Adolescent Brain Development

Cindy C. Cottle, Ph.D
Forensic Psychological Assessment and Consultation Services
Raleigh, North Carolina

Why is Adolescent Brain Development Research Relevant?

- Recent Supreme Court Decisions
- Legal Policies: "Raise the Age" in N.C.
- Individual Cases: Legal competencies, waiver/transfer, disposition

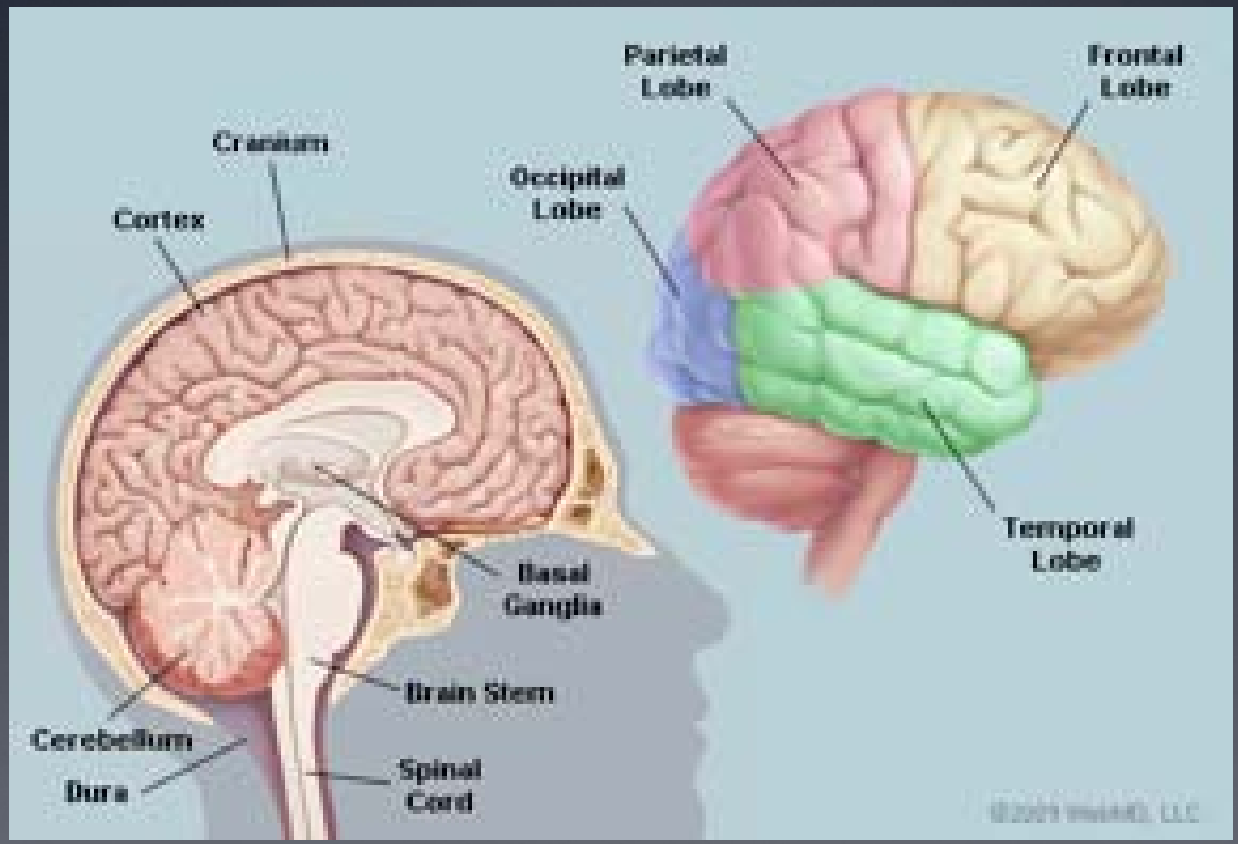
Topics

- Characteristics of Adolescent Development
- Overview of Brain Structures and Functions
- Changes in the Brain during Adolescence
- Influence of Brain Changes on Behavior and Legal Competencies

