

*'All children deserve
the right of full
participation in
community life'*

—Dr. Don Offord



“Growing up in Canada is like running a race and the playing field is not even”

www.offordcentre.com

The First 'R' Relationships: How Love Builds Brains

Jean Clinton BMus MD FRCP(C)

Associate Clinical Professor

Department of Psychiatry and Behavioural Neurosciences
McMaster University and Children's Hospital

Offord Centre for Child Studies

OUTLINE

- Environments matter
- Stress Matters
- Understanding the Adolescent Brain matters
- YOU MATTER

Disclaimer...These are my sponsors





World Health Organization



Commission on Social Determinants of Health

Closing the gap in a generation

Health equity through action on the social determinants of health



EQUITY FROM THE START

“Poor social policies, unfair economics and bad politics are killing people on a grand scale.”

WHO 2008

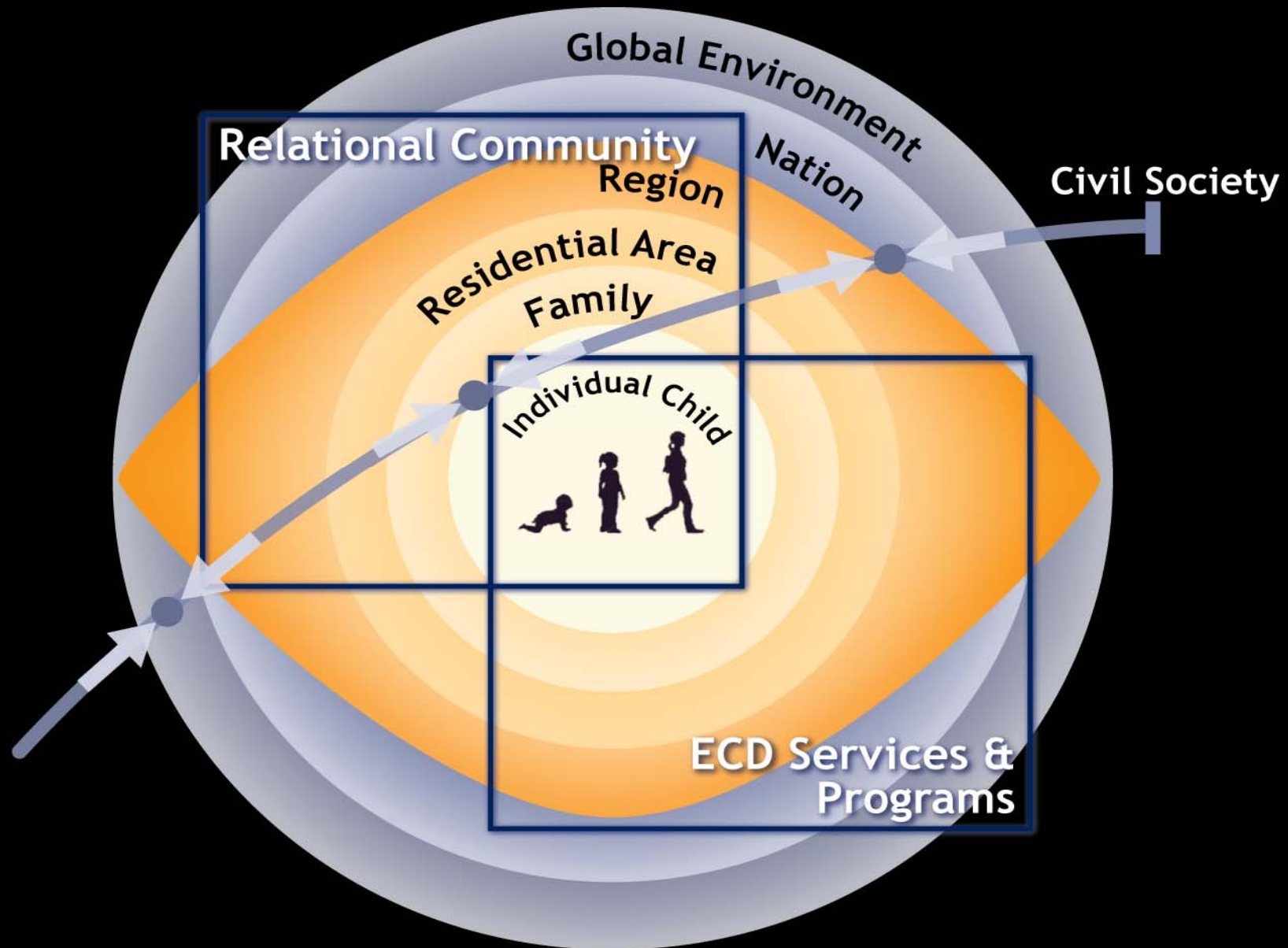
“Our zip code may be more important to our health than our genetic code” RWJ Commission

What Influences Early Child Development?

The experiences children have in the environments where they grow up, live and learn.

Clyde Hertzman

Which Environments Matter?



Masai Greeting: How are the children?



What is our
VALUES DRIVEN
question and conversation?

The Wisdom of the Elders

- "Consider the interest of the next 7 generations when decisions are being made ."



What we believe about children informs our view...and our language.



- Do we see the child
 - As an empty vessel? Needing to be 'filled up' with what we 'know is best'

Or

- Do we see the child
 - AS a Powerful ,resourceful, creative co-learner and creator

Develop normally or function to the best of ability?

- Fix the problem.....or promote activity and what can be?

- **WHAT IS OUR IMAGE OF THE CHILD?**

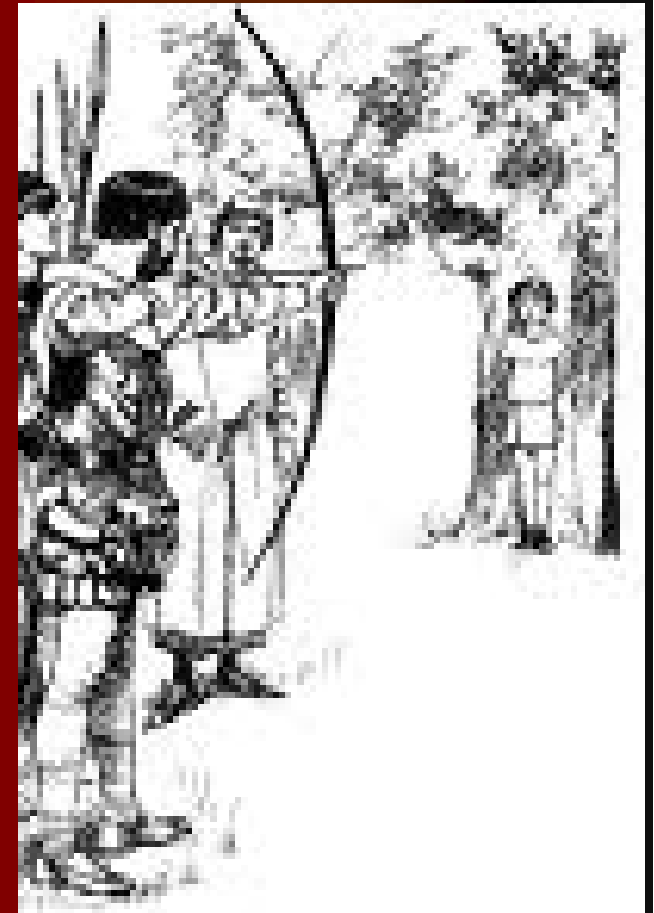
Why do we care about brain?

You are your brain.



