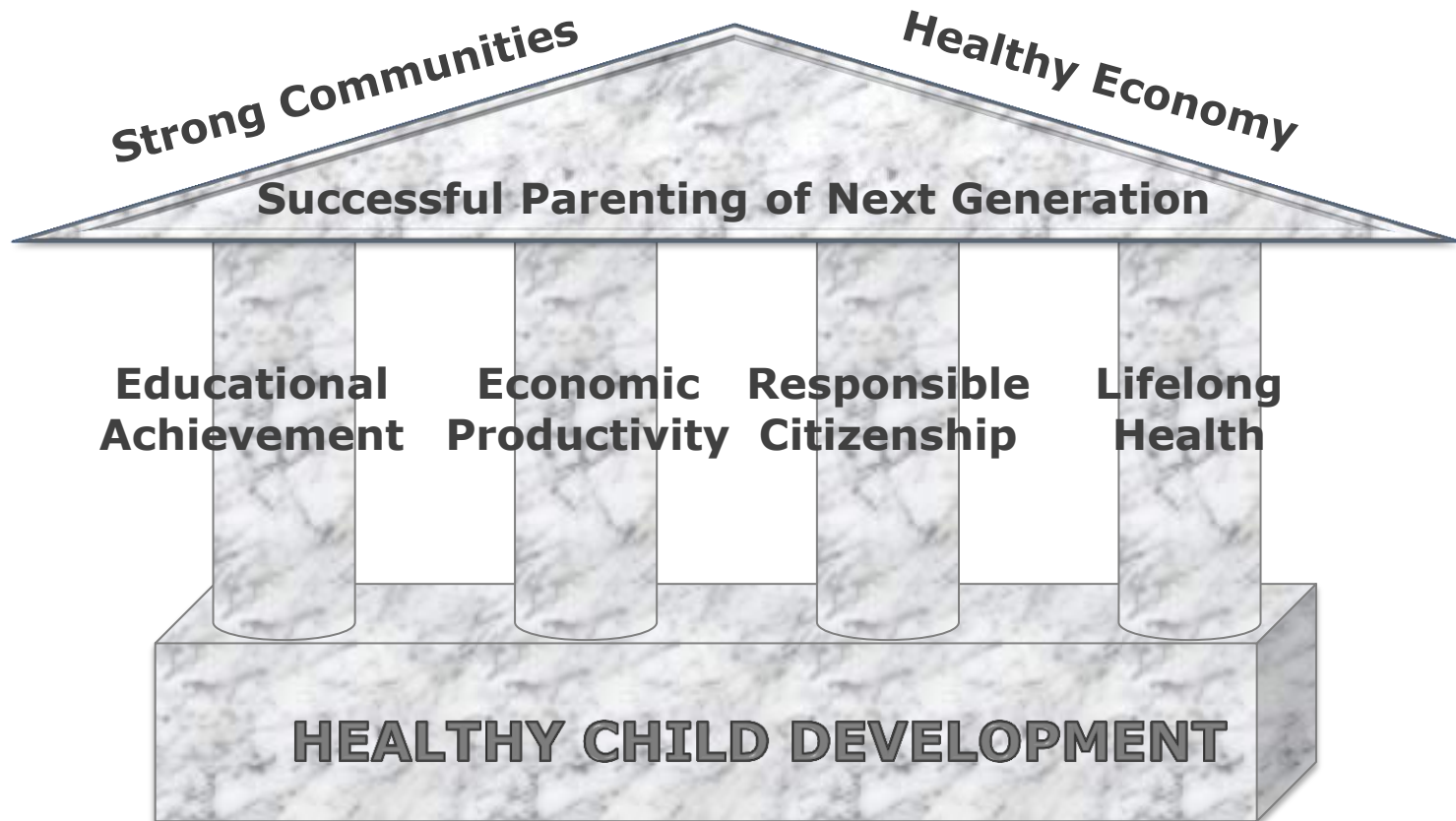


RECOVERY
FROM
ADDICTION

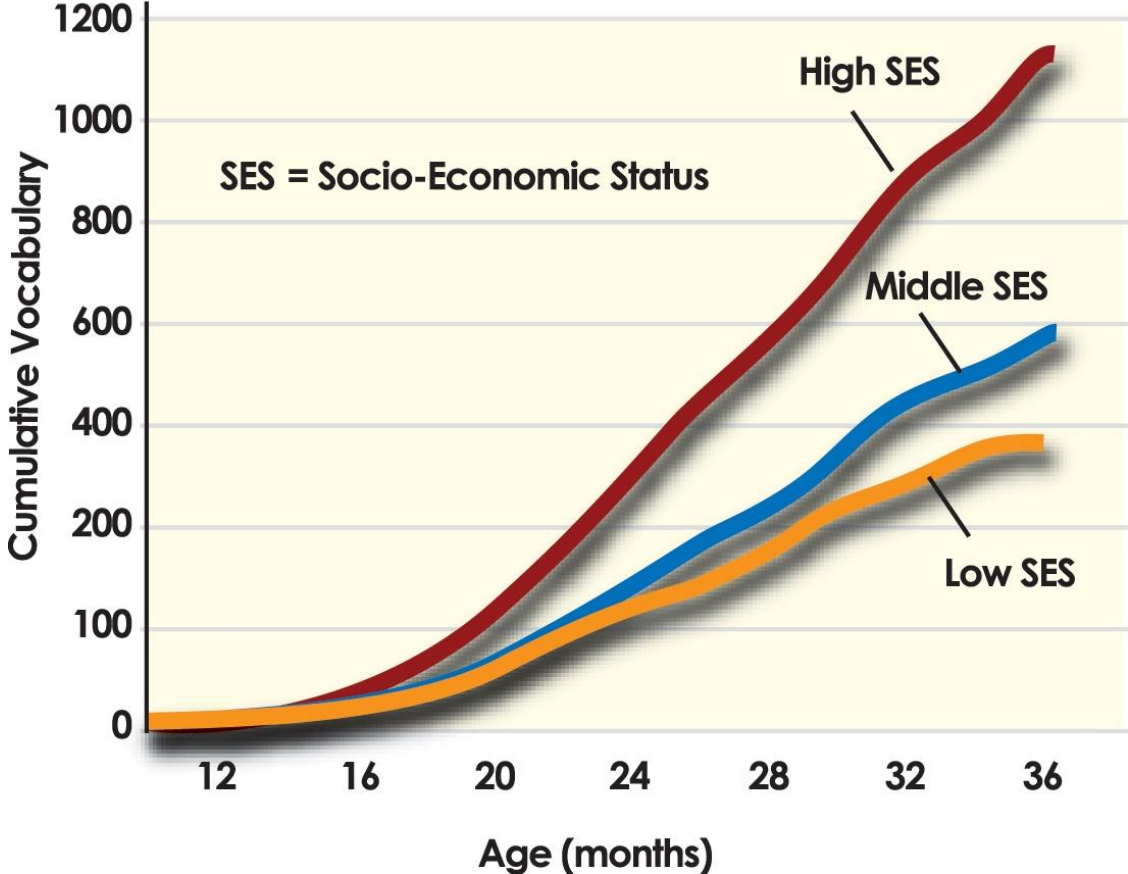
THE CORE STORY OF BRAIN DEVELOPMENT

Judy L. Cameron, PhD
University of Pittsburgh