Adolescent Development

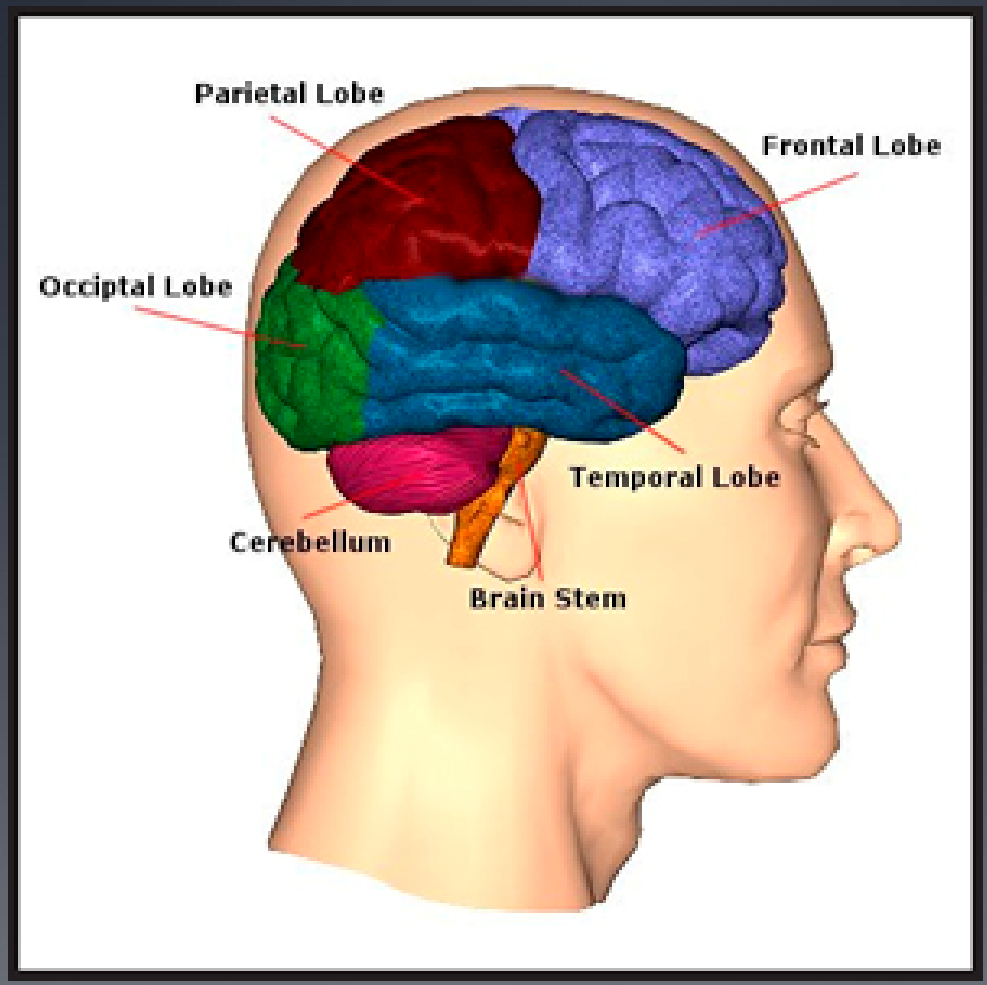
- Transition and Variability
- Domains of Development
  - Physical
  - Emotional
  - Social
  - Intellectual
- Environmental Influences

