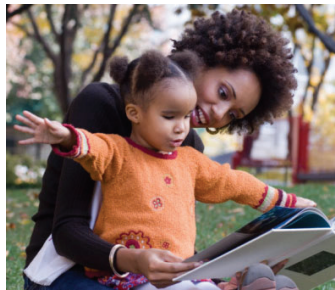


Accelerating Innovation: Telling the Brain Story to Inspire Action

Brain Architecture in Action!

Judy L. Cameron, PhD
Department of Psychiatry, University of Pittsburgh

The National Scientific Council
on the Developing Child

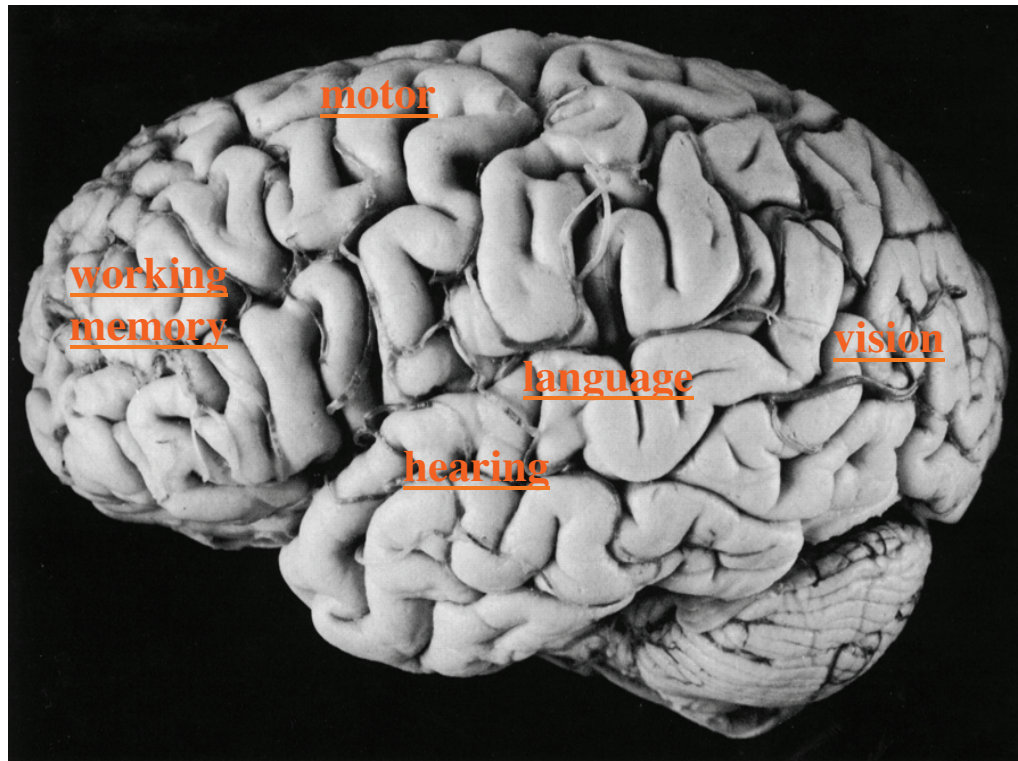


Three Core Concepts of Development

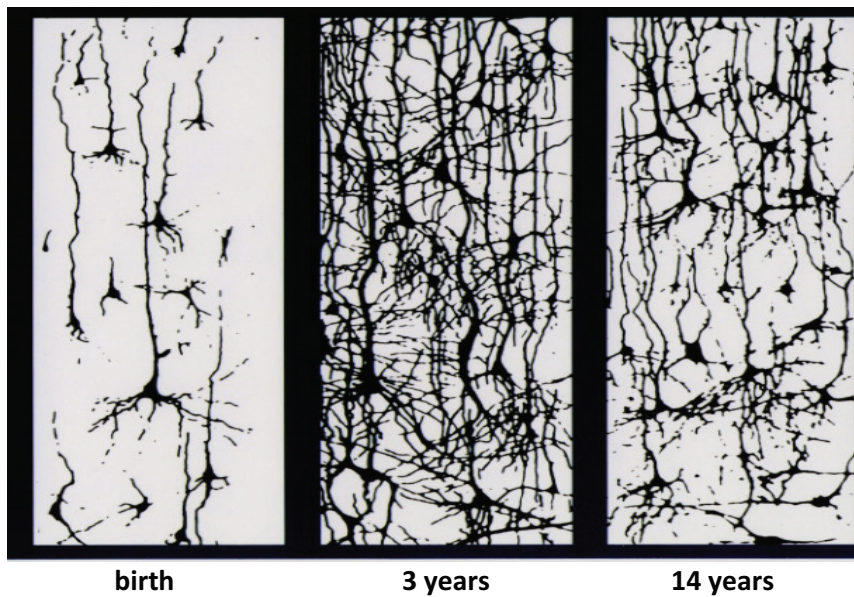
- 1** Brain Architecture Is Established Early in Life and Supports Lifelong Learning, Behavior, and Health
- 2** Stable, Caring Relationships and “Serve and Return” Interaction Shape Brain Architecture
- 3** Toxic Stress in the Early Years of Life Can Derail Healthy Development

