Perceptual Development

Readings & Essay Questions
- Age
- Sampling
- Habituation
- Visual exploration & object perception
- Perceptual guidance of action

Infants Perceiving Possibilities for Going Up & Down Slopes
(Adolph, Eppler, & Gibson, 1993)

Dependent Measures?
- Attempts, Success, Locomotor method
- Latency, Displacement behavior
- Touching with hands & feet
- Shifting positions
- Vocalizations
- Manual gestures
- Facial expressions
- Etc.

Independent Variables?
- Slant
- Direction
- Age??
- Locomotor status??
- Experience crawling & walking??
Psychophysical Assessment
(Adolph, 1995)

- Estimate motor threshold
- Assess perceptual judgments relative to motor threshold
- Multiple measures (method of locomotion, success, latency, touching, shifts)
- 14-month-olds perceive possibilities for action based on own abilities & slope

Longitudinal Design
(Adolph, 1998)

Longitudinal Design
(Adolph, 1998)

Attempts

Age-Held-Constant Design

Principle #1:
Sensitivity vs. Perception

- Sensitivity (discrimination) is not equivalent to perceptual understanding
- Perception is not equivalent to adaptive responding
- Generally, the order of emergence is sensitivity, perceptual understanding, and finally adaptive responding
Principle #2: Perceptual-Motor Development

- Perception functions to guide action
- Perception & action are linked developmentally
- Perception in infants is measured with action; physiological measures must be correlated with action

Devel Cascade: From Sitting to Object Knowledge
(Soska, Adolph, Johnson, in press)

- Acquisition of sitting skill → frees up hands for visual-manual exploration
- Experience seeing objects from different angles → 3D object perception

Development of Sitting Skill

Sitting Facilitates Object Exploration Skill

Manual Exploration Facilitates 3D Object Perception

Principle #3: Multiple Measures

- Multiple measures exploit the richness of infants’ behavior
- Multiple measures confirm, augment, or reinterpret findings from single measures
<table>
<thead>
<tr>
<th>Principle #4: Sampling Intervals</th>
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<tbody>
<tr>
<td>• Adequate sampling intervals are required to characterize developmental change</td>
</tr>
<tr>
<td>• Most developmental research has not sampled adequately to distinguish various trajectories (thus, little evidence for or against developmental stages or any other pattern of change)</td>
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<tr>
<th>Principle #5: Age &amp; Experience</th>
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<tr>
<td>• Age is not an independent variable; it is not an explanatory variable; it is not a grouping variable; age is a stand-in for unknown factors</td>
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<td>• Experience is typically measured by days since onset; there is no punctate onset; days-since-onset is a stand-in for unknown factors</td>
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<table>
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<tr>
<th>Behavioral Methods for Studying Infants</th>
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<tr>
<td>• Problem: Nonverbal</td>
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<td>• Problem: Noncompliant</td>
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<tr>
<td>• William James (1900): “buzzing, blooming, confusion”</td>
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<tr>
<th>Why Study Children?</th>
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<tr>
<td>• “Child Psychology”: Adult questions scaled down for children</td>
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<tr>
<td>• Lo-and-behold demonstrations</td>
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<tr>
<td>• Normative descriptions (age-related changes)</td>
</tr>
<tr>
<td>• Origins (earli(iest) vestige of ability or behavior</td>
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<td>• Process &amp; mechanisms of development</td>
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<th>Infants’ Behavioral Repertoire: Potential DVs</th>
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<td>• Look</td>
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<tr>
<td>• Suck</td>
</tr>
<tr>
<td>• Move head/arms/legs</td>
</tr>
<tr>
<td>• Facial expressions</td>
</tr>
<tr>
<td>• Heart rate</td>
</tr>
<tr>
<td>• Change state</td>
</tr>
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<td>• Stubborn, noncompliant, get bored</td>
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<th>Behaviors in Older Infants</th>
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<td>• Reach, sit, crawl, walk</td>
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<td>• Explore with hands</td>
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<td>• Vocalize, gesture</td>
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Looking Time Methods

Forced Choice Preferential Looking (FPL)

- Visual acuity

Logic of FPL

- Babies can only choose pattern if sensitive to differences
- If E guesses > 50%, must be based on baby’s behavior
- If E guesses from 100% to 50%...
- If E always guesses at 50%...

