

Chapter 9

Attention Deficit Hyperactivity Disorder

Inattentive and Combined Subtypes



Students with the inattentive subtype of ADHD, or **ADHD-IN**, have been compared to children who play baseball but are unaware of the score or who is up and are just as likely to wander off to somebody else's game when there is little action in their own. This is often characterized as daydreaming in classroom contexts (as Figure 9.1 depicts and a couch-potato at home). These children's attentional problems can be summarized as difficulty in selecting and sustaining attention to **relevant information** (e.g., the baseball game, who is batting, who is on base, the score) while ignoring what is not relevant (e.g., the beetle in the field, itchy pants, what to eat for lunch). In most cases, the nonrelevant information is novel (e.g., the beetle) and therefore more interesting and attention captivating (distracting) for children who prefer novelty.

Relevant information, which is typically less interesting, includes the content of spoken or written language (the words) and the details within tasks (e.g., changes in mathematical process signs in a mixed-operation worksheet). Directing attention to this relevant information is difficult for children with ADHD-IN because their attention is captured by what is moving, colorful, funny, or emotional, rather than what is relevant. A child with ADHD-IN may understand that you are angry (emotion) or notice the mole on the left side of your face but have no idea what you have said that explains your anger. Perhaps these children should be better described as having an **attentional bias** toward novelty rather than a deficit of attention, given that all children attend to something at all times, unless they are sleeping.

In addition to difficulties directing attention to relevant information, children with ADHD-IN also have problems with **sustained attention**. This is frequently observed as off-task behavior. Teachers respond to this behavior by "calling" these

ADHD-IN: Attention deficit hyperactivity disorder, inattentive subtype.

Relevant information: Information that is important to correct task performance.

Attentional bias: Preference for certain types of stimuli. All humans selectively attend to their own names, and most attend to information that signals potential danger (e.g., loud sounds). Students with the inattentive subtype of ADHD are more likely than their peers to selectively attend to novelty (movement, color, emotion, and so on).

Figure 9.1 A student with the ADHD–Inattentive subtype

Sustained attention:

The ability to maintain a consistent behavioral or cognitive response during continuous or repetitive activity (Sohlberg & Mateer, 1989). Damage to the right frontal lobe of the brain has been reported to produce deficits in sustained attention (for a review, see Stuss et al., 2001).

OHI: Other health impairment, a category of exceptionality under IDEA.

ADHD-HI: Attention deficit hyperactivity disorder, hyperactive/impulsive subtype.

children back for whatever short period of time that might be achieved (i.e., by redirecting their attention). Ken was such a child—he would drift off and constantly be called out by his teacher. One day his teacher said to him, “You must get tired of hearing your own name all the time.” He replied, “Yeah—I wish I could change my name to Dylan!”

FORMAL IDENTIFICATION

Definitions

IDEA

Typically students with ADHD-IN will receive services under LD, if there is a co-occurring LD. Students who do *not* qualify for any co-occurring disability fall within the category of **OHI**, which is the umbrella under which ADHD is defined in IDEA, with approximately 20% identified in this category (U.S. Department of Education, 2006). The IDEA definition of OHI follows, with italics added to indicate those parts with specific relevance to this chapter:

Other health impairment means having limited strength, vitality, or alertness, including a heightened alertness to environmental stimuli, that results in limited alertness with respect to the educational environment, that (i) is due to chronic or acute health problems such as asthma, *attention deficit disorder or attention deficit hyperactivity disorder*; diabetes, epilepsy, a heart condition, hemophilia, lead poisoning, leukemia, nephritis, rheumatic fever, sickle cell anemia, and Tourette syndrome; and (ii) adversely affects a child’s educational performance. (34 CFR Section 300.8[c][9]; see National Dissemination Center for Children With Disabilities, 2012)

Rule-outs or exclusions: Excluded from a diagnosis of **ADHD-HI** are children who are low IQ or gifted and children with LD or a transient emotional disorder (e.g., a child with parents divorcing).

Placements: Under the OHI category students receive accommodations in general education under Section 504 (if their ADHD adversely affects their major life functions of learning or socialization).