The Foundation of a Successful Society is Built in Early Childhood

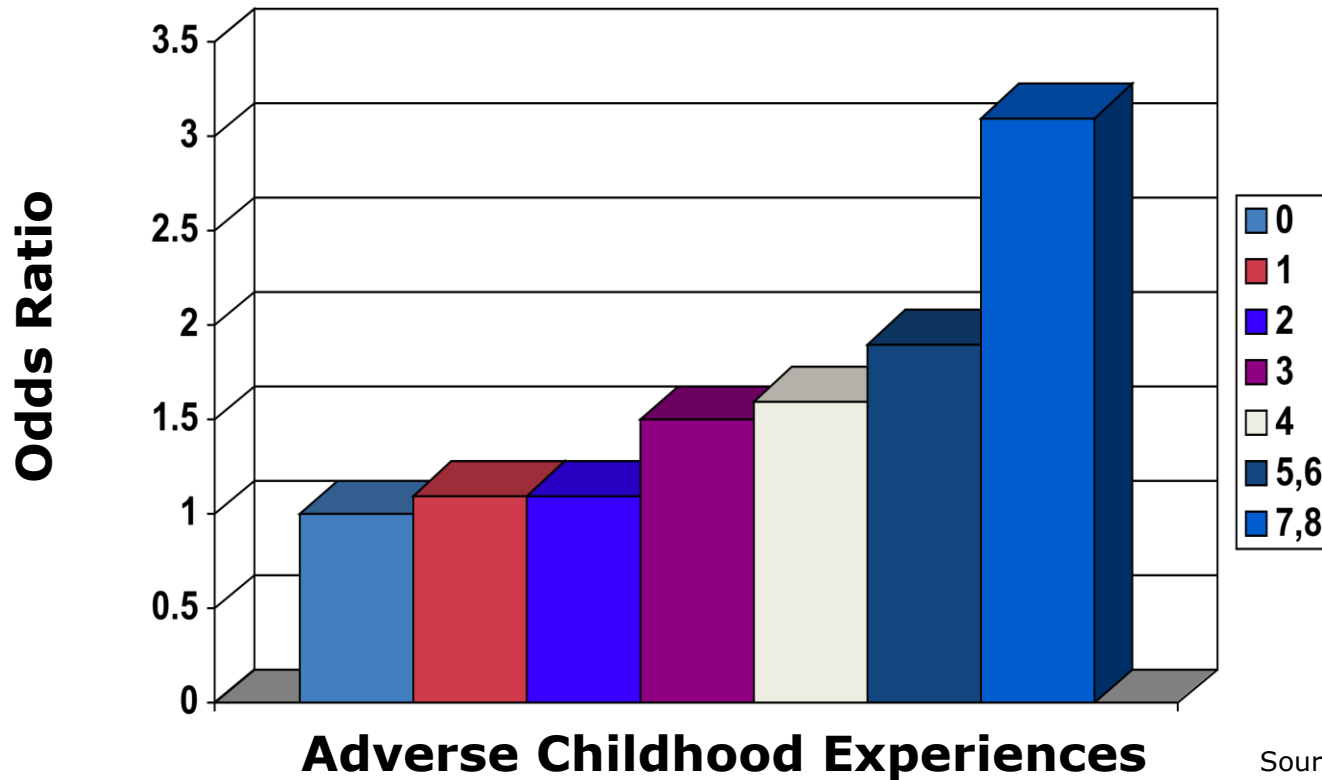


Disparities in Early Vocabulary Growth



Source: Hart & Risley (1995)