Brain Structures



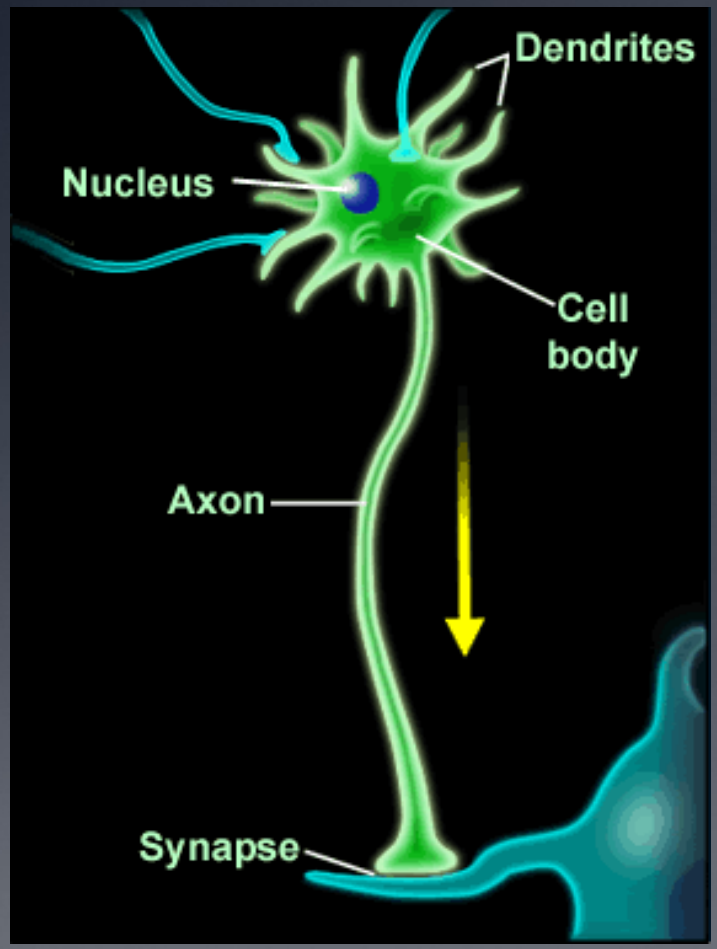
From: WebMD.Com

Brain Structures



www.neuroskills.com

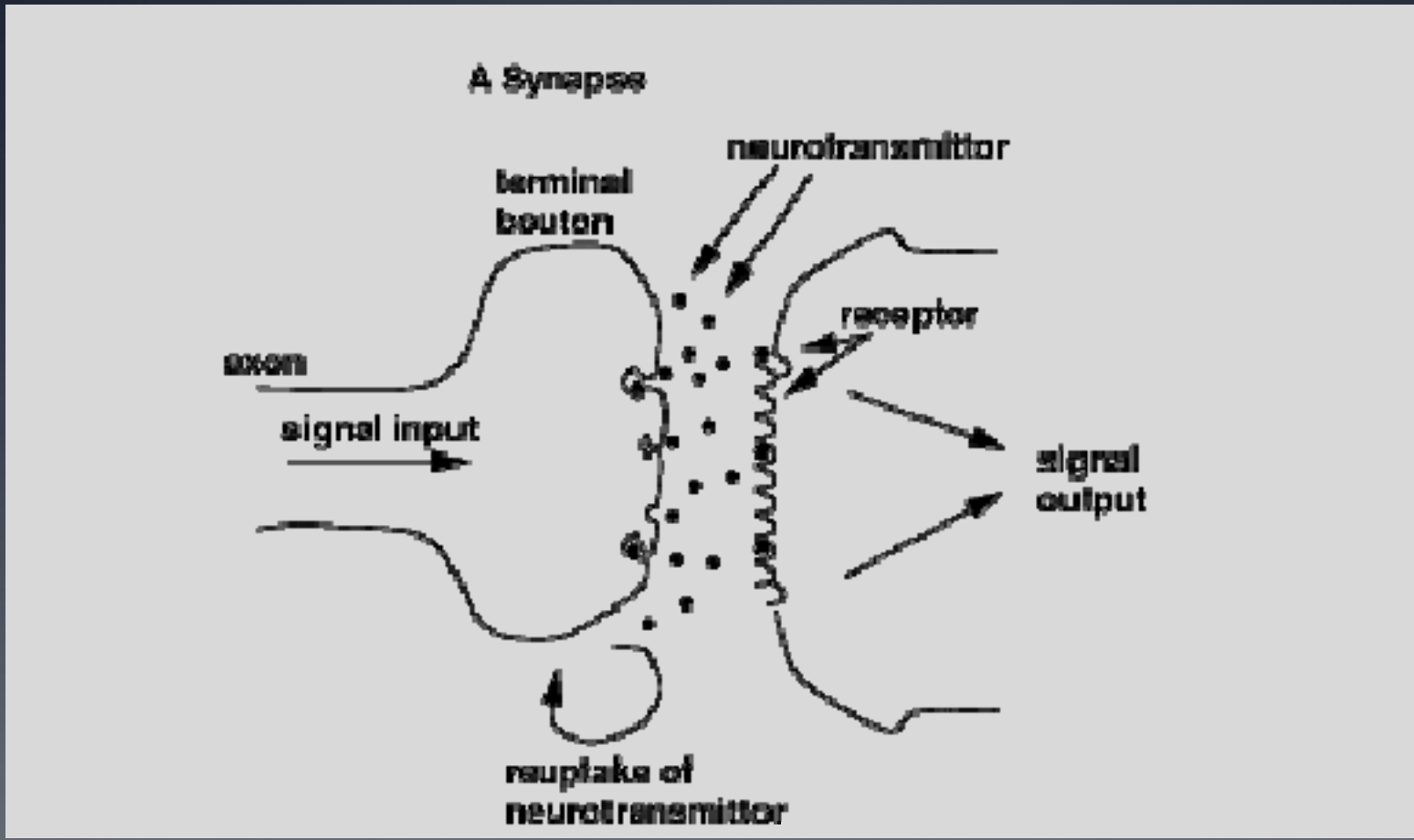
The Neuron: Transmitter of Information



When do Neurons develop?

"Gray matter" versus "White" Matter:
Myelination

Neurotransmitters



Common Neurotransmitters

Serotonin

- Emotion and Mood
- Hallucinations (high levels of serotonin)
- Medications prevent uptake of serotonin, leaving more in the system