HEALTHY CHILD DEVELOPMENT

Brain Architecture is Organized into Specialized Functional Areas

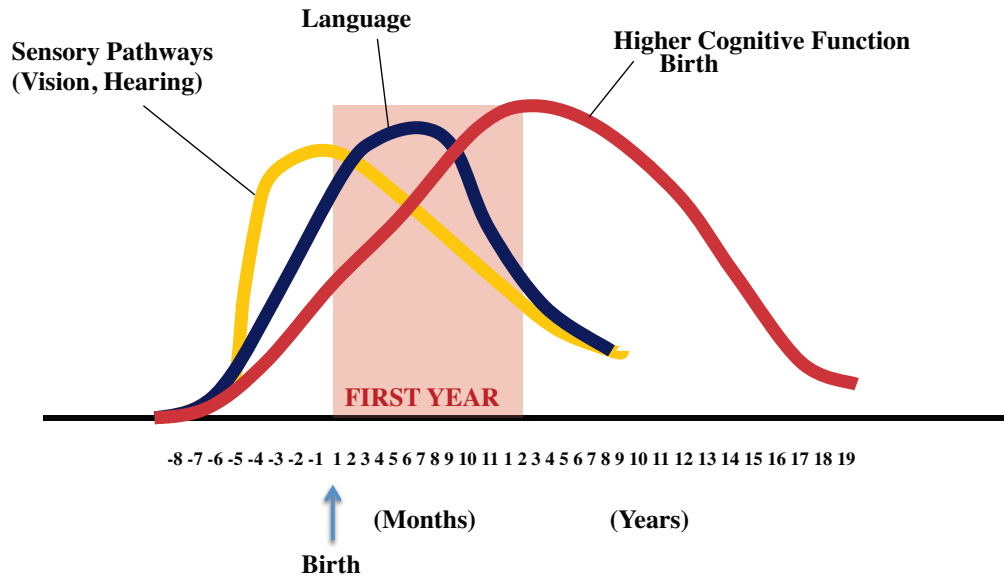


Experience Shapes Brain Architecture by Over-Production Followed by Pruning



Neural Circuits are Wired in a Bottom-Up Sequence

(700 synapses formed per second in the early years)



Source: C. Nelson (2000)

