Second Edition

The THINKING CHILD

Brain-based Learning for the Early Years Foundation Stage

Nicola Call
with Sally Featherstone

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The Thinking Child

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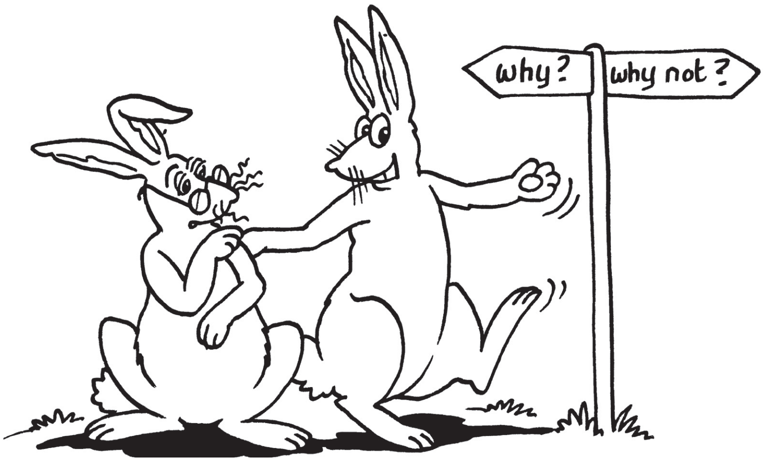

Some men see things as they are and ask why.
Others dream things that never were and ask why not.

George Bernard Shaw

Contents

Preface

The Thinking Child is organized according to the principles of brain-based learning. It is divided into an Introduction and then Parts One to Four, which are divided into shorter chapters. Each of these parts is prefaced with a Big Picture, which gives an overview of the contents, and ends with a ‘plenary’, which suggests some points for reflection.

For the sake of simplification, children are referred to throughout the book as ‘he’ or ‘she’, and practitioners as ‘she’, except where a specific example is being given.

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Understanding the child's brain

The Big Picture

In this section you will:

Step 1: Read the answers to some 'frequently asked questions' about brain-based learning

Step 2: Visit a pre-school, a nursery class and a reception class where the practitioners work using brain-based learning techniques

Step 3: Meet four young children in these three settings, who will become quite familiar to you as you read on through the book

Step 1: Answering some frequently asked questions

What exactly is 'brain-based learning'?
'Brain-based learning' is a term used to describe how to apply theories about the brain to help children to maximize their potential for learning. Once you understand the theory behind brain-based learning, you can put its various aspects into practice and enhance the learning of the children in your care.

Is this a scheme that means that I have to start to work more formally with the children in my setting?
Absolutely not! *The Thinking Child* is not a scheme or a curriculum. This book simply offers a method of working that derives from an understanding of the current research

into how the brain develops. We know that young children learn best through play, and the techniques that are described in this book should be incorporated into the work done in the Early Years Foundation Stage (EYFS).

Will I need additional resources to implement these strategies in my setting?
You should not need to make any major purchases to implement the techniques that are described in this book. Most of your work will simply involve being creative with the resources that are already available.

Will implementing these techniques increase my workload?
Using these techniques will probably involve different work, but not necessarily more work. Understanding the new evidence about how children learn should lead to a more informed way of teaching. In fact, because you will be enhancing the learning of the children in your setting, the same time commitment should lead to far greater productivity.

If I implement these strategies, will it necessitate major changes of policy within my setting?
Implementing the techniques in this book should not necessitate any additional paperwork or radical alteration of current policies. Practitioners find that once they gain a better understanding of the brain and how it works, they may need to reconsider and improve upon some of their ways of working, but this does not necessitate major policy changes in most cases, nor should it necessitate deviation from current curriculum guidance.

How do these learning techniques fit in with the Primary Strategy for Literacy and Numeracy?
Different practitioners implement the Primary Strategy for Literacy and Numeracy according to their individual situations. In Part Two we discuss how to structure the more formal sessions, but brain-based principles, such as using movement, music, and visual, auditory and kinesthetic learning, apply equally to the formal and less formal sessions.