Dopamine

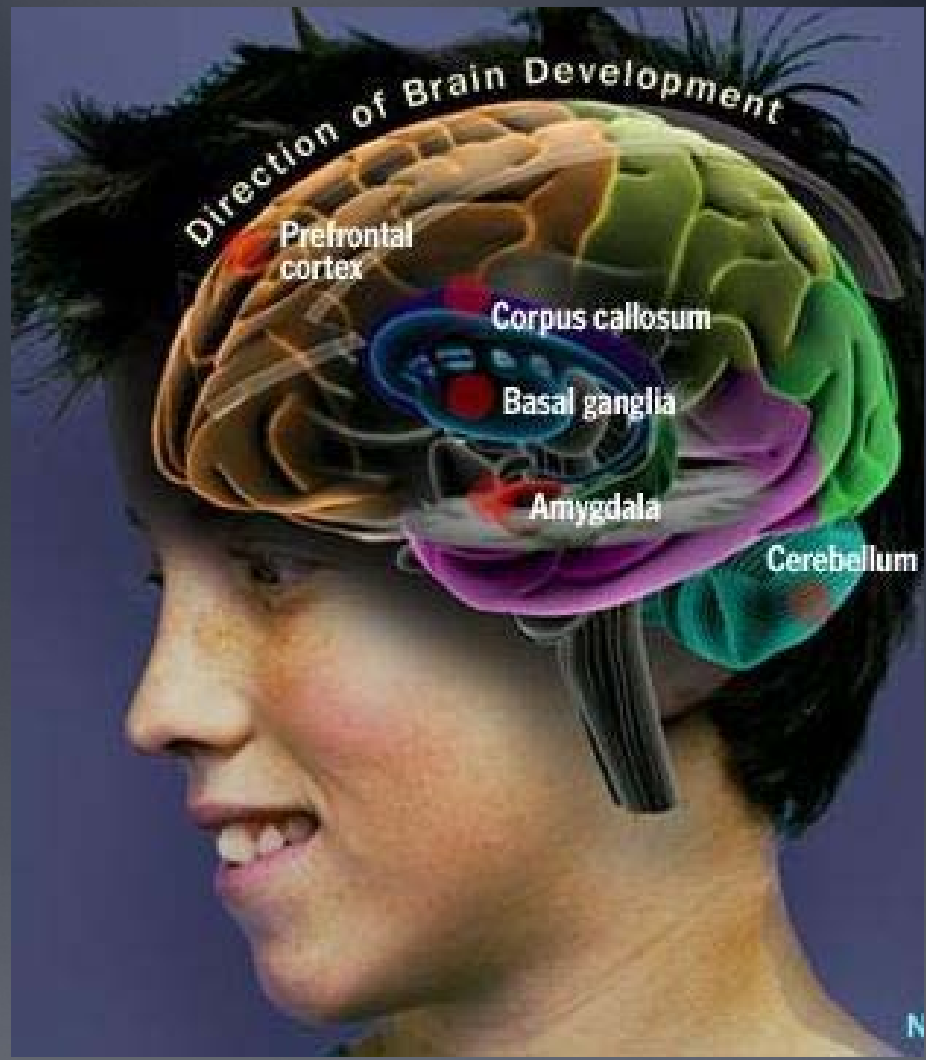
- Associated with "Reward Center"
- Implicated in Schizophrenia and Parkinson's
- Drugs and meds can increase dopamine levels