DSM-IV-TR

DSM-IV-TR (APA, 2000, p. 92) defines ADHD-IN as follows:

Defining characteristics: Six (or more) of the following symptoms of inattention have persisted for at least 6 months to a degree that is maladaptive and inconsistent with developmental level:

Inattention:

- Often fails to give close attention to details or makes careless mistakes in schoolwork, work, or other activities
- Often has difficulty sustaining attention in tasks or play activities
- Often does not seem to listen when spoken to directly
- Often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (not due to oppositional behavior or failure to understand instructions)
- Often has difficulty organizing tasks and activities
- Often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort (such as schoolwork or homework)
- Often loses things necessary for tasks or activities (e.g., toys, school assignments, pencils, books, or tools)
- Is often easily distracted by extraneous stimuli
- Is often forgetful in daily activities

Impairment: Social or academic.

Conditions: “Some characteristic must be present before age 7 years and some impairment must be present in two or more settings” (e.g., school, home).

Frequently Occurring Subtypes

DSM-IV-TR (APA, 2000, p. 93) describes the subtypes of ADHD:

Attention deficit hyperactivity disorder, predominantly inattentive type: Diagnosis of this subtype requires that the criteria listed above are met for the past 6 months

Attention deficit hyperactivity disorder, combined type: Diagnosis of this subtype requires that both the criteria for hyperactive/impulsive subtype listed in Chapter 10 and the criteria for predominantly inattentive subtype listed above are met for the past 6 months.

Possible Co-Occurring Conditions and Differences Among Related Disorders

Inattention is observed in almost every mild disability category (Krupski, 1980) and is associated with significant school failure and co-occurring conditions (Rowland, Lesesne, & Abramowitz, 2002). For example, students with the IN subtype of ADHD are more likely also to have RD (36%) than students in the general population (17%) (Lyon, 2003) and to have an **internalizing disorder**: 10–40% have co-occurring anxiety and 20–30% have co-occurring depression.

Internalizing disorders: Disorders that cause individuals to express feelings inwardly and thus increase the likelihood of anxiety and/or depression.

Students with ADHD plus anxiety may have lower tolerance for both stress and boredom (i.e., a narrow window of arousal).

However, it is important to consider the evidence that symptoms of inattention (off-task behavior or task avoidance) would be expected for any child placed in an academic setting that is inappropriate for his or her (a) high IQ (giftedness), (b) low IQ (ID), (c) divergent perceptual or memory skills (LD or TBI), (d) high stress or anxiety level, or (e) need for familiarity and sameness (autism spectrum disorders). Because inattention (like social deficits and language disorders) is a **marker variable** for so many mild disabilities, it is important to examine the nature of the task the child is avoiding. Table 9.1 provides a comparative analysis that may help with this differential diagnostic task:

Marker variable:
Distinguishing
characteristic.

Table 9.1 Differential Diagnosis of Inattention

<i>Characteristics for ADHD, LD, ID, GT, ODD, and ASD</i>				
	<i>Inattention behavior observed</i>	<i>Problems in performance and persistence observed</i>	<i>Attention and behavior improved with</i>	<i>Differential assessment</i>
ADHD	Variable, sensation-seeking activity, impulsivity, or inattention during wait time when no active responses are available, especially in familiar settings or with familiar people and tasks.	Performance deficits demonstrated by less production and slower, more variable performance that decreases over time, especially during boring, familiar, or repetitive tasks or later in the day or in the school year.	Novel, emotional, colorful, animated themes and tasks, presented with computers or in game formatting, that are self-paced with little wait time.	Assess behavior and persistence during short, novel, self-paced tasks versus longer rote tasks (for a review, see Zentall et al., in press).
LD	More activity (away from seat) and/or inattention during tasks within the child's SLD (e.g., reading but not math, or for all subject areas that involve reading, but not during lab time).	Skill deficits are seen initially in performance and later due to fatigue. Teachers report that these students are easier to redirect back to their tasks than students with ADHD.	Areas where a child can demonstrate competence outside the child's SLD.	Assess academic activities that produce task avoidance and off-task behavior and contrast these with activities during which the child seeks competence.