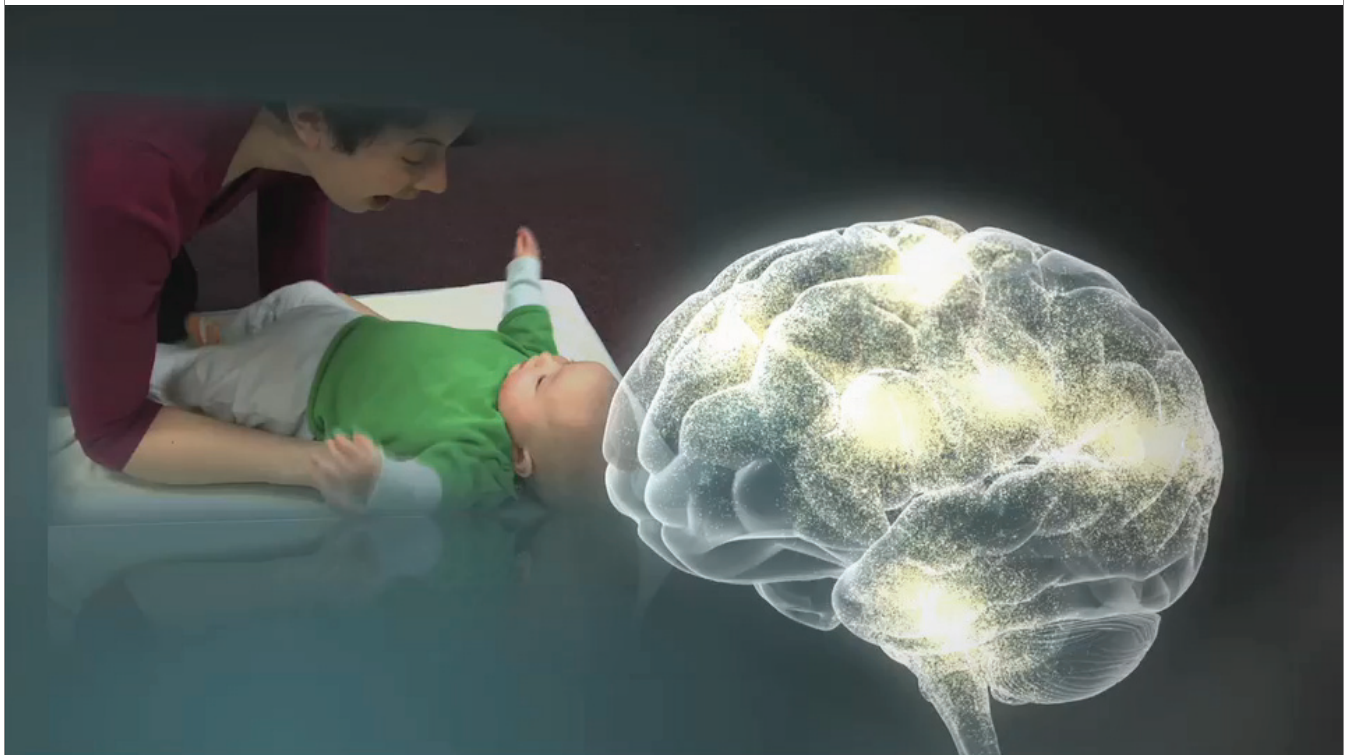
Experiences Build Brain Architecture



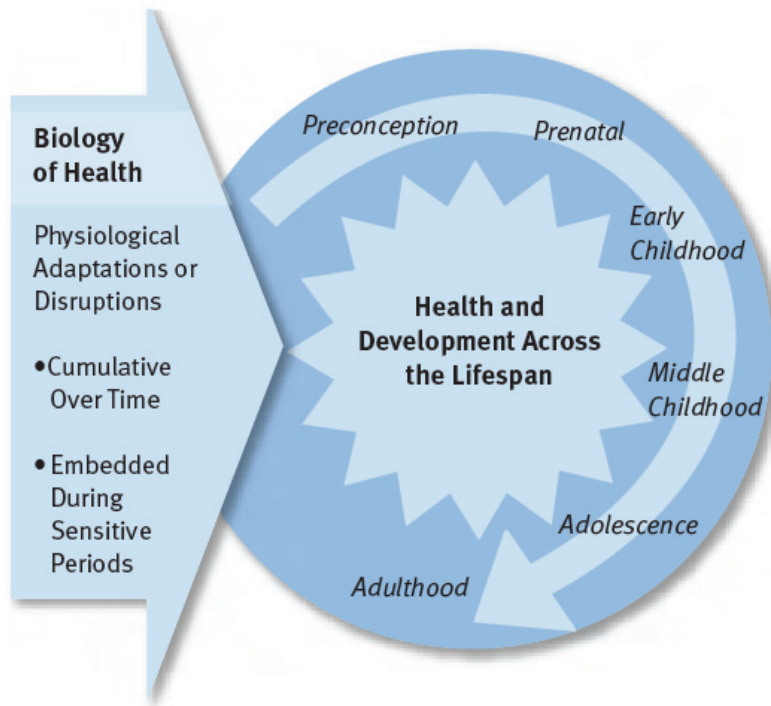
Brains and Skills are Built Over Time



Serve & Return Relationships Buffer the Developing Brain



