A LINE ON LIFE

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In the Learning Womb *

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Have you heard of the "*tabula rasa*" (blank tablet) concept? At birth, children were viewed as blank tablets to be written on by their life experiences. However, research reveals that newborns have genetic predispositions. In addition, some *basic* learning does occur within the womb.

This does not mean that concerned parents should start teaching their children prenatally. For example, there is no indication that playing music during a pregnancy will encourage a musical aptitude in the child.

Even so, newborns have learned distinct preferences for some sounds within the womb – typically the **mother's heartbeat** and **her voice**. Psychologist William Fifer (Columbia University) and his associates found that newborns prefer their mother's voice to voices of other women. Next they electronically modified the mother's voice, so it would sound as it did when the child was in the womb. This sound is more preferred than the mother's voice as it sounds outside the womb.

This does not relate to the father's voice. Newborns exhibited no difference in response to their fathers' voices as compared to other men's voices.

It is unlikely that the specific words make a difference. It seems to be the **rhythm** of the mother's speech pattern, not the words she said. With often-repeated rhymes during the last few weeks of pregnancy, the fetus seems to learn the mother's cadence, not the specific words. According to Fifer, "*These studies show that there is a mechanism for long-term memory available to the fetus*."

The fetus may also remember **food flavors** to influence later food preferences. Certain flavorings (for example, garlic) are found in the amniotic fluid. These flavors may be transferred to the newborn after birth in the mother's milk. Studies are currently exploring this possibility.

A fetus can learn **habituation**. After repeated exposure to a particular stimulus, animals become habituated (accustomed to) that stimulus and no longer respond to it. However, if a new stimulus is provided, the animal will respond to it. The same thing has been found to occur with human fetuses.

To test this with a fetus, a vibrating device was applied to the pregnant woman's abdomen. Researchers found that, as early as 26 weeks prenatal, the fetus moved in response to the stimulus. However, after repeated stimulation, the fetus stopped responding. In other words, the fetus has habituated to that stimulus. In contrast, if a new

stimulus was used, the fetus responded again. Some researchers believe that this ability to habituate can be used to predict the child's ability to learn, but others disagree. However, this might be a possibility in the future.

Animal studies support fetal learning. With rats, researchers can remove a fetus from the womb. Attached to the placenta, it can be kept alive in an amniotic-like fluid.

Psychologist William T. Smotherman (Binghamton University) has done fetal studies with such rat fetuses. **Suckling** seems instinctive, but it may involve learning. Smotherman placed a nipple close to the fetus' mouth. If the fetus grasped the nipple, it received some mother's milk in its mouth.

Around 21 days into gestation – similar to early in the ninth month for humans – the fetuses quickly learned to respond to the nipple. The milk seemed to trigger the release of certain brain opiates, which reinforced the suckling behavior. When this opiate release was chemically blocked, the rats no longer learned to respond to the nipple, even when they still got milk. This indicated that the opiates are necessary for learning.

The **timing** of the experiences was also important. In another experiment, Smotherman gave both the nipple and milk to rat fetuses. However, the events were not paired in time. The fetuses did not become conditioned to respond to the nipple.

This can be related to intravenous (IV) feeding of premature human infants. Like rat fetuses, these infants may not learn to associate suckling with receiving nutrition. It might be helpful to associate sucking a pacifier with receiving food through the IV tube.

Even the trauma of labor may prepare the newborn baby for survival outside the womb.

Even the pressures of labor seem to be important in helping newborns survive. If rat fetuses are "*gently*" removed surgically from the uterus, they never start to breathe. They die when the umbilical cord is cut. It seems that they require the **touch** involved in the birth process. As labor begins, a female rat repeatedly scratches her belly and rears on its hind legs. In the process, "*the fetus is poked, stroked and shaken up*." This seems to be critical to the survival of the newborn.

Similarly, research indicates that premature human babies require pressures of the birthing process to survive. However, even if the tactile stimulation is provided *after* birth, it will help to prepare the newborn to survive outside the womb.

We have long been aware how experiences after birth shape the lives of children. More recently, we have discovered genetic potentials that influence us. Now we are becoming

aware of experiences in the womb that prepare us for adjustment and survival in the outside world.

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* Adapted from Beth Azar's "Learning begins even before babies are born, scientists show," and "Behaviors of a newborn can be traced to the fetus," *The APA Monitor*, December, 1997, pages 15-16.