Working Towards a Goal Over Time (Goal-Directed Thinking)

Goal-directed thinking is a mental process used to achieve a desired outcome. It begins by gathering and familiarizing yourself with relevant information (booting up), recalling knowledge, holding it in working memory that has finite capacity, and then, playing with (manipulating) that information in mind in such a way as to move towards a desired outcome. In short, it is the process of solving problems and bringing ideas to fruition.

Individuals have different thoughts and think differently; but the underlying process of goal-directed thinking is the same. Executive functions are a collection of mind tools used individually and collectively as a process, making goal-directed thinking possible. When these tools are working optimally as an integrated process, we are able to focus attention, hold and manipulate information, organize our thoughts, regulate behavior, evaluate options, and stay directed toward a desired outcome. When they are NOT working properly or if they are IMPAIRED, our ability to focus is diminished.

Booting Up (Familiarizing Yourself with Relevant Information)

When addressing a problem, you must first familiarize yourself with relevant information by loading it into working memory, which has limited capacity. We refer to this process as "booting up."

Relevant information is often gathered from multiple sources and integrated into working memory before meaningful problem-solving can begin. This is an invisible cognitive process that requires both time and mental effort. Think of it like a computer booting up its operating system and applications before you can begin working.

Working memory is analogous to Random Access Memory (RAM) in a computer. Once the information held in working memory is lost or displaced, you may need to start over by reloading the information, much like restarting a computer after it has been unplugged.

Many individuals with ADHD report that they have difficulty "getting into the flow." Once they are engaged, they often perform well, but initiating the process can be challenging. From a Cognitive Ergonomics perspective, this is not surprising. ADHD is an executive function impairment, and executive functions are less efficient. As a result, the cognitive effort required to boot up is often greater than it is for a neurotypical individual.

The cognitive demands of booting up are frequently an overlooked barrier to task initiation, particularly when a task is ambiguous, complex, or requires information from multiple sources.

Most individuals think task initiation begins when they start working. In reality, task initiation begins with booting up, loading enough relevant information into working memory to understand what needs to be done. The more ambiguity and complexity of the task, the greater the barrier to initiating a task.

Recalling Knowledge

Recalling knowledge is required to make sense of relevant information; thus, the brain searches long-term memory for knowledge that is relevant to the problem. When the appropriate knowledge is activated, it is brought into working memory where it can be used to reason, make decisions, and guide action. External cues, prompts, and context can help activate knowledge that otherwise might not come to mind.

In ADHD and executive function impairment, this process is often more effortful because working memory capacity is constrained and the search process is less efficient. The additional cognitive effort carries an emotional cost, often creating an urge to escape, avoid, or shift attention.

Playing with Information in Mind

Once relevant information is loaded into working memory and existing knowledge is retrieved, the brain must operate on that information to solve a problem. This involves holding information in mind while simultaneously organizing, comparing, manipulating, and rearranging it in pursuit of a goal. The process is often repetitive, involving trial and error while different possibilities are considered, evaluated, and refined.

The challenge is that the brain must both hold the information and work on it at the same time. It must keep the relevant pieces active in working memory while reorganizing them, testing relationships, considering alternatives, and evaluating potential outcomes. Problem-solving occurs through this active manipulation of information until a reasonable solution emerges and can be articulated clearly and efficiently.

Working Memory Capacity

Problem-solving in mind requires us to first familiarize ourselves with relevant information and retrieve existing knowledge. Both activities consume working memory capacity before problem-solving can occur. Working memory has limited capacity, and that capacity can vary based on context and emotional state.

The information needed to understand the problem and the knowledge needed to solve it must share the same limited mental workspace. As more capacity is consumed in understanding the

situation, less capacity remains available to retrieve knowledge and manipulate information toward a goal.

- The more information required to understand a situation, the less capacity remains available to retrieve and manipulate knowledge.
- The problem and the solution must share the same limited mental workspace.
- If the workspace fills up just trying to understand the situation, there may be insufficient capacity left to think through a solution.
- Relevant information, retrieved knowledge, and cognitive resources compete for the same limited workspace. When those demands exceed capacity, problem-solving breaks down.

The brain must hold the problem in mind while simultaneously searching for the knowledge needed to solve the problem.