Adverse Childhood Experiences and Adult Cardiovascular Disease

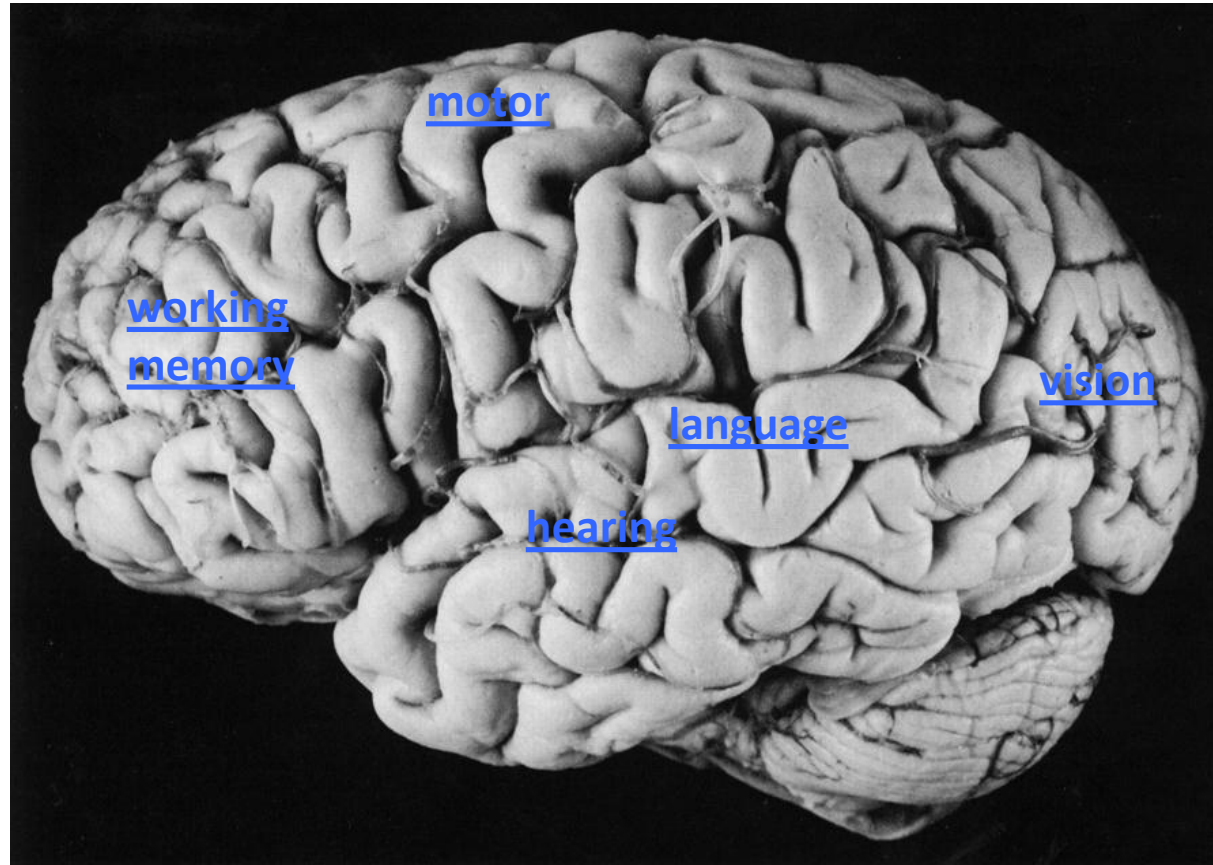


Source: Dong et al, 2004

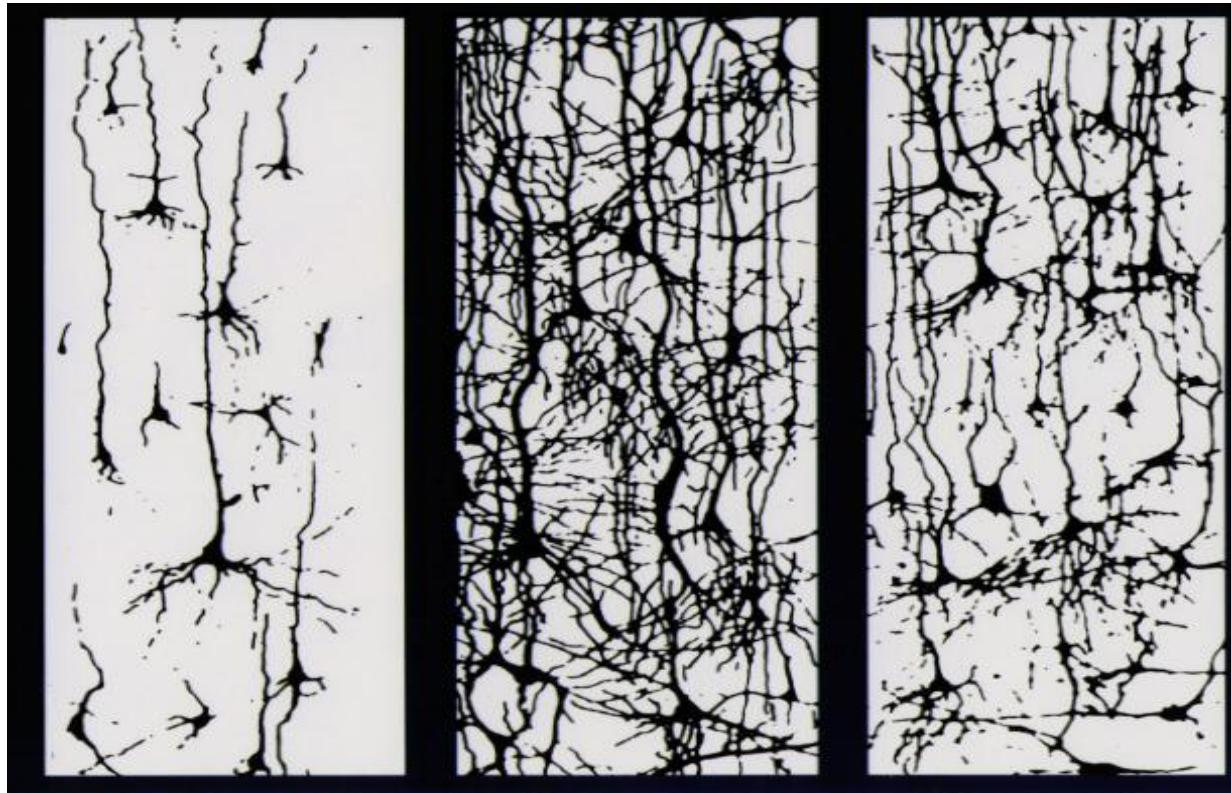
Concept #1: Brains and Skills Are Built Over Time

- **The early years of life matter because both early experience and genes affect the architecture of the maturing brain.**
- **As it emerges, the quality of that architecture establishes either a sturdy or weak foundation for all the learning and behavior that follow.**

