

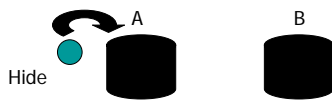
## Cognitive Development

- Neo-Piagetian Accounts
  - Object Permanence
  - Baby Physics
- Neonate and Infant Memory
- Infantile Amnesia
  - Potential Explanations

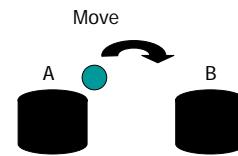
## Neo-Piagetians

- Agree w/Basic Stages
  - Faster
- Believe Piaget Underestimated Child's Capacities
  - Inter-sensory Relations
  - Object Permanence

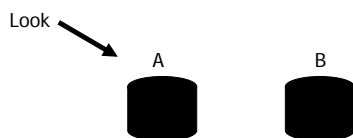
## A not-B Task (7-9 months)



## A not-B Task



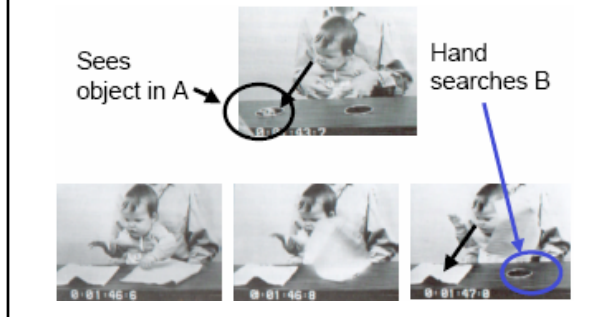
## A not-B Task



## Object Permanence

- Object Permanence or Memory Deficit?
  - Move from A → B forgotten
  - Search in A, not-B proactive interference
  - “Acquisition” of object permanence is change in memory ability rather than conceptual change
- Performance on A not-B task reflects immature motor control
  - Conceptual development there, but motor development not
  - Perseverative behavior not representative of underlying object permanence understanding

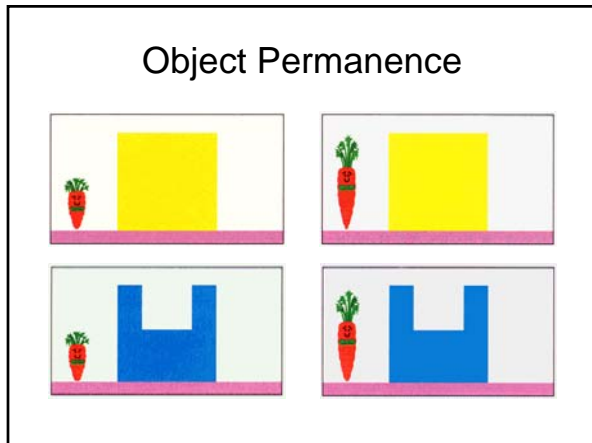
## B not-A Error



## Baillargeon

- Possible/Impossible Event Paradigm
- Possible Event
  - Consistent with expectation being tested
- Impossible Event
  - Inconsistent with expectation being tested
- If infant possesses knowledge/expectation
  - Find impossible event surprising
  - Look longer at impossible event

## Object Permanence



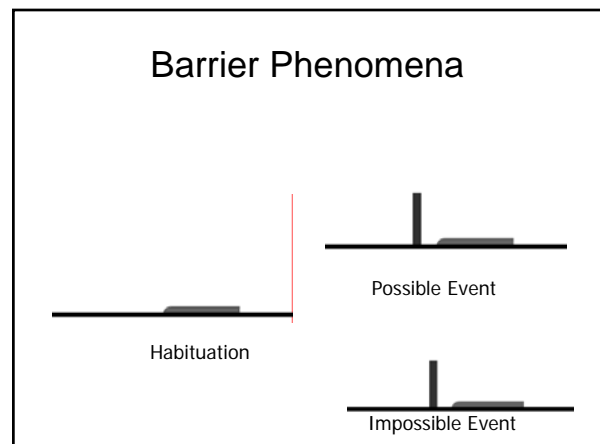
## Object Permanence

- Piaget's results on object permanence
  - infants' poor representational abilities?
  - Infants' poor motor abilities?
- Baillargeon's results controversial...

