

# Inside the ADD Mind

In his provocative new book, psychologist Thomas E. Brown, Ph.D., suggests a novel way of looking at attention-deficit disorder and explains the neurological underpinnings of its symptoms.

**MYTH:** *ADD is just a lack of willpower. People with ADD focus well on things that interest them, and they could focus on other tasks if they really wanted to.*

**FACT:** *ADD looks like a willpower problem, but it isn't. It's a chemical problem that undermines the management systems of the brain.*

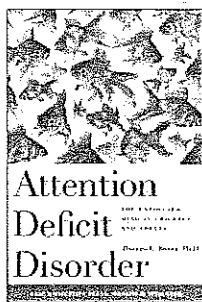
or decades, the syndrome now known as ADD was seen simply as a childhood behavior disorder characterized by chronic restlessness, impulsivity, and an inability to sit still. In the 1970s, it was recognized that hyperactive children also had significant problems paying attention to tasks or listening to their teachers. This discovery paved the way for changing the name of the disorder in 1980 from "hyperkinetic disorder" to "attention-deficit disorder" and to recognizing that some children suffer from chronic inattention problems without significant hyperactivity. That change, from an exclusive focus on hyperactivity and impulsive behavior to a focus on inattention as the principal problem of the disorder, was the first major paradigm shift in understanding this syndrome.

In recent years, there's been another major shift in our understanding of ADD. Increasingly, researchers are recognizing that ADD symptoms overlap with impairments in what neuropsychologists call "executive functions." The term refers not to the activi-

ties of corporate executives, but to the brain's cognitive management functions. The term is used to refer to brain circuits that prioritize, integrate, and regulate other cognitive functions (see chart, "The Brain's Executive Functions," page 36).

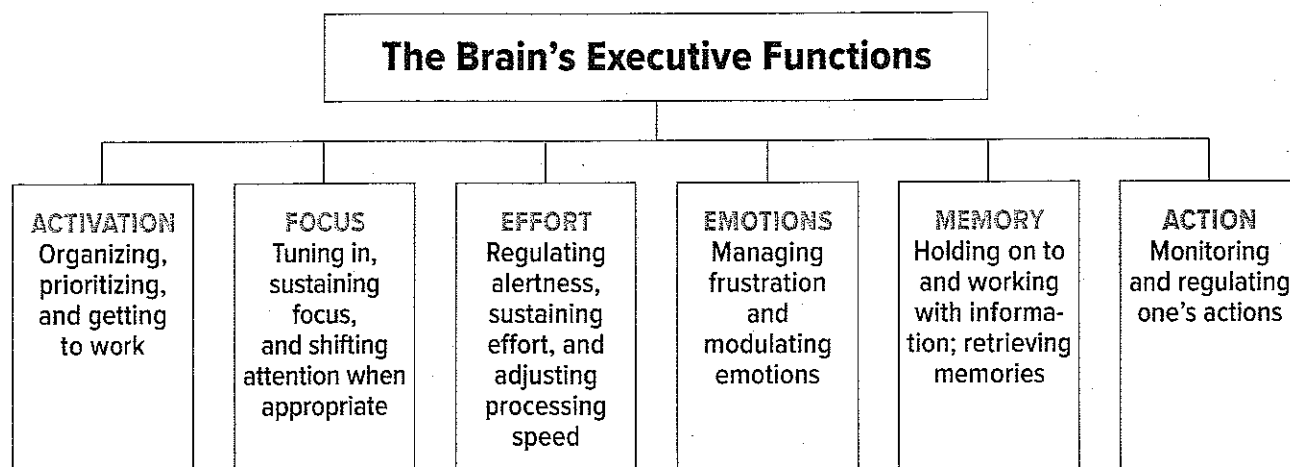
## Inconsistent inattention

Everyone I've ever evaluated for ADD has some domains of activity where they can pay attention without difficulty. Some are artistic, and they sketch intently. Others are childhood engineers, constructing marvels with Lego blocks and, in later years, repairing engines or designing computer networks.



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ADD symptoms reflect kinks in the brain's "executive functions," which manage learning, perception, judgment, and so on. Dr. Brown organizes executive functions into six clusters (above). Impairments in these clusters tend to show up together in persons with ADD, and to respond together to ADD medication.

Adapted from *Attention-Deficit Disorder: The Unfocused Mind in Children and Adults*, by Thomas E. Brown, Ph.D.

which they are unable to activate, deploy, and sustain the needed executive functions.

