

Executive Functions

Goal: Visual/narrative representation of each executive function. Consider what the opposite or “decayed” executive function would appear and how someone would solve/fix it.

Notes taken from Adele Diamond study:

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4084861/pdf/nihms-602706.pdf>

Executive Function: *a collection of top-down control processes used when going on automatic or relying on instinct or intuition would be ill-advised, insufficient, or impossible.*

Inhibitory Control

- “Control one’s attention, behavior, thoughts and/or emotions to **override a strong internal predisposition or external lure**, and instead do what’s more appropriate or needed.”
 - Otherwise be at the mercy of impulses
 - **Making it possible to change our habits**
 - Not be “unthinking creatures of habit”
- **Practice selective attention**
- Suppressing pre-potent mental representations
 - Resisting extraneous or unwanted thoughts or memories
- Self-control
 - Controlling behavior and emotions
 - Avoiding temptation, overindulgence
- **Keeping on task**
 - Delayed gratifications
- Not jumping to conclusions, blurting out first thoughts
 - Thinking through responses
- **“Errors of impulsivity are errors of not being able to wait”**
- Shielding stimulus from view often helps those with inhibitory control issues

- Ex: People dieting eliminating fatty foods from sight
- “Our natural tendency is to look towards a stimulus when it appears”
 - Trials done to inhibit that tendency and do the opposite
 - Responses slower, more likely to err

Working Memory (WM)

- **Holding information in mind and mentally working with it**
 - Incorporating new information into your thinking or action plans (**updating**)
 - Considering alternatives
 - Mental **translations/transformations**
 - Making instructions into action plans
 - **WM is critical for making sense of things that happen over time**
- Involves disassembling and recombining elements in new ways
 - **Helping us to consider our remembered past and future hopes** in making plans and decisions
 - How time affects our growth
- Working Memory vs Short Term Memory
 - WM: holding information and manipulating it
 - Short-Term: Just holding information
- WM and Inhibitory Control generally need one another and co-occur
 - WM supports Inhibitory Control
 - Concentrating hard on information in mind, you increase likelihood that 1) information will guide behavior and 2) decrease the likelihood of inhibitory error (saying a pre-potent response)
 - Using visual cues help children remember what they were just told can improve inhibitory control performance.
 - **EX:** Broken off into pairs, children each given a picture book to share its story. Each child eager to speak. To teach listening skill, teacher hands an ear to one child per pairing. “Ears don’t talk; ears listen,” teacher explains. Child with ear listens. After a few months, children don’t need ear---they internalized the reminder.
 - Inhibitory Control Supports WM
 - Resist focusing exclusively on one thing and recombine ideas and facts in new, creative ways and resist repeating old thought patterns
 - **When such inhibition fails, mind wanders.**
 - Meditation helps train focus
 - **Keep our mental workspace from becoming too cluttered**
 - **EX:** Everyone can obey rules perfectly when given one task

- When given two tasks and then told to ignore one of them, people with lower EF's **fail to clear the irrelevant task from their mental workspace.**
 - Extra information clutters their limited capacity WM
 - Asking subjects to reorder items they hear is an excellent WM measure
 - **EX:** repeating items back by size (cat, mouse, dinosaur, lion)
 - Corsi Block Test https://en.wikipedia.org/wiki/Corsi_block-tapping_test

Cognitive Flexibility

- **“Being able to change perspectives spatially or interpersonally”**
 - “To change perspectives, we need to **inhibit** (or deactivate) our previous perspective and load into **WM** (or activate) a different perspective.
- Changing how we think about something
 - Thinking outside of the box
 - Me: Thinking *inside* of the box?
 - Working within limitations
- **Flexible** enough to adjust to changed demands or priorities
 - **Admit you were wrong**
 - Take advantage of sudden, unexpected opportunities
- Cognitive flexibility is the **opposite of rigidity**
 - Overlap with **creativity**
- Dimensional Change Card Sort Test
 - (https://www.google.com/search?q=dimensional+change+card+sort+task&espv=2&biw=1303&bih=934&source=lnms&tbm=isch&sa=X&ved=0ahUKewjYxNX6wYLOAhVBeD4KHxyjAn8Q_AUICCgB)
 - “Errors seem to occur because of difficulty in overcoming what might be termed ‘**attentional inertia**,’ the tendency to continue to focus attention on what had previously been relevant.”
 - **“We seem to like everything to stay the same** (rule and response site) or everything to change (if the rule changes, we’re faster if the response site also changes).
- “It’s not that demanding for adults to keep doing what they’ve been doing, even if it’s counterintuitive or counter to their initial inclination; after a while it requires little top-down control. **What’s far more difficult is switching back and forth between mental sets. Simply put, it is easier to inhibit a dominant response all the time than only some of the time.**”

- Cognitive flexibility means **overcoming inertial tendencies** so you can switch back and forth between mental sets or ways of thinking about stimuli

Fluid Intelligence (little description)

- Ability to reason, problem solve, and **see patterns or relations among items**
 - Includes inductive and deductive logical reasoning
 - **Solving abstract relations underlying analogies**
- Fluid intelligence highly correlated with independent measures of EFs.