Early Life Stress Impacts Life-long Health

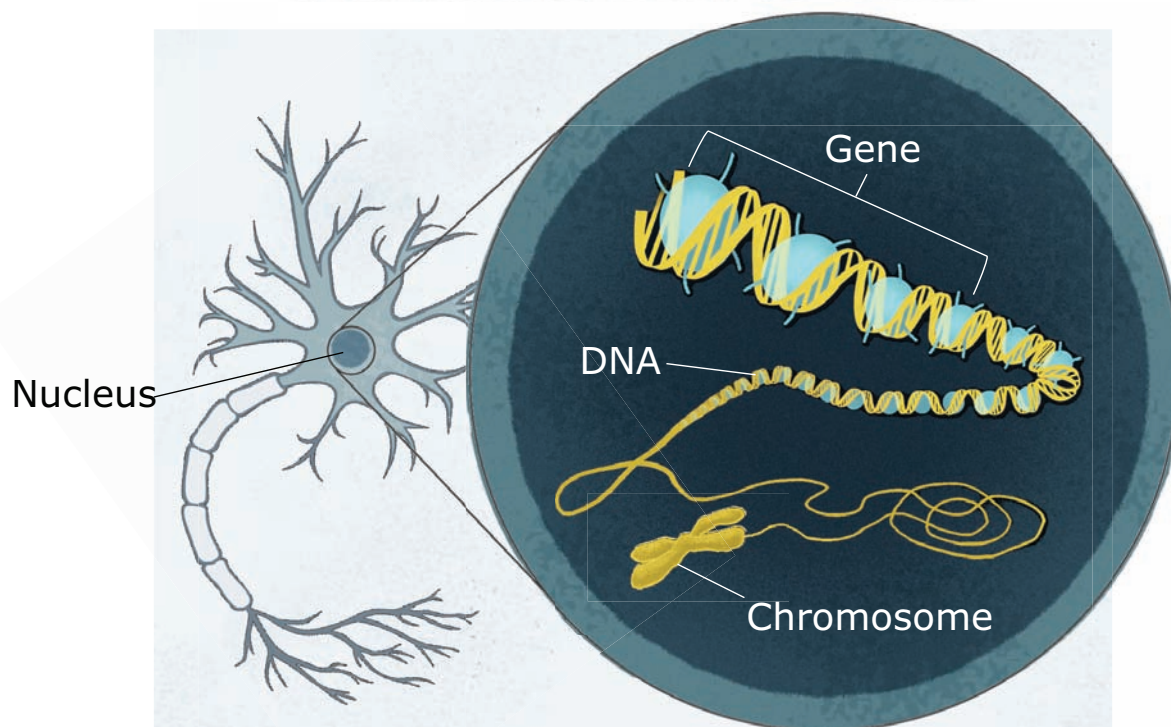


How Does Stress Impact the Brain?

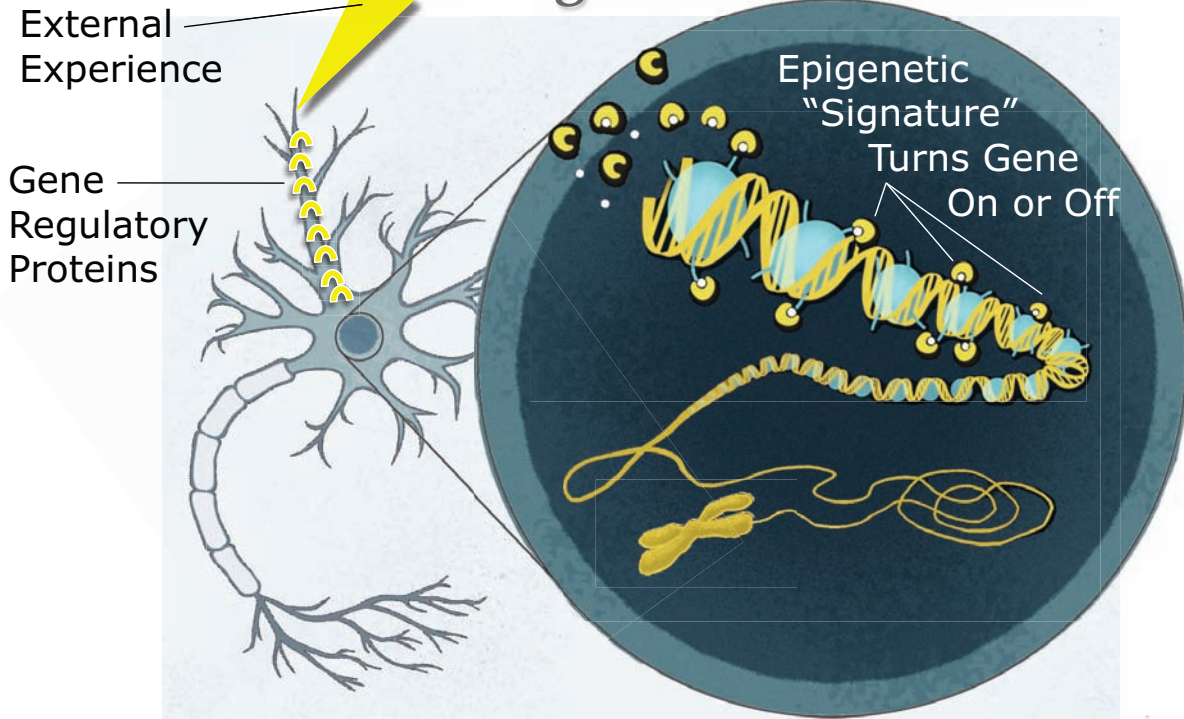
How Early Experiences Alter Gene Expression and Shape Development



