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FIRST ADAPTATIONS IN INFANCY

A Neonate's Competencies Have 5 Important Characteristics:

- They depend on prewired abilities built into the nervous system at birth.
- They often meet survival needs.
- From the beginning, they involve organized sequences of actions that serve some purpose.
- They involve selective responses.
- They allow infants to detect relationships between actions and consequences.

BRAIN DEVELOPMENT

Early Brain Growth: Structure of a Neuron

- Cell Body (Soma)
- Dendrite
- Axon
- Myelin Sheath
- Nodes of Ranvier
- Terminal Buttons
- Synapse

Researchers use a combination of approaches to study early brain development:

- Measure indirectly by charting head growth.
- Post-mortem examinations.
- Electroencephalography (EEG).
- Magnetic resonance imaging (MRI).
- Position emission tomography (PET).
- Estimate from animal experiments.

Brain Growth

- At birth babies brain has almost all the _____ it will ever have, but many _____ in the _____ don't yet function efficiently.
- Infant brain at birth is _____ of its adult weight.
- By one year, the brain has _____in weight.
- By 4 years the brain is _____ of its adult weight.
- At birth head circumference is _____ and grows in spurts to its average adult size of _____.

Changes in Structure & Function

- **Spinal cord** and **brainstem** are fully functional at birth. Why? What functions do they support?

- **Cerebral cortex** (higher cognitive functions) has the longest period of continued development.

Processes involved in early brain development

- neurogenesis/proliferation & neuron migration
- neuron elaboration & differentiation
  - Synaptogenesis
  - glial cell formation & myelination
- pruning excess synapses & loss of plasticity

Experience & Developmental Context

- The development of the nervous system is fostered and constrained by infants' experiences, helping in the development of specialized functions in the cortex.
  - **Experience-expectant synaptogenesis:**
  - **Experience-dependent synaptogenesis:**

Changes in Structure & Function

- **Brain Plasticity**
- **Brain Lateralization:**
  - Left Hemisphere:
  - Right Hemisphere:
- The loss of the brain's plasticity has benefits as well as drawbacks:

The Effects Of Early Environmental Stimulation On Brain Development

- **Rosenzweig (1966, 1970):**
  - Enriched Condition
  - Impoverished Condition
  - Results

REFLEXES IN THE NEWBORN

- **Reflex**: An automatic, inborn response to a particular stimulus.

METHODS OF STUDYING PERCEPTIONAL DEVELOPMENT

- For a long time, thought perceptual abilities at birth & infancy were minimal:
- How can we possibly know what a baby sees, hears, smells, and perceives when she can't tell us about it?

Measures of Attention: Preferential Looking

- **Measures of attention**: state of alertness or arousal focused on a specific aspect of environment.
- **Preferential Looking**: tendency to look at something longer than others.
- **Spontaneous Looking Preferences**:
- **Special photographic techniques**

Visual Preferences in Newborns

- Infants spend more time looking at _____
- Infants spend the most time looking at a drawing of a _____
- Is this just preference for complexity?

Newborns and Human Faces

- Infants were shown blank shape, a proper face, or scrambled facial features.
  - proper face and scrambled face have same complexity.
  - Infants looked more intensely at the _____

Measures of Attention: Physiological Response Measures

- **Orienting Response**: behavioral and physiological changes that occur when a stimulus is first presented.
  - Autonomic Nervous System response to stimulation
  - CNS response: Cortical Evoked Potential

Use of Learning Principles to Study Infant Perception
Habituation-Dishabituation Paradigm

- **Habituation:**
- **Dishabituation:**
- The **habituation-dishabituation sequence** is used to explore whether infants can **perceive** _____.

Operant Conditioning

- **Operant conditioning** is a form of learning in which a behavior is followed by a stimulus that changes the probability that the behavior will occur again.
  - A **reinforcer** is a stimulus that _____.
  - Operant conditioning allows researchers to determine what stimuli babies **perceive** and _____.
  - Used a lot for exploring infant hearing:
    - **High amplitude sucking**

SENSING & PERCEIVING THE WORLD: INFANT VISION

- Vision is the least mature of the newborn baby's senses.
- Infants are _____ and reasons for this are 2 fold:
  - **Retinas**:
  - **Immaturity of Visual Cortex**:

SENSING & PERCEIVING THE WORLD: INFANT VISION

- **Vision Develops rapidly**: Infants begin to perceive patterns, objects, and depth w/in the _____
- **Visual Acuity**: Degree to which one can perceive_____.
- At 2 wks old acuity is approximately _____.
- Increases rapidly over the first 6 months of life _____.
- Measured in infancy by _____ and _____ that occurs in the brain in response to visual stimuli (***Visual Evoked Potentials***).

Preferential Looking & Visual Acuity

- Pairing stimuli with different frequency stripes to gray stimulus and observe preferential looking.
- The closer together the stripes the more difficult the discrimination (greater VA)

SENSORY SYSTEMS IN THE NEWBORN: HEARING

- **Newborns prefer mom's voice:** Decasper & Fifer (1980):
- Newborns are _____.
- Newborns prefer speech that is high-pitched and expressive _____ _____.
- Fetuses respond to sound _____.
  - noises affect brain wave patterns and heart rate.

SENSORY SYSTEMS IN THE NEWBORN: HEARING

- **Decasper & Spence (1986):** "The Cat in the Hat Study."
  - Women read aloud a passage from the "The Cat In The Hat" twice a day during the last six weeks of pregnancy.
  - 2-3 days after birth memory was tested.
  - Results:
- Newborns prefer to listen to _____.

OLFACTION & TASTE IN THE NEWBORN

- At birth Olfaction and Taste are more highly developed than vision and hearing.
- The responsiveness of infants to the smell of certain foods is similar to that of adults.
- A newborn infant is attracted to the odor of her own mother's lactating breast.
- Infant **facial expressions** indicate they can distinguish among several tastes, (e.g., sweet, sour, and bitter), but not others (e.g., salty).

DEPTH PERCEPTION IN INFANCY

- **Depth perception** requires the combination of many visual abilities.
- Infants are born with little or no depth perception, but this ability develops rapidly over the first year of life.
- Investigators have concluded that **avoidance** of heights is made possible by _____ _____.
- **Visual Cliff:**

TOUCH IN THE NEWBORN

- Touch is more fully developed at birth than other senses.
- Necessity of human touch: _____
- Touch is involved in many newborn _____.
- Even premature newborns and older fetuses feel _____.

FIRST ADAPTATIONS IN CONTEXT

- Newborns comes into the world prepared in many ways for the developmental tasks they face. They have:
  - reflexes
  - a variety of sensory capacities
  - preadaptations to attend certain stimuli
  - preadaptations for social interaction

- Environment, in turn, provides experiences that help shape brain development, motor skills, perceptual abilities, and learned behaviors.