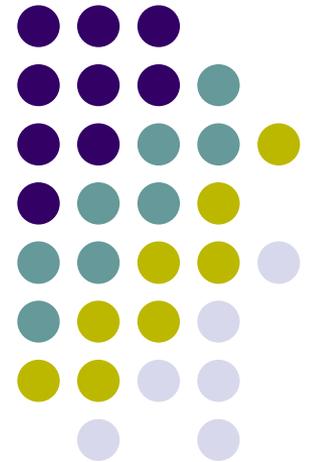


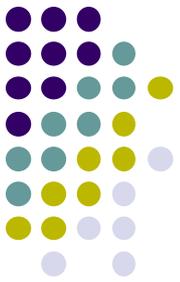
Seeing, Thinking, and Doing in Infancy

How Children Develop

Chapter 5



Infant Development

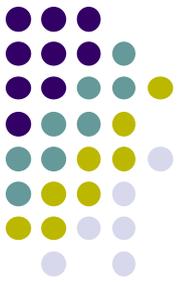


Perception

Action

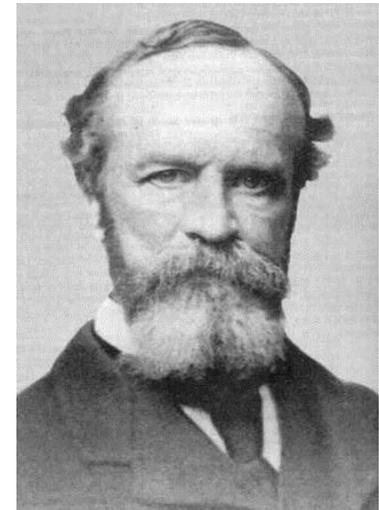
Learning

Cognition



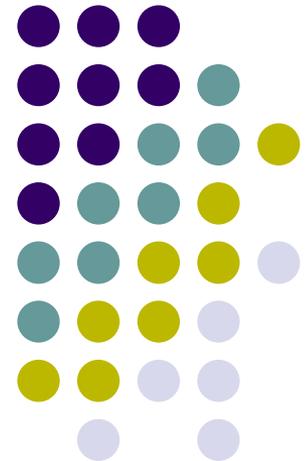
William James: *The Principles of Psychology*
(1890)

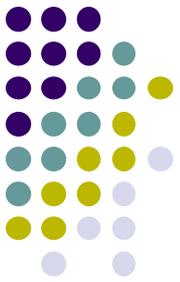
infants perceive the world as a
“blooming, buzzing confusion”



Learning

Habituation
Perceptual Learning
Statistical Learning
Classical Conditioning
Instrumental Conditioning
Observational Learning





Learning Capacities/Processes/Mechanisms

Learning is a change in behavior as a result of experience.

Babies born with innate (built-in) learning capacities.

Four general mechanisms for learning:





Classical Conditioning (CC) – Pavlovian

Reflexes make CC possible:

- new stimulus paired with a stimulus that already causes reflex.

Helps organize world - recognize events that co-occur.

E.g., Sucking and salivation 3-4 hours after feeding.

Babies respond only to stimuli pairing with survival value

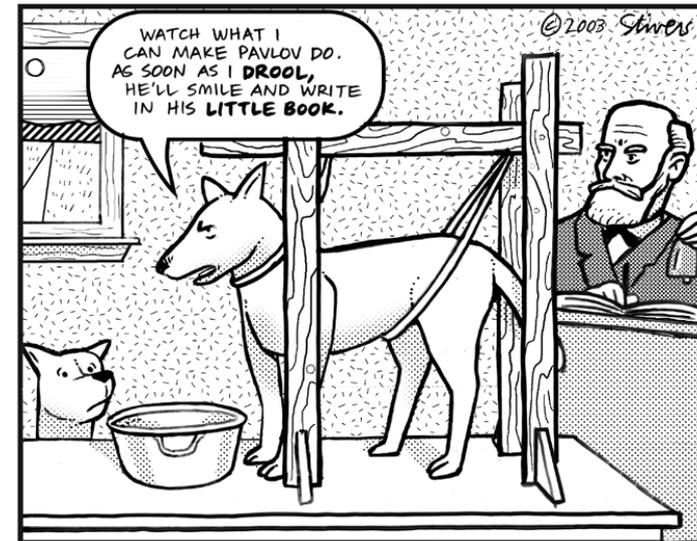




Illustration of Classical Conditioning

BEFORE CONDITIONING:

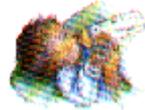


Sight of bottle — — — — — elicits — — — — — > No sucking (UR)
with nipple (CS)

DURING CONDITIONING:

(C) Show baby the a bottle and place its nipples in baby's mouth.

Repeat a number of times:



Touch of nipple (US) — — — — — elicits — — — — — > Sucking reflex (UR)

(paired with)



Sight of bottle — — — — — elicits — — — — — > Sucking reflex (UR)
with nipple (CS)

AFTER CONDITIONING

(D) Show baby the bottle with nipple:



Sight of bottle — — — — — elicits — — — — — > Sucking reflex (UR)
with nipple (CS)



Operant/Instrumental Conditioning (OP) – Skinner

Infants operate (act) on environment:

Stimuli following behavior affect chance of act occurring again.

Operant conditioning limited to sucking and head turning:

- Infants turn head for sugar-water reinforcer.
- Suck faster to see visual designs or hear music.
- Kick leg to see mobile move.