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	<i>Inattention behavior observed</i>	<i>Problems in performance and persistence observed</i>	<i>Attention and behavior improved with</i>	<i>Differential assessment</i>
ID	<p>“ADHD symptoms are increased in children with ID” (Simonoff et al., 2007, p. 595). The lower the IQ, the higher the rating of ADHD symptoms (e.g., more activity during tasks of greater difficulty). However, there is less impulsivity in the ID population than in the ADHD population (Pearson et al., 1996).</p>	<p>Less persistence when students with ID are exhausted by tasks that are cognitively complex, involve concepts, or require comprehension but not during tasks assessing basic skills.</p>	<p>Familiar tasks or when the task is of moderate difficulty.</p>	<p>“In children with Mental Retardation, an additional diagnosis ADHD should be made only if the symptoms of inattention or hyperactivity are excessive for the child’s mental age” (APA, 2000, p. 91).</p>
GT	<p>High-energy behavior characterized as intense and busy (Beljan et al., 2006). Disruptive activity may also occur during wait time, where these students spend much time waiting for others to catch up.</p>	<p>Less persistence and more possible disruption when tasks are at a basic level or when tasks are nonchallenging and in “academically understimulating environments” (APA, 2000, p. 91).</p>	<p>Challenging and complex tasks.</p>	<p>Assess off-task behavior in problem-solving tasks versus basic skill tasks.</p>
ODD	<p>Due to high rates of co-occurring ADHD, these students can be active but can also exhibit more withdrawn, anxious, aggressive, and depressed behavior (Carlson, Tamm, & Gaub, 1997). Children with ODD have less inattention than those with ADHD but have higher rates than typical children (Carlson et al., 1997).</p>	<p>Assigned tasks with little choice in type of task, response mode, materials, and so on. Often less compliance getting started on an assigned task.</p>	<p>Self-selected or choice tasks.</p>	<p>Assess noncompliance or off-task behavior in self-selected or choice tasks versus in assigned tasks.</p>
ASD	<p>Children with ASD and anxiety disorders are generally passive and typically show repetitive activity, repeated topics of conversation, and avoidance of specific persons, tasks, settings, or events (e.g., tractors or storms in close proximity).</p>	<p>A change in schedule, novel tasks or settings, and social tasks (e.g., crowding) elicit avoidance and poorer performance.</p>	<p>Greater persistence on tasks of special interest and on repetitive tasks, due to their familiarity.</p>	<p>Assess off-task behavior in areas of child’s special interests (familiar tasks) versus in novel topic areas.</p>

Etiology

Similar to most mild disabilities, ADHD has no single causative factor. The biogenetic explanation is favored and could account for any number of possible cognitive and academic outcomes.

Biogenetic. The combined subtype of ADHD that includes both inattention and hyperactivity/impulsivity has higher heritability than either of the pure subtypes. For example, heritability for identical twins is .91 compared to .75 for fraternal twins, which suggests that genetics is more important than environment (for a review, see Wenar & Kerig, 2006). One specific gene that has been identified is the D4 receptor gene. Also associated with biogenetic factors are differences in the chemistry and structure of the brain. At the chemical level, there is evidence of deficient **dopamine** and norepinephrine, which are involved in the transmission of information among nerve cells. Furthermore, there is evidence that psychostimulants such as Ritalin (methylphenidate) can increase the availability of dopamine at the synapses of cells in the brain (McNab et al., 2009). Finally, at the structural level, some individuals with ADHD have reduced total brain size (3–4%) and smaller prefrontal cortex (8%) and lower activity in the frontal lobes (for a review of this evidence, see Castellanos et al., 2002). This does not cause ADHD symptoms but is associated with it, in the same way that a larger brain size at birth and in early development is associated with autism (Redcay & Courchesne, 2005).

The academic deficits reported for the IN and combined subtypes have also been explained by biogenetic differences in executive functions. Barkley (2006) has suggested that executive functions are needed to self-regulate effort, and poor EF can be used to explain ADHD. However, executive dysfunctions (a) are common to many disability groups, (b) do not explain the severity of academic impairment (Barry, Lyman, & Klinger, 2002), and (c) are not necessarily responsive to psychostimulants (Swanson, Baler, & Volkow, 2011). In other words, descriptions of biogenetic EF differences cannot explain the primary characteristics of ADHD (activity, impulsivity, inattention) (for critiques, see Nigg, 2001; Willcutt, Doyle, Nigg, Faraone, & Pennington, 2005), since evidence of EF deficits does not explain why these characteristics exist.

Environmental. Prenatal factors, such as maternal smoking, and postnatal contributors, brain injury, and ingestion of toxins, such as lead, can account for about one in five children with clinically defined ADHD. In addition, as few as 3–5% of preschoolers with ADHD may be sensitive to food dyes or sugar, and 40% may have deficiencies in essential fatty acids compared with 10% of typical children (Stevens et al., 1996).