Brain Architecture is Organized into Specialized Functional Areas



Experience Shapes Brain Architecture by Over-Production Followed by Pruning



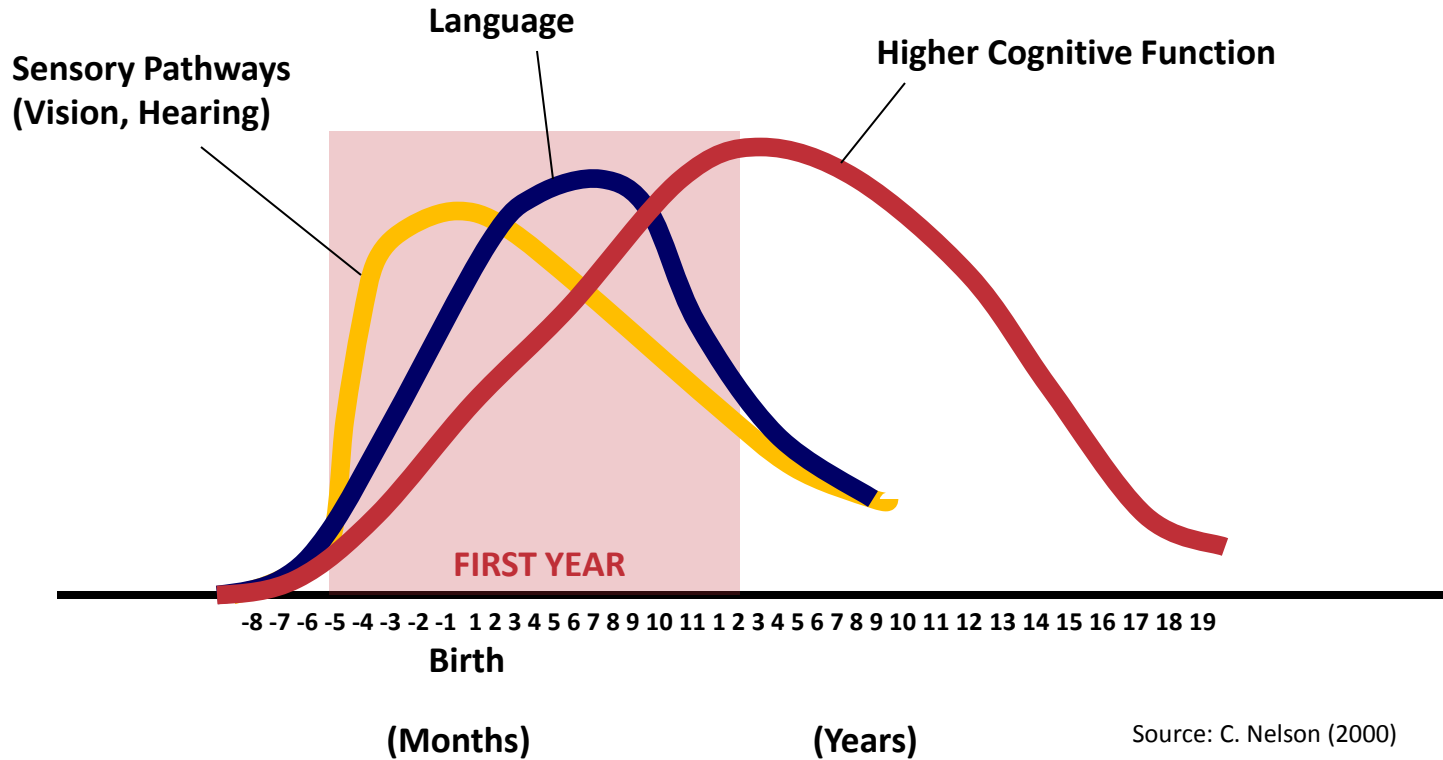
birth

3 years

14 years

Neural Circuits are Wired in a Bottom-Up Sequence

(700 synapses formed per second in the early years)



Source: C. Nelson (2000)

Three Core Concepts in Early Development

1 Experiences Build Brain Architecture

NATIONAL SCIENTIFIC COUNCIL ON THE DEVELOPING CHILD

Center on the Developing Child  HARVARD UNIVERSITY

Brain Architecture Supports Lifelong Learning, Behavior, and Health

Brains are built over time, starting in the earliest years of life.

Simple skills come first; more complex skills build on top of them.

Brain circuits are strengthened by use; having children practice skills they will need over their lifetime strengthens those brain circuits.

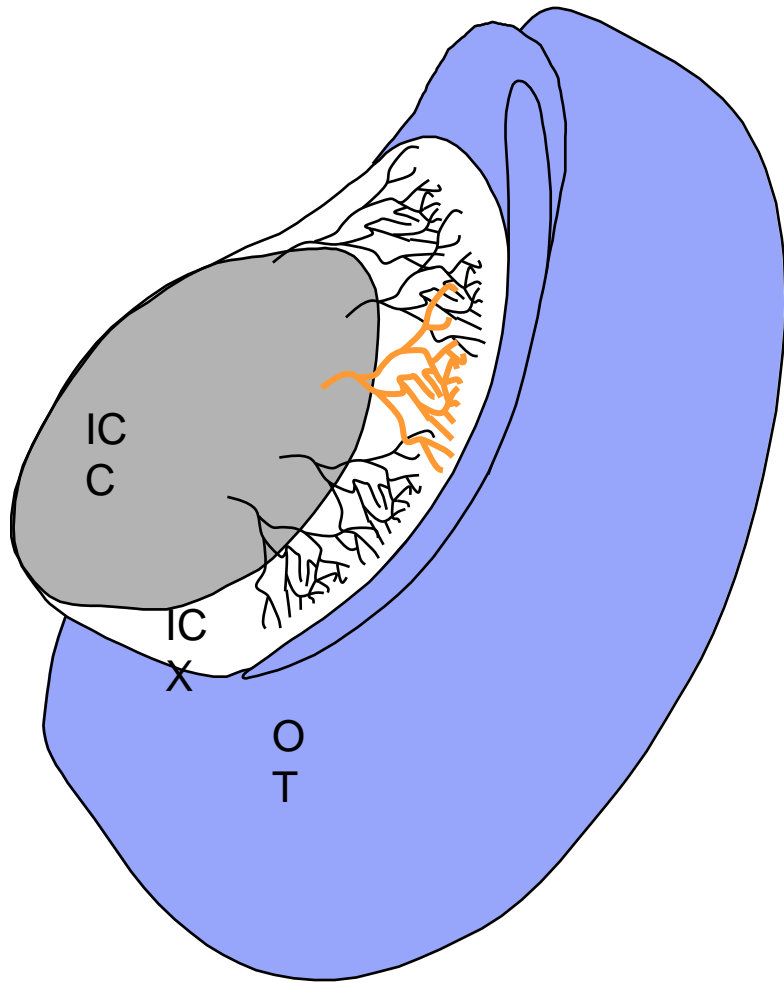


Concept #2:

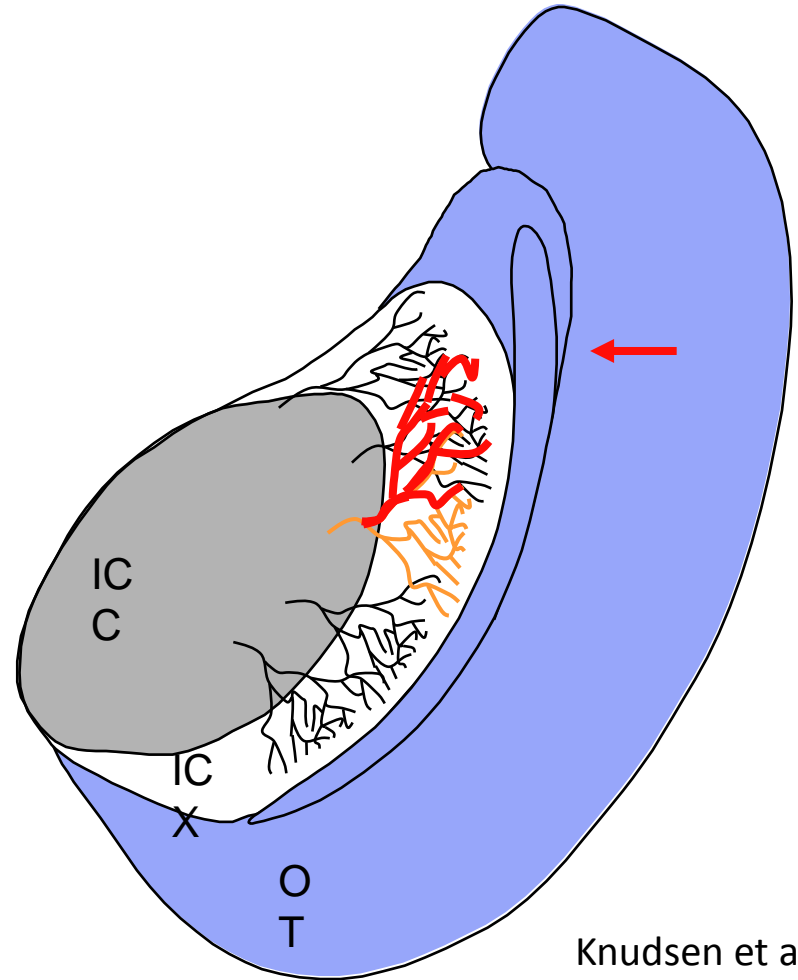
Brain Plasticity – The Ability To Change Behavior Decreases Over Time

- Neural circuits that process basic information are wired earlier than those that process more complex information.
- Higher circuits build on lower circuits. Adaptation at higher skill levels is more difficult if lower level circuits are not wired properly.
- Advanced skills build on basic skills in all aspects of development.