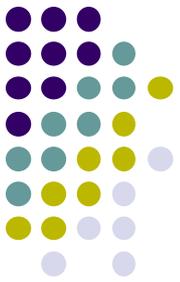




Studying Instrumental Conditioning in Infants

| Age Group | Learned Response | Reinforcement |
|------------------|-------------------------|-----------------------------------------|
| Newborns | Head turn to side | Drink of sucrose water |
| 3 weeks | Sucking pattern | Interesting visual display |
| 5–12 weeks | Sucking pattern | Keep a movie in focus |
| 6 months | Push a lever | Cause a toy train to move along a track |

Source: Bruner (1973); Hartshorn & Rovee-Collier (1997); Siqueland & DeLucia (1969); Siqueland & Lipsitt (1966)

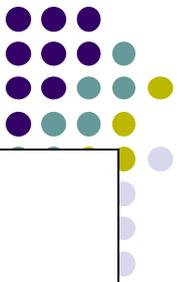


Novelty preference: Habituation & dishabituation

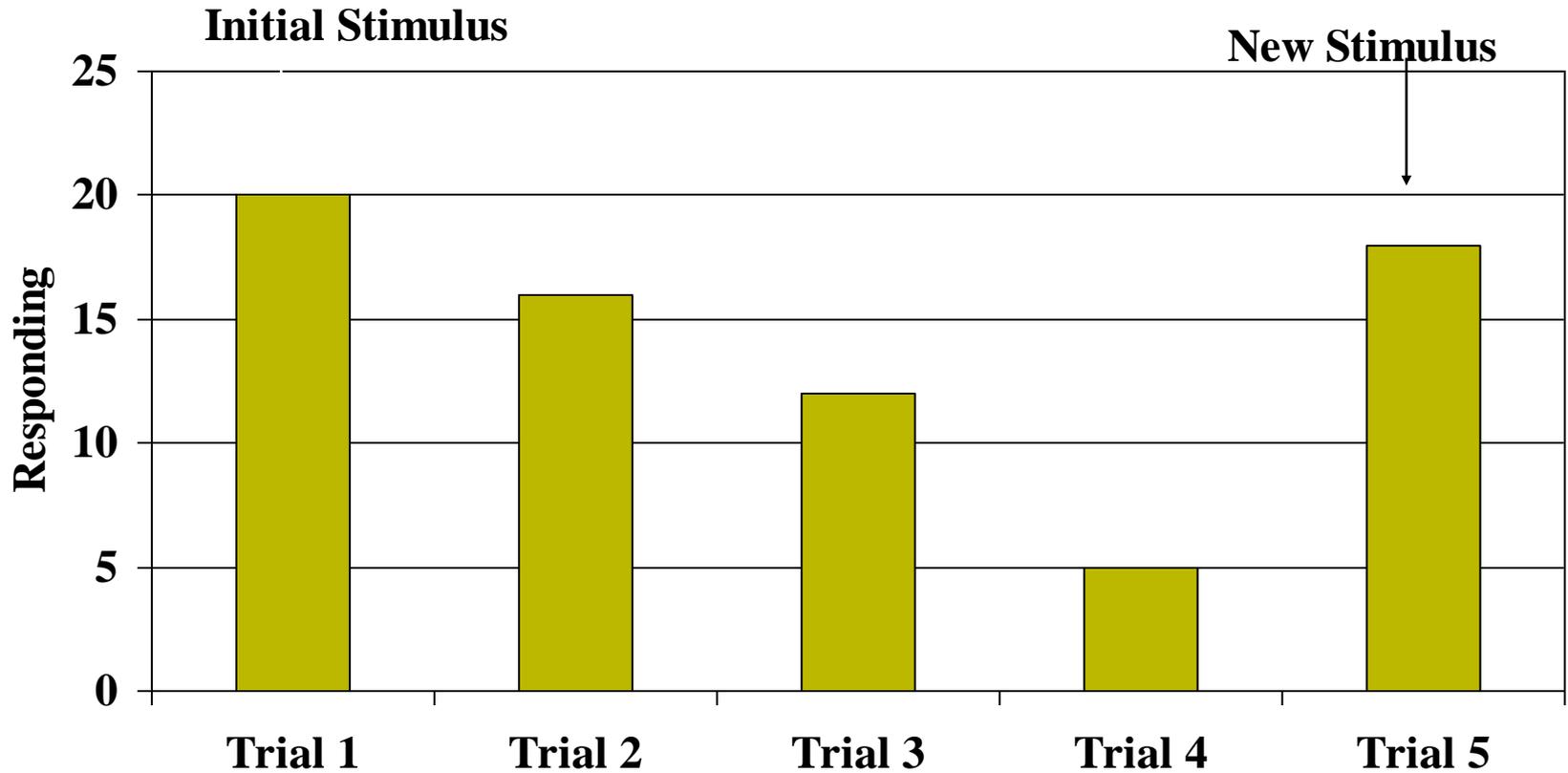
- Babies born with preference for novelty.

Habituation:

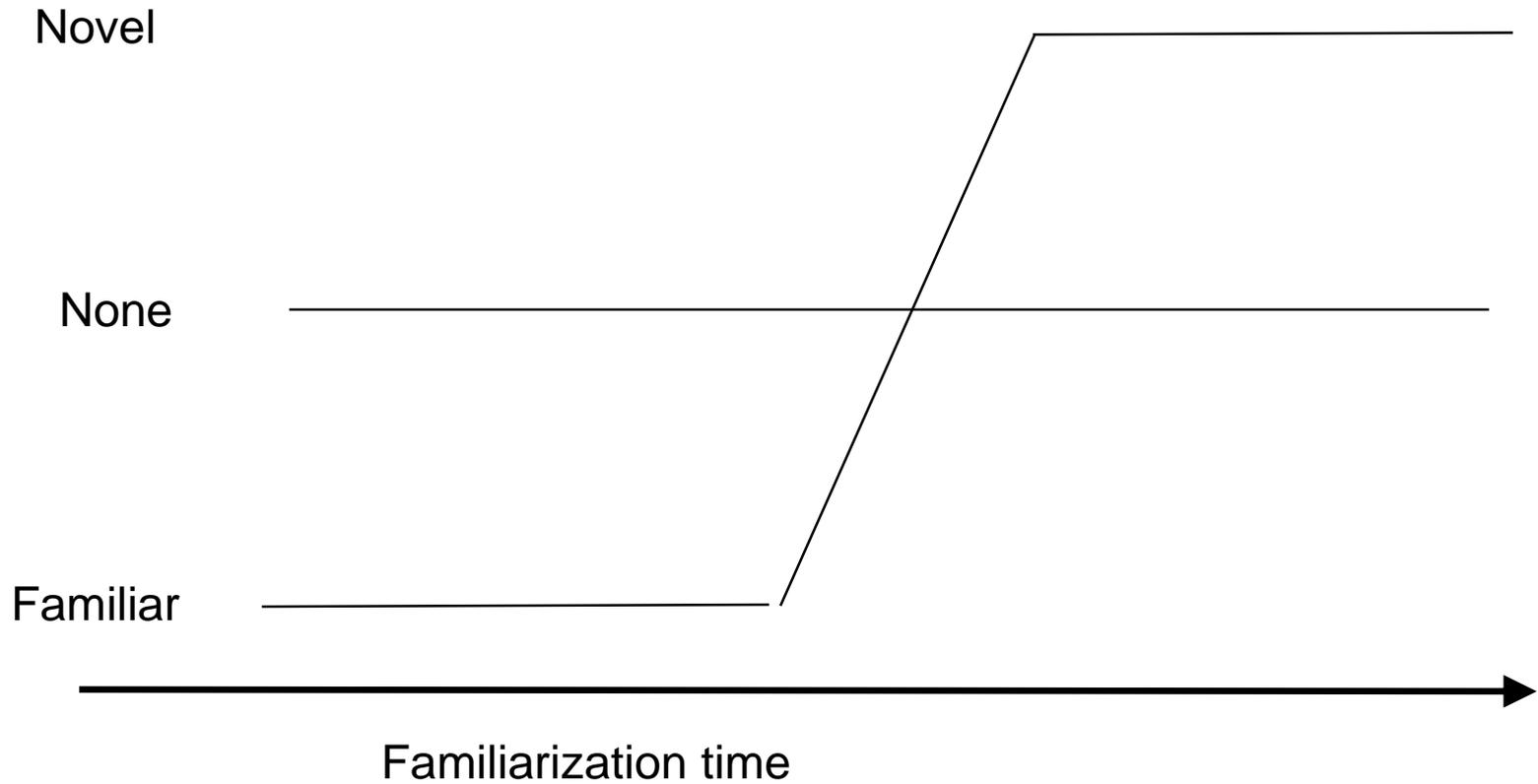
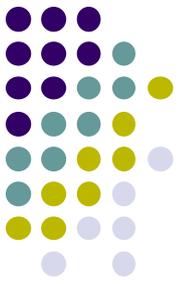
1. Repeated presentation of a stimulus leads to decline in interest
2. A new stimulus is then presented.
3. Renewed interest is called **dishabituation**.

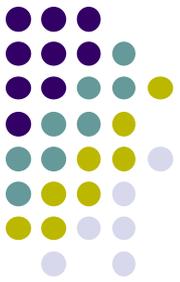


Habituation/Dishabituation



Familiarity vs. Novelty





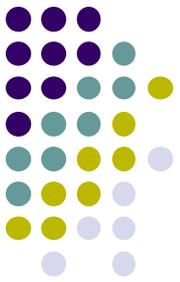
Novelty preference: Habituation & dishabituation

- Allows infants to learn about new things.

Type of study? Judging gender, beauty, categorization.

Habituation speed best IQ predictor: Infancy to 11 = .3 to .6



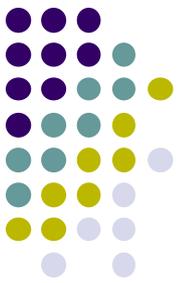


Imitation – evidence of recall

Neonates imitate facial expressions (Meltzoff & Moore, 1977).

Why? Disappears at 3 months. So, it is a reflex?





Imitation – evidence of recall

Neonates imitate facial expressions (Meltzoff & Moore, 1977).

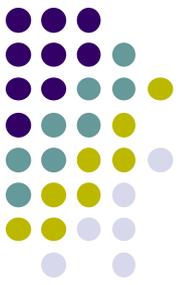
Why? Disappears at 3 months. So, it is a reflex?

- But **deferred imitation**: behavior modeled after adult stops – perhaps voluntary?

Helps baby share states: notice similarity of their behavior to others.