Your brain is not just produced by your genes

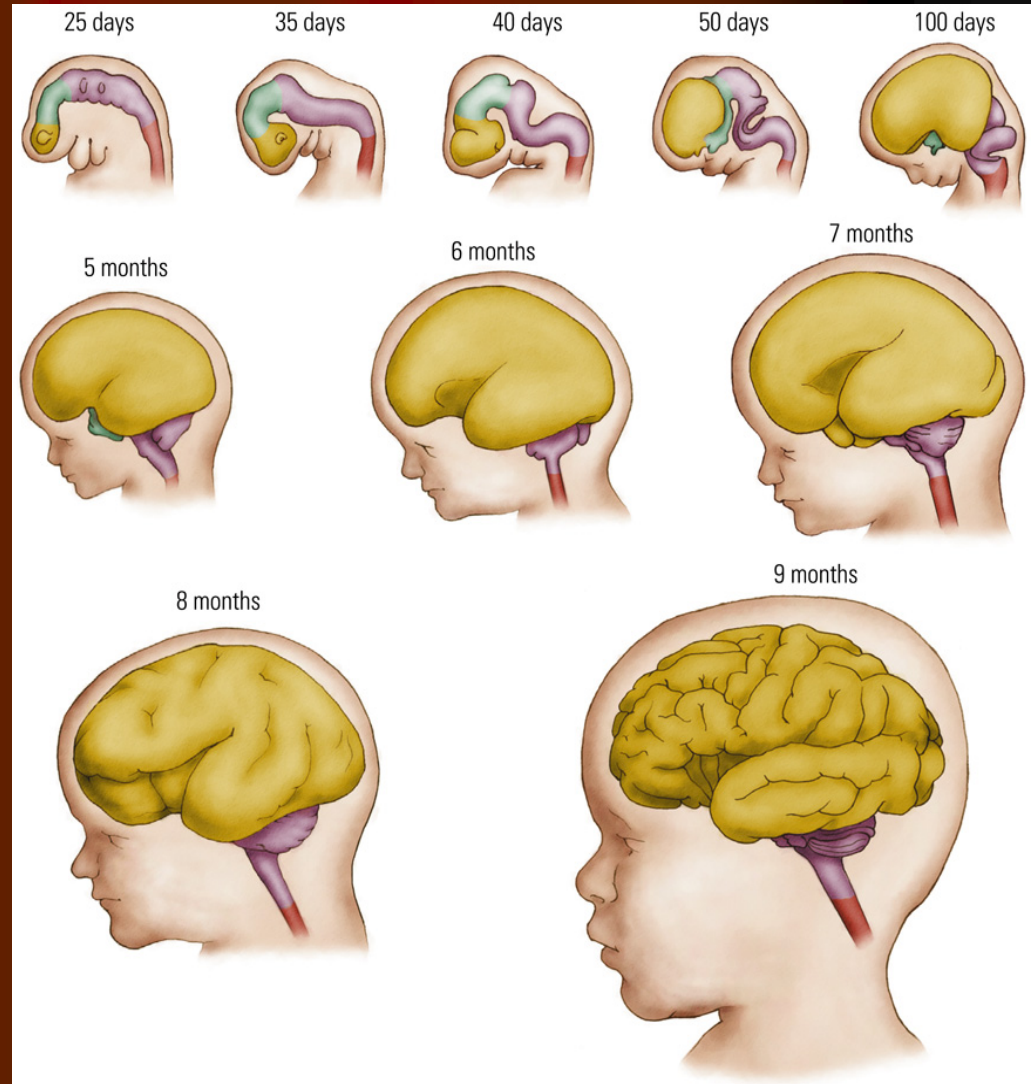
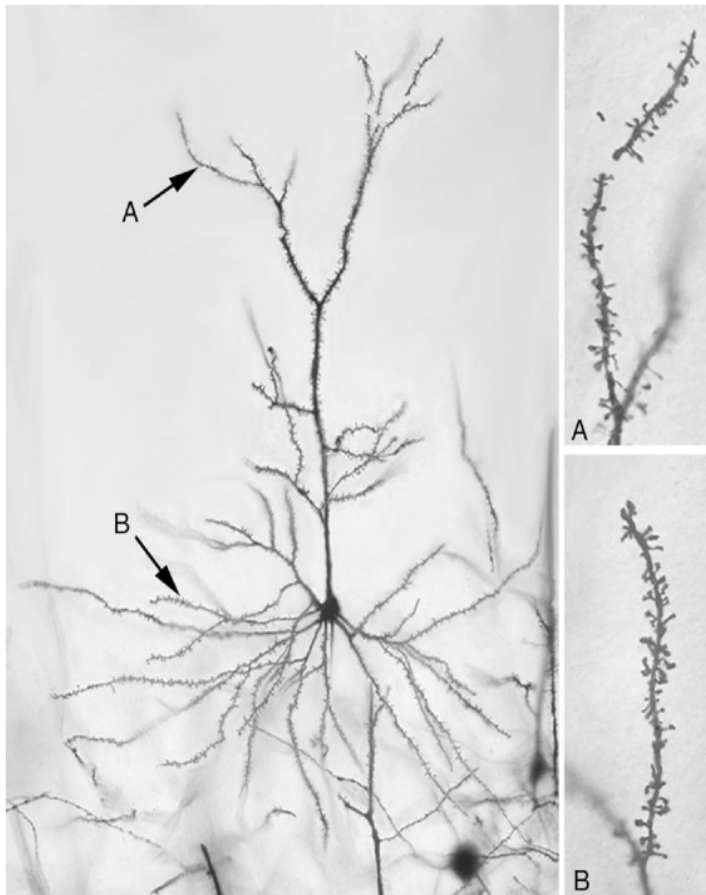
Your brain is sculpted by a lifetime of experiences .



Dr R Gibb UofLethbridge

BRAIN PLASTICITY

Connections are formed and altered by experience



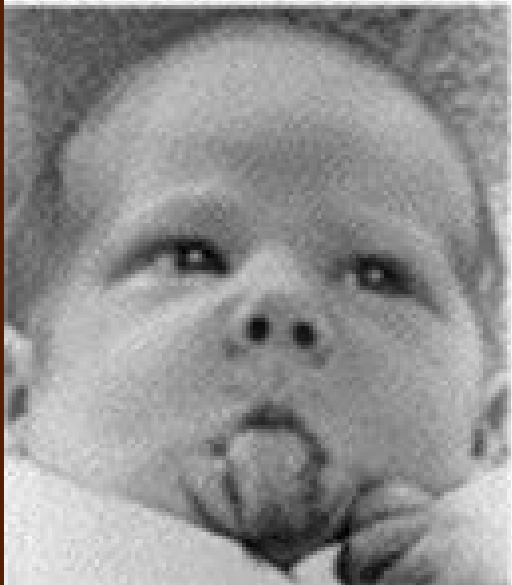
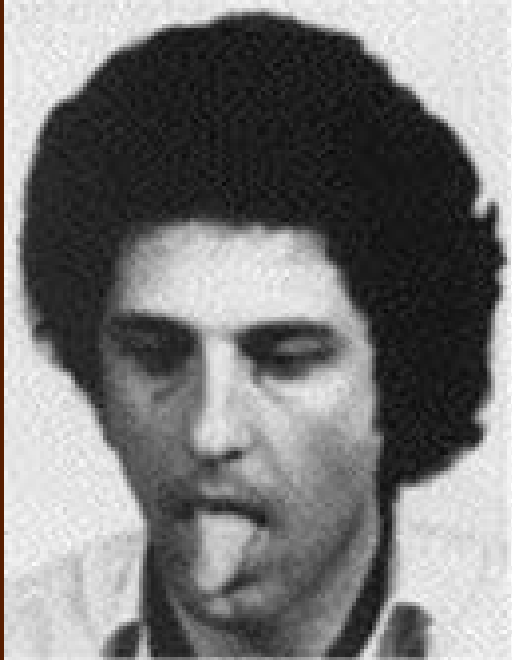
But, not done until
at least age 24+years...

Nature/ Nurture

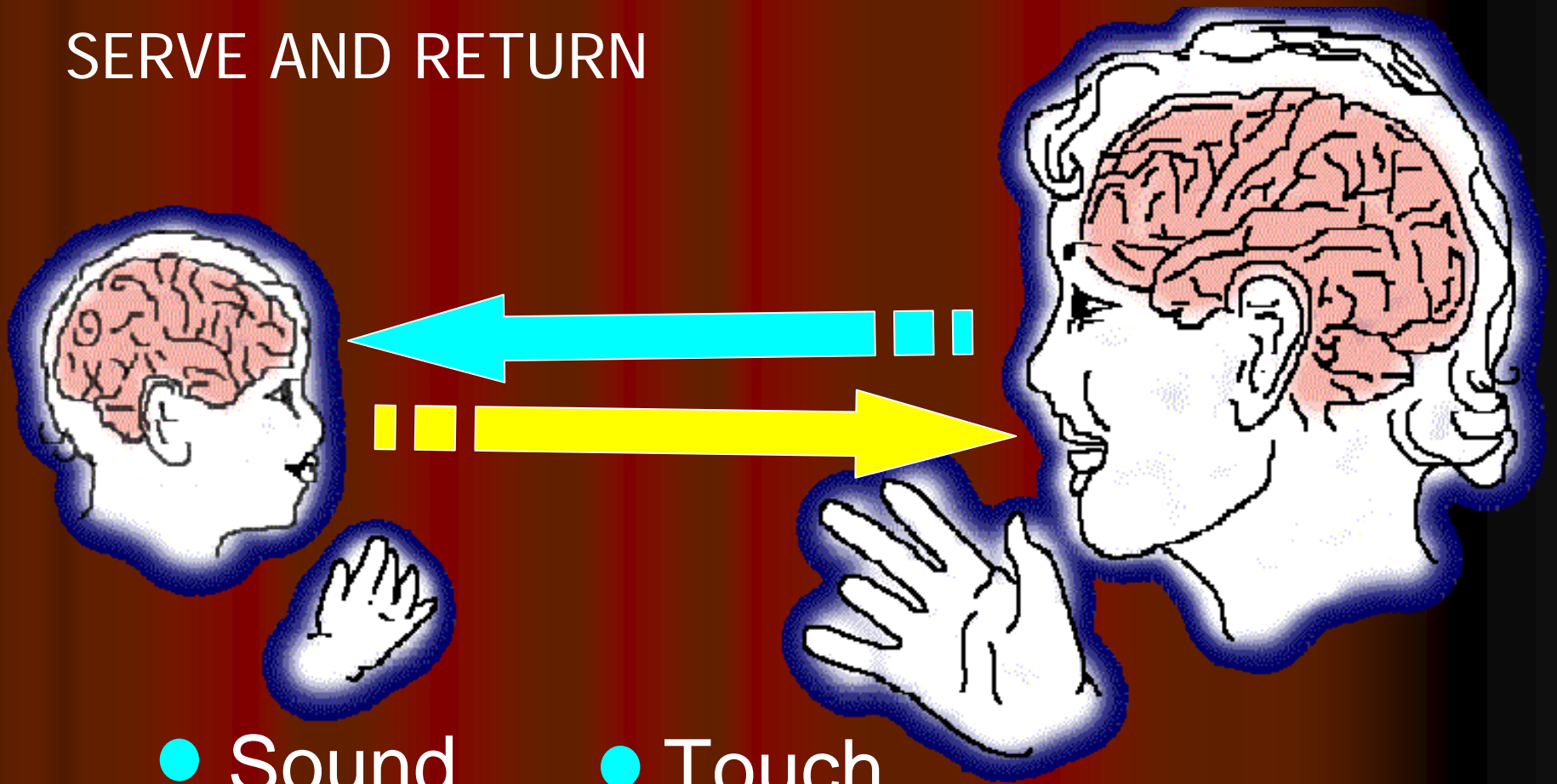
- No longer a debate
- Environment leaves its mark on our genome and can modulate future gene expression in a sometimes heritable fashion
- The study of how environment leaves its footprint on the genome falls into the domain of *Epigenetics*

Dr Robin Gibb U of Lethbridge

Hamilton Regional Child Welfare
Conference September 2010



SERVE AND RETURN



- Sound
- Vision
- Smell

- Touch
- Proprioception
- Taste



BREASTFEEDING

It Rocks!