## Development of baby physics

- Predisposition to learn critical physical facts rapidly
- "...infants are not born with substantive beliefs about objects...but with highly constrained mechanisms that guide the development of infant reasoning about objects." Renee Baillargeon

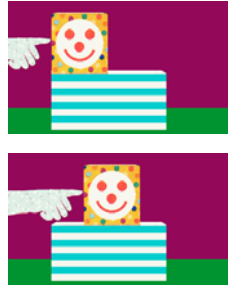
## Barrier Phenomena



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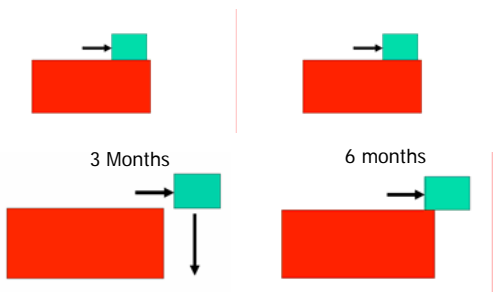
- 4.5 month-olds show surprise at impossible event
- Ability to detect more subtle variations increases with age
  - 4.5 month-olds can't predict where the screen should stop
  - 6.5 month-olds detect 80% variation
    - 157 degrees vs. 180 degrees

## Support Phenomena

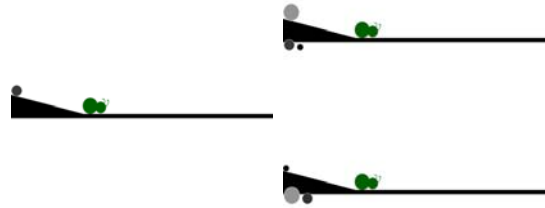


- 3 months
  - Only expect object to fall if it loses all contact with the platform
- 6 months
  - Understand notion of partial support

## Baby Physics



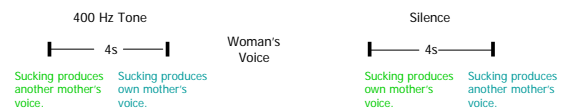
## Collision Phenomena



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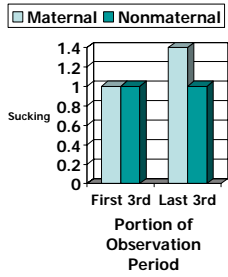
- 2.5 month-olds
  - Surprised if bug doesn't move when hit, or if it *does* move when it's *not* hit
  - Don't expect bug to roll farther when hit by big ball than small one
- 6 month-olds
  - Bug should roll farther when hit by big ball than small one

## Neonate & Infant Memory



- DeCaspar & Fifer
  - Babies can be conditioned to suck on an artificial nipple more or less frequently, depending on which action led to the voice of kid's mom

## DeCaspar & Fifer

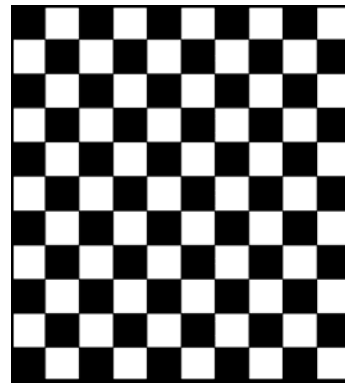
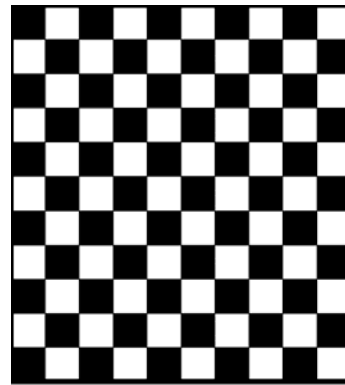