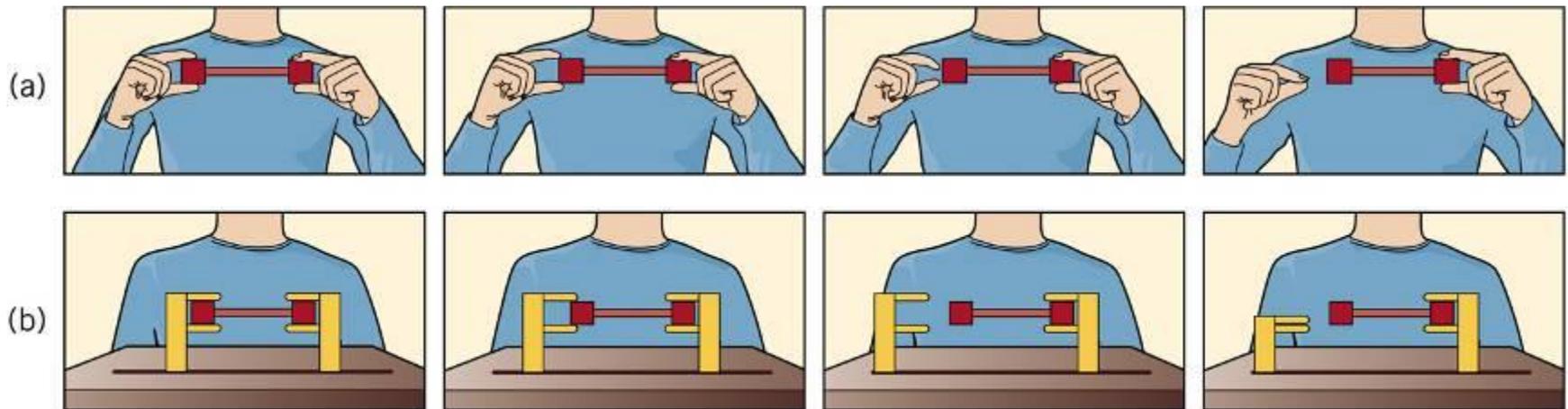
Question: How does baby know its tongue maps onto adult tongue?





Imitating Intentions

- When 18-month-olds see a person apparently try, but fail, to pull the ends off a dumbbell, they imitate pulling the ends off
- They do not imitate a mechanical device at all



Perception

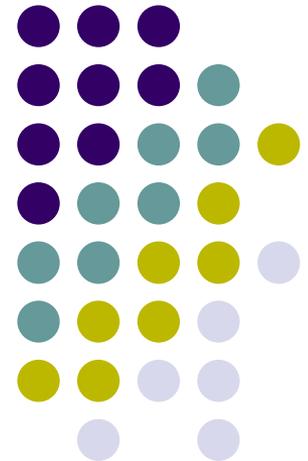
Vision

Auditory Perception

Taste and Smell

Touch

Intermodal Perception





Sensation and Perception

- **Sensation:** Refers to the processing of basic information from the external world by the sensory receptors in the sense organs and brain
- **Perception:** The process of organizing and interpreting sensory information about the objects, events, and spatial layout of our surrounding world



Touch



Fundamental means of interaction:
Important for early physical emotional growth.

- ❖ Few days: Mothers recognize infant by stroking cheek.
 - ❖ Most reflexes are touch related.
1. Infants put new objects to mouth and then look at it
 2. this exploratory mouthing stops at 6 months.



Newborns sensitive to:

Temperature: Cold more than hot.

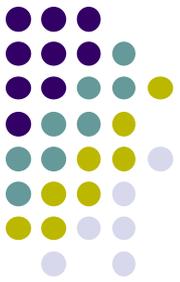
Pain: = ↑ heart rate, blood pressure.

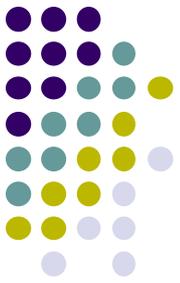


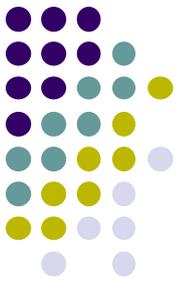
Taste

Infants suck sweet liquid longer than water.

- Newborns relax face with sweet things:
- purse lips with sour things:
- arch mouth with bitter things.







Smell

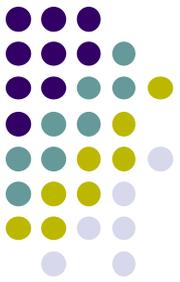
Neonates smile with banana, frown with rotten eggs.

They locate smells and turn away from nasty ones (NH₃)

- Breast fed newborns (only) recognize mother by smell.
- Bottle fed babies prefer lactating to non-lactating women.

Why? Important for survival to find right foods – milk.





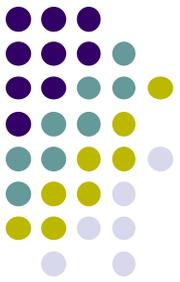
Hearing

- At 3 days, turn head to a sound.
- At 4 months, reach for sound in the dark (Clifton)
- By 8 months, reach for sound only if in range.



Very sensitive to human voice: By 3 months, infants:

1. Differ between ba, ga, ma, na.
2. Screen out sounds (speech and others) in other languages.



Hearing

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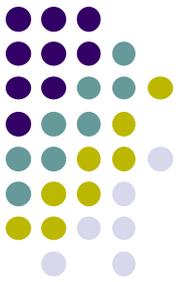


Very sensitive to human voice: By 3 months, infants:

1. Differ between ba, ga, ma, na.
2. Screen out sounds (speech and others) in other languages.

We make it easy—

Helps with emotions: 3-months-olds pick up feelings of others through hearing: before visual discrimination.



Vision

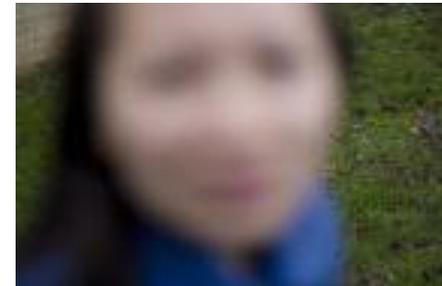
- Vision is the most important – but least mature sense.

Neonates' *lens muscles, retina, and optic nerve* underdeveloped.

