sense, and I was safely held in a small space. Now I can move freely, but I still feel most safe when I am in contact with a grown up who loves me.

Feeling safe with you fills my body with special chemicals that help my brain to grow. The patterns that grow in my brain when you cuddle me will mean that all my life I will be able to feel safe with safe people.

When I am close to you my body begins to work in tune with yours. When you feel excited or stressed your heart beats faster and so does mine. When you feel calm or happy your heart beats slower, and so does mine. Connections are building in my brain that will make it possible for me to control my body one day.

Remember that my brain works more slowly than yours, so I need time to notice what is happening and respond to it.”

some suggestions

- Cuddle your baby as often as you like – babies can't have too much contact.
- Respect the space of infants as they grow older. There may be times when they don't want a cuddle but you should try to find other ways to provide reassuring contact.
- Use different kinds of touching. Massage and stroking, tickling, hair-brushing and finger games (like 'Round and round the garden') are all good for your baby's brain.
- Use gentle circular rubbing of the stomach to help a baby with wind or constipation.

remember

- Babies need touch that soothes (cuddles) and touch that stimulates (tickles).
- Some very young babies (especially if they are small at birth) may sleep too much – gentle stroking or finger-play can encourage them to wake and feed.
- As well as cuddling, it is good to put your baby down to experience time on their own – this is the start of learning how to be independent.



The importance of touch

All sorts of touch can be included in the concept of 'cuddle'. Stroking, patting, holding, feeding, hair care, nail care, massage, being carried, holding hands, and many more interactions involving physical contact are vital in building the relationship between the parent and the child.

Physical contact is essential for healthy brain development, and the second step of the attachment process is physical attunement, in which the bodies of the baby and the parent begin to work together in harmony, with the physiology of each changing to match the other.

For example, when stressed the baby cries. When the baby cries, the adult becomes stressed. The parent then tends to the baby, removing the source of the stress if possible (feeding, changing nappy, changing position, and so on). But crucially the parent will also soothe the baby, rocking, patting or stroking, making soothing sounds.

When the adult soothes the baby the most important thing that happens is that the adult's own state of stress reduces. Heart rate, blood pressure, breathing and muscle tone all return to a calm state, and the attuned baby physically follows suit. This baby is gaining a pattern in the brain linking together soothing activity and physical relaxation, which is the basis of stress regulation for life.

Physical attunement quickly begins to have an impact on other aspects of brain development, especially the right brain which controls emotions and social interaction. Babies are not aware of feelings, they just feel. When the parent shares the feeling and reflects it back to the baby, only then does the baby become aware of having a feeling. So emotional attunement quickly follows physical attunement.

Most human females cradle their infants on the left side of the body. This tendency is independent of handedness, and is widespread in all cultures. It means that the baby has maximum exposure to the maternal heartbeat. It may also allow enhanced affective communication from the baby via the left eye and ear to the right brain of the mother, producing direct right-brain to right-brain communication.

Parental gaze and emotional attunement

Eye contact is stimulant, and babies right from birth will be looking for eye contact. When their parents gaze at them the baby knows that they are safely being claimed. Soon this hunger for eye contact turns into interest in what faces do. And one vital thing faces do is to express feelings.

Just as the baby imitates the movements of the parents in establishing physical attunement, they imitate the facial expressions of the parent in establishing emotional attunement. The slower pace of the baby brain means that parents need to wait patiently for this imitation to occur.

So the parent imitates and exaggerates the expressions on the face of the baby, and the baby, by in turn imitating the expression of the parent, comes to grasp their own emotional experience.

These interactions also reinforce behaviours in the baby such as smiling and making sounds, which vastly increase the ways in which the baby can communicate. The baby begins to move from **aversive attachment behaviours** such as crying (which engage the parents in order to get the baby to stop it) to **attractive attachment behaviours** such as smiling (which engage the parent because the behaviour gives pleasure).

My brain grows better when you relax with me...

“ When I was born I had no way to calm myself down or to manage my own reactions. When we are stressed our bodies are full of chemicals that make us active so that we can deal with whatever is upsetting us. These chemicals can be bad for the brain if we can't get the stress under control.

So when I feel stressed I need you to help me. My body works in tune with yours. When I am stressed I need you to calm down!

I know that having a baby is stressful. But if you can find ways to relax when you are with me, you can make a big difference to the way my brain works.