### Executive functions and awareness

A 43-year-old man came to my office with his wife to be evaluated for attentional problems. Both of the couple's children had recently been diagnosed with ADD and had benefited from treatment. When I explained that most children diagnosed with ADD have a parent or other close relative with ADD, both parents laughingly responded, "Those apples haven't fallen far from the tree." Both agreed that the father had more ADD symptoms than either of the children. Here's how the wife described her husband:

"Most of the time he's totally spaced out. Last Saturday he set out to fix a screen upstairs. He went to the basement to get some nails. Downstairs he saw that the workbench was a mess, so he started organizing the workbench. Then he decided he needed some pegboard to hang up the tools. So he jumped into the car and went to buy the pegboard. At the lumber yard he saw a sale on spray paint, so he bought a can to paint the porch railing and came home totally unaware that he hadn't gotten the pegboard, that he had never finished sorting out the workbench, and that he had started out to fix the broken screen that we really needed fixed. What he needs is a lot more awareness of what he is doing. Maybe that medicine our kids are taking can give him that."

From this wife's description, one might conclude that the central problem of ADD is essentially a lack of sufficient self-awareness. She seems to believe that if only her husband were more steadily aware of what he is doing, he would not be so disorganized, jumping from one task to another without completing any single one. But most people do not require constant self-awareness to complete routine tasks. For most people, most of the time, operations of executive functions occur automatically, outside the realm of conscious awareness.

For example, while driving a car to the local supermarket, experienced drivers do not talk themselves through each step of the process. They do not have to say to themselves: "Now I put the key in the ignition, now I turn on the engine, now I check my mirrors and prepare to back out of my driveway," and so on.

Experienced drivers move effortlessly through the steps involved in starting the car, negotiating traffic, navigating the route, observing traffic regulations, finding a parking place, and parking the car. In fact, while

doing these complex tasks, they may be tuning their radio, listening to the news, thinking about what they intend to prepare for supper, and carrying on a conversation.

Even the simpler example of keyboarding on a computer illustrates the point. If one can type fluently without stopping to consciously select and press each individual key, one's mind is left free to formulate ideas and to convert these into words, sentences, and paragraphs that convey ideas to a reader. Interrupting one's writing to focus on and press keys one at a time costs too much time and effort; it cannot be done very often if one is to write productively.

Many other routine tasks of daily life—for example, preparing a meal, shopping for groceries, doing homework, or participating in a meeting—involve similar self-management in order to plan, sequence, monitor, and execute the complex sequences of behavior required. Yet for most actions, most of the time, this self-management operates without full awareness or deliberate choice.

The problem of the "unaware" husband is not that he fails to think enough

### ADD Is Not Like Pregnancy

ADD is not like pregnancy, where one either does or does not have the characteristics, where there is no "almost" or "a little bit."

ADD is more like depression, which occurs along a continuum of severity.

Everyone occasionally has symptoms of a depressed mood. But being unhappy for a few days does not qualify one for the diagnosis of depression. It is only when symptoms of depression significantly interfere with an individual's activities over a longer time that he is eligible for such a diagnosis.

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Others are musicians who push themselves for hours at a time to learn a new song or to compose a new piece of music.

How can someone who is good at paying attention to some activities be unable to pay attention to other tasks that they know are important? When I pose this question to patients with ADD, most say something like: "It's easy! If it's something I'm really interested in, I can pay attention. If it's not interesting to me, I can't, regardless of how much I might want to."

Most non-ADDers respond to this answer with skepticism. "That's true for anyone," they say. "Anybody's going to pay bet-

ter attention to something they're interested in than to something they're not." But when faced with something boring that they know they have to do, non-ADDers can *make themselves* focus on the task at hand. People with ADD lack this ability unless they know that the consequences of not paying attention will be immediate and severe.

### Metaphors for executive functions

Imagine a symphony orchestra in which each musician plays his or her instrument very well. If there is no conductor to organize the orchestra, to signal the introduction of the

woodwinds or the fading out of the strings, or to convey an overall interpretation of the music to all players, the orchestra will not produce good music.

Symptoms of ADD can be compared to impairments, not in the musicians but in the conductor. Typically, people with ADD are able to pay attention, to start and stop their actions, to keep up their alertness and effort, and to use their short-term memory effectively when engaged in certain favorite activities. This indicates that these people are not totally unable to exercise attention, alertness, or effort. They can play their instruments very well—but only sometimes. The problem lies in their chronic inability to activate and manage these functions in the right way at the right time.

One way to consider this broader view of attention as executive functions is to observe situations where tasks are *not* dealt with effectively. Martha Bridge Denckla, M.D., professor of neurology, pediatrics, and psychiatry at Johns Hopkins University School of Medicine, in Baltimore, has written about intelligent patients with no specific learning disabilities who have chronic difficulties in dealing effectively with tasks. In her 1996 book *Attention, Memory, and Executive Function*, she compares these people to a disorganized cook trying to get a meal on the table.