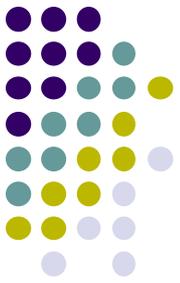
Born with poor **visual acuity**: see objects at 20ft as we see them at

But, infants actively scan visual field:

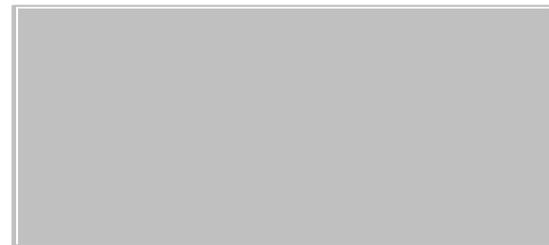
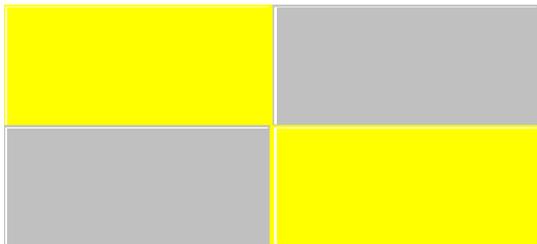
- By 3 months, they focus like adults
- By 6 months, visual acuity is 20/100.
- By 2 years, near adult level.



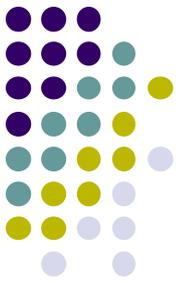
Color Perception



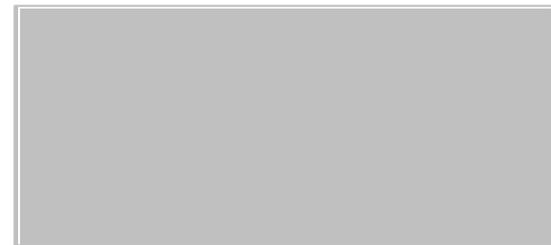
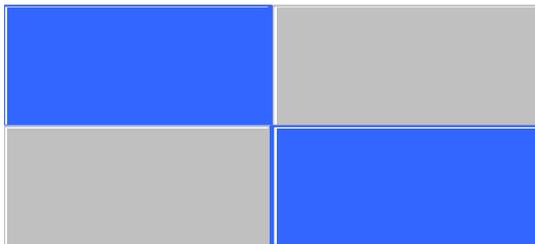
- Contrary to myth, newborns see color
- Preferential looking experiment with 1- to 5-day-olds
- Colors were either red, green, yellow, or blue

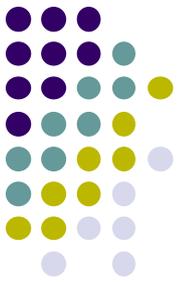


Color Perception



- Newborns could see red, yellow, and green
- Newborns could not see blue
- Adult-like color perception develops by 3 - 4 months of age





Depth Perception (DP)

Need DP to interact/explore environment (grasp, crawl, walk)

- World is 3D, but retinal image is 2D

Do young infants perceive depth?

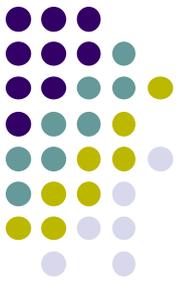


Depth Perception

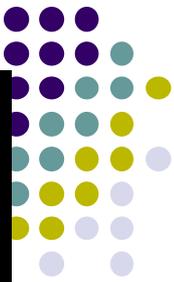
- This 7-month-old infant is using the monocular depth cue of relative size
 - Wearing an eye patch to take away binocular depth information, he is reaching to the longer side of a trapezoidal window
 - This behavior indicates that the baby sees it as the nearer, and hence more readily reachable, side of a regular window



Depth Perception

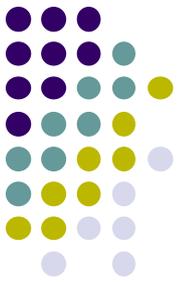


- Gibson & Walk (1960) - Visual Cliff
 - Found that the young locomote to shallow side and avoid the deep side, even if moms call the infant from deep side
 - Suggestion that age of crawling onset determined avoidance of deep side



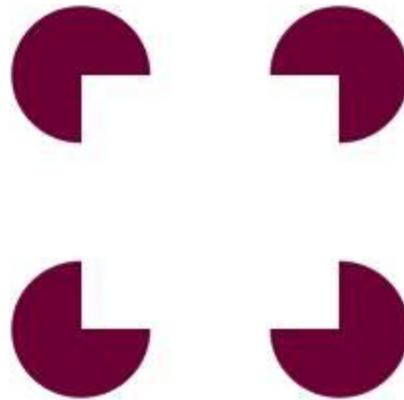
The Visual Cliff

© Worth Publishers

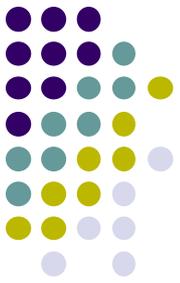


Pattern Perception

- Two-month-old infants can analyze and integrate separate elements of a visual display into a coherent pattern



- Seven-month-olds also see the overall pattern here and detect the illusory square