Changes in the Brain During Adolescence

Myelination

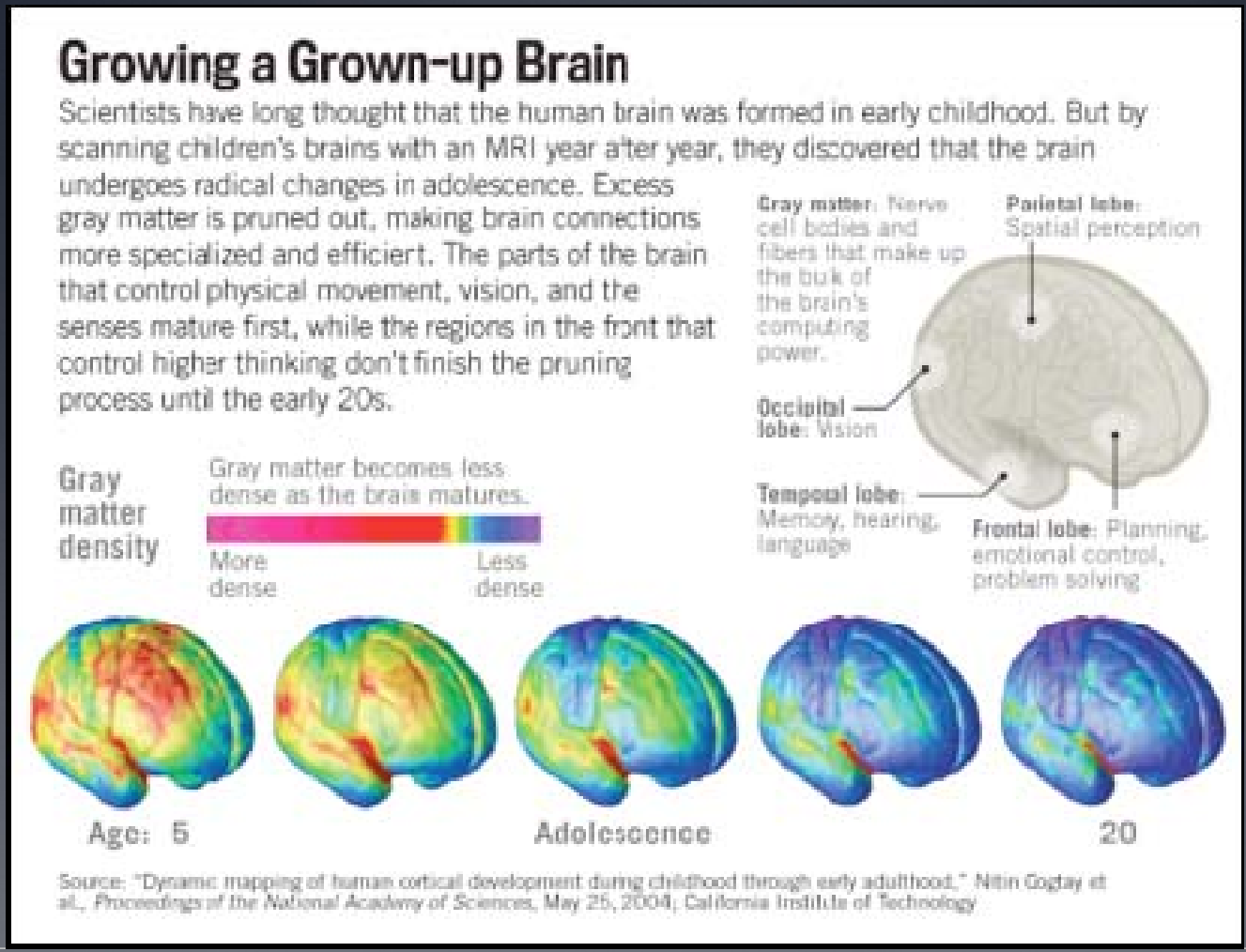
Pruning

Direction of change



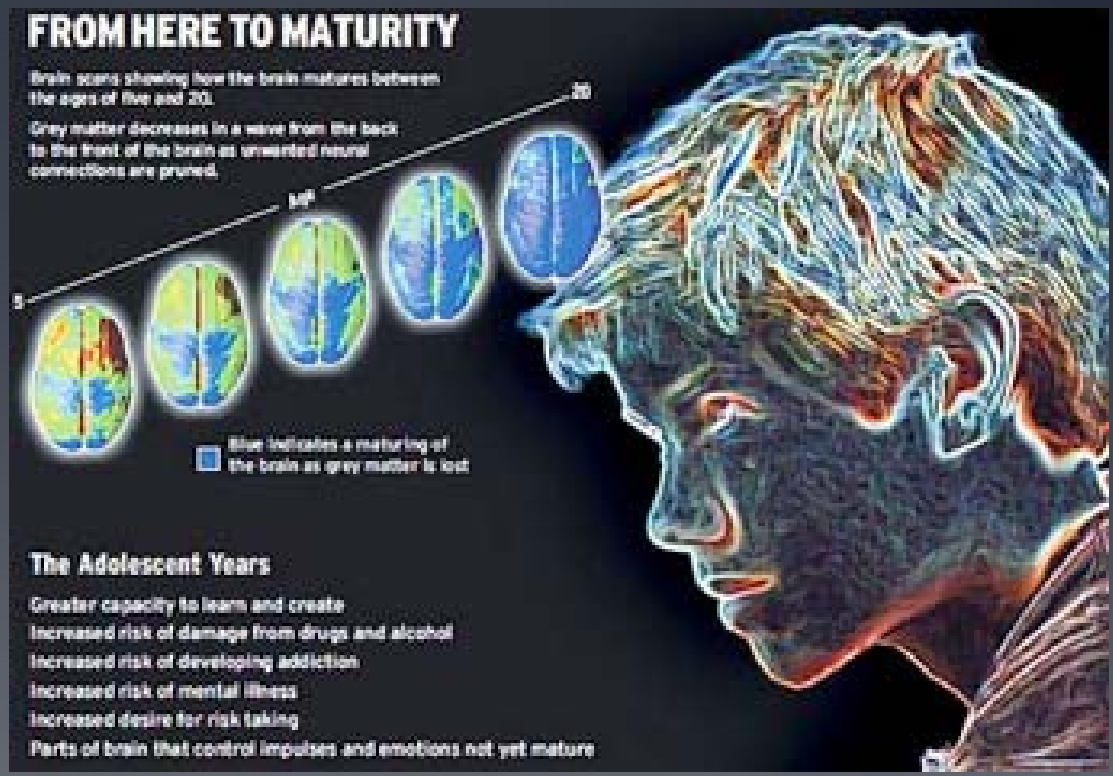
Ken Winters, Ph.D. University of Minnesota
http://pruegill.wordpress.com/

Adolescent Brain Development



Cognitive Changes

- Information Processing Abilities
- Reasoning Ability (logical thinking, hypothetical)
- Executive Functioning Ability



Cognitive Skills

"rather than talking about a stage of cognitive activity characteristic of adolescence,...it is more accurate to depict these advanced reasoning capabilities as skills that are ...