Normal

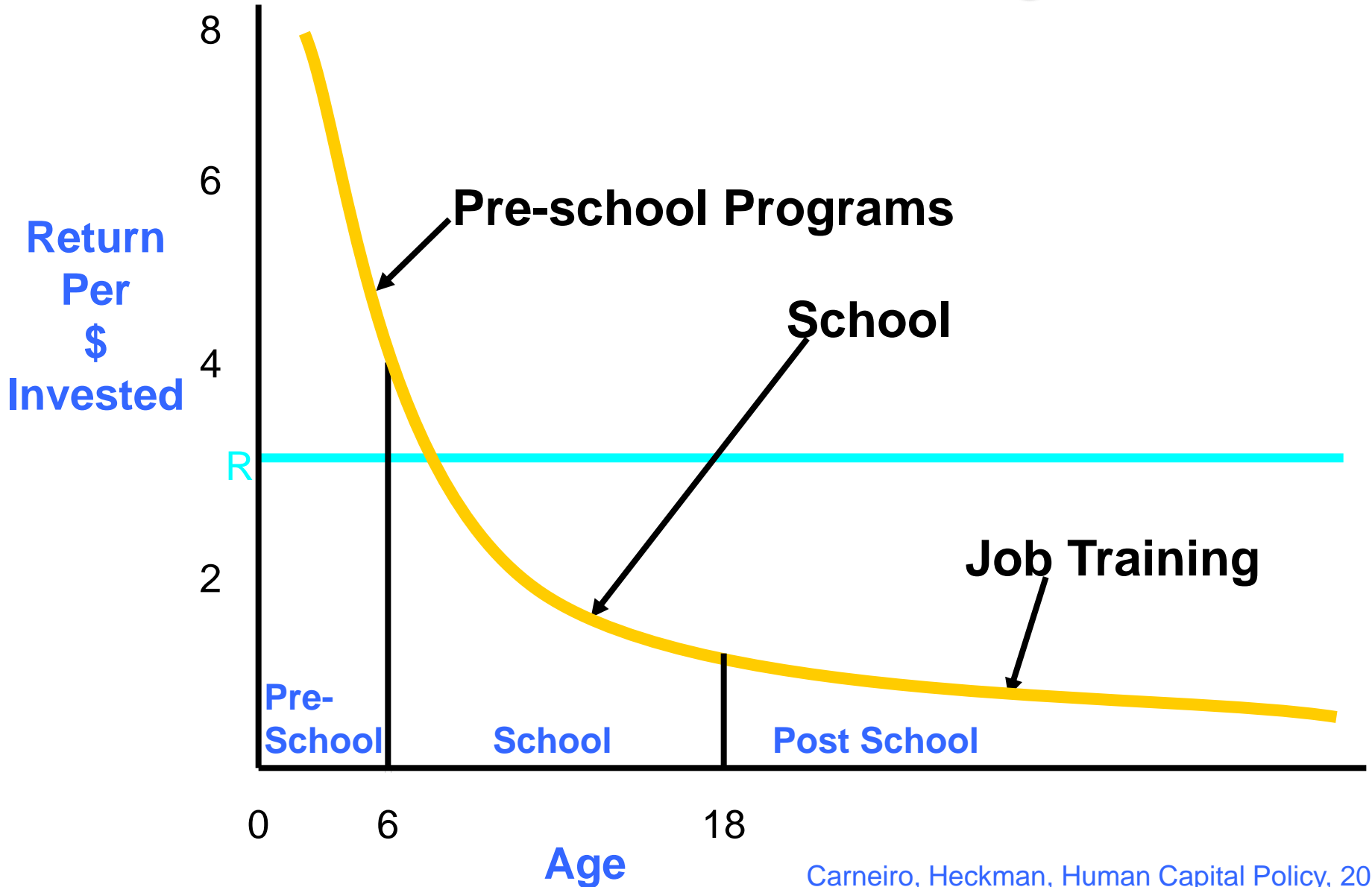


After Prism Experience



Knudsen et al.
2007

Rates of Return to Human Development Investment Across all Ages



Concept #3:

“Serve and Return” is a key ingredient in the learning process

- **Social interactions are important. Children learn best when an attentive adult is engaged with them in the learning process.**

Brains and Skills are Built Over Time



Three Core Concepts in Early Development

2 Serve & Return Interaction Shapes Brain Circuitry

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Serve and Return Builds Brains and Skills