When you relax your heartbeat slows down – and so does mine. Your breathing slows down – and so does mine. Your blood pressure drops – and so does mine. Your muscles relax – and so do mine. Then you feel calm and comfortable, and so do I. That calm relaxed feeling fills my body with chemicals that help my brain to grow.

Just remember that my brain works more slowly than yours, so it may take some time for me to respond.”

some suggestions

- Try to end exciting play or activity sessions with a wind-down time in which you and your baby can enjoy a few moments of calm.
- Think about what makes a relaxing space for your baby to be in – soft lighting, warmth and gentle sounds all help.
- Sing or hum if you or your baby are getting stressed – this will help you relax and is very soothing for your baby. Singing is better than shouting!
- Try to have some time when you are just focused on the warmth, sounds, sights and smells of your baby, not on things you need to get done, or on people or events that have made you upset or angry.
- Find some of your own time to do the special things that help you relax – you have to look after yourself if you want to look after your baby.
- Relax into being a parent – the experience can be unfamiliar, scary or leave you feeling guilty or stressed, but all parents have had to learn the hard way.

remember

- A baby that has become over-tired and over-stimulated may need particular help to wind down. A close cuddle, rhythmic rocking and persistent Ssh-ing in a dark environment will sometimes ‘reset’ an over-stimulated baby brain.



Stress and brain development

Stress hormones such as adrenaline and cortisol can injure the human brain. Under the impact of unregulated stress, these excessive hormones change blood supply to key areas of the brain such as those that control language and the self-regulation of mood and impulse. This is the organic explanation for the survival mechanism of fight or flight, in which brain functions that slow down response times (such as thinking) are switched off.

If excessive stress is toxic to the adult human brain, it is much more toxic to the rapidly developing brain of a baby. Yet human babies are not born able to self-regulate stress. They must acquire this ability through attunement to at least one adult who can self-regulate their own stress. As the adult relaxes the attuned baby also relaxes, and this builds patterns in the brain enabling the child to begin to self-regulate.

So relaxation is a vital activity for parents. Relaxation techniques can be learned, and learning to relax in the presence of the child is a key skill for all parents.

When relaxation is impossible for a parent, perhaps because they are experiencing a mental disorder such as depression or post-traumatic stress disorder, then they can help their baby's brain development by making sure that the baby does have access to at least one reliable adult who can relax with the child.

Like all these brain-building activities, relaxation in the parent can involve both soothing and stimulation. Sometimes when a child is in an agitated state they can only be soothed by the parent matching the level of stimulus so that the child re-attunes to the parent. Then when the parent relaxes the child is able to relax with them.

Using saliva swab tests, scientists have been able to measure toxic levels of the stress hormone cortisol in distraught babies whose cries elicit no response from parent or carer.

The cycle of attunement

This may sound like a paradox, but as Allan Schore shows, healthy brain development requires both attunement and misattunement. The baby develops self-regulation through a rhythmic cycle of attunement, which soothes the child, and misattunement, which agitates the child and causes them to initiate re-attunement. In this way the young child develops resilience, becoming able to handle stress and to find change interesting.

This misattunement and re-attunement is also the way that children become able to manage their own impulses. When they do something unacceptable the parent shows them through facial expression and tone of voice that they have made a mistake. The child experiences a moment of shame as a result of this brief misattunement. But re-attunement enables the child to build a brain pattern for managing shame and for learning from mistakes.

This is the origin of the capacity for social learning, and for recognising social cues. It is regulatory patterning, providing the child with the ability to self-regulate impulses and shame.

relax

My brain grows better when you play with me...

“ I need you to soothe me when I’m upset, but I also need you to make life interesting for me. Toys are great, but the best toy in the world for me is... you!

When you stick your tongue out at me I copy you, and connections build in my brain linking together controlling my tongue and communicating. That will help me learn to speak.

When you pull faces at me I copy you, and connections in my brain make links between the expression on my face and communicating. That will help me to understand feelings.

When you play counting games, or singing games, or action games, my brain builds connections that help me to make sense of the world around me and to have fun.

As I get older, playing with me and helping me to play on my own or with other children builds connections in my brain that make it possible for me to think and plan, to make sense of the world around me, and to develop social skills.