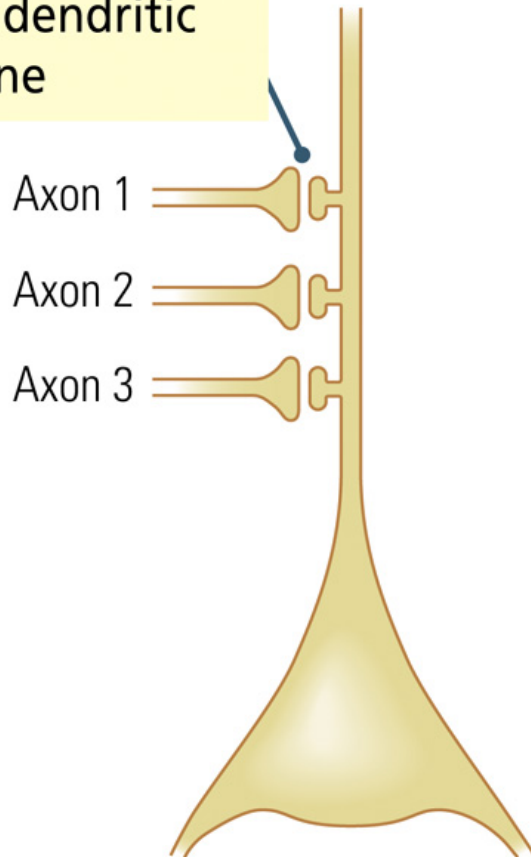
A Citizen and Competent from Birth



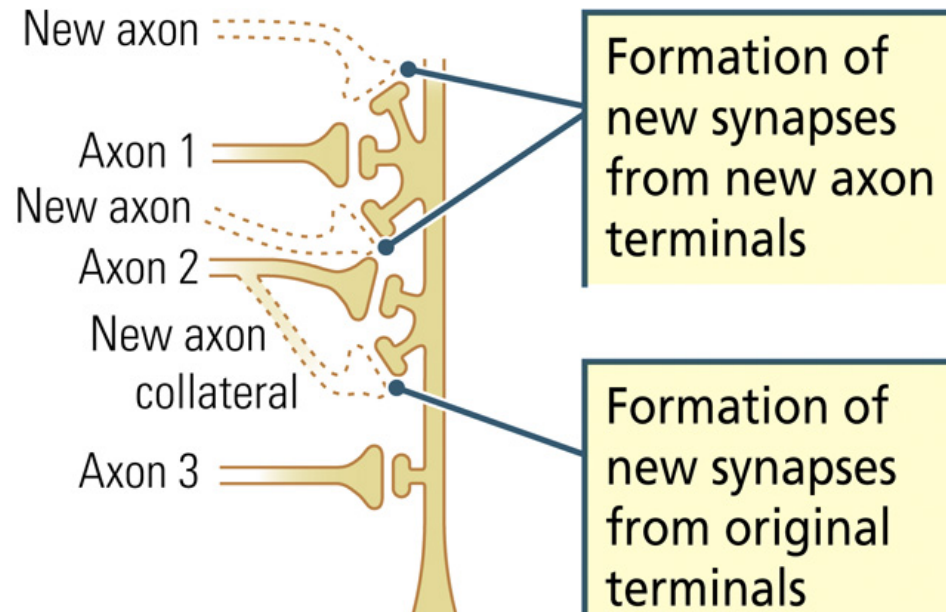
Amazing Talents of the Newborn ; Johnson & Johnson

(A) Before experience

Single synapse on dendritic spine



(B) After experience



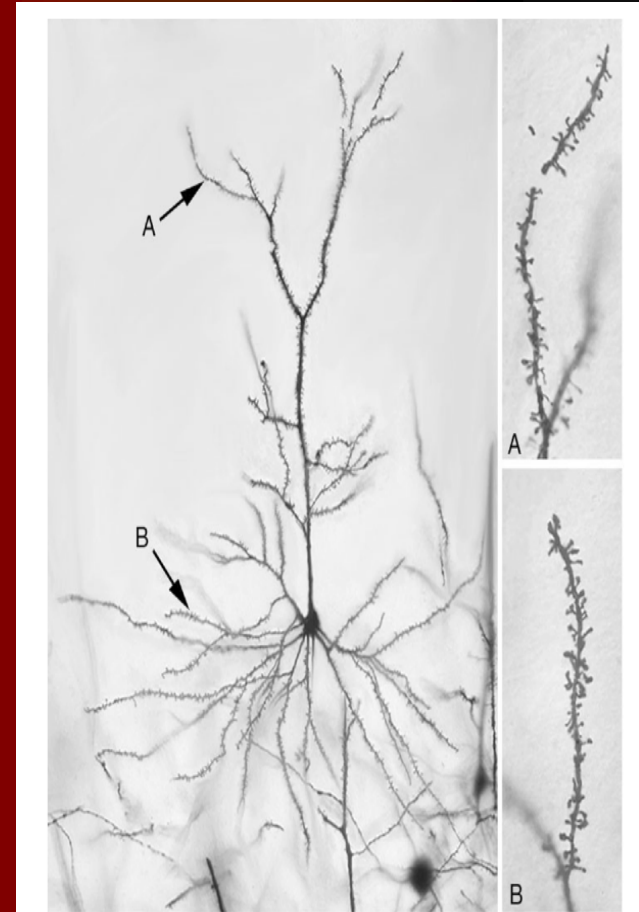
(C) Various observed shapes of new dendritic spines



Vision and Hearing Critical Period

Eye cataracts at birth prevent normal development of vision neurons in the occipital cortex (Hubel and Wiesel)

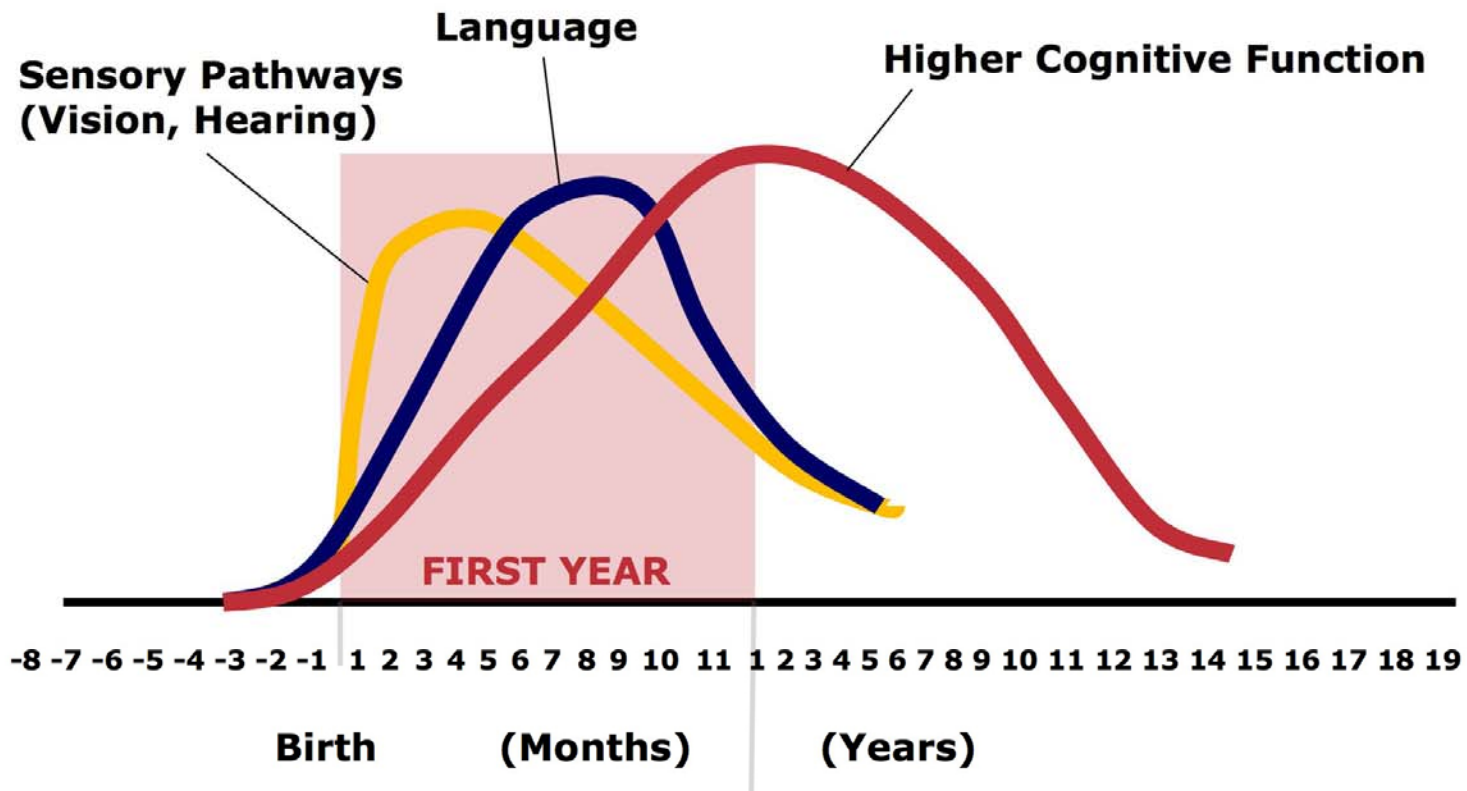
Cochlear defects at birth impair hearing development (Rauschecker and O'Donoghue)





Human Brain Development

Neural Connections for Different Functions Develop Sequentially



Graphic courtesy of Center on the Developing Child at Harvard University. Originally published in Nelson, C.A. (1999) Change and continuity in neurobehavioral development: lessons from the study of neurobiology and neural plasticity. *Infant Behavior and Development*, Volume 22(4) 415-429. Cited in *InBrief: The Science of Early Childhood Development*, presentation summary from the National Symposium on Early Childhood Science and Policy, Cambridge, MA, June 2008.