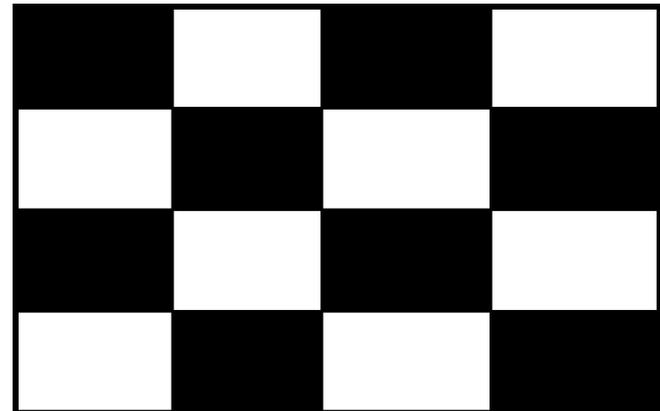
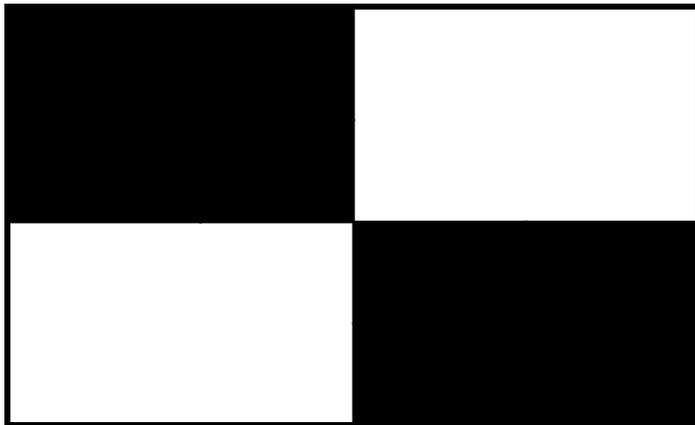
Pattern Perception

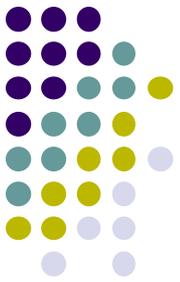
Do infants prefer some patterns?

Yes. Patterns rather than plain stimuli (scrambled face to b/w oval)

3 weeks: squared checkerboard.

8 weeks: squared checkerboard.





Pattern Perception

Do infants prefer some patterns?

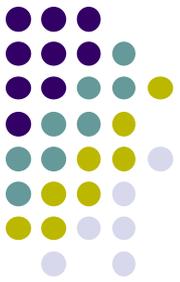
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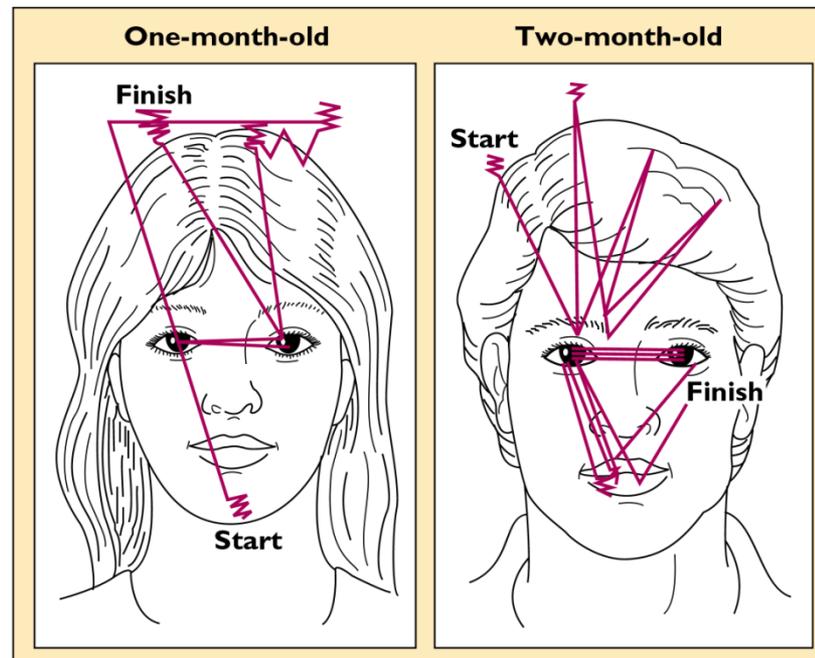
Contrast sensitivity

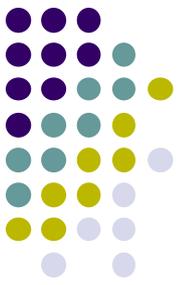
Why do babies prefer some patterns? **Contrast sensitivity.**



Combining pattern elements

- Neonates attend to high contrast areas – e.g., hairline of a face.
- 2 months: inspect internal features of shape (e.g. face).

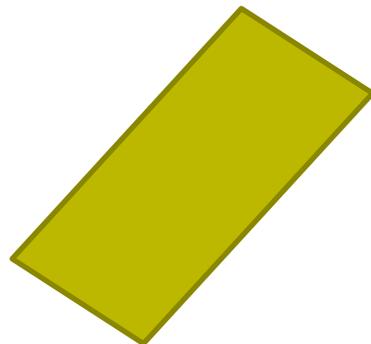




Combining pattern elements

- Neonates attend to high contrast areas – e.g., hairline of a face.
- 2 months: inspect internal features of shape (e.g. face).
- 2-3 months: combine pattern elements.
- 3 months: differ between human point-light display and disorganized version of same movement.

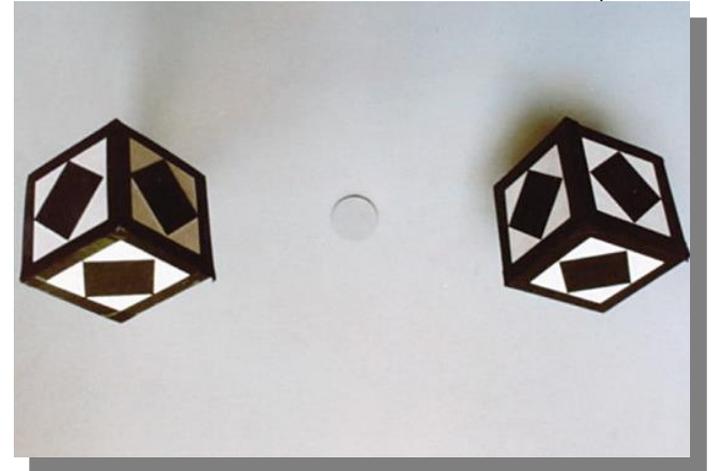
<http://www.biomotionlab.ca/Demos/BMLwalker.html>