Are these ideas appropriate for all settings and schools?
Having a better understanding of the most up-to-date evidence about how children learn will help a childminder improve on her practice just as much as the headteacher of a large nursery school, or a practitioner in a Children's Centre or extended provision. The methods described in this book are equally applicable to any child in any setting.

How do these techniques fit in with the demands upon practitioners, such as the EYFS Guidance and Every Child Matters?
Because these techniques are all derived from the latest understanding of child development and brain research, they do not need to be adapted or tailored to keep up with the demands of current legislation. Instead, they should underscore all the work that you do, meaning that you can respond more effectively to new challenges as they arise.

Is this just the latest educational fad?
Brain-based learning is not a 'fad'. This is not to say that there have not been some fads emerge as the concept of brain-based learning became better known, but these faddish trends should not negate the importance of understanding the latest evidence of how children learn. In this book, you will find descriptions of the current research into how the brain functions, along with suggestions of techniques that will help to maximize children's learning. It is simply not possible to learn in a way that is not brain-based!

Step 2: Let's meet a brain

> To have a good brain, first you have to exercise and then you must eat lots of apples.

Owen, aged five

In this chapter we are going to meet a human brain and learn a little about how it works. In other words, we're going to get the hard bit over first – but don't let this put you off! The intent is simply to provide a very basic overview of the major components of the human brain. Later, we will use this information as a reference point, allowing us to more easily visualize what is happening inside the minds of children as they undergo the enriching, brain-based learning experiences described in this book.

> *When it comes to building the human brain, nature supplies the construction materials and nurture serves as the architect that puts them together.*

Ronald Kotulak[1]

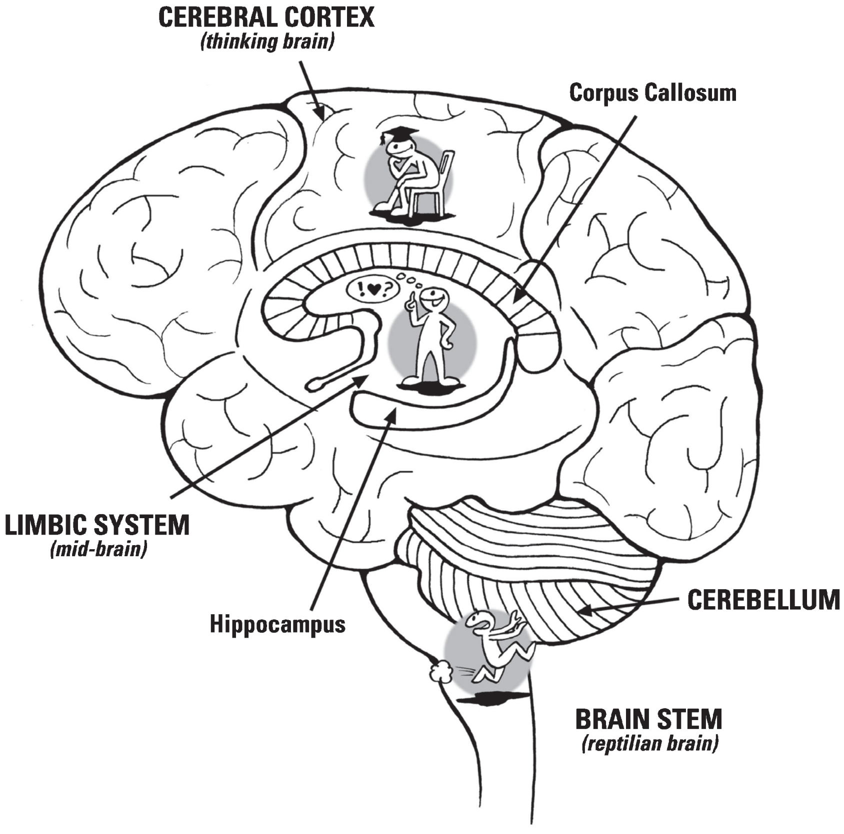
Over the years, experts have developed numerous theories about the nature of intelligence and its relationship with two powerful and sometimes conflicting forces: nurture and nature. Recently, researchers have made more progress than ever before, and the mysteries of intelligence have begun to unravel. For instance, scientists have now managed to count the numbers of brain cells within specific areas of the brain and can calculate the phenomenal number of interconnections that are made as these cells communicate with one another. Scientists now have technology that allows them to look deep inside the living, functioning brain and observe electro-chemical activity as thoughts and emotions are developed and processed. As the mysteries of the brain are unravelling, many long-held theories are being disproved and new ones developed.