Dopamine: A chemical that helps transmit signals from one nerve cell in the brain to the next.

Functional. Functional analysis would find that the antecedents that encourage inattentive behavior for students with ADHD are nonmeaningful, nonstimulating, or **rote tasks** with too much delay-time between responses. Examples of this would be during listening tasks, especially when active responses are not available, and during tasks that require delay to examine detail or that require **sustained attention** or working memory. During these times, inattention or “distraction” functions to create novelty or change for a child who has difficulty maintaining sufficient activation and may be considered easily bored. These functional responses are explained by the optimal stimulation theory (i.e., inattention, activity, and impulsivity all serve to increase stimulation in an underactivated/underaroused child) (for discussion of the theory and a review, see Zentall & Zentall, 1983; for a review of a related biochemical dopamine deficiency hypothesis, see Swanson et al., 2011).

Overall, there is a mismatch between the arousal state of the child with ADHD (biogenetic) and the arousal state required for the child to perform a long or effortful task (environmental) (Wu, Anderson, & Castiello, 2006). This functional dependence of ADHD on the amount of stimulation available in different task and setting conditions is well elaborated in *DSM-IV-TR* (APA, 2000, pp. 86–87):

Symptoms typically worsen in situations that require sustained attention or mental effort or that lack intrinsic appeal or novelty (e.g., listening to classroom teachers, doing class assignments, listening to or reading lengthy materials, or working on monotonous, repetitive tasks). Signs of the disorder may be minimal or absent when the person is receiving frequent rewards for appropriate behavior, is under close supervision, is in a novel setting, is engaged in especially interesting activities, or is in a one-to-one situation (e.g., the clinician’s office). The symptoms are more likely to occur in group situations (e.g., in playgroups, classrooms, or work environments) where waiting is required.

In contrast, good attention is likely to be observed in children with ADHD when they are engaged in novel tasks (tasks involving color/light, sound, movement, emotion, meaningfulness/interest).

Prevalence, Gender, Age, and Cultural Factors

Prevalence. ADHD, inclusive of all subtypes (the combined, inattentive, and hyperactive/impulsive), is the most frequently identified disorder in school-aged children (e.g., Willcutt et al., 2001). Although 8–20% of community samples would receive a diagnosis of ADHD based only on behavioral indicators (two to six students per class), only 3–7% of children have a severe enough disorder with

Rote tasks:

Repetitive tasks that lack variation or novelty, such as math calculations, spelling drills, and handwriting practice.

Sustained attention:

The ability to maintain a consistent behavioral or cognitive response during continuous or repetitive activity (Sohlberg & Mateer, 1989). Damage to the right frontal lobe of the brain has been reported to produce deficits in sustained attention (for a review, see Stuss et al., 2001).

significant impairment to warrant services (one or two students per class) (see, e.g., Shaywitz & Shaywitz, 1988). That is, the prevalence rate drops when students must also show evidence of social or academic dysfunction. Thus, about 44% of students with ADHD are receiving special education services, and the other 56% could be found in inclusion settings receiving accommodations if they have Section 504 plans (e.g., Bussing, Zima, Perwien, Belin, & Widawski, 1998).

Gender. Boys and girls are identified at equivalent rates within the pure inattentive subtype of ADHD (see Wenar & Kerig, 2006). For the ADHD combined subtype in the general population, around 9% of males and 3% of females are found, with a ratio of about four boys to one girl (e.g., August, Realmuto, MacDonald, Nugent, & Crosby, 1996).

Age. Children with the inattentive type of ADHD tend to be identified during elementary school, when the attentional demands of task performance are needed (Barkley, 2003).

Culture. There is consistent evidence of associations between high levels of ADHD characteristics and low parental education, single-parent and stepparent families, and low economic status (for a review and evidence, see Rydell, 2010). Girls, in particular, have been found to be vulnerable to these family stressors.

INFORMAL EDUCATOR IDENTIFICATION OF CHARACTERISTICS

CD: Conduct disorder.

Internalizing symptoms: Symptoms that are directed inward. Somatic internalizing symptoms include stomachache, insomnia, and nausea; mood symptoms include worrying and depression; and behavioral symptoms include crying, withdrawal, and phobias.

Behavioral

Students with the IN subtype of ADHD are less disruptive and less likely to have ODD or **CD** than students with the HI subtype. Casey, for example, “did not display disruptive behavior but instead began avoiding assignments and teachers.” This behavior may be specific to Casey, since girls with ADHD more typically solicit attention and assistance from their teachers (for a review, see DuPaul et al., 2006).