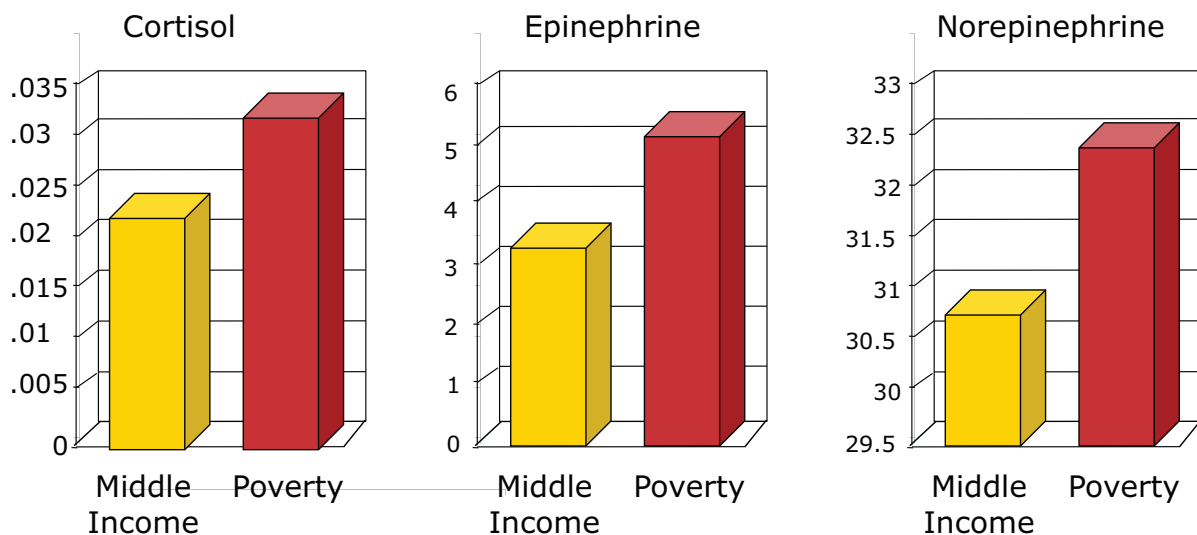
Genes Carry Instructions that Tell Our Bodies How to Work