What is becoming increasingly clear is that the first few years of life are the most critical in terms of physical brain development. The most significant period for the wiring of the brain is during these years. Typically, this process is nearly complete by the age of 12. We now know that there are various windows of opportunity for learning between birth and the age of three or four, but that nature gives a child's brain a second chance between the ages of about four and 12. This means that an enormous responsibility lies in the hands of parents and early years practitioners.

At the micro level, the human brain consists of about one hundred billion nerve cells, called *neurons*. These neurons can be thought of as very simple data processors, which work together to solve a particular problem as it is presented to the brain. The human brain is able to easily perform tasks that the largest, most expensive computers today find impossible to accomplish. Some everyday examples of these tasks include understanding spoken human language, identifying objects by sight, sound, smell, touch and taste, and writing and understanding literature. Whereas computer processors typically attack problems sequentially, one piece at a time, the power of the human brain lies in its ability to orchestrate the activities of billions of individual neurons working together. The human brain can be likened to a symphony conductor.

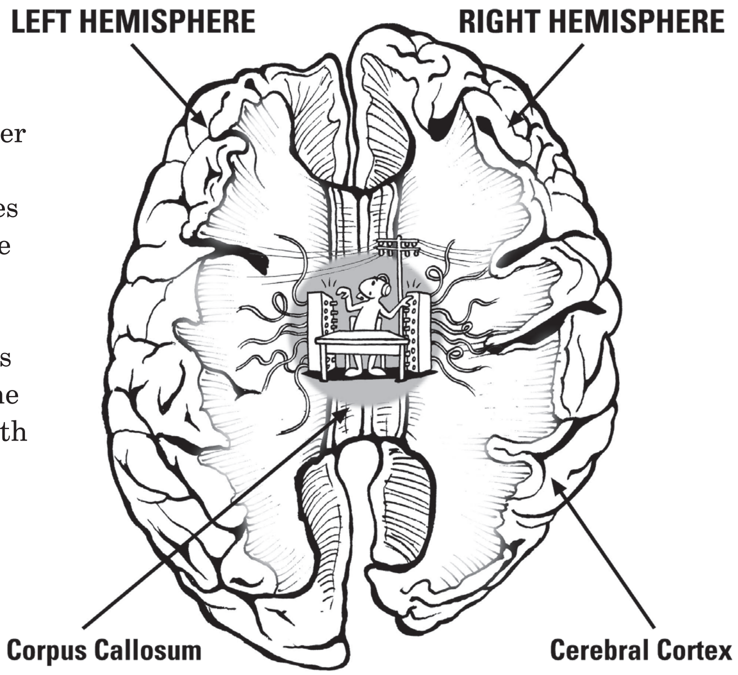
Neurons develop *axons* for transmitting information to other neurons and *dendrites* for receiving information. As patterns of thought are first initiated and subsequently repeated, the participating neurons continually process and communicate. In doing so, they build stronger and more direct axon-to-dendrite pathways – called *synapses* – to other neurons. In other words, with repeated stimulation, these connections become ever stronger and more established, and the brain has in effect 'learned' how to solve that particular problem. At this point, the brain is ready to undertake further learning. Interestingly, those neurons that do not generate synapses quite literally die off.

At the macro level, the brain can be thought of in three parts: the *brain stem*, the *limbic system* and the *cerebral cortex.* These parts of the brain are divided again into specific areas, each with an individual and complex role to play. Some areas process information gleaned from the senses, while others process different aspects of our emotional responses. Some are responsible for laying down certain types of memory, while others help us to 'read' cues from other people and make appropriate emotional and physical responses.