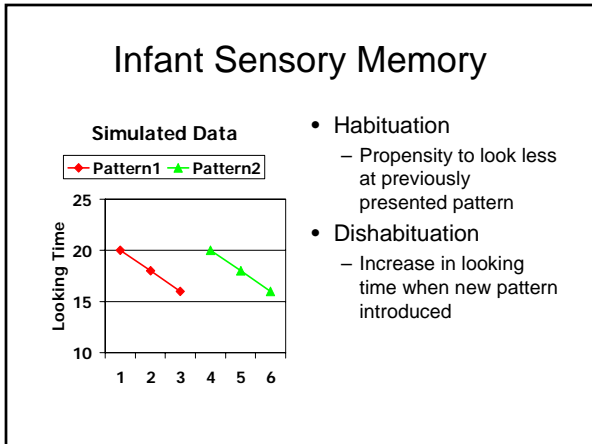
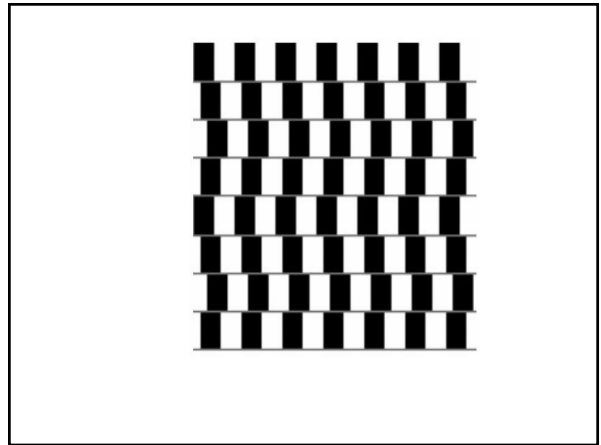
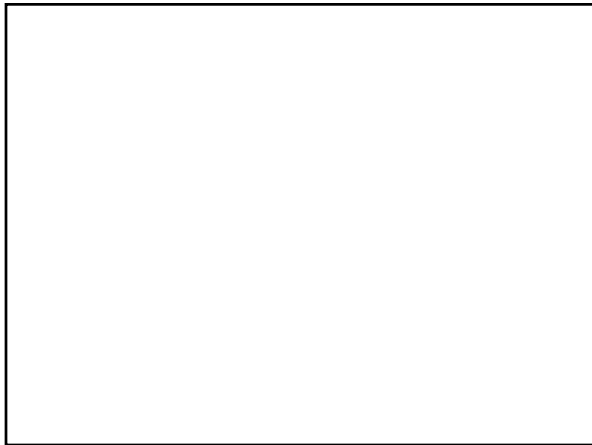
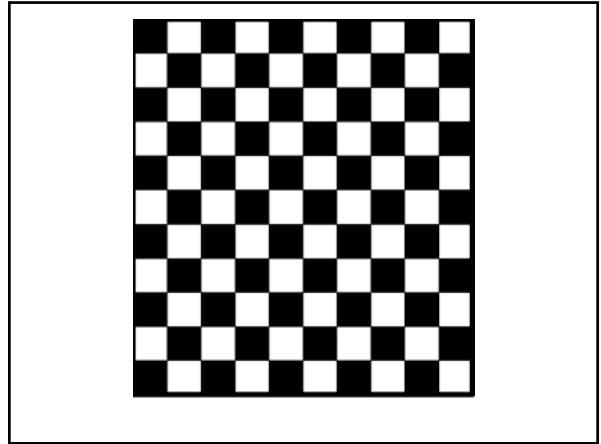
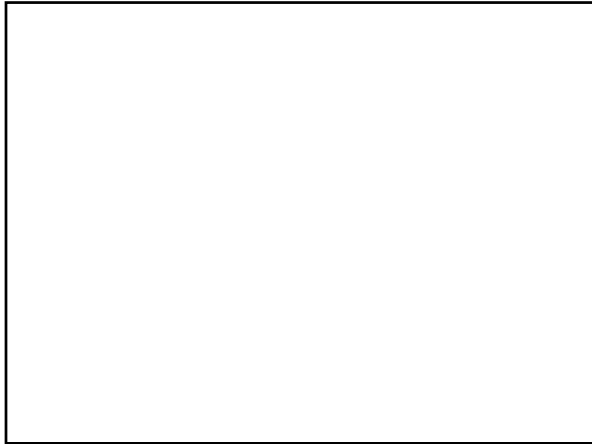
- Infants suck more actively when it leads to their own mother's voice

## Very early learning

Phenomenon	Measure	Age	Retention Interval
Prefer visual novelty	Looking time	1-4 days	(none)
Prefer mother's voice	Operant sucking	3 days	?
Prefer mother's smell	Head turning	6 days	?
Classical conditioning	Eyeblink	10 days	Brief
Classical conditioning	Eyeblink	30 days	10 days

## Habituation Paradigm





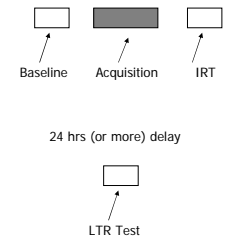
- ### Problems w/Habituation
- Do children prefer familiar or novel items?
  - Does failure to attend necessarily imply forgetting?
  - What about child's ability to use remembered info?

## Conjugate Reinforcement



## Rovee-Collier and Friends

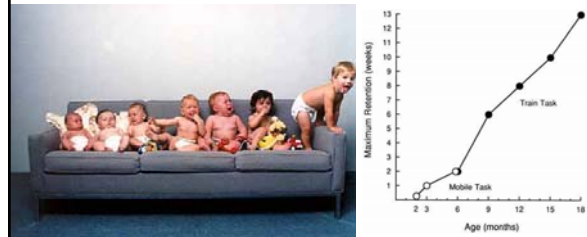
- Baseline (0-3 mins)
  - Measure baseline activity of baby's kicking
  - Attach ribbon to mobile
- Acquisition (3-9 mins)
  - Let baby experience leg-mobile connection
  - Detach ribbon from mobile
- Immediate Retention Test (9-12 mins)
  - Measure activity of baby's leg



## Do babies remember?

- Retention
  - LTR Kick-rate: Baseline Kick-rate
- Forgetting
  - LTR Kick-rate: IRT Kick-rate
- Findings
  - 2-month-olds retention of 1 day
  - 3-month-olds retention of 1 week

## Continuity of Memory Development



## Train Task

74 Harshbom and Rovee-Collier

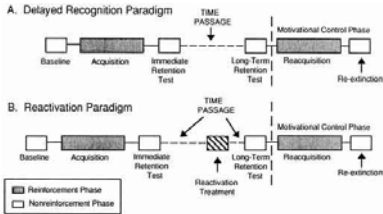


**FIGURE 1** The experimental arrangement used with 6-month-olds, shown here during a reinforcement phase. Each lever press moves the train for 2 s and turns the light on and off for one cycle; presses made while the train is in motion are recorded but do not affect the reinforcing event.