Serve and Return: Young children naturally reach for interaction through babbling, facial expressions and gestures, and adults respond in kind.

These “serve and return” interactions are essential for the development of healthy brain circuits.



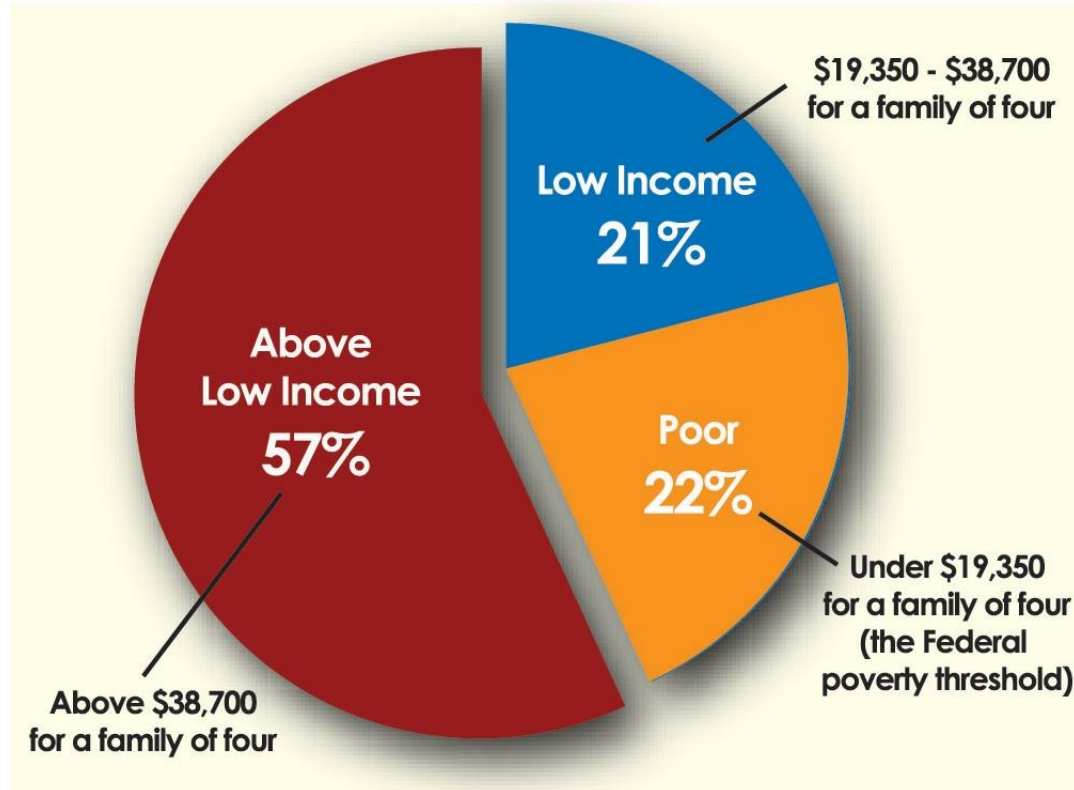
Concept #4: Toxic Stress in the Early Years of Life can Derail Healthy Development

***Chronic stress* repetitively activates brain circuits that respond to stress, altering these circuits.**

Activation of stress hormones also modulates brain circuit function.