Early Experiences Leave Lasting Chemical "Signatures" on Genes



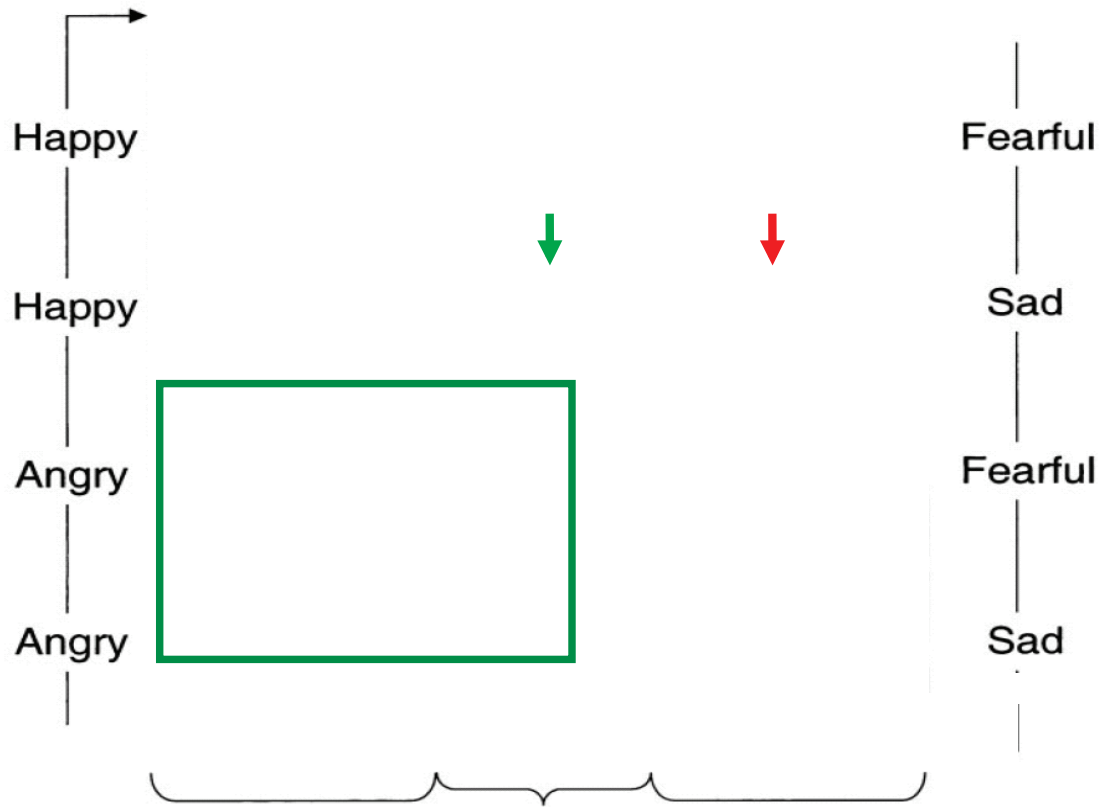
Poor Children Experience Elevated Stress



Overnight levels in rural 9-year-old white children

Source: Evans, GW and English, K. (2002)