"Imagine a cook who sets out to cook a certain dish, who has a well-equipped kitchen, including shelves stocked with all the necessary ingredients, and who can even read the recipe in the cookbook. Now imagine, however, that this individual does not take from the shelves all the relevant ingredients, does not turn on the oven in a timely fashion so as to have it at the proper heat when called for in the recipe, and has not defrosted the central ingredient. This individual can be observed dashing to the shelves, searching for the next spice mentioned in the recipe, hurrying to defrost the meat and heat the oven out of sequence. Despite possessing all the equipment, ingredients, and instructions, this motivated but disheveled cook is unlikely to get dinner on the table at the appointed hour."

The "motivated but disheveled cook" sounds very much like a person with severe ADD who tries to accomplish a task but is unable to "get it together." Individuals with ADD often describe themselves as intensely wanting to accomplish various duties for

about what he is doing. The problem is that the cognitive mechanisms that should help him stay on task, without constantly and consciously weighing alternatives, are not working effectively.

## The brain's signaling system

Some might take my orchestra metaphor literally and assume that there is a special consciousness in the brain that coordinates other cognitive functions. One might picture a little man, a central executive somewhere behind one's forehead, exercising conscious control over cognition like a miniature Wizard of Oz. Thus, if there is a problem with the orchestra's playing, one might attempt to "speak" to the conductor, requesting—or demanding—needed improvements in performance.

Indeed, this presumed "conductor," or controlling consciousness, is often the target of encouragement, pleas, and demands by parents, teachers, and others as they attempt to help those who suffer from ADD. "You just need to make yourself focus and pay attention to your schoolwork the way you focus on those video games!" they say. "You've got to wake up and put the same effort into your studies that you put into playing hockey!"

Alternatively, they may impose punishments on people with ADD or shame them for their failure to "make themselves" do consistently what they ought to do. These critics seem to assume that the person with ADD needs only to speak emphatically to the "conductor" of his own mental operations to get the desired results.

In reality, there is no conscious conductor within the human brain. There are networks of neurons that prioritize and integrate all of our cognitive functions. If these networks are impaired, as they are in ADD, then

that individual is likely to be impaired in the management of a wide range of cognitive functions, regardless of how much he or she may wish otherwise.

## How medication helps

There is now considerable evidence that executive functions of the brain impaired in ADD depend primarily, though not exclusively, on two particular neurotransmitter chemicals: dopamine and norepinephrine.

The most persuasive evidence for the importance of these two transmitter chemicals in ADD impairments comes from medication treatment studies. Over 200 well-controlled studies have demonstrated the effectiveness of stimulant medications in alleviating symptoms of ADD. These medications work effectively to alleviate ADD symptoms for 70 to 80 percent of those diagnosed with this disorder.

The primary action of medications used for ADD is to facilitate release and to inhibit reuptake of dopamine and norepinephrine at neural synapses of crucially important executive functions. Improvement produced by stimulants generally can be seen within 30 to 60 minutes after an effective dose is administered. When the medication has worn off, ADD symptoms generally reappear at their former level.

Stimulants do not cure ADD; they only alleviate symptoms while each dose of medication is active. In this sense, taking stimulants is not like taking doses of an antibiotic to wipe out an infection. It is more like wearing eyeglasses that correct one's vision while the glasses are being worn.

Given the often-dramatic alleviation of symptoms experienced by people with ADD when they take stimulant medications, it is very difficult to sustain the notion that ADD impairments amount to a lack of willpower.

Much more remains to be learned about how the brain's complicated neural networks operate to sustain the broad range of functions encompassed in "attention." Yet it is clear that impairments of executive functions, those brain processes that organize and activate what we generally think of as attention, are not the result of insufficient willpower. Neural-chemical impairments of the brain's executive functions cause some individuals who are good at paying attention to specific activities that interest them to have chronic impairment in focusing for many other tasks, despite their wish and intention to do otherwise. ▲

## Executive functions and intelligence

Disorganization is independent of general intelligence. It is quite possible for an individual to be extremely bright on standard measures of intelligence and still have severe impairments of executive functions, such as those often seen in ADD.

An individual's overall level of "smarts," as measured by standard IQ tests, appears to have little to do with whether he or she meets the diagnostic criteria for ADD. Some of my ADD patients are extremely bright, employed as university professors, scientists, physicians, attorneys, and senior executives.

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