USE IT OR LOSE IT !

The more a system, or set of brain cells is activated, the more that system changes in response. The stronger the repetitions the stronger the memory.

3 Year Old Children



Normal



Extreme Neglect

Impact of Stress



Three Levels of Stress

Positive

Brief increases in heart rate,
mild elevations in stress hormone levels.

Tolerable

Serious, temporary stress responses,
buffered by supportive relationships.

Toxic

Prolonged activation of stress response systems
in the absence of protective relationships.



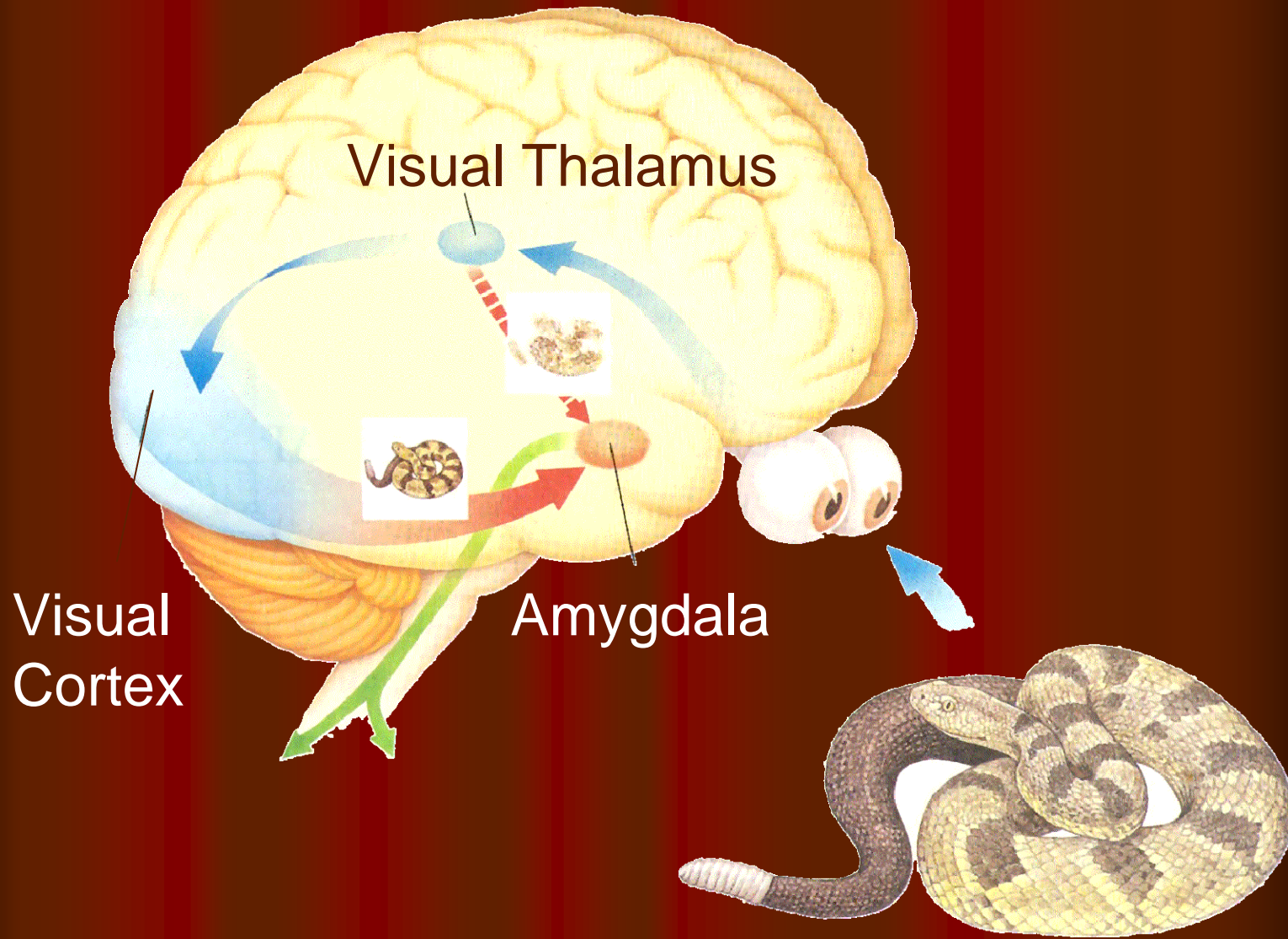
Stress is NUTS

- Novelty,
- Unpredictability,
- Threat to the ego
- Sense of loss of control

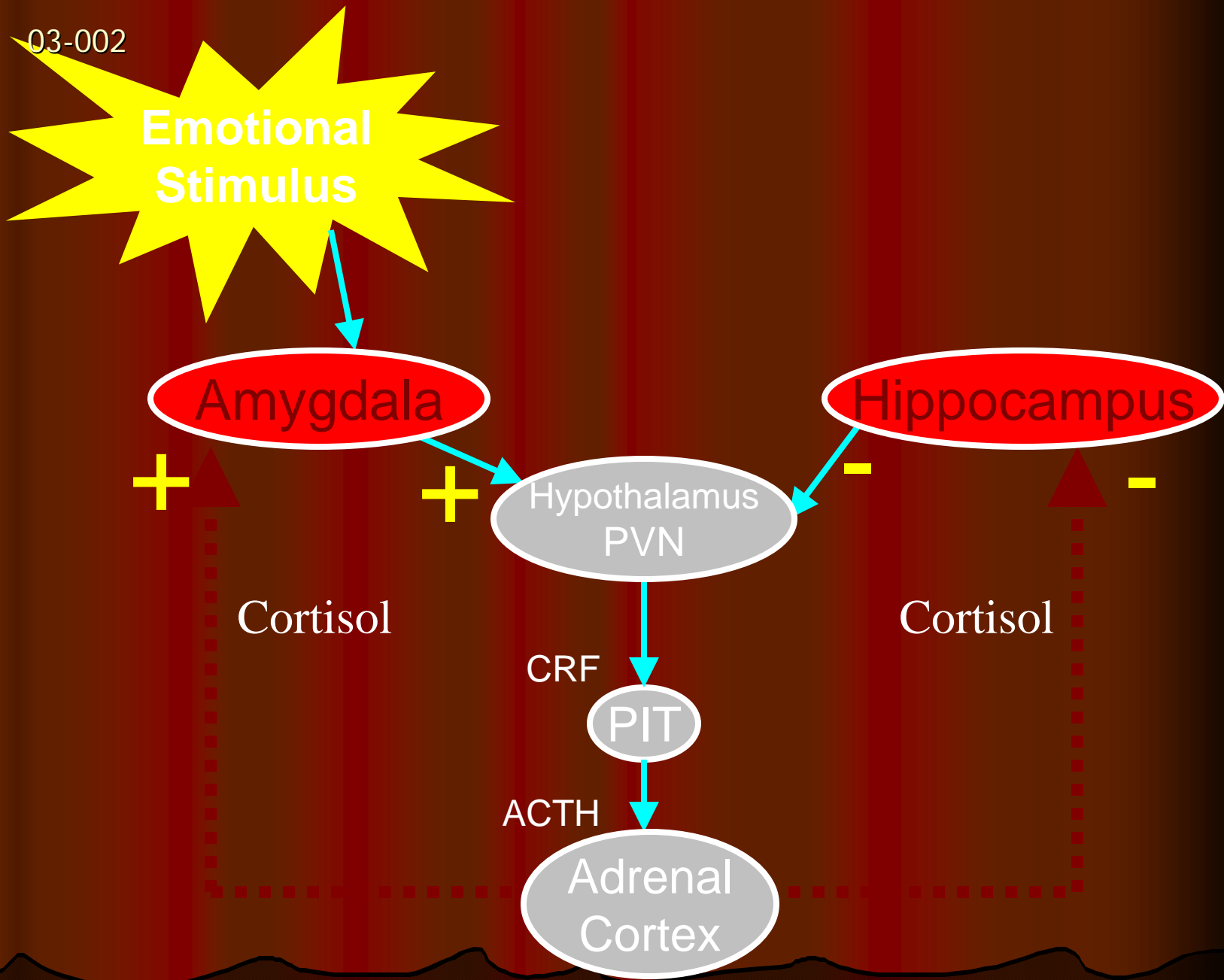


- Dr Sonia Lupien Centre for Studies on Human Stress