And whenever I smile and you smile back at me I feel happy. Happiness fills my body with chemicals that help my brain to grow.”

some suggestions

- Follow your child’s lead – if you join in their game, you are telling them that their ideas and decisions are important.
- Try to ensure you spend some time outside every day. The outside world is full of interesting, exciting things for your baby, and being able to look across long distances is very important in helping their developing vision.
- Get down on the floor for creative play – with models, dolls, blocks or just pieces of paper.
- Explore shapes, colours and textures with your child. You could look at picture books together, or make simple toys and pictures with pens, paper, fabric, etc.
- Encourage your growing child to play pretending games. Who will they be? Where will they go? What will they do there?

remember

- Play works best when you are on the same level as your child – on the floor together, sitting together at a table, etc.
- As your child grows older they will need more time to play by themselves and invent their own games – but they will always love to have some special time with you.



The importance of play

At every opportunity during the day when a young child needs stimulation, play can provide it. For young babies this can include wakeful times after feeding, during and after nappy changes, and at any time when the baby is actively seeking stimulation. Older children thrive on play, and love it when parents are playful without being intrusive.

Play can also be used for soothing, especially by stepping down from high-stimulus interaction through gentle play to full relaxation.

- Play involving facial expressions builds brain patterns for recognising feelings in self and others. As the adult follows the lead of the baby, and then alternates leading and following in copying facial expressions and accompanying gestures, this also develops turn-taking and the ability to take part in conversations.
- Tongue play (wiggling the tongue, blowing raspberries, and so on) builds brain patterns linking together tongue control, human communication and pleasure. This is pre-speech, making the baby more ready to develop speech and language.
- Physical play builds motor brain function. This can include finger play, hand play, balancing games, dancing, crawling, jumping, running, ball play, skipping, and climbing.
- Matching, counting, hiding, and giving-and-taking games all build pre-cognitive patterns in the brain. These patterns will underpin later cognitive function, so that the child will be able to think more effectively.

Research shows that face play induces neurotrophins in the baby, which activate growth of dopamine neurons, and dopamine promotes cortical growth. In addition such play produces reciprocated activation of the opiate systems in both adult and baby with elevated levels of beta endorphins – in other words, it is pleasurable for baby and adult.

Resources for play

It is very important that play is not confused with having toys. All sorts of ordinary objects can be used in play. And most importantly, play involves interaction between people.

Resources for play can include, for example:

- toys, books, musical instruments, puzzles,
- everyday objects in the indoor environment, such as pans, wooden spoons, cloths (for playing peep-bo or tug-of-war games)
- everyday objects in the outdoor environment such as sticks, stones, leaves, shells, flowers, and so on

My brain grows better when you talk to me...

“ I love the sound of your voice. I could hear well even before I was born, and when I was first born I already recognised the voices of the people I live with. I love it when you talk, when you make nonsense noises, and when you sing. I get frightened if there is too much shouting or arguing.

When you talk to me I copy you. At first I can only make a few sounds, but the more you talk to me the more I can make sounds into words. I need you to tell me everything right from the start. I know nothing, so everything I learn in my life will be built on what you are teaching me now.

I need you to listen to me as well. Remember that my brain works more slowly than yours, so it will take me time to respond when you speak to me. When I make sounds to you, it really helps the connections in my brain if you look straight at me and copy the sounds back to me. Then I know you are listening to me, which makes me feel I matter.

As I get older, take notice of what I am trying to say to you. Help me to tell you how I feel, so that I learn to manage my feelings by talking about them.

Reading is a great way to talk to me. Looking at a book together helps me to focus my eyes, to concentrate, and to think in a logical way. I can enjoy looking at a book with you right from the start of my life. And helping me to be interested in books and reading gives me a good start for learning through all my life.”

some suggestions

- Start by copying your baby's sounds and generating new ones (from 'Ma ma ma' to 'Ga ga ga'). The first talking doesn't have any words.
- Use as many rhymes, poems or songs as you can – to your baby you are the world's greatest singer!
- Read to your baby regularly, even when they are very young. Simple rhymes and rhythms will hold their attention.
- Talk to your baby about what they are experiencing. “Can you feel the soft toy?” “Did you see the cat?” “You're enjoying your milk this morning.”
- Provide a running commentary on your own life. Tell your baby about colours, count the steps you climb or the socks and towels as you do the washing.
- Keep your 'sharp' voice for when you are warning a baby about something dangerous.

remember

- Any words will help to build your baby's brain. Pop songs, a shopping list or the writing on the cereal packet are more meaningful than Shakespeare to young children.



Research shows that children's language development by age two is the single most reliable indicator of later success, and that this is directly linked to the words a child hears. Children from homes providing a positive learning environment are likely to have heard on average 45 million words by the age of four. Children from homes providing a poorer learning environment are likely to have heard 13 million words in the same period. These differences are highly persistent in patterns of attainment throughout childhood.