employed by older children more often than by younger ones,

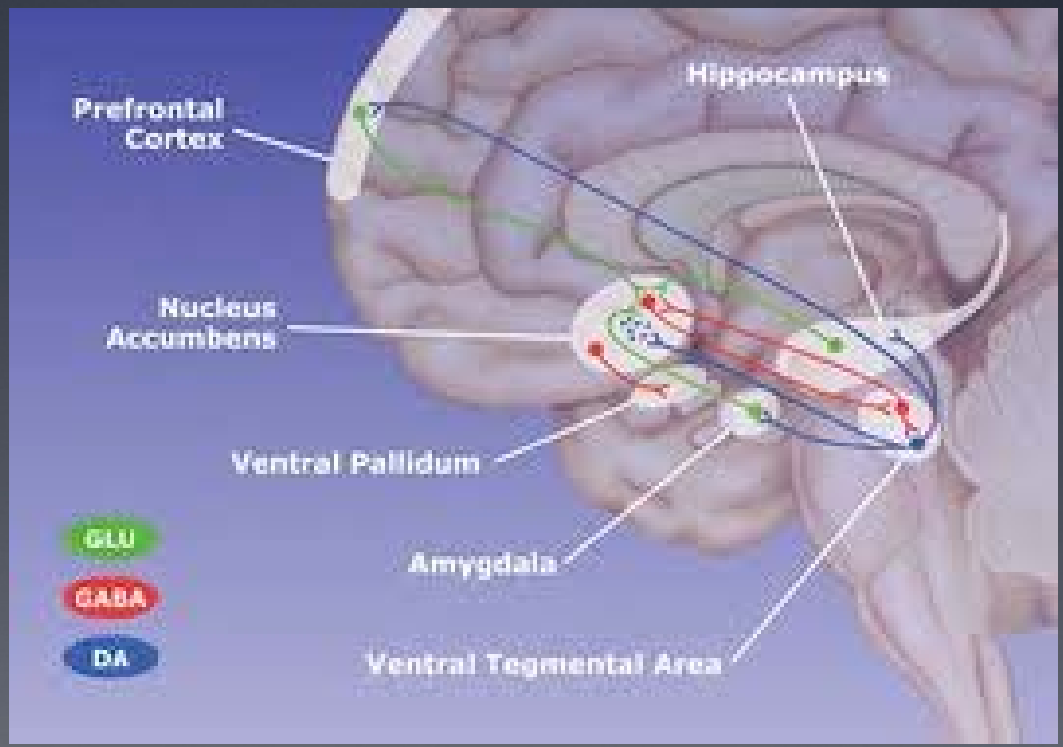
by some adolescents more often than by others, and

by individuals when they are in certain situations (especially familiar situations) more often than when they are in other situations."

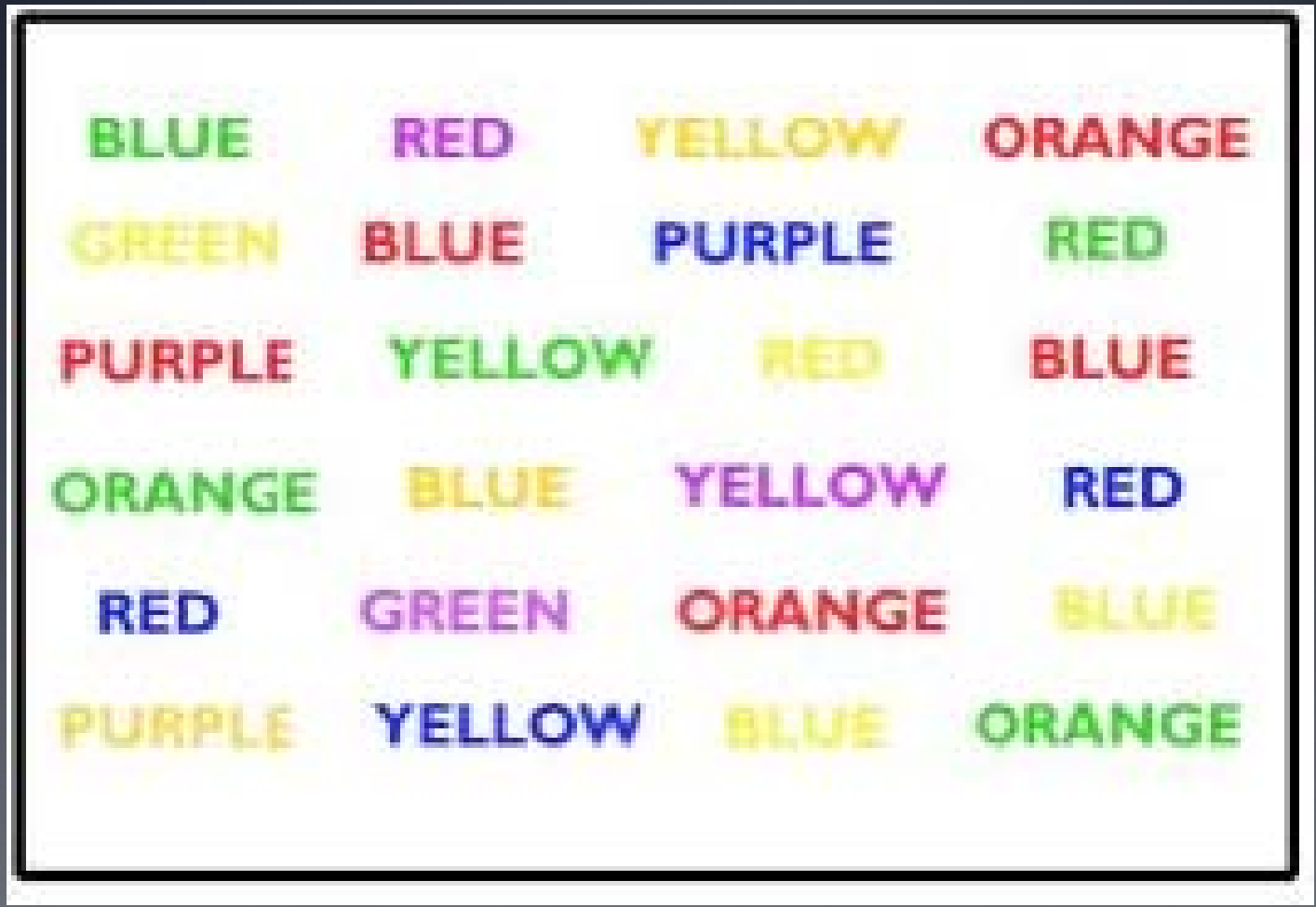
- Lawrence Steinberg (2005)

