PERCEPTUAL DEVELOPMENT
CHAPTER 16

Overview of Questions

- What can newborns perceive?
- When can an infant perceive color?
- Can a newborn recognize his or her mother?

INFANT BRAIN DEVELOPMENT

- At birth babies brain has almost all the neurons it will ever have, but

- Brain is _____ of its adult weight at birth, and _____ by 4 yrs.

- **Brainstem and Midbrain** are

- **Postnatal Growth:**

METHODS OF STUDYING PERCEPTIONAL DEVELOPMENT

- For a long time, thought perceptual abilities at birth & infancy were minimal:
  - partly due to _____

- 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**
  - 2 stimuli are presented to the infant and if she stares at one longer than the other, the experimenter concludes _____.

- **Spontaneous Looking Preferences**:

- **Special photographic techniques**

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:

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 differences between stimuli.

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 _____ the occurrence of a response.
- Operant conditioning allows researchers to determine what stimuli babies perceive and which ones they _____.
- Used a lot for exploring infant hearing:
  - High amplitude sucking (Peter Eimas)

INFANT VISION

- Vision is the _____ of the newborn baby's senses.
- Infants are **_____** and reasons for this are 2 fold:
  - **Retinas**: Newborns don't have enough _____ functioning in their retinas, but the _____ appears adult-like.
  - **Immaturity of Visual Cortex**: don't have enough _____ in **visual cortex**.
- **Vision Develops rapidly**: Infants begin to perceive patterns, objects, and depth w/in the first _____.
- At one month old visual acuity is approximately _____**.**
- Increases rapidly over the first 6 months of life _____.

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)

Visual Acuity

- Visual Evoked Potential (VEP): _____ are placed on the back of the infant's head, over the _____.
- The infant looks at a gray field which is briefly replaced by either a grating or a checkerboard pattern.
- If stripes or checks are detected the _____.
  If the pattern cannot be detected no VEP is generated.

Contrast Sensitivity

- Measured by determining the smallest difference between light and dark bars of a grating that can be detected.
- Spatial frequency - number of cycles of the grating per visual angle
- Contrast sensitivity function - plot of contrast sensitivity versus spatial frequency
- Infant's ability to perceive contrast is restricted to _____.
- At these low frequencies the infant's contrast sensitivity is _____ by a factor of 20 to 100.
- Infants can see little or nothing above _____, which is an adult's most sensitive range.
- The vision of a _____ is slightly worse than _____:
  - Infants see no fine details and can see only relatively large objects with high contrast.
- Undeveloped state of infant's fovea forces the infant to see primarily with _____

Object Recognition: Recognizing Mom's Face

- A _____ old infant can recognize his mother's face.
- Bushnell, Sai, & Mullin (1989)
  - Using the preferential looking paradigm found that infants spent _____ of the time looking at **mom** vs. _____ for stranger.
- Walton et al. (1992) found that infants respond more to mom than stranger when videotape images are used.

How do infants discriminate between mom and stranger?

- **Pascalis et al (1995)** found that when mom wore a

Perceiving Object Unity

- **Kellman & Spelke (1983):** Habituated **4 month olds** to a rod moving back and forth behind a block.
  - They then presented either **2 separate rods** or a **single longer rod.**
  - **Dishabituation**
  - Perceived the partial occluded moving rod _____.
  - **Importance of Movement**: Perception of unity doesn't occur when infant is habituated to a _____ rod and block display.
- Slater et al (1990) repeated the Kellman & Spelke experiment on _____.
  - Results: Newborns look longer at the _____ during dishabituation.
  - Rod behind the block = _____
- Johnson et al. (2004) used the same technique as Kellman and Spelke and also recorded **eye movements**
  - 3-month-old *perceivers* followed the motion with their _____ while *nonperceivers* fixated on the non-moving element of the display.

Perceiving Adjacent Objects as Separate

- **Xu and Carey (1994)** habituated infants to a yellow toy duck sitting on top of a red toy truck.
- Dishabituation occurred when they showed a hand lifting the duck away from the truck.
- This result suggests that they perceive the duck and truck as _____.

