

Learning in the Womb & Brain Architecture

by Chris Lester

The architecture of the brain develops during an ongoing process that starts before birth and continues throughout childhood. Like the construction of a home, the brain-building process begins by laying the foundation, framing the structure, and wiring the brain's circuitry in a predictable sequence.

Crucial to early learning is the structure and wiring of the circuitry for each of the five senses: touch, smell, taste, auditory and visual. These vital pathways for learning are framed in the following sequence:



Touch is the first sense to develop in the framing sequence of brain development. By eight weeks gestation touch receptors begin to transfer the sensations of warmth and movement from the womb environment through the fetus's skin to form the basic foundation of brain architecture.

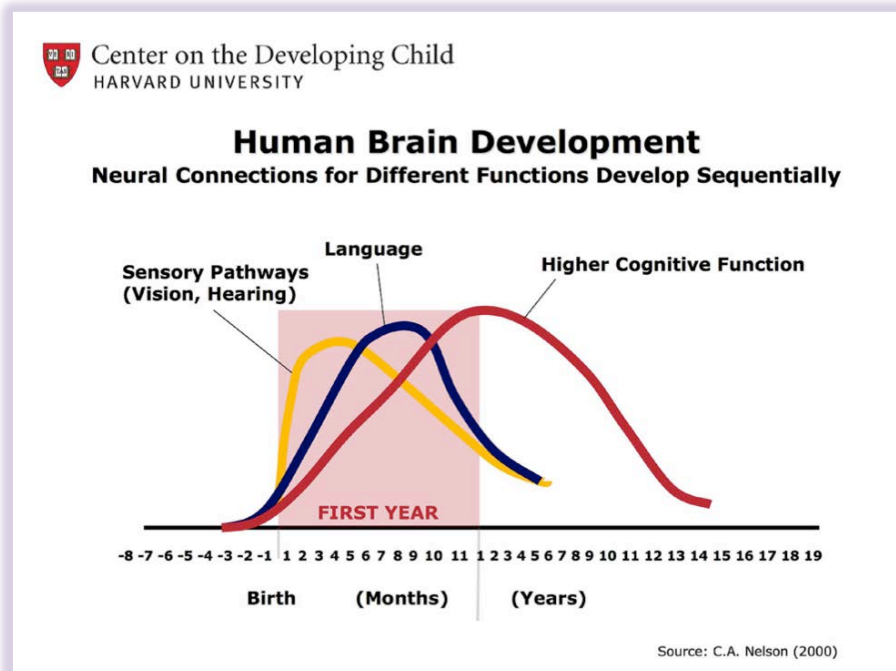
What this means to caregivers: The fetus learns feelings of warmth and movement. Your newborn will expect to feel warm and snug. Swaddling and gentle rocking motions (think of the swaying sensation the fetus feels when mother walks) bring calming sensations to your baby. Gentle, rhythmic massage can be soothing to newborns.

Smell and Taste are next in the framing sequence of brain development. "Fetal breathing" begins in the second trimester and is the term used to describe the intake of amniotic fluid that

stimulates olfactory development. Optimal development requires good nutrition with no alcohol, tobacco or other toxic substances.

www.neflhealthystart.org is a good source of healthy prenatal care.

What this means to caregivers: The fetus is learning about tastes and smells based on what the mother eats and drinks. Newborns expect to smell and taste reminders of the fetal environment. Mother's breastmilk is bio-identical to her amniotic fluid and her skin secretes substances her newborn will recognize. Researchers have demonstrated that newborns will respond to the smell of spices such as cumin and turmeric if these were part of mother's prenatal diet.



Auditory pathways begin to develop toward the end of the second trimester of pregnancy. The process of wiring the brain for hearing and processing sound continues during the next four months of pregnancy. Mother's rhythmic heartbeat, digestive noises and her voice influence the wiring process.

What this means to caregivers: The fetus hears the rhythmic heartbeat as a "shushing" noise. Newborns expect the same muffled noises learned in-utero. Researchers have shown that newborns recognize their mother's voice and will respond to songs mother sang while pregnant. Learning sounds begins months before birth!

Visual pathways begin developing during the third trimester of pregnancy. The wiring process unfolds in response to fetal sleep-wake cycles as brain circuitry prepares the visual system for outside stimulation at birth. Alcohol, nicotine and other substances can disrupt this process.

What this means to caregivers: Sturdy architecture of the visual system is crucial for learning. The optimal environment for construction of visual pathways is the fetal environment, underscoring the importance of 40 full weeks of pregnancy. Newborns expect soft, diffused lighting similar to that of the fetal environment. Matching mother's face with her voice, as well as those of other caregivers, is a vital task of the newborn. High quality sleep is critical as interference with the REM cycle also interferes with the organization of the visual cortex.