

Building a Theory of ADHD: Inhibition, Self-control, and the Executive Functions

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Executive Function Deficits

- Greater reaction time variability
- Impaired response inhibition
- Poorer motor sequencing
- Reduced sequential working memory
- Reduced verbal working memory
- Diminished flexibility of responding
- Greater temporal discounting of future rewards
- Greater errors in time reproduction
- Poorer time management
- Deficient planning & problem-solving ability
- Reduced sensitivity to errors
- Deficient listening & reading comprehension
- Diminished organization of work
- Less able to sustain motivation to tasks
- Larger positive illusory bias (disparity in self-evaluation)

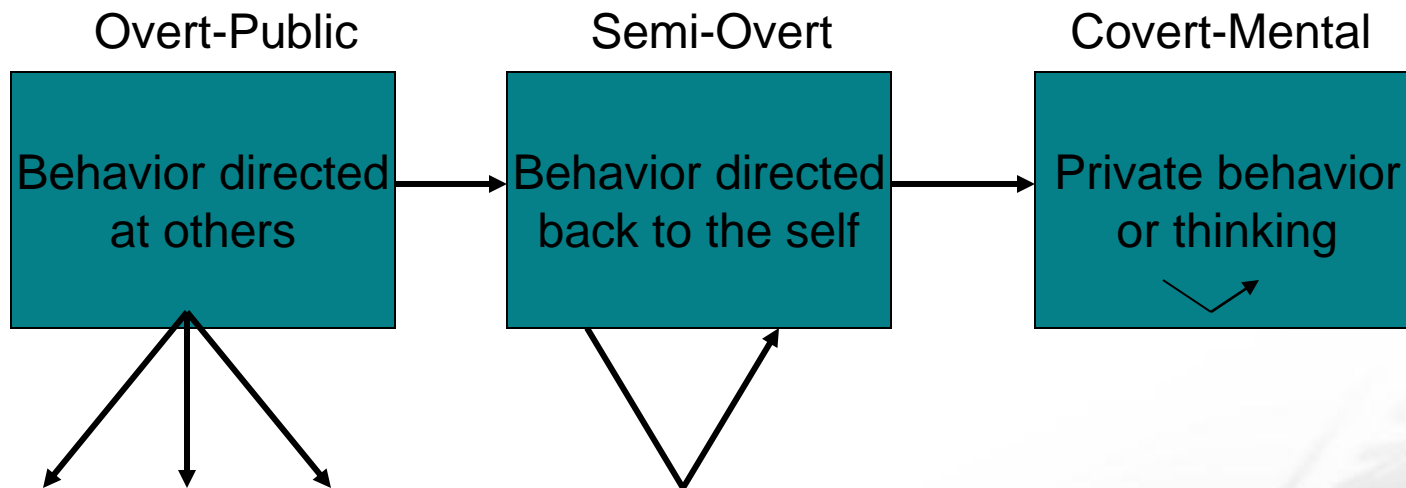
Building Blocks of A Theory

- Start with a theory of normal development of inhibition, self-regulation, and executive functioning
- Inhibition comprises three related processes:
 - Inhibiting the prepotent or dominant response
 - Interrupting ongoing behavior
 - Interference control: Protecting the EFs from distraction
- Self-regulation can be defined as:
 - Any action a person directs toward one's self
 - So as to change their own behavior
 - In order to change the likelihood of a future consequence
- An executive function can be defined as:
 - a major type of action-to-the-self (a type of self-regulation)