Social-Emotional

Students with ADHD-IN display fewer externalizing types of behavior and have more internalizing emotional problems, such as anxiety, depression, and social passivity, all of which contribute to neglect by peers and to decreased popularity. Girls, who more often represent the IN subtype, have more **internalizing symptoms** of depression and anxiety than do boys (DuPaul et al., 2006).

Cognitive distortions are another part of the social profile of older children with ADHD (combined subtype). That is, they are less optimistic about what might happen socially next week (Zentall, Cassidy, & Javorsky, 2001). This attitude can be explained by their history, which has been self-reported as more negative and as having more failure experiences in their everyday lives, and by their emotional overreaction to both the good and bad events in their lives (this the case especially in adolescent girls with ADHD) (Abikoff et al., 2002; Grskovic & Zentall, 2010). Casey at the age of 13 has characteristics of inattention (failure to organize and complete tasks) and of emotional overreactions to distress: “She has daily contact with a case manager who works with Casey on basic skills involving organization, task completion and managing stress and emotions.” These emotional overreactions in students with ADHD-C are similar to the reactions of younger children (i.e., emotional immaturity).

While keeping in mind the information presented above, we must also take into account the social and emotional resilience of some children with ADHD, even those with co-occurring LD, and of their resource room teachers. For example:

Now Justin had already been in the resource room to have a 100-question final in English read to him earlier that day. It wasn't easy but I did manage to keep him on-task. . . . Around 1:00 p.m. Justin walked into my room again with a 187-question final in Earth and Space. At this point it was apparent that he was worn out and not at all happy. . . . Well I started reading the final and he stopped me close to the middle of the final. He looked at me and said “Ms. Y I only have two brain cells left right now, and I just want you to know that they are fighting over which one of them is going to survive. I'm just not sure that the surviving brain cell is going to be able to handle the rest of this final.” I just looked at him, and we started laughing hysterically, because it was such a true statement, and I was feeling the same way (Zentall, 2006, p. 121).

Cognitive

Intellectual. Overall, the IQ scores of the population of students with ADHD vary from severely ID into the gifted range. However, individuals selected from clinics do have lower IQ scores than students drawn from school-based samples, and children who have ADHD plus LD have lower verbal IQ scores than their peers (e.g., Andreou, Agapitou, & Karapetsas, 2005). In addition, girls more than boys with ADHD have intellectual impairments associated with their inattentive symptoms (DuPaul et al., 2006). There is further evidence that IQ scores decline as students get older (Nussbaum, Grant, Roman, Poole, & Bigler, 1990), perhaps because problem-solving speed is emphasized on IQ tests at advanced age levels (Silverman, 2003). Furthermore, IQ tests may underestimate intelligence in school-based samples of students with ADHD, because *some* IQ subtests (e.g.,

mental math and digit span) also require working attention and attention, which can lower IQ from 2 to 5 full-scale IQ points (Jepsen & Mortensen, 2009).

Some types of problem solving may be advanced. For example, research has found that students with ADHD (a) scored higher on tests of creative thinking than similar-IQ peers without ADHD (Brandau et al., 2007; Shaw & Brown, 1990), (b) told more creative stories with novel themes and plots (Zentall, 1988), (c) used more nonverbal information and strategies during problem solving in response to high states of arousal (videos and games; Lawrence et al., 2002; Shaw & Brown, 1999), and (d) contributed to higher percentages of correct problem solutions in cooperative groups than were observed in groups without these students (Kuester & Zentall, 2012; Zentall, Kuester, & Craig, 2011). Casey fits this evidence of creative intelligence: “Casey is a creative young girl. She loves to draw and write. Her artistic talent is impressive and she hopes to do something within the art industry after high school.” It has been suggested that the attentional bias seen in ADHD (i.e., attraction to novelty/originality) may be a contributor to creativity (Zentall, 2005b), and Hallowell and Ratey (1995) have suggested that individuals with ADHD have a higher tolerance for ambiguity.

Executive functions are another aspect of intelligence (defined in Section I and discussed in the subsection on biogenetic etiologies in this chapter). There is evidence of EF deficits in many children with ADHD. However, EF deficits are also documented for many students with mild disabilities (reported in the chapters on LD and ID) and thus fail to provide an explanation of ADHD as different from LD and ID.