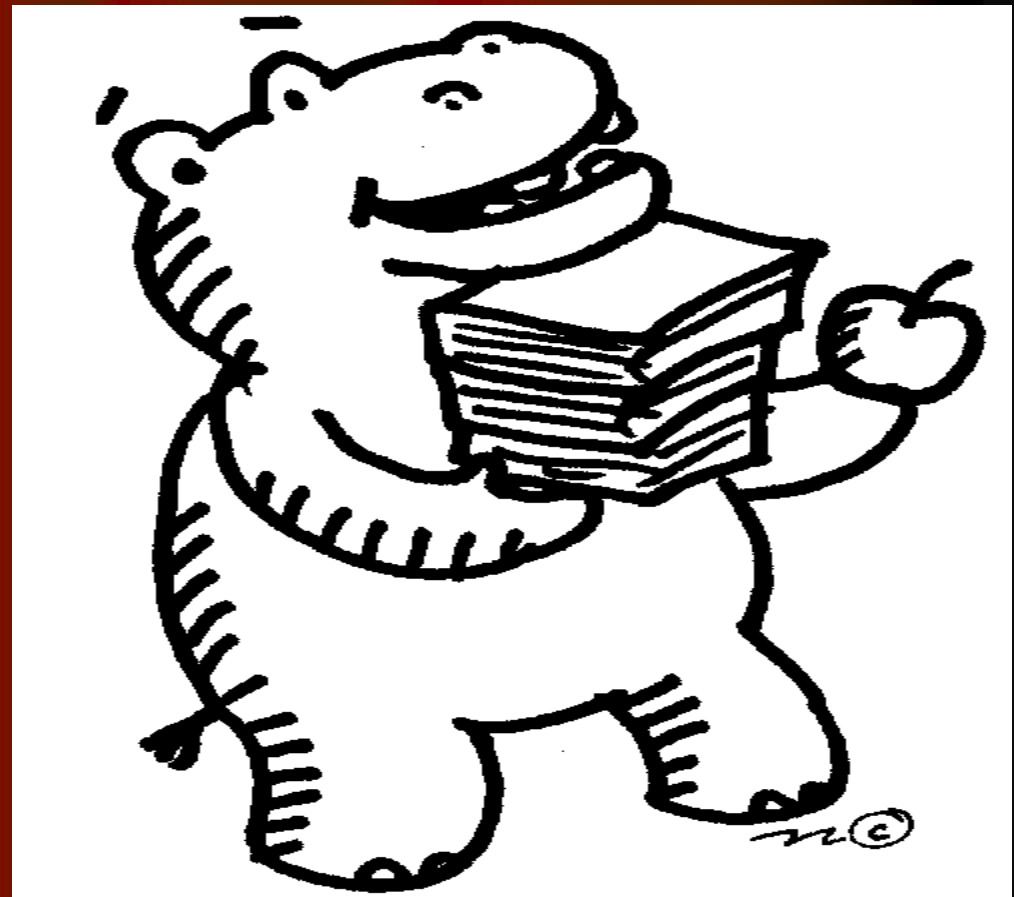
The Fear Response



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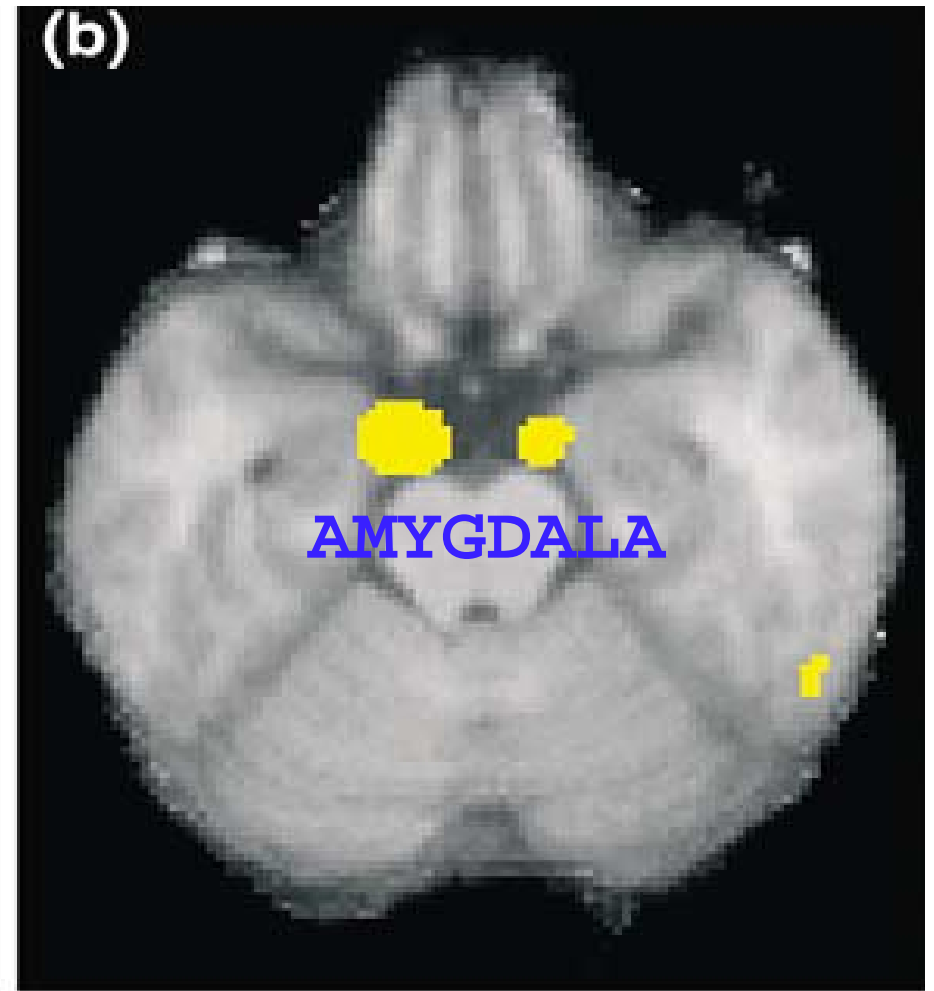
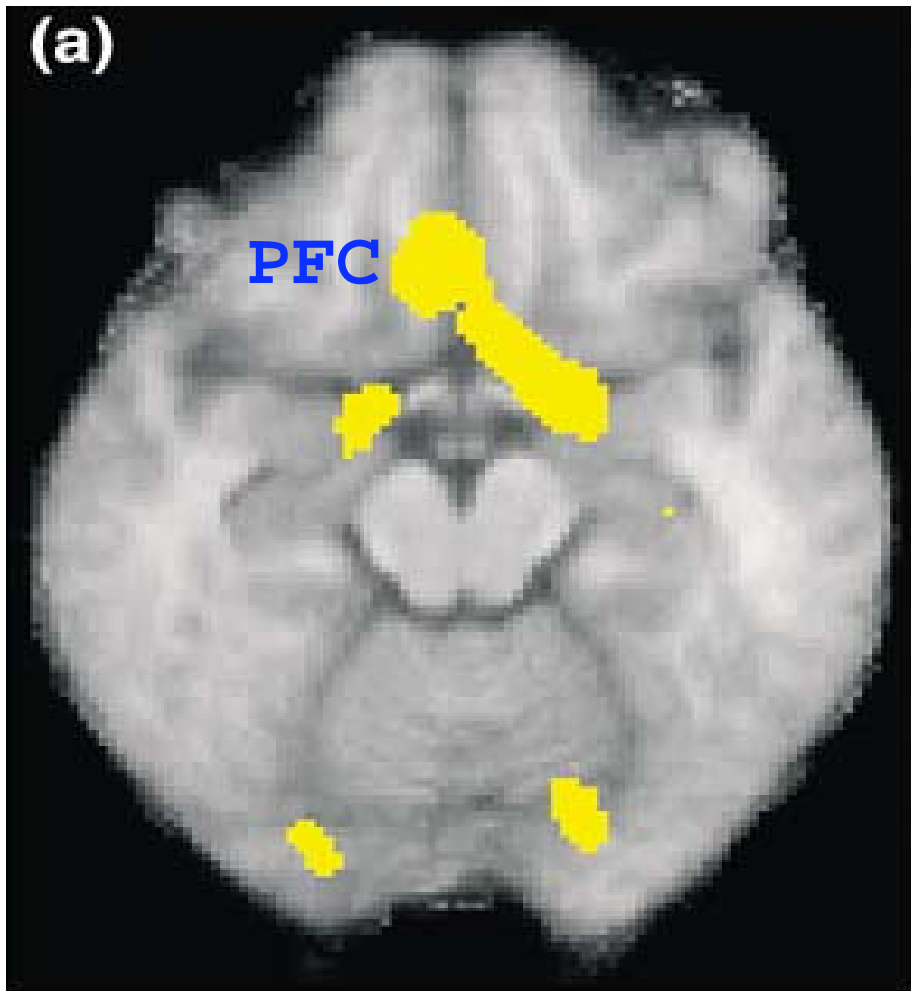
Amygdala and Hippocampus



Children's Stress Pathway

- "Children's number one fear is PUBLIC HUMILIATION. They will do anything to belong".
- "If a child is not sure if they are going to be embarrassed or humiliated they can't learn"

Mary Gordon



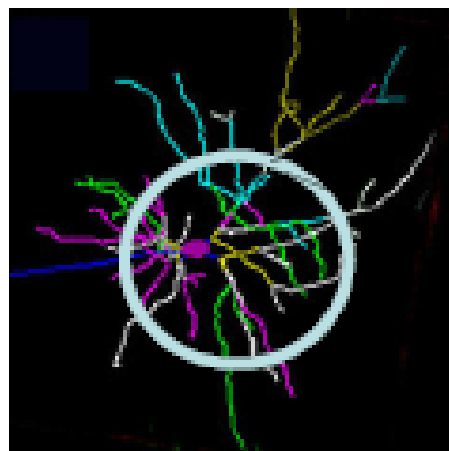
A: Positive emotional state, flow through amygdala to PFC and better memory test results.

B: Stressed state: No passage of information to PFC & lower memory testing short and long-term.

(Hamman, et al. *Cognitive Neuroscience*.)