Risk Taking, Decision Making, and Self Control

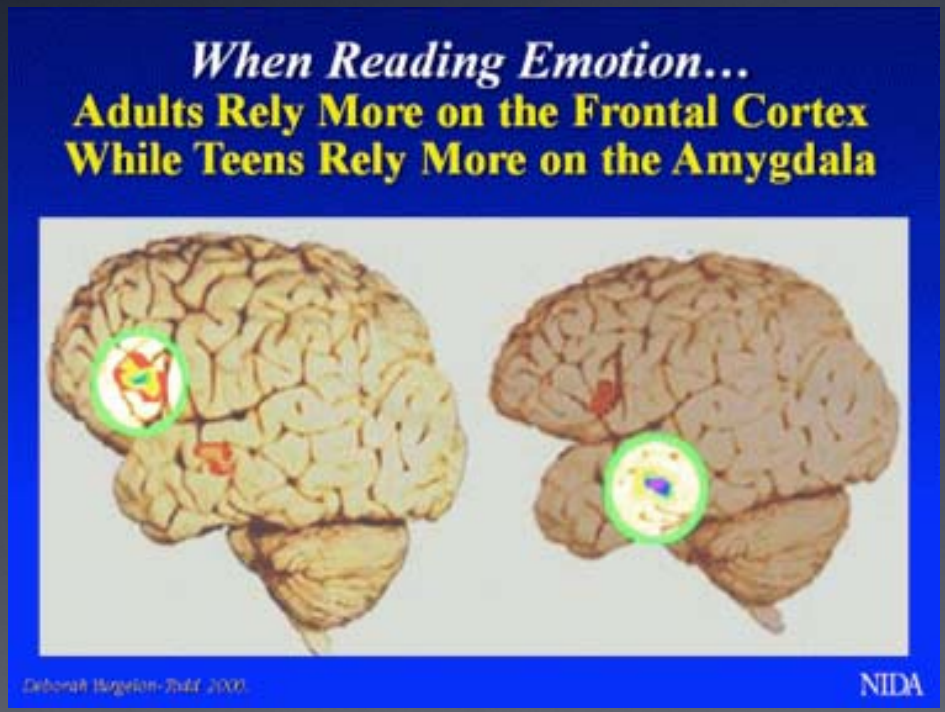
- Sensation Seeking
- Weighing costs and benefits
- Inhibiting Impulses
- "Hot Cognitions"



The Stroop Test



Social and Emotional Behavior



- Susceptibility and Importance of Peers
- Emotional sensitivity and processing of emotional information
- The "Reward Center" and the "Avoid Center"

The Environment, Mental Illness, and Substance Use

- The greatest period of risk for the emergence of a mental health diagnosis is during adolescence
- There are differences in the brains of adolescents who have mental health diagnoses
- Adolescents' increased risk of alcohol and substance use could be related to brain development