Attention. **Selective attention** is the failure to “get on track,” especially with added details and descriptions (e.g., adjectives/adverbs, overlapping visual or conversational backgrounds). Selective attention makes it difficult for students with ADHD to pay attention to **neutral cues**, to the underlying structure of a task, and to details. This attentional bias contributes to these children getting lost in the beginnings of things and in transitions between settings or tasks or when there is a complex task (visual or auditory) and relevant information is covered up in some way (e.g., conversations that overlap a listening or a difficult reading task for young children). Average children find it easier to selectively attend to relevant task information—to the underlying structure of a task, the details, the relevant information in directions. The implications of this attentional bias in the classroom are a failure to pay attention to important information, especially neutral information that occurs early in a task, setting, or social experience, and a failure to attend to **internal cues**, such as feelings.

Sustained inattention is the failure to “stay on track,” especially on tasks that are long or repetitive, or that require holding information in mind, such as mental math, multiple-step directions, organizing, or planning. In the classroom, difficulty sustaining attention is seen as: (a) visual off-task behavior, (b) changes in activities and failure to

Selective attention:

Preference for attending to some things. For students with ADHD, selective attention is directed toward external stimulating sights, sounds, smells, tastes, movement, emotion, and aggression, and internally to exciting daydreaming, thought, and emotionality. This can be called an attentional bias rather than an attentional deficit.

Neutral cues:

Information that is not salient and is difficult to notice, such as the organization of a room or the structure of an assignment.

Internal cues:

Thoughts, feelings, strategies, values, and the like.

maintain routines (i.e., routines require repetition of the same behavior), (c) verbal changes in topics of conversations, and (d) cognitive off-task behavior, such as reading or daydreaming. Daydreaming is often observed in children with the IN subtype:

He's not a child really that disturbs other children as far as he doesn't run around the room or necessarily talk a lot or anything. He just tends to daydream a lot and just be in another world. So it's not that he's disturbing to other children (Zentall, 2006, p. 112).

And as stated by a parent:

I am a mother of four children. My second child, Damon, age 7, has been diagnosed as ADD. He does have a limited memory and is a daydreamer; however, he also reads on a 6th grade level and has a very big imagination (Zentall, 2006, p. 146).

Failure to stay on task reduces work speed and production. However, attending to “distractions” does *not* increase errors unless the distractions are very tempting (e.g., cartoons, toys, animals; Freer et al., 2011). For example, students with ADHD performed more poorly than peers when required to walk along a path and follow a series of instructions (touching or looking at objects at a series of checkpoints in a zoo) in the presence of distracting animals (Lawrence et al., 2002). Surprisingly, “distractions” may actually help the child perform in the classroom, especially when tasks are long and tedious. That is, off-task looking may provide “doses” of environmental stimulation that the child needs. Thus, being distracted does not necessarily mean performing poorly, and placing the child away from windows is not an appropriate accommodation, although it is often incorrectly recommended. For individual children, performance should be assessed with and without “distractions” and with different types of tasks that offer varying levels of engagement.

Memory. The memory characteristics of children with inattention are typically related to the length of the material to be memorized. In other words, attention and memory are related. If a child has difficulty attending to repetitive information, the child will have difficulty recalling that information. *Working memory* involves the ability to hold information in mind (sustain attention) and ignore nonrelevant interfering information. Poor WM is seen in the slower, more variable performance with more errors for children with ADHD than for their peers (Wu et al., 2006). Students with ADHD may have little difficulty with math until they are in high school algebra with multiple step problems to perform. Deficiencies in WM have been explained as the outcome of insufficient arousal or brain activation (dopamine neurotransmission) (McNab et al., 2009). Tasks that are fun (e.g., video games) release dopamine, which temporarily increases arousal and can improve the cognitive functions of WM (Lawrence et al., 2002).

Students with ADHD recall fewer items in *short-term memory* tasks, but they also spend less time rehearsing and do not select efficient memory strategies (i.e., they fail to categorize information). When information is pre-categorized or they have practice in sorting, they can recall as much as their peers (e.g., Kerns, Eso, & Thomson, 1999). Verbal *long-term memory* of children with ADHD has been assessed in studies asking students to name common objects rapidly. For example, when asked to name letter/number symbols and objects/colors, children with ADHD show impairment primarily when naming colors and objects, whereas children with RD show impairment with the more abstract letter/number symbols (Bental & Tirosh, 2007; Ghelani et al., 2004).