Modification of Experiment: Addition of Movement

- When the duck moved back and forth on top of the truck during habituation the infants dishabituated to the _____.
- Indicating that **_____** helped them to see the duck and truck as **2 separate objects**.

Color Vision

- Perception of color is determined by _____ **of cone receptors**.
- Cones are _____.
- Research suggests that color vision develops early and by 3 to 4 months is near adult levels.

Depth Perception

- **Depth perception** requires the combination of many visual abilities.
- Infants are born with _____ depth perception, but this ability develops rapidly over the first year of life.
- **Motion** is the _____ of depth cue to which infants are sensitive.
- **Binocular Disparity** becomes functional early _____, but **pictorial cues** become functional later _____.

Independent Movement and Depth Perception

- Investigators have concluded that _____ is made possible by independent locomotion.
- Researchers believe that _____ is so important in structuring infants' experience of the world, it may promote a new level of _____ by strengthening certain synaptic connections in the cortex.

Visual Cliff

Using Binocular Disparity

- One requirement for binocular disparity is that the eyes must be able to binocularly fixate so that the two foveas are directed to exactly the same place.

- **Aslin (1977) filmed infant's eyes** while moving a target back and forth from distances of 12 cm to 57 cm.

  - Not until _____ did both eyes reliably move toward the target.

- **Binocular Fixation is present at 3 mos**, but can infants use the information from disparity to perceive depth?

Using Binocular Disparity

- **Fox et al. (1980) Experiment**
  - Infants (2-6 months) wore special viewing glasses.
  - Random-dot stereograms were presented.
  - Infants between three and six months of age

Perceiving Movement

- Infants prefer moving stimuli.

- At first infants track a moving object using a series of short, jerky movements called _____.

- At about _____ they are able to make smooth eye movements while tracking moving objects.

SUMMARY: VISION

- By 2 months, infants can discriminate colors across the entire spectrum.
- By 3 months, infants can focus on objects and discriminate colors about as well as adults can.
- By 6 months, their visual acuity is about 20/100.
- By 11 months, visual acuity reaches a near-adult level.

INFANT HEARING

- Newborns prefer complex sounds such as voices.
- Newborns are_____
- Newborns prefer speech that is high-pitched and expressive _____
- In the second half of the first year, infants can detect _____ in sentences.
- Between 7 and 9 months, infants have begun to analyze the internal structure of sentences and words.

HEARING

- Fetuses respond to sound _____
  - noises affect brain wave patterns and heart rate.
- **Decasper & Spence (1986)**: Dr. Seuss's "The Cat in the Hat“
- **Newborns prefer mom’s voice:** Decasper & Fifer (1980):

Perceiving Speech

- Categorical perception of phonemes - experiment by Eimas et al.
- One-month-old infants are exposed to phonemes with different voice onset times (VOT).
- Habituation responses for sucking on a nipple show that VOTs of 20 ms (sounds like “ba”) with changes to 40 ms (sounds like “pa”) _____.

o VOTs changed from 60 to 80 ms (both sound like “pa”) showed _____

o Control group with no changes in sound, showed _____ throughout experiment.

o These results reveal the _____.

Speech Perception – continued

- At birth, infants can distinguish between phonemes _____.
- By one year of age, this ability becomes “tuned” so that
- An example is the distinction between /r/ and /l/, which Japanese infants can distinguish at birth but not at _____.

OLFACTION

- Olfaction and Taste are the _____ of all the senses at birth.
- The responsiveness of infants to the smell of certain foods is _____.
- A newborn infant is attracted to the odor of her own mother’s lactating breast.

TASTE

o Infant facial expressions indicate they can distinguish among several tastes,

TOUCH

- Touch helps stimulate physical and emotional development.
- Sensitivity to touch, pain, and temperature change is present at birth.

Intermodal Perception

- **Intermodal perception**
- Recent evidence indicates that babies perceive the world in an intermodal fashion from the beginning. For example, newborn behaviors suggest that they expect sight, sound, and touch to go together.