The importance of communication

All sorts of verbal communication can be included in the category of 'talking'. Talking builds brain patterns for language development, cognitive function and social interaction.

Words are therefore vital to the child's pre-cognitive patterning. Strengthening the language centres of the brain also improves self-regulation, as feelings are processed through expressing them in language.

Listening is also a vital part of verbal communication. Parents listen to the baby, and then echo the sounds the baby is making, which reinforces the development of meaningful speech. Being listened to with interest also creates brain patterns for self-worth and self-esteem, which further reinforce the capacity for self-regulation.

Reading with young children provides a great opportunity for talking and listening, as well as promoting physical contact and developing interest in the written word.

Singing is also a wonderful way to communicate words to a baby. And if the parents are becoming stressed they can be encouraged to switch from talking to singing, which may relax them and will reduce the stress in their voice as they communicate with the child.

Different modes of communication

Different ways of using words at different times or on different occasions can help the baby build pre-cognitive brain patterns such as internal awareness of time, cause and effect, or distinguishing between fact and fantasy. For example

- songs at bedtime
- poems at settling down times
- encouraging or upbeat tones of voice to get energy levels going after periods of sleep
- special tones of voice or special words used when things go wrong
- stories and make-believe narratives

Parents can be encouraged to notice how a child responds differently to different voices (male or female, older or younger, loud or soft), and how they respond to the same voice used differently (talking or singing, higher or lower, louder or softer).

useful resources

Below is a selection of resources that may be helpful to you. Some of them you can access locally; others are available free online; books and DVDs may be available via the library service. Please note that the list is not exhaustive, but should provide a useful starting point.

If you want help to access these resources or to find anything else that would be useful as you look after your baby, please talk to your local children's centre.

Local resources

BookStart – Provide a Baby Pack, with two board books for you to share with your baby, or the BookStart Treasure Chest for older children (3-4 years)

Baby Rhyme Time and **Story Time** – These parent and baby sessions take place in local libraries and children's centres and are a great way for you to learn some simple rhymes, songs and stories to share with your child

Every Child A Talker – A national project to develop the language and communication of children from birth to five, which has been rolled out in every children's centre in Hertfordshire

Peers Early Education Partnership – Sessions run at some (not all) children's centres where parents can share experiences and support one another

Start for Life – Free information and support to help you provide the best nutrition and exercise for your child

Online resources

My Baby's Brain – Hertfordshire Council site with resources for practitioners and parents:
www.hertsdirect.org/mybabysbrain

Families in the Foundation Years – National site with useful information, videos and links:
www.foundationyears.org.uk/parents

iCan – Charity that provides lots of resources on communicating with your baby:
www.ican.org.uk

Small Talk – A free book (available online) which can help you learn to talk to your baby:
www.hello.org.uk/resources/resources/resources-for-parents/smalltalk.aspx

Talk To Your Baby – Public website with free leaflets on communicating with young children:
www.literacytrust.org.uk/talk_to_your_baby

Books and DVDs

The Wonder Year (DVD) – An enchanting film showing the first year of a baby’s life and how the brain develops (*Siren Films*)

What Every Parent Needs To Know – An accessible and comprehensive guide to child development and psychology (*Margot Sunderland, 2007*)

Your Baby and Child – Another great introduction to brain development for parents (*Penelope Leach, 2010*)

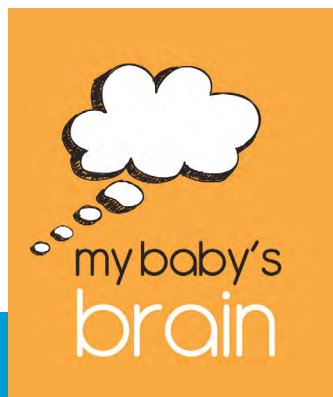
... and for practitioners and professionals

Affect Regulation and the Origin of the Self – The hard science behind the process of attunement (*Allan Schore, 1999*)

Attachment Across the Lifecourse: A brief introduction – An important book from one of the most influential thinkers on attachment in the UK, giving vital insight into the lifetime impact of early experience (*David Howe, 2011*)

Attachment, Trauma and Resilience – A moving look at how brain development and brain injury link to challenging behaviour in vulnerable children and young people (*Kate Cairns, 2002*)

Principles of Attachment-Focused Parenting – A pioneer of attachment-based therapy, Dan Hughes recent work offers both inspiration and practical ideas for everyday work with



A Hertfordshire County Council project in partnership with Kate Cairns Associates