What do infants perceive?

- Historically, world of infants was believed to be very confusing; infants are passive.
- By 1970’s, change in this perspective
  - Use of new methods to measure infant perception

Sequence of Sensory Development

- Cutaneous
- Vestibular
- Chemical (smell/taste)
- Auditory
- Visual

Development of Visual System

- Infancy
  - eyes begin to develop 4th week of gestation
  - finished by 7 months gestation
Visual Development - Infancy

- young infants - nearsighted (8-12 inches)
- immature lens muscle - trouble accommodating
- fewer cones on fovea - affects detail and color

Visual Acuity - Infancy

- Newborns: 20/600
- 6 months: 20/100
- 12 months: 20/20
- Newborns see double
- 2 months: convergence - ability to focus both eyes on single object to form single image.

Why low acuity?

1. Cell migration to fovea comes later
2. Neural development in visual cortex continues after birth.
Visual Preferences

• Visual Fixations/Preferences – Fantz
• Preferential looking

Fantz

• Showed 2 patterns – 1 was always gray, other was set of black and white stripes
• Prefer moderate contrast

[Image of two checkerboards differing in contrast]
Visual preferences in infancy demonstrated by Fantz (1961)

- Curved lines
- Symmetry
- Human faces

Scanning

Scanning
Color Vision

• At birth, dichromatic
• By 2-3 months, trichromatic vision

Development of Depth Perception

• Gibson & Walk (1960)
• 6 months olds - distressed over deep end

Static monocular cues

• Interposition
Static monocular information

• Pictorial cue - trapezoidal window

Static monocular information

• Relative size

Auditory Perception - Infancy

• Hearing peaks at 6 months of age
• Evidence that fetus' can hear
  – DeKasper and colleagues
  – High Amplitude Sucking Paradigm
Chemical Senses

• Smell, taste and touch: well developed senses at birth

• Smell and taste: “Chemical” senses: neural excitation in response to molecules in environment

Taste

• The sense of taste (gustation) first becomes functional during the third trimester

• Taste ability changes slightly during infancy, but taste preference is highly malleable

How Taste Works

• Taste buds detect only 4 basic categories
  – sweet
  – salty
  – bitter
  – sour

• To taste full flavor then involves considerable interaction between taste and the sense of smell
Ability to Taste Begins in Utero

- Taste buds emerge just 8 wks after conception
- By 13 weeks, taste buds have formed throughout the mouth and are already communicating with their invading nerves
- The number of taste buds continues to increase for some time postnatally

Taste - Prenatally

- Amniotic fluid is rich with chemicals that excite taste cells and the amniotic fluid is constantly changing over the course of pregnancy (through mother’s diet & even the fetus’s own urine)
- Fetuses can taste some flavors (sweet and perhaps bitter) by the last 2 months of gestation
- Like prenatal smell, a fetus’s taste experience in the womb may bias of food preferences

Taste - Newborns

- Newborns: sweet, sour and bitter tastes
  - reactions to vanilla/strawberry vs. fish/rotten eggs
  - react to flavors added to amniotic fluid
  - 4 months: develop liking for salty taste


Smell

- Information transmitted directly from nose to cerebral cortex – no information processing through lower brain centers

- Rely on smell in infancy more than at any other time

Smell - Newborns

- Newborns: recognize mom’s smell
  – studies of breastmilk and underarm odor
Importance of Touch

• Somatosensory system is most developed at birth

• Four types of touch
  – Temperature
  – Pain
  – Cutaneous sensation
  – Proprioception

Pain

• Babies can feel pain

• Doctors originally thought that they could not feel pain

• Babies will have infantile amnesia for pain

Benefits of Early Touch

• Essential to sensory motor development, physical growth, emotional well-being, cognitive potential and overall health

• Premature babies are benefited by massage therapy

• Touch is one of the easiest ways of molding emotional and mental well-being
The Vestibular System

- Named for hollow opening in skull
- Involved in the stabilization of gaze and in the control of balance
- Composed of 3 semicircular canals and 2 otoliths

Benefits of Vestibular Stimulation

- Contributes to development of reflexes and motor skills
- Short-term: soothes and comforts infants
- Continued: decreases infants arousal

Crossmodal Perception

- Nubby Nipple Study
- 1 month old infants
Attention

- Underlies awareness and interpretation of world
- Social consequences
- At birth – ability to attend to some types of stimulation
- What can they detect?
- What differences can they discriminate?
- What stimuli do they prefer?

Habituation Paradigm

- Method most frequently used to test these questions

  - Habituation: decline in orienting response as initially novel stimulus becomes familiar.
  - Dishabituation: recovery of orienting response when an habituated stimulus changes.
Habituation

• Time to habituation is used as index of processing efficiency
• Three attention patterns
Attention Patterns

![Graph showing habituation and discrimination response](image)

- **Type of Stimulus**: Habituation, Similar, Dissimilar
- **Magnitude of Discrimination Response**