Adverse Early Life Experiences Change How You See the World

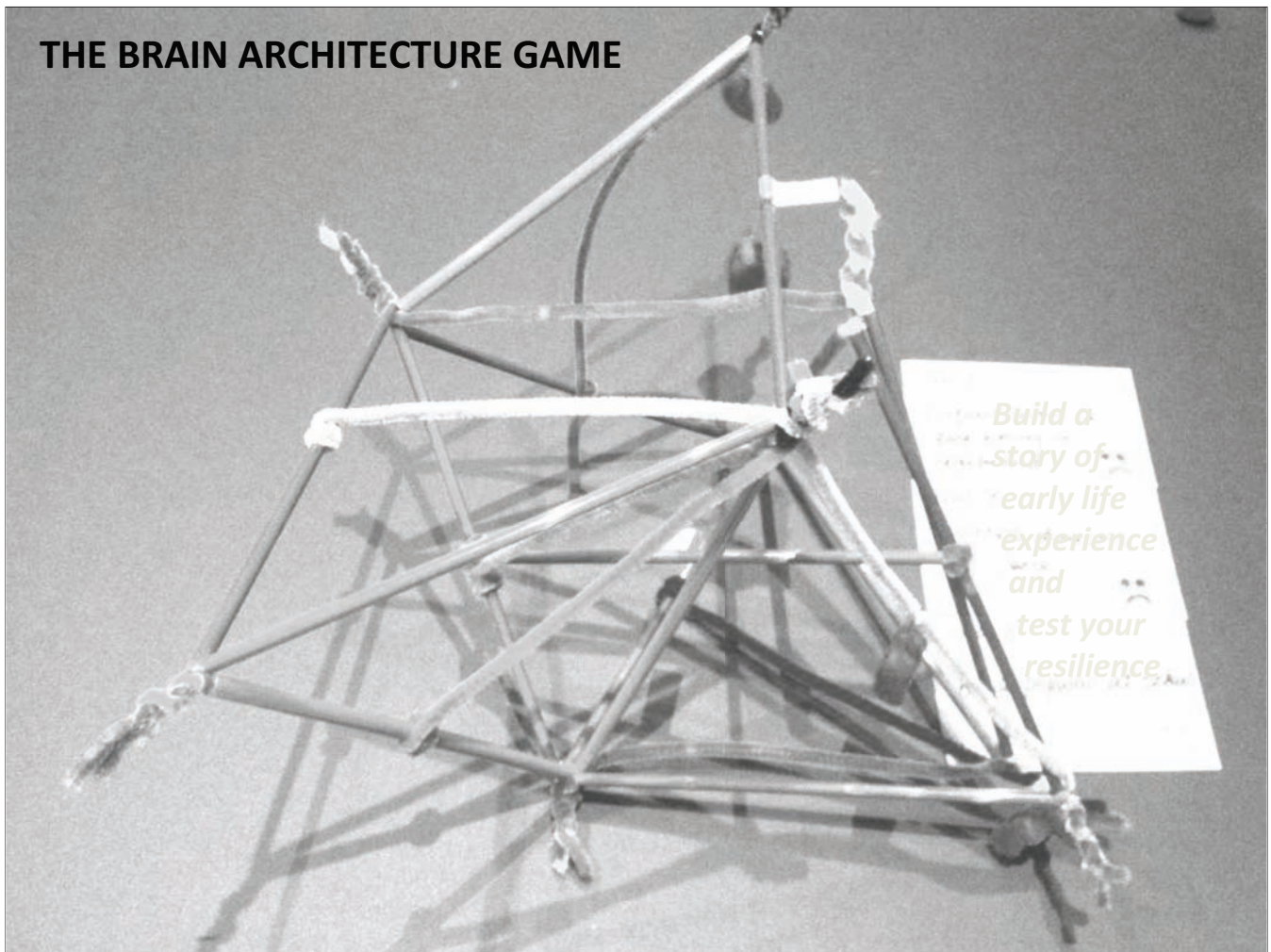


Source: Pollak & Kistler (2002)

Toxic Stress Derails Healthy Development



THE BRAIN ARCHITECTURE GAME



Building Blocks for the Development of Brain Architecture

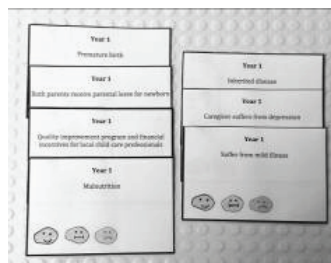
Marientina Gotis, Ph.D.
Creative Media & Behavioral Health Center
USC



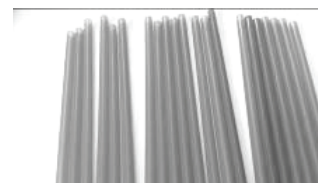
Experiences build brain architecture



Genetics



Life experience cards



Life supports



Toxic stresses

Game Goals:

- The game has two phases: *early development* and *pruning*.
- Build brain structure with available strong and weak materials.
- In the early development phase, build as *tall* and *sturdy* a structure as you can.
- In the pruning phase, you will *test the resilience* of your structure.

Life Experiences Shape Brain Development

1. Draw three random cards per year, starting with YEAR 1.
 2. Read your card to figure out what type of stress it is. 😊 😐 😞
- ⇒ Record the number of events and what type they are (positive, tolerable, toxic) in the order you received them.

Build Neural Connections

Early Development Phase:

Take building materials based on the following rules:

- 😊 **positive stress = 1 pipe cleaner + 1 straw**
- 😐 **tolerable stress = majority of past events rule; roll die if a tie, or if your first event is tolerable stress**
- 😞 **toxic stress = 1 pipe cleaner**

Build closed structures.
No reinforcing or extending building blocks.



The Pruning Phase

In years 6-8, follow new material rules:

- 😊 **positive stress = 1 pipe cleaner**
- 😐 **tolerable stress = majority of past events rule; roll die if a tie**
- 😞 **toxic stress = 1 weight
(hang on the highest point of your structure)**



Goal is to have the tallest, sturdiest brain possible, that does not collapse under the weight of stresses.

Discussion

- What was your child's life history?
- How did life experiences shape brain development?
- How important were early social supports?
- Can you have a brain that withstands life stresses later in life after experiencing toxic stress early in life? At what price?