Toxic Stress Changes Brain Architecture

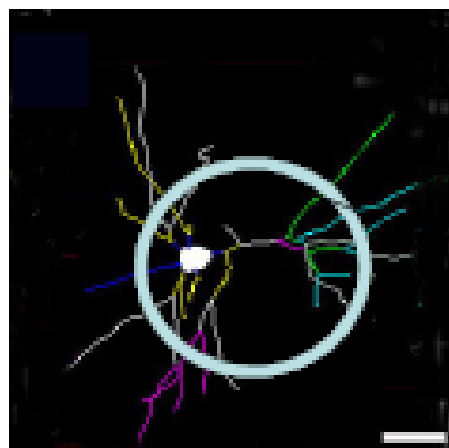
Normal



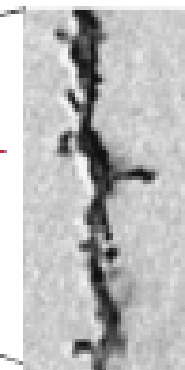
Typical neuron—
many connections



Toxic stress



Damaged neuron—
fewer connections

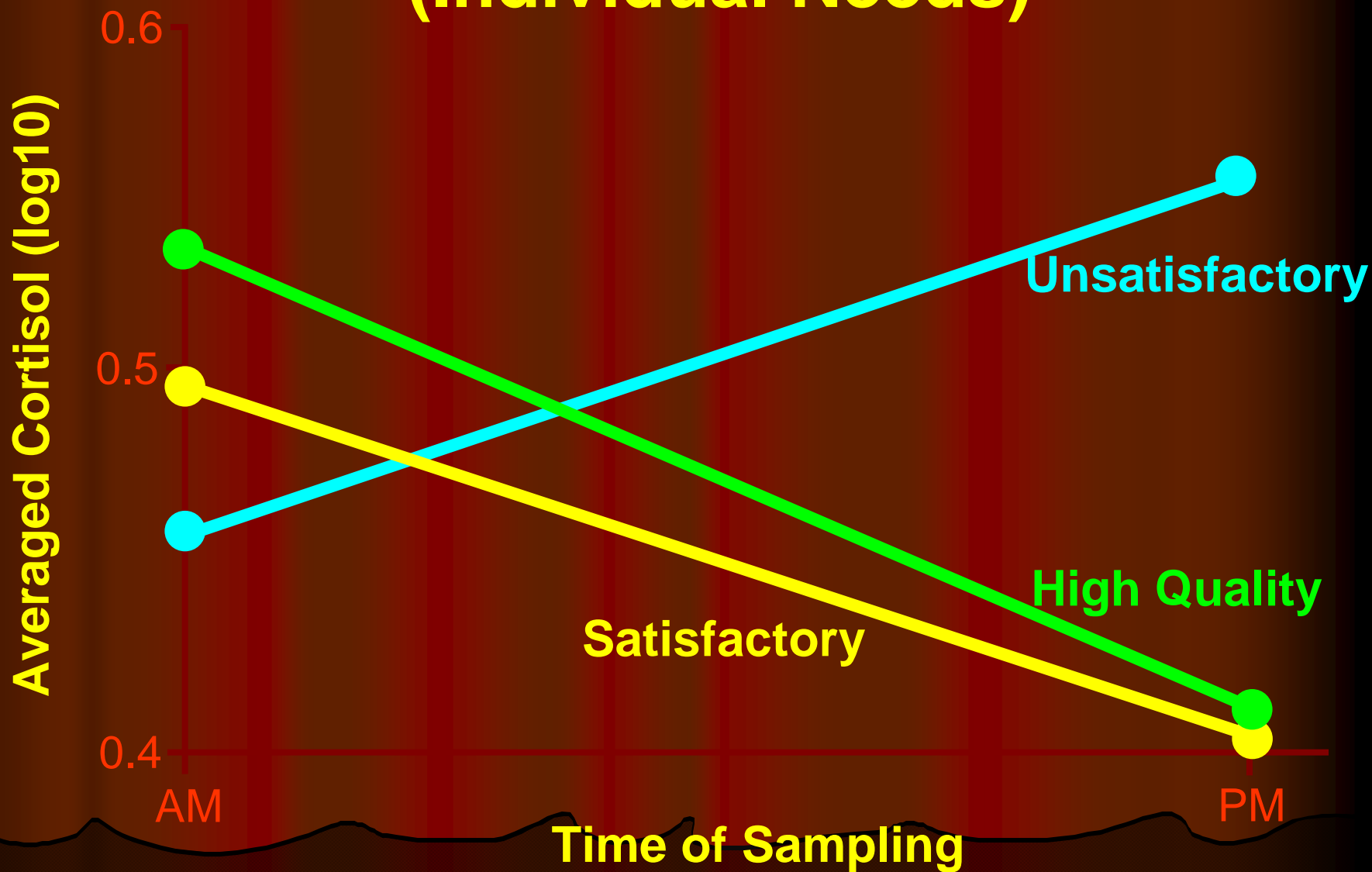


Prefrontal Cortex and
Hippocampus

Sources: Radley et al. (2004)

Bock et al. (2005)

Daycare Quality & Cortisol Levels (Individual Needs)



Dr Megan Gunnar

- Social Relationships control cortisol levels in infants and young children.
- Children with secure attachments to their caregivers show stable cortisol levels.
- The key ingredient to buffering stress is sensitive, responsive, individualized care.
- It's not separation from parents, but the experience in child care that triggers their stress responses.



Promoting Healthy Child Development with
**Ontario's Enhanced
18-Month Well-Baby Visit**

18-MONTH WELL-BABY VISIT



**Funded by the
Government of Ontario**

www.18monthvisit.ca

Adolescents: Why DO they do the things they do?



Kids Today

"The children now love luxury; they have bad manners, contempt for authority; they show disrespect for elders and love chatter in place of exercise. Children are now tyrants, not the servants of their households. They no longer rise when elders enter the room. They contradict their parents, chatter before company, gobble up dainties at the table, cross their legs, and tyrannize their teachers."

PLATO

Mismatch- Dr Peter Gluckman

- **As a society we confuse physical maturation with psychosocial maturation**
- **Youngsters are biologically mismatched to the society they live,**
- **The time needed to be fully functional as an adult has increased markedly**
- **Our PSYCHOSOCIAL maturation occurs AFTER our physical maturation.**

Key Messages

'UNDER CONSTRUCTION'

- Teens need MORE of our time, not less.
- What we THINK, affects how we FEEL, affects how we ACT
- -AT PROMISE rather THAN AT RISK
- The majority of adolescents do well YET

The Paradox

- Measures of most abilities indicate that adolescence is the healthiest and most resilient period of the lifespan.
- Yet overall morbidity and mortality increases 200-300 times from childhood to late adolescence.
- Primary causes of death and disability related to

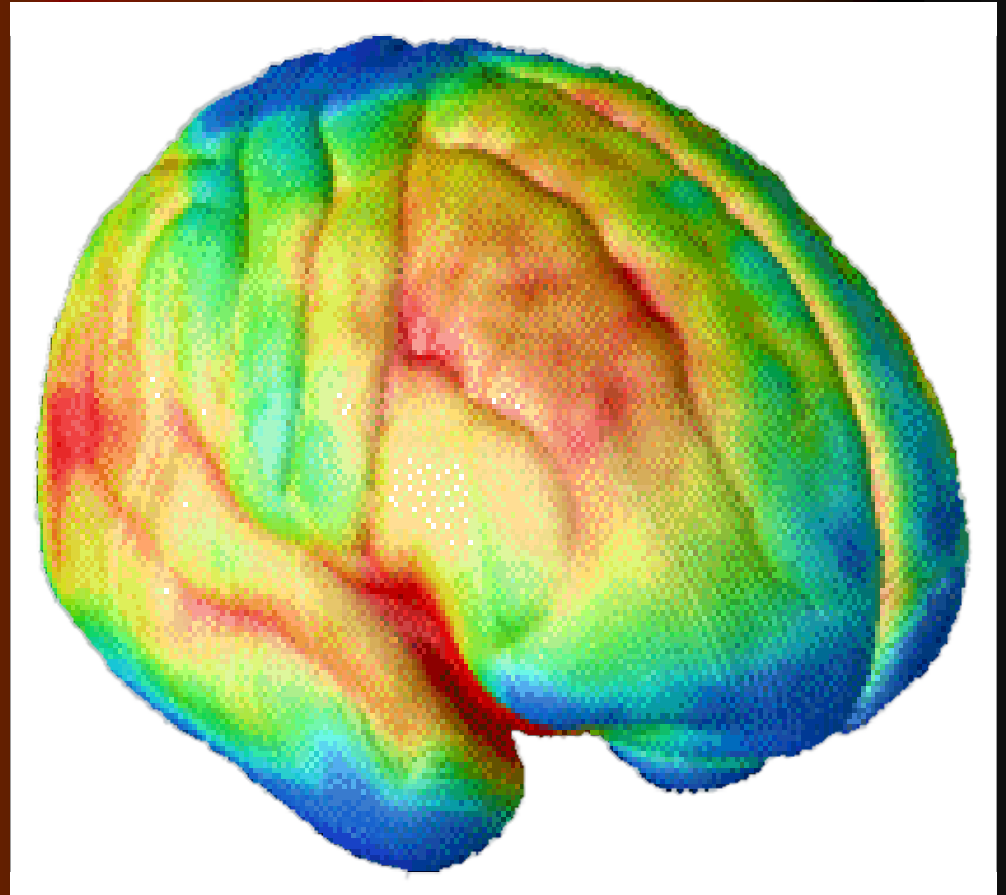
Problems with control of behaviour and emotions

