Brain Science: How Early Experiences Shape the Brain

Sarah E. belly
Director of Outreach and Education
Institute for Learning & Brain Sciences
Same or Different?
<table>
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<th>English</th>
<th>Spanish</th>
<th>Hindi</th>
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Same or Different?
The Genius of Children

Adapted from Johnson and Newport, 1989
Rapid Brain Growth

- Birth: 25%
- 1 year: 70%
- 3 years: 85%
- 5 years: 92%
- 7 years: 95%
- 10 years: 98%
- Adult: 100%

Gray’s Clinical Neuroanatomy, 2010
Neurons Make Connections

When we learn something new...

...we build connections between neurons

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Building an Ecosystem
Experience Drives Connections

Newborn  1 Month  3 Months  6 Months  1 Year  2 Years  4 Years  6 Years
A Thriving Brain

Blooming

Pruning

Thriving

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Bursts of Brain Growth

- Sensory
- Language & motor
- Higher cognitive

Plasticity vs. Development
Looking Inside the Brain (MEG)
Language Regions

Language Perception

Language Production
Building a Coordinated Brain

Language Perception

Newborn

6-month-old

12-month-old

Language Production

Adapted from Imada et al., 2006
Specializing Based on Experiences

Strength of Brain Response

SPANISH

Bilinguals

ENGLISH

Monolinguals

Ferjan Ramirez et al., 2016
Experiences Impact Brain Processing

Raizada et al., 2008
Brain: Biology + Experience
Components of nurturing care

- Good Health
- Adequate Nutrition
- Opportunities for Early Learning
- Security and Safety
- Responsive Caregiving

Unicef, World Bank, WHO
Social Learning is Key

Live Interaction  DVD Session  Audio Session

Do infants learn to discriminate Mandarin sounds?

Kuhl, Tsao & Liu, 2003
The Power of Touch

Meltzoff et al., 2018
Relationships Build the Brain

Meltzoff et al., 2018
Types of Stress

- TOXIC
- TOLERABLE
- POSITIVE
Back and Forth Interaction

Roseberry, Hirsh-Pasek, & Golinkoff, 2014
Sort cans of fruit from cans of vegetables

“How do we cook asparagus?”

“Milk comes from a cow. What else comes from a cow?”

“Squash”
“Dairy”
“Eggplant”
Parentese Boosts Language

↑ Infant-Directed Speech
↑ Babbling

↑ Infant-Directed Speech at 12 m
↑ Vocabulary at 24 m

Garcia-Sierra et al., 2011
Exploration for Learning

Bonawitz et al., 2011
The Power of Social Activities

Social Activities:
• Boost motivation
• Prolong focus
• Raise scores
• Increase confidence

Master et al., 2017
Where are children?
• **Children** thrive when…
  • their basic needs are met
  • they are in the context of relationships with caring and responsive adults

• **Parents** are best able to support children when…
  • their basic needs are met
  • they have time to engage with their child
  • their stress level is low or manageable
Parent Coaching Works

- Coach feedback on recordings of language at home
- Listen to audio samples
- Discuss upcoming language milestones
- Find times for interactive activities, like book sharing

Ferjan Ramirez et al., 2018
Parent Coaching Works

- **Language to child**
- **Parentese**
- **Babbling**

Ferjan Ramirez et al., 2018
What skills will the next generation need?
What skills will the next generation need?

- Solve Problems
- Lead and follow in play
- Self-regulate
- Control impulses
- Is aware of emotions
- Understands routines
- Explore the environment
- Take turns & seek help
- Shift attention well

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I-LABS Training Modules

The Latest Research

modules.ilabs.uw.edu

About the Youngest Minds

Free resources

Also available in Spanish, Somali, and Vietnamese.

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