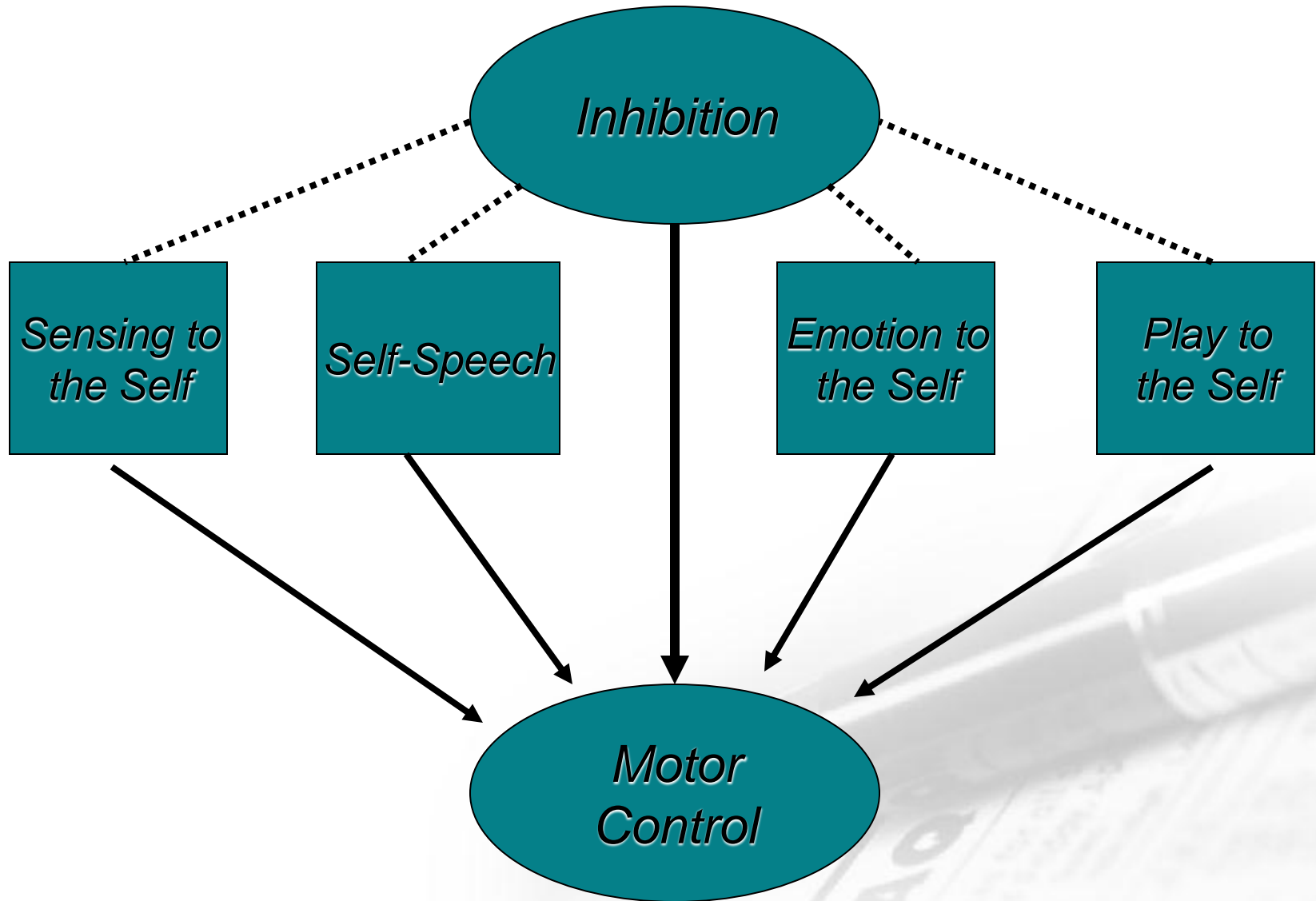
More on the Theory

- There are 4 other EFs besides inhibition:
 - Nonverbal and verbal working memory
 - Emotional self-regulation
 - Planning and problem-solving
- They can be redefined as actions-to-the-self:
 - Sensing to the self (visual imagery & re-hearing)
 - Speech to the self
 - Emotion and motivation to the self
 - Play to the self
- Each likely develops by behavior being turned on the self and then internalized (privatized)
- They develop in a step-wise hierarchy - Each needs the earlier ones to function well

Developmental Progression



The Internalization (or Privatization) of Outward Behavior



Developmental Transitions in Behavioral Control

- External → Mental (private)
- Others → Self
- Temporal now → Anticipated future
- Immediate gratification → Delayed