Brain Development

Maturation Occurs from Back to Front of the Brain

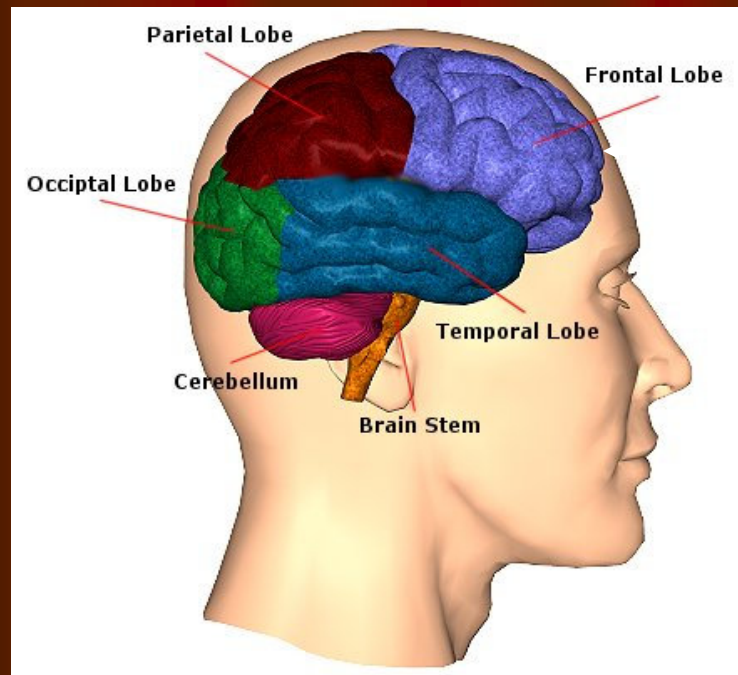
Images of Brain Development in Healthy Youth (Ages 5 – 20)

Blue represents maturing of brain areas



Source: Gogtay, Giedd, et al., 2004.

The Frontal Lobes



***Self- “everything”**

“Executive Functions”

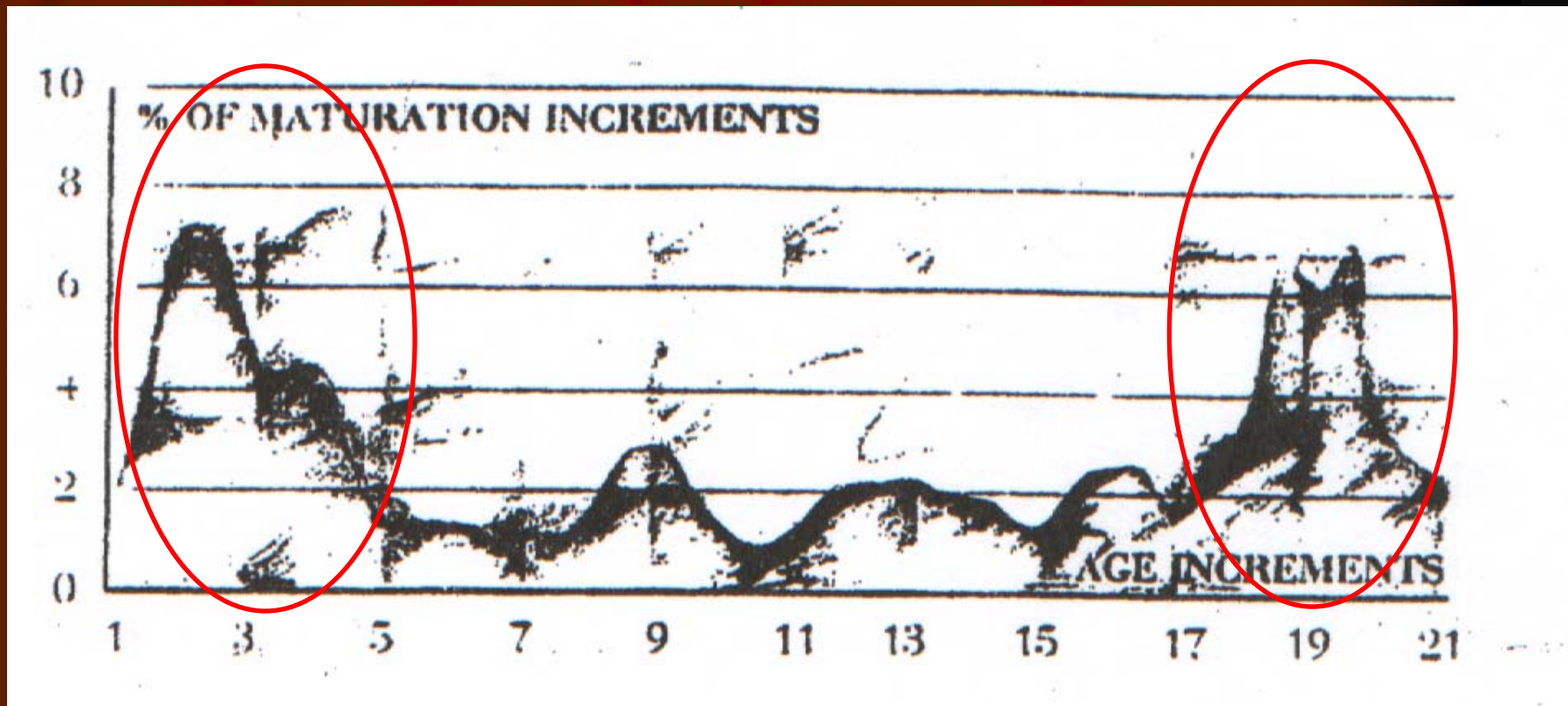
- Governing emotions
 - Judgment
 - Planning
 - Organization
 - Problem Solving
 - Impulse Inhibition
 - Abstraction
 - Analysis/synthesis
 - Self-awareness*
 - Self-concept*
 - Identity
- and
- Spirituality

AREAS UNDER CONSTRUCTION

Prefrontal Cortex

- Responsible for planning , strategies (cognitive flexibility).
- Allows one to solve problems.
- **DEVELOPED** frontal cortex allows one to regulate emotions, solve problems effectively and plan behaviour.

Frontal Lobes for Behavioral Control, Birth - 21



Self-Regulation

- SR is the ability to manage emotions and behaviour independently
- Is considered by some to be a central organizing feature of human development
- Most mental illnesses can be thought of as a problem of self-regulation
- Babies learn to self-regulate from their caregiving experiences

Self regulation

enfants marshmallow test.flv

Follow up at 18 years of age

High delayers and low delayers had very different outcomes

- High delayers:
 - Higher academic achievement (SAT 210 pts higher)
 - Worked well under pressure
 - Self reliant and confident
- Low Delayers
 - Over-react to frustration
 - Indecisive
 - Prone to jealousy and envy



Limbic System

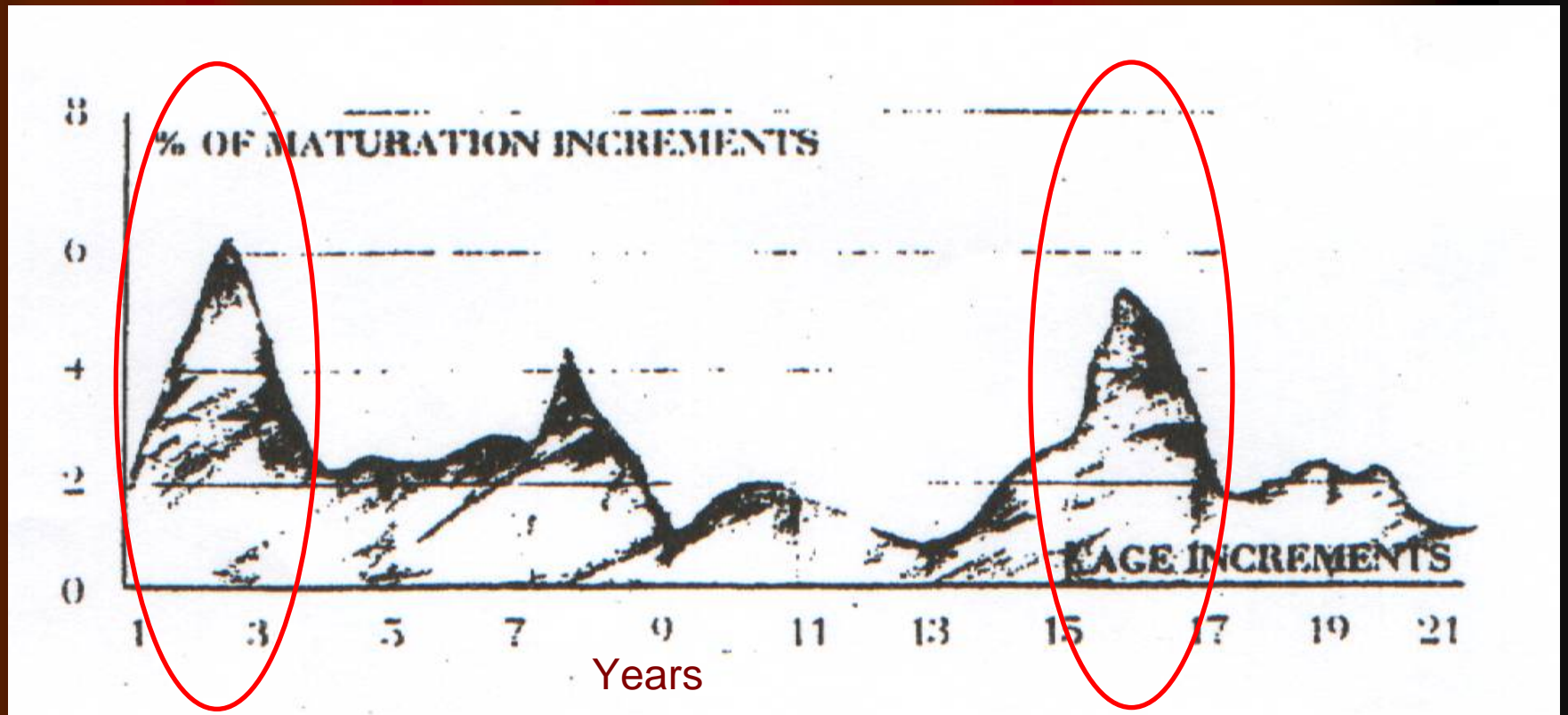
Do it Now!