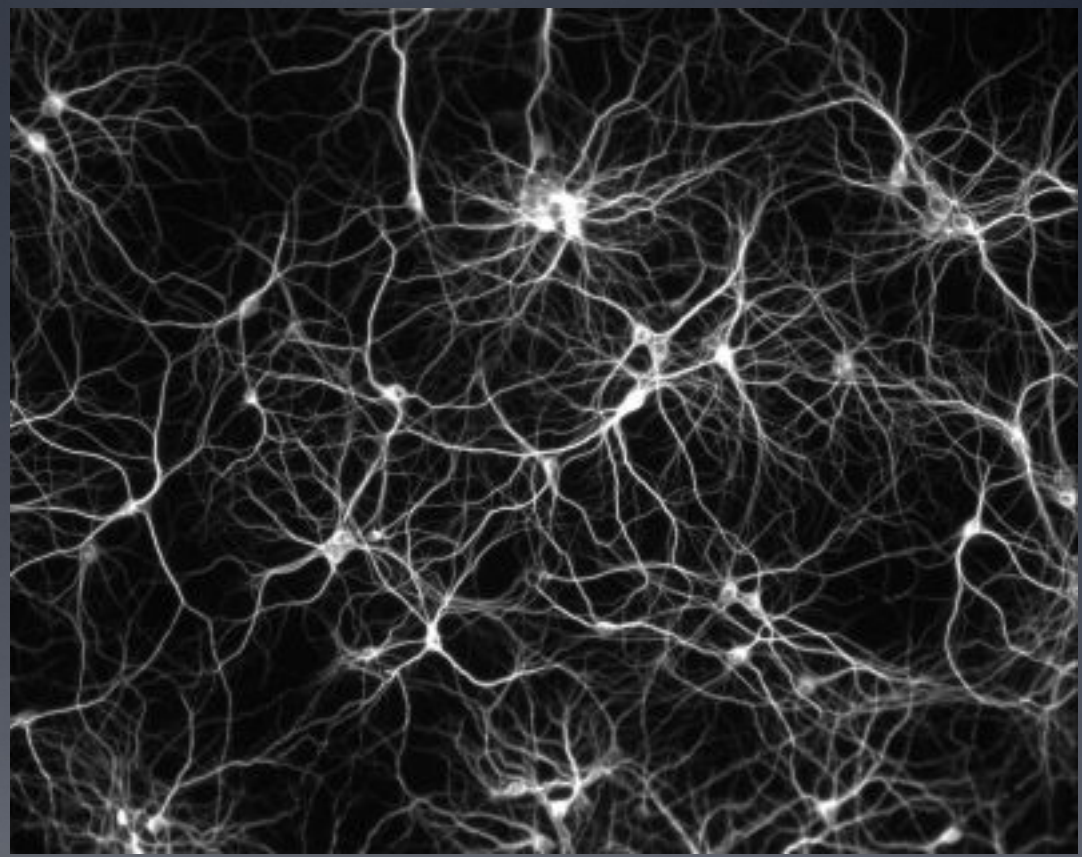
Effect of Brain Development on Behavior

Ineffective levels of neurotransmitters	→	Problems with mood, attn/concentration, problem solving, & risk taking behaviors
Less reliance on frontal lobes in decision making	→	Impulsivity, "gut" reactions; problems ignoring distractions
Less efficient connections, such as those to/from memory centers of brain	→	Less reliance on experience and memory in decision making; more reliance on emotion

Adolescent Opportunities and Treatment Amenability

Pruning:

Connections between neurons become more efficient with learning and experience



Neuropsychology in Court

- Capacity to Waive Miranda (NCGS 7B-2101)
  - IQ, age, experience with law enforcement
  - Time of day, level of stress, number of adults present
  - Level of emotional arousal (effect on decision making)
  - Short-term vs long term thinking
  - Effect of peers (protecting someone?)

Neuropsychology in Court

- Transfer/Waiver (NCGS 7B-2203)
  - Age, IQ, maturity, prior record, etc..
  - Decision making during alleged offense
  - Susceptibility to peers, emotional arousal
  - Level of planning versus impulsivity
  - Psychopathy Research: Caution!
  - Treatment needs and amenability

Neuropsychology in Court

- Capacity to Proceed to Trial/Plea Bargain (NCGS 15A-1001)
  - Ability to weigh risks and benefits (how to plead)
  - Ability to consider hypothetical situations
  - Ability to delay gratification

Neuropsychology in Court

- Legal Culpability
  - Age, IQ, maturity
  - Emerging mental health functioning
  - Alcohol/Substance Use
  - Consider possibility of misdiagnosis, effectiveness of treatment, consistency of treatment
  - Peer Influence

Neuropsychology in Court

- Disposition/Sentencing (15A-1477c)
  - Age, maturity, IQ
  - Ability to appreciate consequences
  - Mental health functioning
  - Family/peer pressure
  - Likelihood that juvenile would benefit from rehabilitation in confinement
  - Treatment amenability (also history of treatment effectiveness, consistency)

Cindy C. Cottle, Ph.D.

www.mentalhealthandlaw.com

cindycottle@gmail.com

(919) 827-2148