Preferential Looking (PL)

- Robert Fantz (1970s)
- Exp Q: Are 2 displays different?
- Baby A: Yes if look longer at 1 display

2 Rules of Thumb for PL

1. Prefer something over nothing
2 Rules of Thumb for PL

1. Prefer something over nothing
2. Can’t infer familiarity vs. novelty preferences apriori!!

Cross-Modal Preferential Looking

• Matching one modality with another modality
• Vision & hearing
• Vision & touch
• Vision & proprioception
• Etc.

Vision & Proprioception
(Bahrick & Watson, 1985)

• “Yellow bootie” study

More Vision & Proprioception
(Rochat & Morgan, 1995)

• “Booties” with no difference in timing
• Information for the self!

Vision & Hearing
Eppler (1995)

• New motor skills → attention shift → new perceptual skills
• 5-month-olds:
  – Sophisticated social skills
  – Emerging object manipulation skills
• 2 groups: Good vs. bad object skills

Vision & Hearing
Eppler (1995)

Social Events

Object Events
Vision & Hearing
Eppler (1995)

Object Manipulation at 5 Months

Object Manipulation at 3 Months

“Sticky Mittens”
Needham, Barrett, & Peterman (2002)

• Can object manipulation experience lead to better object skills?
• 3-mos-olds (poor object manipulation skills)

• Results...
  – Visual & oral exploration
  – Less dropping
  – Less “misses”
• Later experiments showed:
  – Outperformed unpracticed infants in cross-modal preferential looking tasks
Logic of Cross-Modal Preferential Looking

- Differential looking by group
- If look longer at 1 display, infer sensitivity
  - Doesn’t matter which display
  - Sometimes match, sometimes non-match
- If look 50%... Null results

Habituation
Lecanuet et al. (1993)

- Habituation: Gradual lessening of response

Ultimate Habituation

Visual Habituation:
Kellman & Spelke (1983)

- Do infants perceive complete objects?
- 3- to 4-month-olds

Visual Habituation:
Kellman & Spelke (1983)

- Habitate to: no move
- or move
- Test with: one rod
- or two bits

Logic of Habituation

- Infants get bored & noncompliant
  - High attrition rates...
- If dishabituate at test, infer sensitivity & learning
- If don’t dishabituate, know nothing
- DISHABITUATION NE SURPRISE
- Habituation curves not robust for individuals
- Infant-controlled vs. familiarization trials
**Violation of Expectation (VOE)**

- Assume longer looking to something unexpected
- Reminder of something infants already know; no familiarization
- Show set-up event, followed by expected vs. unexpected test events
- If infant looks longer at unexpected, infer expectations from set-up event

**Eye-Tracking:**

- Does knowing about objects depend on knowing where to look??

**Eye-Tracking:**

**Eye-Tracking:**

**Easiest? No fancy equipment & easy to train staff??**

- Habituation
- Eye tracking
- VOE
- Preferential looking
- FPL
- Cross-modal preferential looking

a “perceiver”  a “non-perceiver”
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Is powerful enough to allow inferences about single Ss?
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Shows that infants are “surprised”?  
- Habituation  
- Eye tracking  
- VOE  
- Preferential looking  
- FPL  
- Cross-modal preferential looking

Shows that infants are “surprised”?  

Classical Conditioning  
MacFarlane (1978)
- UCS
- UCR
- CS
- CR

No!
### Tactile & Taste Perception

**Blass, Ganchrow, & Steiner (1984)**

- UCR = rooting & sucking to UCS of sweet fluid in mouth
- Sweet fluid paired with CS of stroking infant’s head
- Newborns rooted & sucked to head strokes

### Logic of Classical Conditioning

- Modify elicited, reflexive behaviors
- If NS → CS...
- If NS doesn’t → CS... depends on UR

### Operant Conditioning:

**DeCasper & Spence (1986)**

- Contingent (conjugate) reinforcement =
- Pregnant moms read Dr. Seuss
  - Read new vs. old story after birth

### Operant Conditioning:

**DeCasper & Spence (1986)**

- Non-nutritive nipple sucking

### Logic of Operant Conditioning

- Modify emitted, intentional responses
- If frequency changes, infer sensitive to reinforcer, cared about consequences, paired emitted behavior with reinforcer
- If frequency doesn’t change... no answers