Children in Poverty

U.S. Families with Toddlers and Infants



Source: National Center for Children in Poverty (2006)

Three Core Concepts in Early Development

3 Toxic Stress Derails Healthy Development

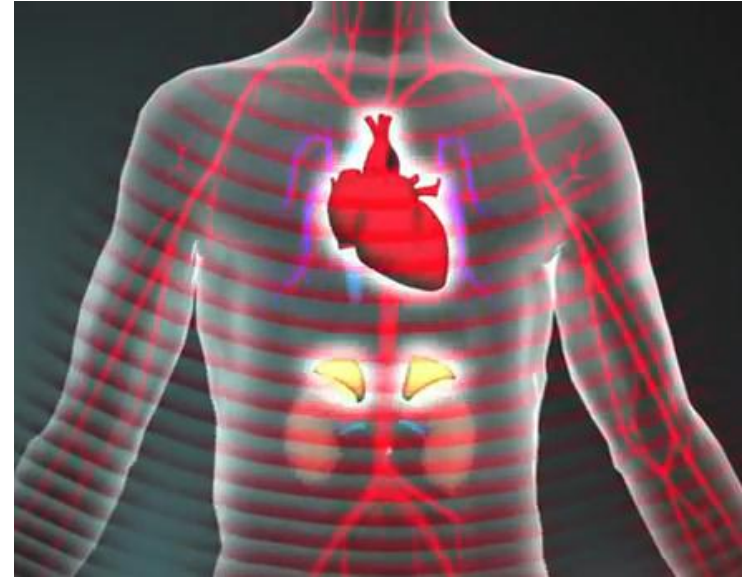
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Relationships Buffer the Effects of Stress

Learning how to cope with moderate, short-lived stress can build a healthy stress response system.

Toxic stress – when the body's stress response system is activated excessive – can weaken developing brain architecture.



Without caring adults to buffer children, toxic stress associated with extreme poverty, neglect, abuse, or severe maternal depression can have long-term consequences for learning, behavior, and both physical and mental health.

Keys to Healthy Development



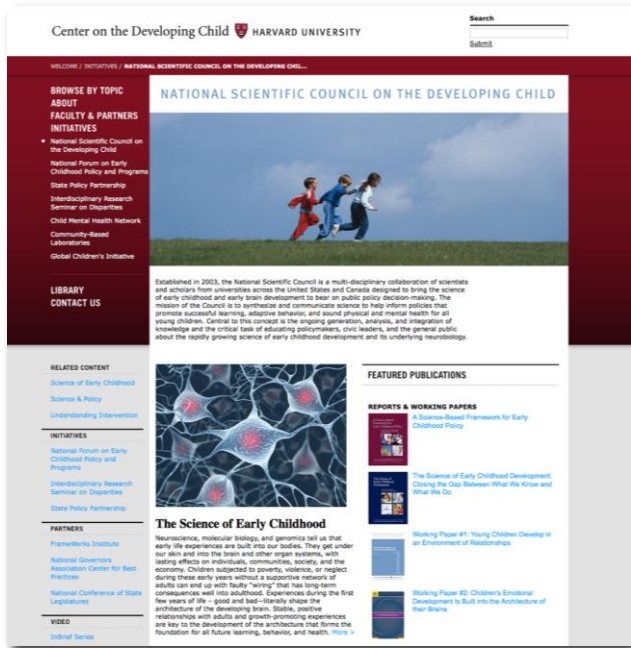
A balanced approach to emotional, social, cognitive, and language development, starting in the earliest years of life.

Supportive relationships and positive learning experiences that begin with parents but are strengthened by others outside the home.



Highly specialized interventions as early as possible for children and families experiencing significant adversity.

Further Information:



Knudsen EI, Heckman JJ,
Cameron JL, Shonkoff JP.

Economic, neurobiological
and behavioral perspectives
on building America's future
workforce.

World Economics 7: 17-41, 2006

<http://www.developingchild.net>

Center on the Developing Child  HARVARD UNIVERSITY

Judy Cameron, Ph.D.
jcameron@pitt.edu

NATIONAL SCIENTIFIC COUNCIL ON THE DEVELOPING CHILD
NATIONAL FORUM ON EARLY CHILDHOOD PROGRAM EVALUATION