
PAUL BELJAN, PSYD, ABPdN, ABN
BELJAN PSYCHOLOGICAL SERVICES

**EXECUTIVE FUNCTIONING &
ATTENTION:**

**A Hypothesis for the
Neurodevelopmental Origins of
Asynchrony**

Main Topics

- **Definition of Asynchronous Development**
- **How the Brain Works**
 - **Back to Front**
 - **Sub-Cortical to Higher Cortical**
- **Executive Function/Attention**
 - **The Mirsky Model**
- **How Asynchronous Development Works**



Asynchronous Development

- A form of development in which there is greater variability in skill set expression.
- Some skills lag behind others that seem superior.
- The child may be frustrated with the skill sets that lag behind.
- Will the skill sets that lag behind eventually catch up?

Asynchronous Development

- Typical skill sets that lag behind:
 - ❑ Fine motor – writing, numbers, pencil grip...
 - ❑ Gross motor – clumsiness, fall a lot, poor at sports...
 - ❑ Language acumen over speech (articulation)
 - ❑ Hyper sensitive to stimuli.
 - ❑ Low frustration tolerance
 - ❑ Pressured speech; racing thoughts.
 - ❑ Cannot execute what the mind's eye sees.

Asynchronous Development

- The skill sets that are lagging behind depend on frontal lobe mediation.
- This is important to know, because it may be a predisposing factor in why so many gifted children get misdiagnosed as ADD.
 - To understand this, let's look at the brain.

HOW THE BRAIN WORKS

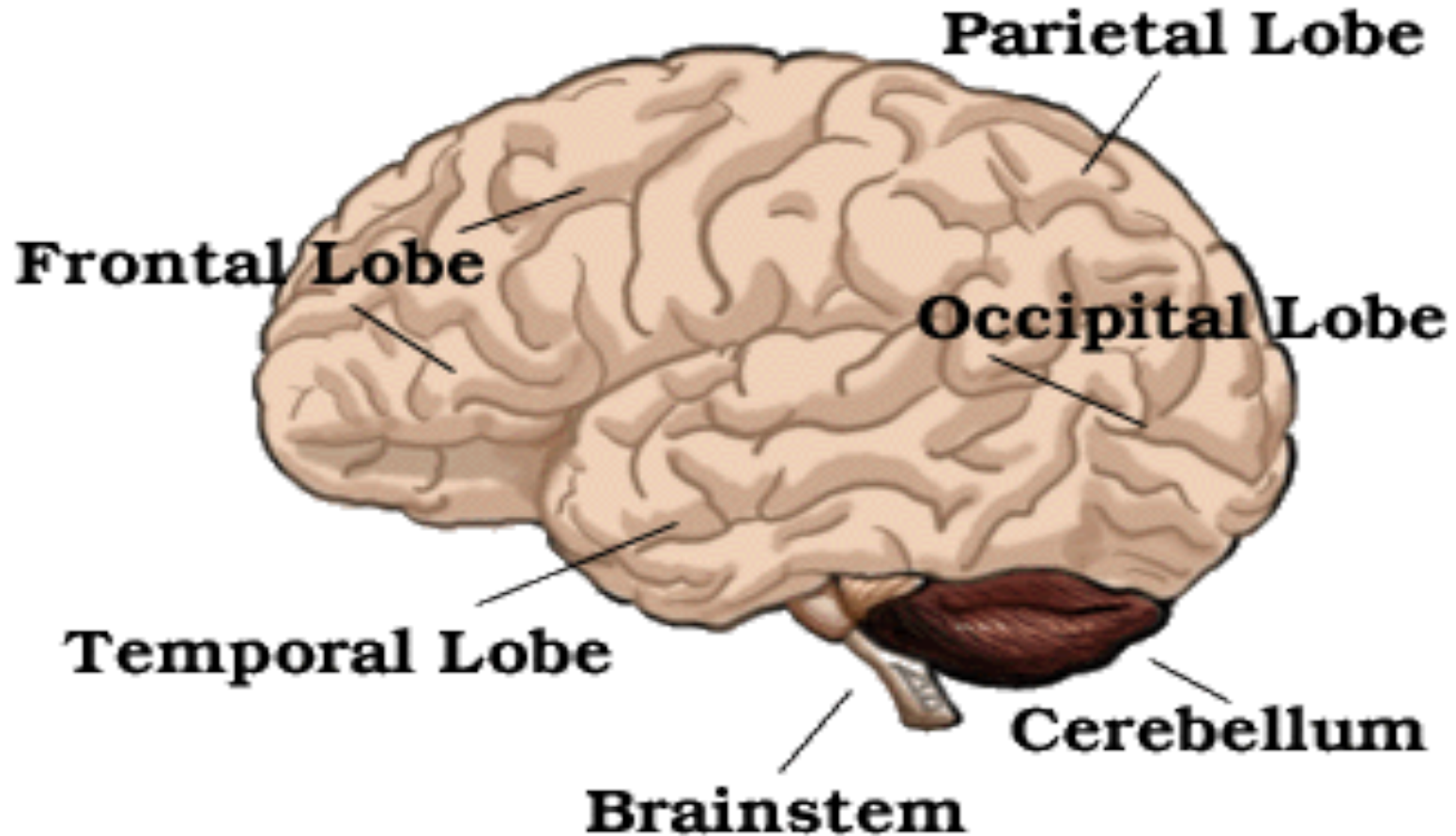
Personality and
Behavior is Driven by
Cognition:

- All Brain Function is
Multiply Determined
 - Koziol



FRONT

BACK



How the Brain Works

- **Back**
 - **Occipital**
 - **Temporal**
 - **Parietal**
- **Middle**
 - **Limbic System**
 - **Basal Ganglia**
- **Front**
 - **Frontal Lobes**
 - **Pre Frontal Lo**



BRAIN DEVELOPMENT

- When an infant is born, the sub-cortical brain is intact and ready to function.
 - The frontal system continues to develop across time.
 - **With increased frontal control, one's emotional life and sub-cortical processes are mediated more efficiently.**

An Example: Frontal Mediation

- The poker analogy...



