

# Critical Periods that Change Brains

The discovery of *critical periods* in brain development is one of the most famous discoveries in biology in the second half of the twentieth century. Brain systems require environmental stimuli to develop correctly. In other words, the brain learns how to see, hear, smell, taste and feel by interacting with things outside the body. These must take place at specific periods of time in order for the brain to develop successfully. This is called “*critical-period plasticity*.”<sup>1</sup>

Each sensory system has a different critical period, or window of time, during which it was *especially plastic and sensitive to the environment*, and during which it had *rapid, formative growth*.<sup>2</sup> Infants come *prewired to pay attention to everything*, because only a more mature brain that is already somewhat organized can make distinctions between the things their senses perceive and sort out what is worth paying attention to.<sup>3</sup>

At birth a baby’s neurons are disparate and unconnected, and in the first two years of life they begin connecting up extremely rapidly as they take in sensory information. *As many as two million new connections, or synapses, are formed every second in an infant’s brain*. By age two, a child has over one hundred trillion synapses, double the number an adult has.<sup>4</sup> Below are some of the critical periods.

1. **birth to two years old** – Brain learns to process nonverbal visual cues exchanged with its mother or caretaker and process musical components of speech or tones by which humans convey emotion.<sup>5</sup>
2. **birth to eight years old** -- This period overlaps the first critical period and is required for language development.<sup>6</sup>
3. **ten to eighteen months** – The period for developing and shaping brain circuits that allow infants to maintain human attachments and regulate emotions. It allows the brain to read people’s facial expressions, and connect them to emotions, which is required for understanding and controlling emotions.<sup>7</sup> These kinds of interactions must be repeated hundreds of times in this critical period and then reinforced throughout life.<sup>8</sup>
4. **twenty-six-month-old** --- Child has developed into a complex “right-brained” emotional creature, but it cannot talk about its experiences because left-brain functions required for that has developed yet.<sup>9</sup>
5. **just before onset of puberty until age 25** -- The prefrontal cortex sprouts new cells and makes new connections that create new neural pathways. This excess in growth is followed by approximately a decade of pruning and shaping circuits that sets them up

for the challenges they face and lessons they learn on their paths to adulthood. Massive changes take place in brain areas required for higher reasoning and the control of urges. It is important for teens and other to understand that the area in for impulse control is among the last regions of the brain to mature.<sup>10</sup>

The critical periods of childhood and adolescence are finally over at age twenty-five. Tectonic shifts in identity and personality have ended. The brain appears to now be fully developed. But, adult brains are not fixed in place and immovable. The brain will still change, but it will be life experiences not genes that change it.<sup>11</sup>

It was not until the late 1980s that critical periods were beginning to be understood by scientists. Today, most people know very little or nothing about them, especially the people that need to know it the most – *parents, family members, teachers, law makers, judges, law enforcement officers, counselors and religious leaders, to name a few.* Understanding how the biological organ that literally controls everything we think and do should be a top priority of every one of us.

### **Personal Profile Project**

Now it is time to expand your **Personal Profile** by adding the five critical periods. You will have to rely on others for a great deal of information.

1. Add dates of the five critical periods (or the ones you have experienced so far).
2. Record places where you lived during those periods.
3. Add names of caretakers or guardians.
4. Add traumatic events and “life changing experiences.”
5. Add identities acquired, dropped or modified period #5.

Creating your Personal Profile not only helps make your journey of self-discovery more successful, it is an empowering skill. The more you know about the role biology, nature and human actions played in making you what you are and who you are – the more powerful you become.

---

<sup>1</sup> *The Brain that Changes Itself*; p. 52.

<sup>2</sup> *The Brain that Changes Itself*; p. 52.

<sup>3</sup> *The Brain that Changes Itself*; p. 226.

<sup>4</sup> *The Brain: The Story of You*; p. 7.

<sup>5</sup> *The Brain that Changes Itself*; p. 226.

- 
- <sup>6</sup> *The Brain that Changes Itself*; p. 52.  
<sup>7</sup> *The Brain that Changes Itself*; p. 226.  
<sup>8</sup> *The Brain that Changes Itself*; p. 227.  
<sup>9</sup> *The Brain that Changes Itself*; p. 226.  
<sup>10</sup> *The Brain that Changes Itself*; p. 15.  
<sup>11</sup> *The Brain: The Story of You*; p. 18.