Prefrontal cortex

Think about it

Limbic System for Birth - 21



What emotion do you see?



WHAT YOU SEE IS WHAT YOU GET!



Fear



Contempt



Surprise



Anger



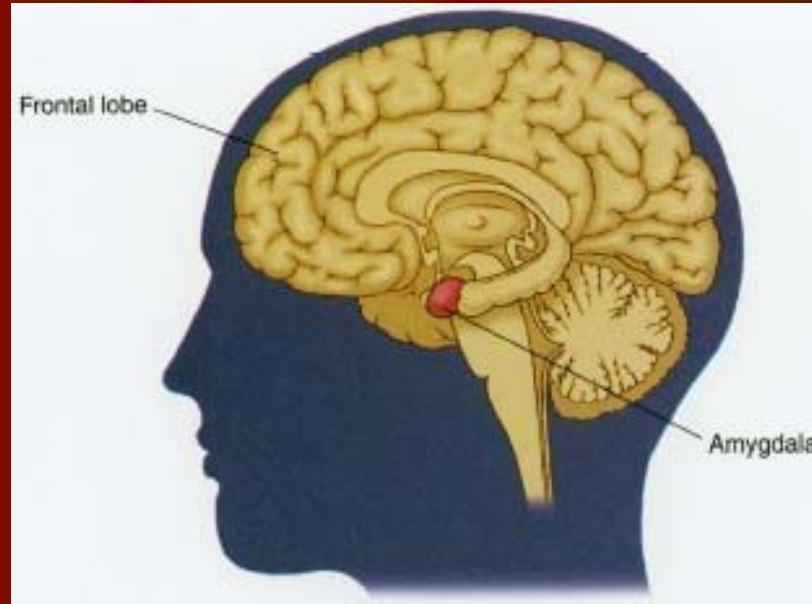
Disgust



Sadness



Happiness



Adolescents use the **Amygdala** (fight or flight response) rather than the **Frontal Cortex** (used by older adults) to read emotions

Communication Gap

- **Teens are more likely to misinterpret facial expressions of emotion**
- **See anger when there isn't anger**
- **Process in the amygdala**
- **May react quickly**



What Does This Mean in terms of Behavior?

- Impulsiveness
- Mood changes
- Inadequate emotional control
- Seeks out risks



- “Being an adolescent is like starting an engine without yet having a skilled driver behind the wheel”

R.E. Dahl

Made worse as group adolescent brains amp-up the levels

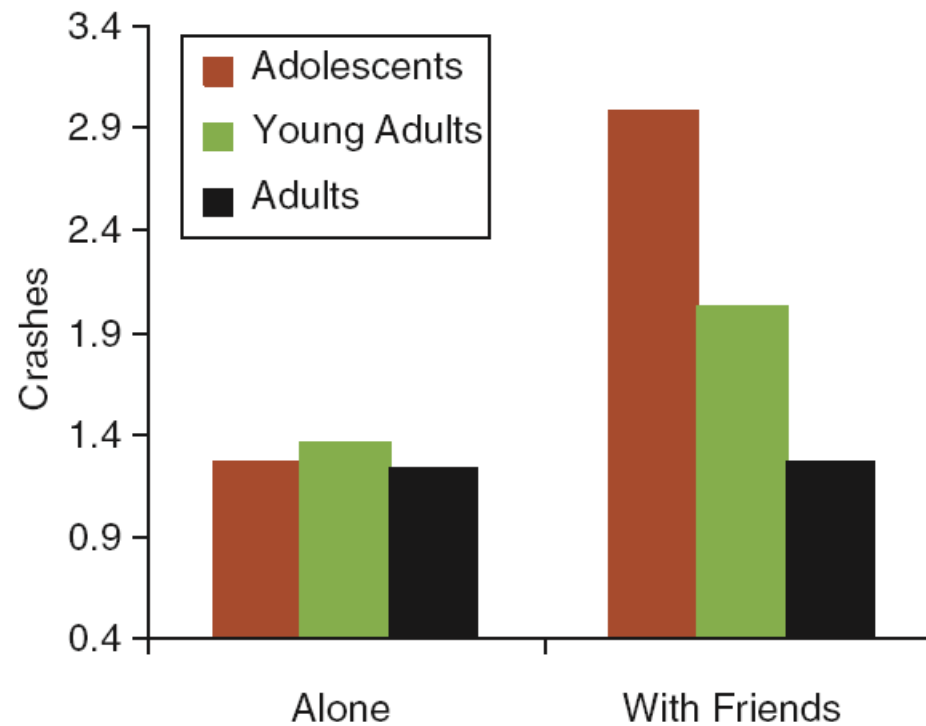


Fig. 2. Risk taking of adolescents, young adults, and adults during a video driving game, when playing alone and when playing with friends. Adapted from Gardner & Steinberg (2004).

Judgment Gets Better with Age

- By age 18, the adolescent's judgement for structured challenges is roughly equal to that of adults.
- But judgement that involves resisting impulses or delaying gratification is still under construction during late adolescence and early adulthood.

Individuals Mature Intellectually Before They Mature Socially and Emotionally



How Important is Relationship for Youth

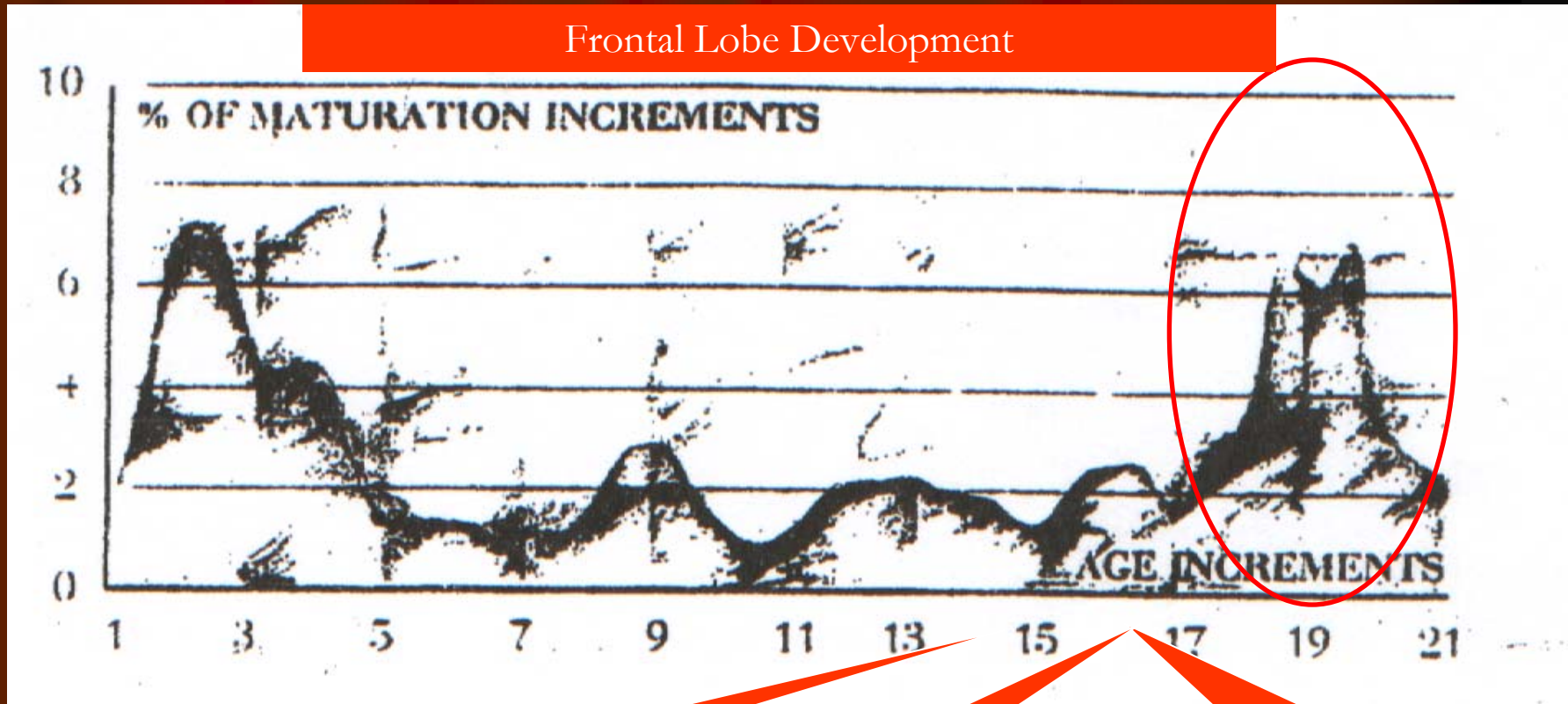
- Before many youth can learn and make positive changes, it is imperative that they feel respected, and valued, validated and understood (Safe and Significant)
- Stephen de Groot
- www.myriadconsult.com

GREATEST OPPORTUNITY...GREATEST VULNERABILITY

As the adolescent brain is reconfigured it is more susceptible to long lasting damage of drugs, alcohol, and negative experiences. Unfortunately, the brain is most vulnerable at a time when they are most inclined to take risks and to act impulsively..."

(Jay Giedd, NIH 2004)

The Problem



Autonomy

drivers
license

Average age of first
sexual encounter in
Canada 16

SCENARIOS

- What we THINK....
- Affects what we FEEL...
- Affects how we ACT....