Perceptual Constancy



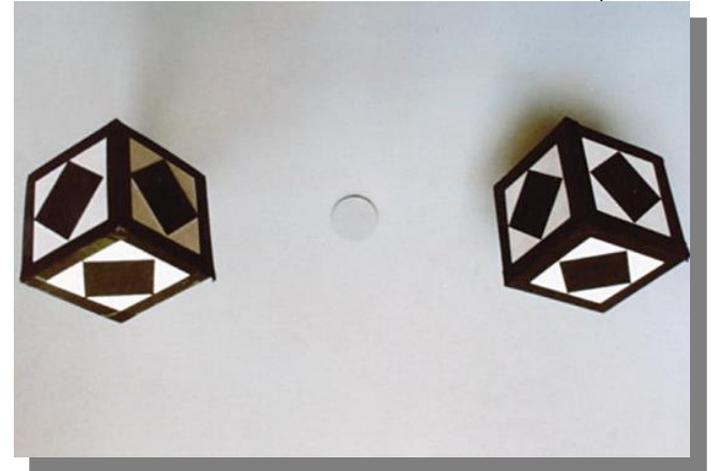
- The perception of objects as being of constant size, shape, color, in spite of physical differences in the retinal image of the object
 - If an infant looks at the larger, but farther away cube, researchers will conclude the child has size constancy



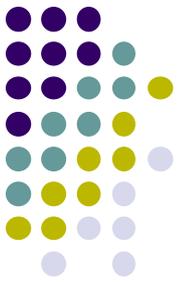
Perceptual Constancy



- The perception of objects as being of constant size, shape, color, in spite of physical differences in the retinal image of the object
 - If an infant looks at the larger, but farther away cube, researchers will conclude the child has size constancy
- Supporting the nativist position, visual experience does not seem to be necessary for perceptual constancy



Faces



- Newborns are drawn to faces because of a general bias toward configurations with more elements in the upper half than in the lower half
- From paying attention to real faces, the infant comes to recognize and prefer his or her own mother's face after about only 12 cumulative hours of exposure



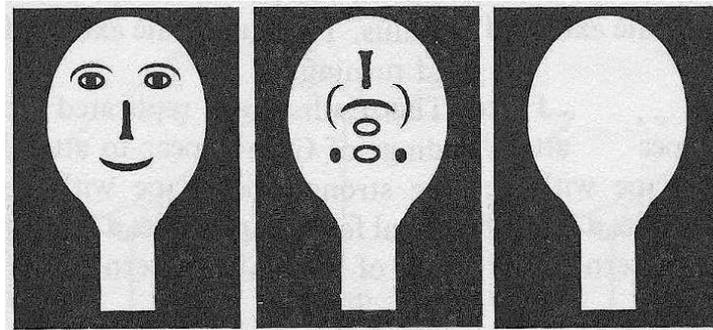


Perception of human face

Do babies have innate attention mechanism for faces?

- Neonates track a face-like pattern longer than others.

But: can't discriminate static face from equally complex pattern.

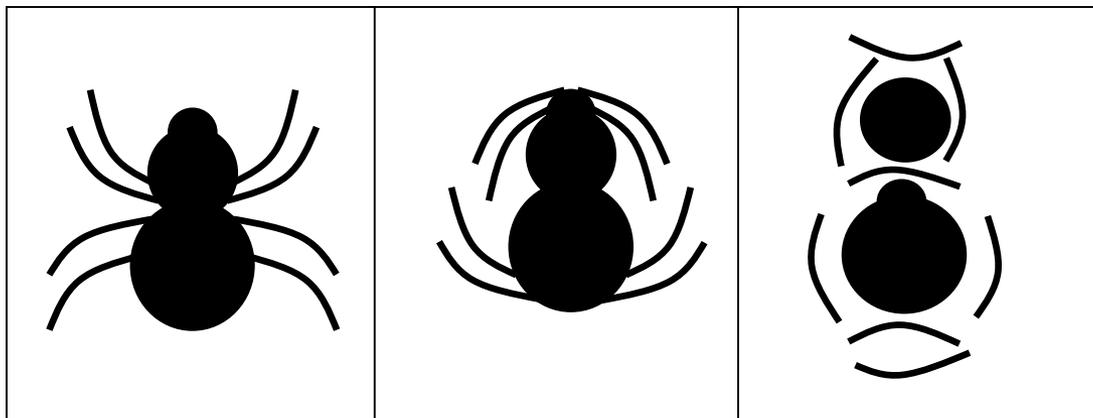
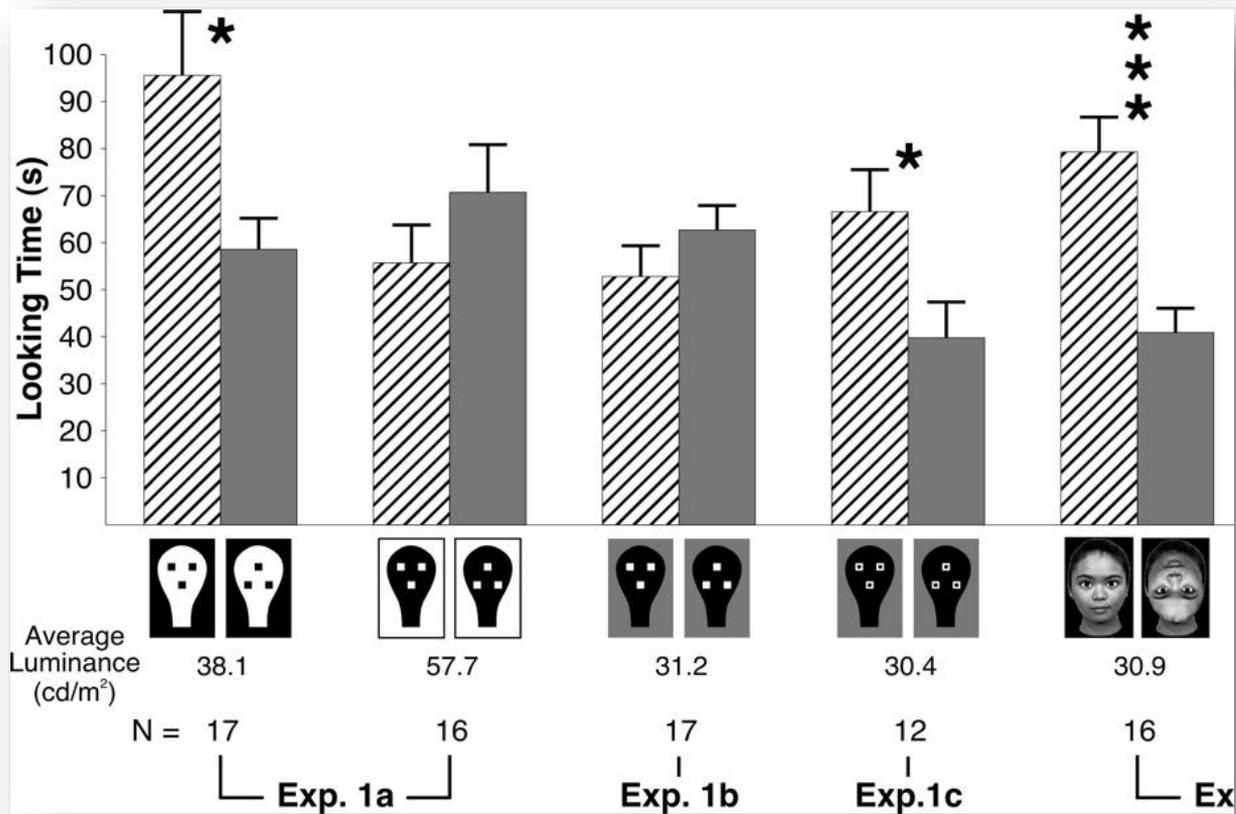