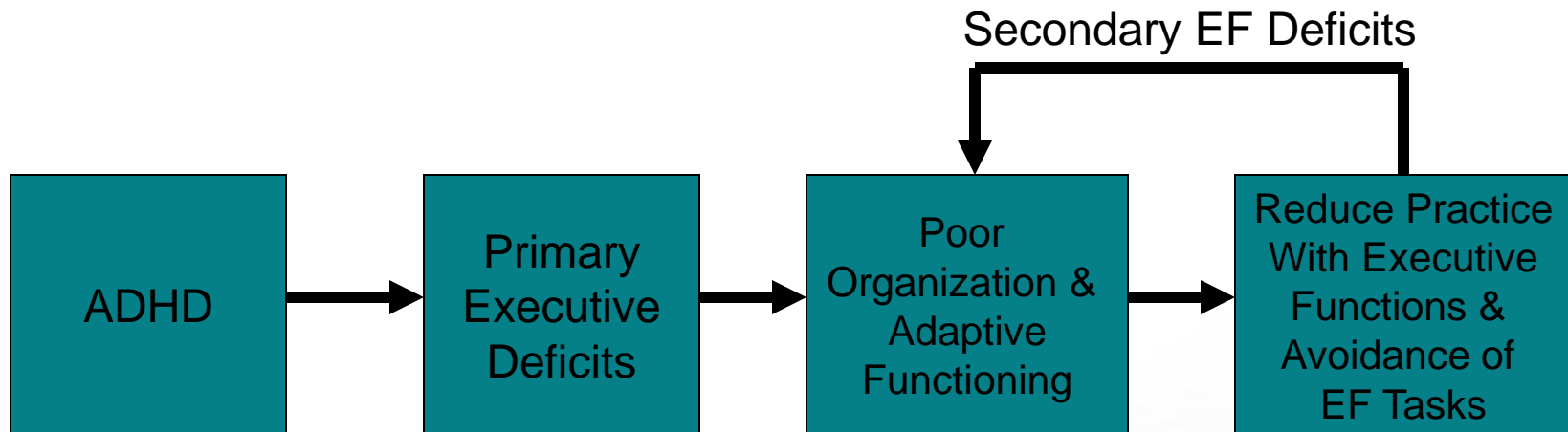
What Arises From Each EF?

- **Sensing to the self** (nonverbal working memory):
 - Reciprocal exchange, social cooperation
 - Imitation and vicarious learning
 - Hindsight, foresight, future-direction acts
 - Sense and use of time for self-management
- **Self-speech** (verbal working memory):
 - Self-description, reflection, and questioning
 - Self-instruction (rule governed behavior) & Use of meta-rules
 - Reading comprehension & morally guided behavior

More *Features of Each EF*

- **Emotion/motivation to the self:**
 - Modifying emotional states and creating new affect
 - Intrinsic motivation – fueling future-direction behavior
- **Play (reconstitution) to the self:**
 - Planning-generating multiple options toward a goal
 - Goal-directed innovation (problem-solving)
 - Verbal and nonverbal fluency (generating diversity)
 - Rapidly assembling complex, hierarchical goal directed actions