WHERE ARE WE?

- Completed basic brain functioning.

Moving on to:

Executive Functioning and Attention

Executive Function

- **Pre-Frontal: Anterior to the Motor Cortex**
 - **Working Memory**
 - **Inhibition**
 - **Planning and Organization**
 - **Focus Execute**



WORKING MEMORY

The ability to hold two or more points of thought in mind & simultaneously, use that information to generate novel solutions or behaviors.



WORKING MEMORY

- ❑ **WHAT IF:** you cannot think ahead?
- ❑ **THEN:** you cannot self-direct behavior and you are *stimulus bound*.

WORKING MEMORY

- **WHAT IF:** you are *stimulus bound* ?
- **THEN:** how do you anticipate consequences to your behavioral choices?

WORKING MEMORY

- Stimulus Bound behavior is impulsive; i.e., the child is attracted to (distracted by/bound by) extraneous stimulus that is occurring in their environment.

***Hint: Think Hyperactive**

INHIBITION

- ❑ **Inhibition** is being able to stop when you should.
 - Behavioral brakes
 - A full working memory can cause dysinhibition, behavioral overflow
 - Intact inhibition, does not mean working memory is intact
 - Working memory can be intact, but attention span can undermine the skill set.



INHIBITION

- **Impulsivity vs. Inhibition: It's as if that kid is run by a motor.**
- **The child does not have extra energy (ADHD), they are disorganized in the direction of their behavior.**



INHIBITION

■ CAN'T vs WON'T

- ❑ Inhibition is a have/have not ability.
- ❑ This changes our view of intent/willful behavior.
- ❑ This changes our view of goal directed behavior vs. planning and organization.
- ❑ This changes our view of generalizing treatment gains in the office.



PLANNING and ORGANIZATION

- The direct result of a functioning working memory and inhibition system.
 1. You have to keep things in mind to think.
 2. You have to be able to think to plan.
 3. You have to be able to plan to organize.
 4. You have to inhibit extraneous behavior to think ahead.

Planning and Organization

- **If you do not think ahead: how do you factor in consequences to behavior?**
- **If you don't think ahead: how do you inhibit or direct your own behavior?**
- **If you don't think ahead: how do you change behavior?**
- **If you don't think ahead: how do you clean your room and do your homework?**



EXECUTING FUNCTIONING and ATTENTION

- **Done:** Executive Functioning
- **Moving on:** Attentional Components

ATTENTION♪

- ❑ **Focus Execute**
- ❑ **Shift**
- ❑ **Sustain**
- ❑ **Encode**

FOCUS EXECUTE

- the ability to add a novel trait or behavior to a mastered or habituated behavior; i.e., the brain modifies what it knows)



FOCUS EXECUTE

- Adaptability.
- Using old skills in new ways.
- Frees working memory.

FOCUS EXECUTE

- **Requires flexibility in:**
 - ❑ Allocation of attentional resources on a specific task
 - ❑ Reasoning
 - ❑ Speed of adjustment (Cognitive processing speed)
 - ❑ Fluency of thought
 - ❑ Skill integration

SUSTAIN

- **Sustaining attention** is the ability allocate attentional abilities as mediated by the frontal executive functioning system.



SUSTAIN

- ❑ Requires vigilance and inhibition from distractibility.
- ❑ Has to do with arousal (the skill set) and frontal allocation of the skill set.

SHIFT

- Using cues from the environment to direct one's concept formation-problem solving appropriately.

SHIFT

- Suggests:
 - Allocation of attentional resources.
 - Concept formation.
 - Inhibition.
 - Cognitive flexibility.

ENCODE

- is the means by which one places information into memory for later recall.
 - Requires planning and organization.
 - Must be distinguished from storage or recall deficits.

ENCODE

❑ Requires

- working memory
- divided attention
- language comp. (ex. Semantics)
- planning

- ❑ Semantic Associations = increased retention



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End of Executive Functioning and Attention.

QUESTIONS?

ASYNCHRONOUS DEVELOPMENT

- The sub-cortical brain is intact at birth.
- The front and higher cortical portions of the brain are in development at birth.
 - The frontal-higher cortical system continues to develop across childhood into the early twenties.

ASYNCHRONOUS DEVELOPMENT

- The back of the brain must be functioning:
 - Faster
 - More efficiently
 - More flexibly
 - More adaptively
 - More sensitively
- The front of the brain that mediated the back of the brain (think poker) cannot manage what is happening sub-cortically.

ASYNCHRONOUS DEVELOPMENT

- A gifted child has a Ferrari back of the brain...



.....but a Dune Buggy set
of frontal lobes.



ASSESSMENT

- Comprehensive pediatric neuropsychological evaluation:
 - History & Clinical Interview
 - Domains
 - Sub-cortical to higher cortical evaluation model
 - No discrepancy testing

IT TAKES A WHOLE BRAIN TO FUNCTION

Paul Beljan, Psy.D.

BELJAN PSYCHOLOGICAL SERVICES

4350 E. CAMELBACK RD., STE. E-250

PHOENIX, AZ 85018

602-957-7600

beljanpsy@qwest.net