

Motor Development



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Physical & Motor Development

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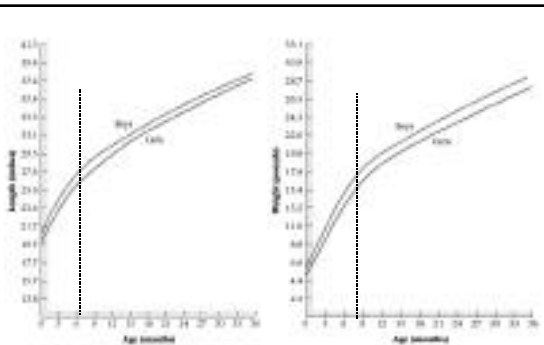
Physical Development

- Growth in bones
 - Lengthen
 - Harden
- Growth in Muscle
 - Lengthen
 - Thicken
- ****Physical development necessary for locomotion.**

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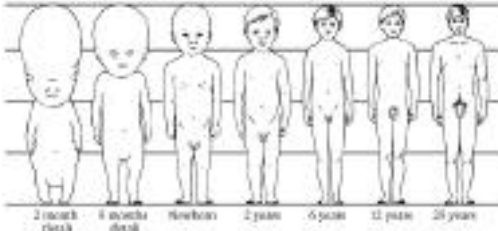
Growth in height and weight from birth to 3 years

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Physical Development (cont)



Change in body proportions with age

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Brain Developments (3-12 mos)

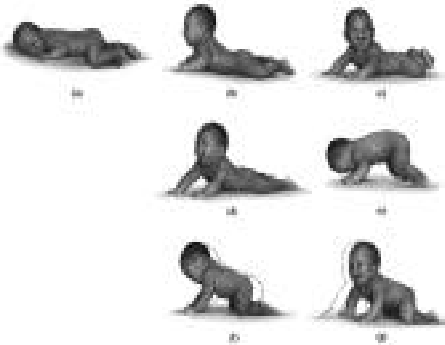
- Explosion in rate of synaptic density
 - Pruning (Use it or lose it)
- Major synaptic growth in motor cortex - 6 mos.
- Frontal cortex development
 - Control of Inhibition (self-regulation)

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Development of Locomotion



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Video

- Myrtle McGraw
- Esther Thelen
 - **reaching**
 - **stepping reflex**
 - **contextual influences on behavior**
 - **Sequence and timing of motor development**
- Microgenetic method

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Prenatal Period

- Motor activity believed to promote other aspects of development
 - Synaptic development and pruning

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What about later?

What influence does locomotion have on development?

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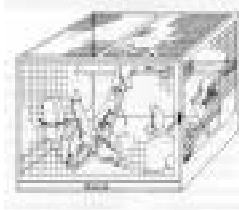
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Rosensweig, et al 1972

Procedure.

- Rats raised in 3 environments
 - Normal-isolated
 - Normal-group
 - Enriched-group



Results

- Neuroanatomical changes:
 - wt of cortex, brain enzyme for learning, synapses, cell bodies
- Behavioral effects-learning
- Watching doesn't work

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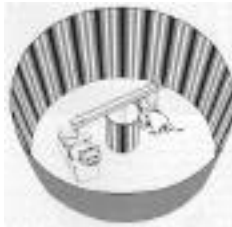
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Held & Hein, 1963

Method

- Kittens raised in darkness
 - Only visual experience in kitty carousel
 - I.V.: Half controllers, half passengers in carousel
- D.V. Performance on "visual cliff"



(From Held, 1965)

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• Result

- Kittens who controlled the movement of the carousel
 - avoided the cliff
 - physically adjusted for the "fall"
- Passenger kittens
 - Did NOT avoid cliff
 - Did NOT physically adjust for the "fall"

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But what about Humans?

- Visual Cliff
 - Major Finding
 - Before 6 mo babies don't avoid the visual cliff and cross it.
 - Interpretation
 - Before 6 mo babies depth perception is undeveloped.
 - But there is a confound (2 things varying systematically)
 - Age and locomotion ability

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Bertenthal, et al., 1994

•Method

Participants: Crawlers at 6, 7, or 8 mos.

Procedure: Assessed on Visual cliff (Gibson & Walk)

I.V. Crawling for 11 or 41 days

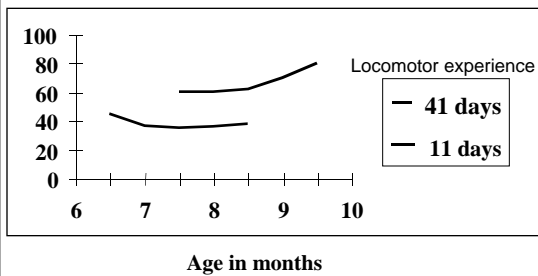


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Percent of infants avoiding deep side of cliff



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So, is it locomotion itself that influences performance?

OR, is it experience falling?



Campos, Bertenthal, & Kermoian, 1992

• Method

- Participants: 7 mos. old infants
- Procedure: 4 groups
 - Prelocomoters w/walkers
 - Prelocomoters w/out
 - Locomoters w/walkers
 - Locomoter w/out
- Dependent Measure: heart rate response on visual cliff (Wariness/fear of heights)

Campos, Bertenthal, & Kermoian, 1992

- Results
 - Prelocomoters w/walkers = locomoters without
 - Prelocomoters w/out walkers (no change)
 - “Double dose” locomoters (w/walkers) greatest change
- Conclusion
 - Locomotion not age is causal factor in the development of wariness of heights

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Bertenthal, et al., 1994

- Method
 - Participants: Infants who began to crawl at 6, 7, or 8 mo.
 - Procedure: Assessed after crawling for 11 or 41 days
- Dependent Measure: Spatial search



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Object Permanence Task (Piaget)



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Number of infants showing correct and incorrect search on 1st trial

Infant group	Search	
	Correct	Incorrect
Precrawling	5	15
Belly crawling	3	7
Hands-and-knees crawling	13	5

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Benson & Uzgiris, 1985

- Participants: 9- to 12-month old infants
- Method:
 - Hidden objects Task
 - Training - Movement 180° around hiding box
 - Independent Variable
 - Self-Initiated Movement (SIL) vs carried
- Result
 - SIL more frequently correct

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Conclusion

- ★ Active interaction with environment promotes development of:
 1. Depth Perception
 2. Wariness of heights (emotional development)
 3. Spatial Relations (search tasks)

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Effects of locomotion on social relationships

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Biringen, et al., 1995

- 3 sessions
 - 9 1/2 mos. (all crawling)
 - 12 months (some walking-matched control)
 - 14 mos. (all walking)
- Categorized infants as earlier vs later walkers

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Measures -Biringen, et al

- Videotaped home observation
 - Rated maternal sensitivity
 - Infant responsiveness
 - "Test of wills"
- Bayley Infant Scales: mental & motor abilities
- Maternal perceptions of infant emotions

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Findings -Biringen, et al.

- Earlier walkers had less positive relations
- More testing of wills (esp. boys)
- No cognitive differences.
- Later walkers more stable affective relationship.

- Conclusion
 - When infants start walking has an impact on their social relationship with their caretakers

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Conclusion

- Timing of transitions is important!

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Piaget's Theory (Constructivist)

- Action
- Reflex schemas
- Motor activity
- Assimilation/accomodation

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Fundamental Principles of Development

- Regressions are common
- Development proceeds unevenly
- Wide individual differences
- Timing is important
- Importance of context
- Sequence is fundamental
- Stagelike changes

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