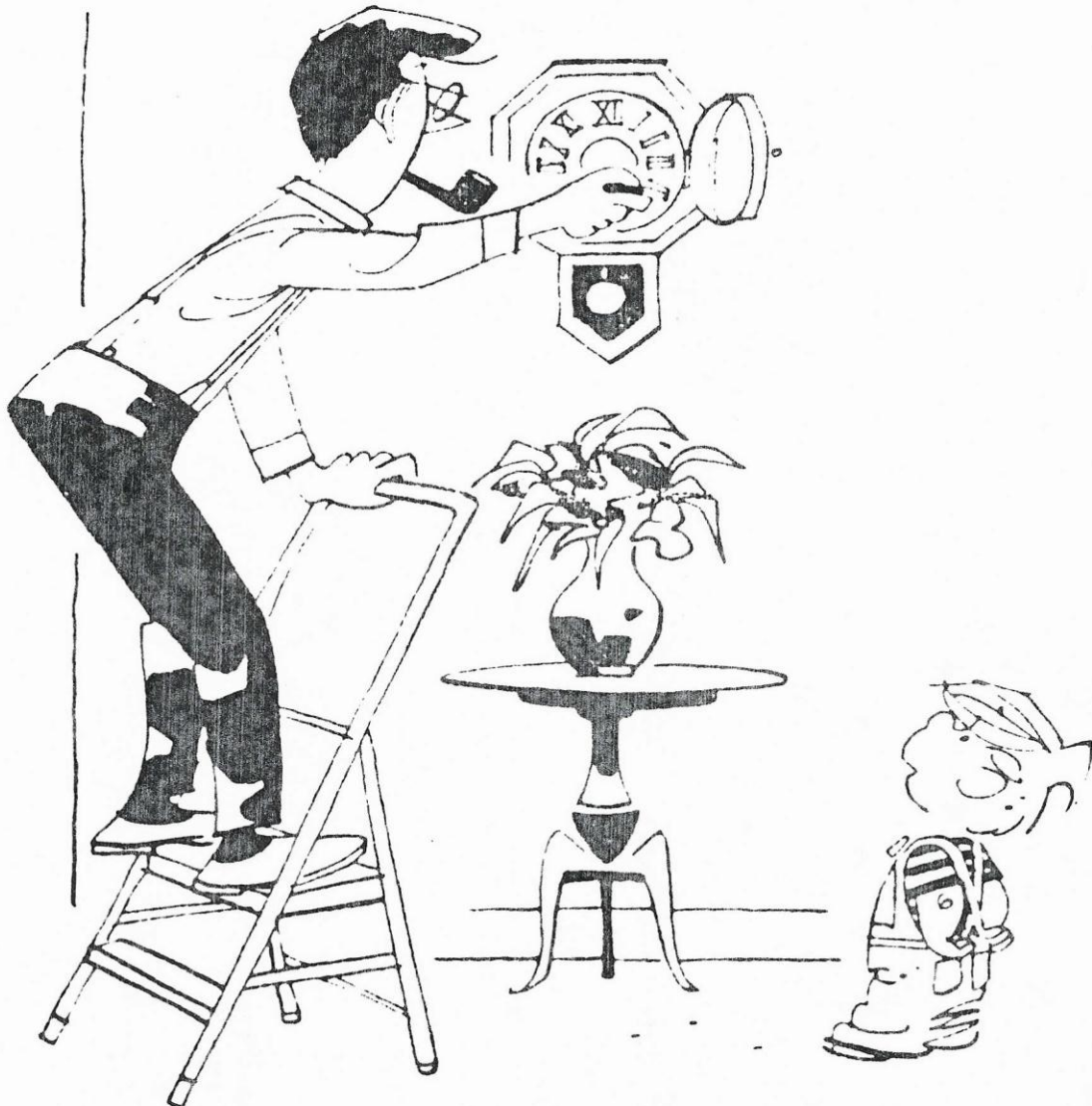
Lack of use can lead to secondary deficits



The older the ADHD case is, the more likely that some EF deficits may be secondary deficits that could be amenable to some forms of EF training, but such training would not solve the problems arising from the primary EF deficits

Effects of EFs on Behavior

- Behavior is Guided By Mental Events about Time
- Decreased Task-Irrelevant Behavior
- Increased Purposive, Future-Directed Action
- More Complex, Hierarchically Organized Behavior
- Self-Improvement by Vicarious Learning
- Inventing More Novel, Complex Actions
- Greater Goal-Directed Persistence (Motivation)
- Increased Sensitivity to Feedback (Flexibility)
- Better Task Re-engagement After Disruption
- Overall, Better Time Management (Behavior Managed Relative to Time)



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"ISN'T IT ALWAYS NOW?"

Understanding ADHD

- ADHD Creates a “Time Blindness” or “Temporal Neglect Syndrome” (Myopia to the Future)
- Those with ADHD Live in the Moment
- Its a Disorder of:
 - Performance, not skill
 - Doing what you know, not knowing what to do
 - The when and where, not the how or what
 - Using your past at the “point of performance”
The point of performance is the place and time in your natural settings where you should have used what you know but did not
- Its Not an Attention Deficit but an Intention Deficit Disorder (Inattention to mental events & the future)

Implications for Treatment

- Teaching skills is inadequate – Design prosthetic environments for a neuro-genetic disorder
- Effective treatments are at the “point-of-performance”
- Medications may be essential for most (not all) cases
- While it creates a diminished capacity: Does this excuse accountability?
 - (No!, the problem is time not consequences)
- Behavioral treatment is essential for restructuring natural settings and externally assisting EF
 - but it does not generalize or endure after removal
- The compassion and willingness of others to make accommodations are vital to success
- A chronic disability perspective is most useful

Reverse Engineer the EFs

- Externalize important information
 - lists, posters, signs, other cues of critical reminders and post at the point of performance
- Externalize time periods related to tasks
 - use timers, clocks, counters, that signal time's passing
- Break up future tasks into many small steps
 - do 1 step each day; keep the E-R-Os close in time
- Externalize sources of motivation
 - Quick praise, token/point systems, tangible rewards
- Permit more external manipulation of task components
 - manualize the problem as much as you can