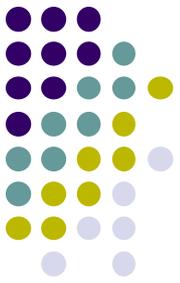
Face

Scrambled

Blank

Figure 1





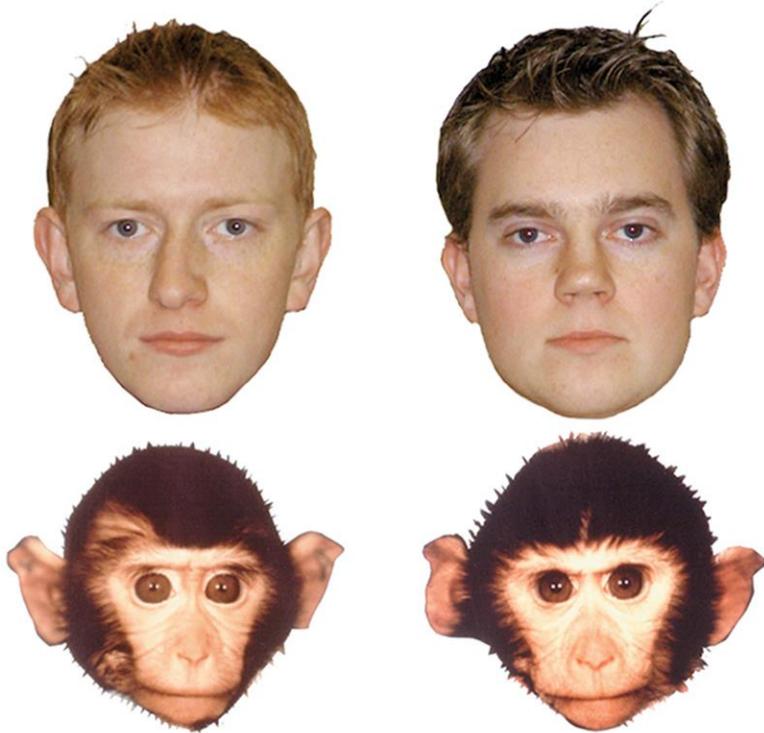
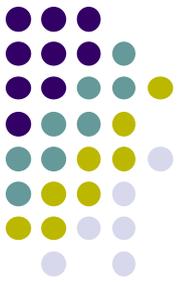
Perception of human face

By 2-3 months: prefer facial pattern to others, recognize mother
differentiate photos of 2 strangers

By 7 months: happy faces different from sad faces

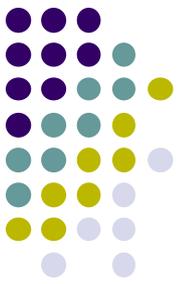
Remember: this evidence comes from studies with pictures

Same or Different?

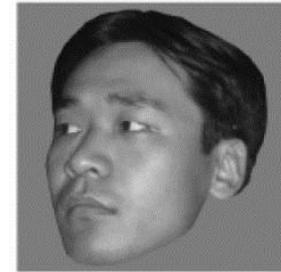
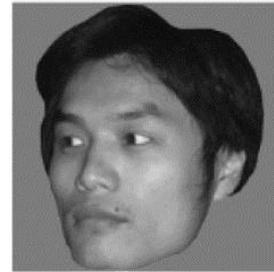


- **As an adult human, you no doubt can tell the two men apart quite easily, but you may still not be sure whether the two monkey photos are of different individuals or not.**

Same or Different Kelly et al. (2007)



3 months:



6 months:



9 months: only

