In a recent study by Civitas, Zero to Three and BRIO, **1** in **5** future parents and **1** in **5** non-parents believe parents cannot impact a child's brain development until he is one-year-old or more. *Not true.* There is enormous development during that first year.

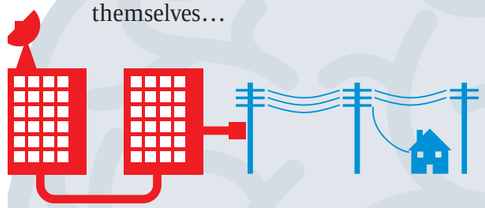
The brain is so malleable in the first years of life that young children with epilepsy who have had an entire hemisphere surgically removed can still mature into highly functional adults with intensive therapy.

Genes influence behavioral development in the areas of IQ, specific cognitive abilities, academic achievement, mental retardation, personality factors, schizophrenia, affective disorders, delinquent and criminal behavior, and alcoholism.

As a way to understand the difference between **nature** and **nurture,** with regard to your child's brain, imagine the construction of a telephone network:

genes

(the **nature** part) are like engineers who select and develop the different parts of the system—the relay stations, the big trunk lines between relay stations, and the phones themselves…



experience

(the **nurture** part) is like the person from the phone company who fine tunes the wiring between the telephone poles and each individual household. **Experience** monitors that wiring to make sure it works and adapts to any changes that are needed.

It's easy to see that you need both parts for the system to work.

Does experience change the actual structure of the brain?

Yes. Brain development **depends on how and how much the brain is used.** The way that each circuit in the brain—sensory, motor, emotional, cognitive—is put together is shaped by the electrical activity in them. But these circuits are not fixed structures (as they are in a computer).

Use it or lose it

Every experience excites certain neural circuits and leaves others inactive. **Those circuits that are consistently excited by experience (positive or negative) are strengthened, while the others that are not stimulated are weakened.**

In the words of some neuroscientists, **"cells that fire together, wire together."**

A young child expands her ability to absorb and understand new information as she grows and interacts with people and her world. One way that this happens is through **dendritic growth** in her brain. Dendrites are filaments that branch out from the body of a brain cell. They recieve electrical signals from other brain cells. According to Peter Huttenlocher, a neurologist at the University of Chicago, there are two phases in this development:

1. From birth to age four, dendrites branch and grow, pushing neurons apart and causing the cerebral cortex to become thicker and heavier.
2. Between age four and adolescence, **pruning** of unused circuits causes nerve connections to decrease in density, even though dendrites continue to branch and grow.

Pruning is the process by which inactive brain circuits are removed. This elimination, or streamlining, is a good thing since it allows remaining active circuits to work more quickly.

What roles do nature and nurture play in brain development?

Nature (genes) and nurture (experience) interact at every step of brain development but play different roles.

Genes provide the basic wiring plan. They are responsible for the formation of brain cells and the connections between brain regions.

Experience fine tunes the architecture of the brain, through a streamlining process which determines which circuits will be kept and which discarded.

Source: Brain Wonders, Zero to Three.

ACTION ITEMS

Nurture your child's brain with:

1 Love and affection

Your affection is key to your baby's growth and development. Giving your child lots of love, attention and positive reinforcement helps her feel confident, relaxed and happy and impacts on the development of her intellectual capacity. When she is happy, she can explore, be more open to learning and better cope with stress.

2 A predictable world

Providing routines and consistent responses at bedtime, feeding and bathing gives your baby a sense that the world around him is trustworthy and teaches him that he can depend on you. If your baby knows this, he will spend less energy fussing over his needs and more time learning.

3 Opportunities for fun

Activities that most encourage your child's brain to grow are those that she enjoys. If your child is forced to participate in activities that do not hold her interest, she will tune out. Make learning fun, and your child will grow to love it.

4 The sound of your voice

The newborn brain is especially interested in sounds—the building blocks of speech and language. You can form a deep emotional connection between you and your baby by simply talking to him. It doesn't matter what you say, let your baby hear your voice as much as possible.

5 Understanding and patience

Respond to your baby's fusses or cries, without worrying that you will spoil her. By understanding and answering your baby, you teach her that you care about her and that she can trust you to read her signals. If you are unsure of what your baby needs, don't panic. And, keep in mind that there will be times, such as nap or bedtime, when letting her cry it out may be appropriate.

6 Time to digest what he's learned

Beware of overstimulation. If your child is exposed to a lot of new information about the world without time to digest and process it, he will tune out or break down. Pay attention if he is getting frustrated and let him regroup.

7 Group play

Interacting with peers and other adults meshes perfectly with the natural curiosity of toddlers to explore the world beyond their home and family. It can be helpful if your child interacts with a child slightly more advanced than her, someone who can show her new ways of acting or playing.

8 An enriched environment

Creating an enriched environment means providing everything from good food to stimulating colors, novel challenges, and an enjoyable and stress-free atmosphere with opportunities to explore and learn.