The brain stem is physically the lower part of the brain, which connects to the spinal cord. The brain stem and cerebellum are often referred to as 'the reptilian brain'. This part of the brain is primarily responsible for the body's survival systems: for regulating our life support mechanisms such as heart rate and breathing, and for what is known as the 'flight or fight' response to perceived danger. Under stress, our basic survival instincts kick in and we produce chemicals that put the body under heightened alert. During these times of stress, higher order thinking becomes derailed, and learning cannot take place effectively. It is for this reason that ideal learning environments are those that reduce a child's stress level to its absolute minimum.

Between the brain stem and the cerebral cortex is the limbic system. This is sometimes referred to as the *mid-brain.* The limbic system consists of several structures that manage our emotions and are responsible for some aspects of memory. The lower structures of the limbic system control our more basic emotional responses, while the higher ones



are responsible for making a more intellectual response. For example, if you were to hear an unfair criticism of your work, the lower areas of the limbic system would deal with your more spontaneous responses such as blushing or shaking, while the higher areas would process the social issues that might help you to make a measured response to your critic. This makes sense, as the higher parts of the limbic system are in closer contact with the cerebral cortex, where the most sophisticated thought processes take place.

The cerebral cortex is the largest part of the brain. It is sometimes referred to as 'the thinking brain'. The cerebral cortex is physically separated into two hemispheres, rather like two halves of a walnut. Scientists are constantly discovering more about the left–right relationship and the very specific roles that each area undertakes. Often new information about the different hemispheres is discovered through studies of people who have suffered brain damage. For example, researcher Tatiana Schnur from Rice University in Texas studied a group of healthy people alongside a group who had suffered strokes.[2] She wanted to know more about the process that occurs when we choose one word above another – for example, selecting the word 'warm' to describe the temperature of water. If we were to say the word 'wet' instead of 'warm', we would not convey the correct meaning, even though the word 'wet' can pertain to water. Many stroke patients encounter difficulties with word selection, and are described as 'Broca's aphasics'. Schnur found that successful decision-making when choosing words depended upon the health of the left inferior frontal gyrus, where Broca's area is located. When that area of the brain is damaged, the patient cannot make efficient choices about word usage. Other aspects of language processing happen in different areas of the brain, and nothing happens in complete isolation. We are complex creatures, and in order for us to function normally, each part of each hemisphere needs to do its own job and the two hemispheres need to communicate effectively through the *corpus callosum,* which is like a super-highway through which messages travel.

In recent years, pop culture has created the concept of 'left-brain learners' and 'right-brain learners', as if individuals can be categorized according to the side of their brain that supposedly dominates their thinking. This is a gross oversimplification. Nobody is a 'leftie' or 'rightie' when it comes to brain use. It would be very foolish of us to try to categorize children before we even know if they are left or right handed, especially as the notion of brain-handedness is nonsense! While everyone has strengths and weaknesses and learning preferences, each area of each person's brain is used for many different and very specific functions. As they interact with each other, they are performing something like an incredibly elaborate and complex dance, which scientists are only just beginning to understand. Nobody's brain performs this 'dance' in only one hemisphere, and so if asked what sort of brain you have, you can answer very confidently that your brain is ambidextrous.

Throughout this book you will find references to various parts of the brain along with explanations of research that supports the theory behind brain-based learning techniques. What is perhaps startling is the fact that altering a child's environment and breadth of experiences can actually make a radical difference to his or her IQ level at a later age:

> *Within a broad range set by one's genes, there is now increasing understanding that the environment can affect where you are within that range. . . . You can't make a 70 IQ person into a 120 IQ person, but you can change their IQ measure in different ways, perhaps as much as 20 points up or down, based on their environment.*

Frederick Goodwin[3]

As we become more informed about the functioning and capability of the brain, we can become increasingly effective in helping children to learn. Scientists are helping to inform our practice more now than ever before. It is an exciting time to be involved with the learning of young children, and the adventure is only just beginning.

Step 3: Meeting the children in their settings

Arriving at the setting

> *We teachers can only help the work going on, as servants wait upon a master.*

Maria Montessori[4]

Today we are going to spend some time in an early years setting where the staff have been using brain-based learning techniques for several years. This setting consists of a pre-school situated in the church hall, and a nursery and reception class in the school next door. The practitioners here enjoy a strong relationship and work to ensure good continuity and progression. We will meet four children: George, who attends the pre-school, Carrie, who