## Do babies have implicit or explicit memory?

TABLE 1 Common Distinctions Between Implicit and Explicit Memory	
Implicit memory	Explicit memory
early-maturing	late-maturing
nonepisodic	episodic (particular time/place)
without conscious awareness	with conscious awareness
general	specific
abstract	concrete
automatic	strategic
context-free	context-dependent
all-or-none	partial retrieval (decay effects)
perceptually weighted for form	weighted for function/meaning
incidental	intentional
nonassociative	associative

## Recognition & Priming?



## “Reactivation”



## Explicit/Implicit Mem Systems

- Recognition and Priming dissociate in adults
  - Magnitude of recognition decreases with interval between study and test, but magnitude of priming is all-or-none
- Delayed Recognition and Reactivation dissociate in infants
  - At 3 and 6 mos. magnitude of recognition decreases w/interval, but magnitude of reactivation effects is all-or-none

## Context-dependence



- Implicit memory is context-independent
- Explicit memory context-dependent
- Train in bedroom, test in kitchen (same crib)
  - Evidence of recognition present only when tested in same room

## Deferred Imitation

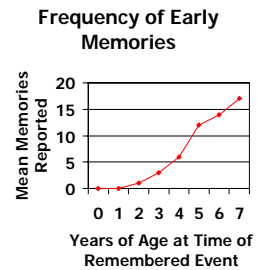
bauer\_fig1



- Evident in children as young as 6 months
- Not evident in adult anterograde amnesics

## Infantile Amnesia

- Inaccessibility of early childhood memories
  - Very Few Memories from Before Age 4
  - Almost No Mem from Before Age 2



## Bruce (2000)

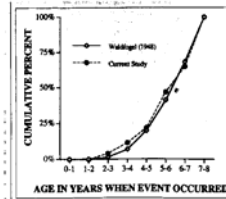


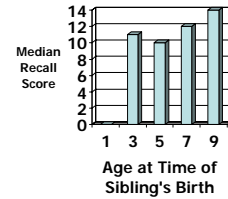
Fig. 1. Cumulative relative frequency distributions for persons' memories reported in Wadlington (1943) and the current study.

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## Specific Datable Event Mem

- Sheingold & Tenny
- Study 1
  - Kids quizzed about sibs' birth
  - 4s, 8s, & 12s all remember 10-12 items
- Study 2
  - Asked teenagers what they remembered about sibs' birth
  - 9 yrs = 3 yrs
  - < 3 yrs No memories

### Recall of Siblings' Birth



## Explanations

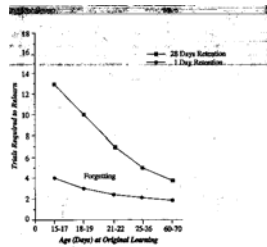
- Amnesia, what amnesia?
- Repression
- Episodic memory formation deficit
- Change in Encoding Techniques
- Context-dependence
- Neural reorganization

## Amnesia, what amnesia?

- Normal Forgetting
- But
  - 80-year-olds can remember when they were 10 years old (retention interval 70 years!)
  - Wetzler & Sweeney: Disproportionate loss of early memories

## Repression

- Freud
  - Greedy thoughts and desires (selfish Id)
  - Sexually inappropriate thoughts
- *But* animals show infantile amnesia as well
  - Rats
  - Guinea pigs



## Episodic memory formation

- Lack brain structures for episodic memory formation?
  - Medial temporal lobe structures
- But toddlers can recall episodic memories (just not when asked later)
- Habituation/Dishabituation
  - Babies habituate
  - Monkeys habituate
  - Monkeys with medial temporal lobe lesions don't habituate

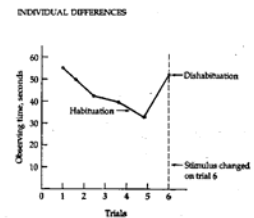


FIGURE 12.1 This shows the change in observing time if dishabituation occurs.



## Encoding Techniques

- Language acquisition
- Storytelling ability

## Context-dependence



- Internal context radically different in infancy and adulthood
- Physical perspective
- Language acquisition (2-4 yrs)
- Sense of self