Perceptual skills involve attending to visual detail in tasks, and students with ADHD attend for less time and respond faster, but they are as able as non-ADHD peers to search for global themes in pictures and respond as well in listening tasks when presented with **global or gestalt cues** (e.g., it looks like a giraffe) (Zentall & Gohs, 1984). Research has also found that *perceptual speed* is slower than average for RD, ADHD, and RD + ADHD groups (Willcutt, Pennington, et al., 2005), with the RD group the slowest (Shanahan et al., 2006). It has been suggested that the speed of processing visual detail may depend on the type of stimuli, and some variables (e.g., the addition of color) can slow down that speed (Kercood, Zentall, Vinh, & Tom-Wright, 2012).

Global or gestalt cues: Cues to the big picture that can be presented as advance organizers, concept maps, general descriptions, or comparisons (e.g., “It is like X”).

Communication

Teachers and parents often complain about the *listening skills* of children with ADHD. This could be explained by observations that these children *look like* they are not listening or they fail to comply over time to verbal requests to “be quiet,” “pay attention,” and so on. However, these students *can* get major points from conversations and stories, as long as their listening task is not too long or interrupted, and the material listened to is not boring, too detailed, or too descriptive (with irrelevant information) (for a review, see Zentall, 2006).

In expressive skills, children with the combined subtype of ADHD in general education typically *talk more* than other children (showing verbal hyperactivity; see Chapter 10), but more relevant to this chapter on attention is the *quality* of their language. Language impairment exists in 35–50% of children at risk for ADHD and in about 90% of children with ADHD selected from clinical populations (see Redmond, 2004). Some of these deficits can be described as the social or pragmatic aspects of language. Compared with typical students, students with ADHD make more off-task comments, interrupt more often, are poorer at turn taking, and show poorer organization in their language. They also make more sequencing errors, use more ambiguous referents, and make more changes in the

focus of their play and their conversational topics. However, these children also produce less language with fewer idea units, provide insufficient information, and make fewer requests for information when they are asked to talk about a specific topic. Decreased language can be explained by the difficulties children with ADHD have with holding sequences of related information in mind (e.g., while waiting for a turn to talk). We do know that picture cues and TV programs (without toy distractors) can improve their storytelling performance (e.g., in production and in relaying story goals and outcomes) to the level of typical peers (Freer et al., 2011; Zentall, 1988). That is, cues and visual prompts may reduce the requirements for verbal working memory; this has implications for accommodations.

Academic

Academic deficits and school-related problems tend to be most pronounced in the subtypes of ADHD marked by inattention (APA, 2000, p. 88), and the more severe the behavioral/attentional symptoms, the greater the reading/math difficulties (Barry et al., 2002). Inattention could also explain the lower achievement test scores of girls with the inattentive subtype (but not those of boys) (DuPaul et al., 2006).

Most researchers agree that poor academic performance is secondary to the attention problems of students with ADHD. Primary academic problems are more typical of students with LD or ID. Students with ADHD have academic difficulties (a) starting tasks (often seen as noncompliance), (b) organizing task information and materials, (c) accuracy (grades), (d) persisting, and (e) producing sufficient work—a set of problems represented by the acronym SOAPP (Zentall, 2006). These difficulties contribute to findings that 80% of these children have learning problems severe enough to cause them to lag several years behind their peers in school, and about a quarter of them have learning disorders severe enough to receive a codiagnosis of LD (Barkley, 2006). Difficulties maintaining attention further reduce their ability to memorize calculations or read long books/stories and reduce the time they spend studying or rereading materials (Lorch et al., 2004). Difficulty attending to **detailed cues** contributes to spelling problems and careless errors in many tasks, such as mathematics.

Detailed cue: A part of the whole (e.g., a tree that is one of many that make up the forest).

Composition, reading, and spelling. Overall, disorders of written language are twice as common as reading, math, or spelling disabilities (Mayes, Calhoun, & Crowell, 2000), partly because writing compositions requires the use of reading, spelling, handwriting, and spoken language skills. Similar outcomes would be expected from students with ADHD, who score lower than peers in both recall and recognition spelling tests, and 38% of these students have significant spelling

disabilities (for a review, see Zentall, 2006). In the area of reading, ADHD and RD co-occur in about 34% of the combined subtype of ADHD (Willcutt, Pennington, et al., 2005). For this ADHD + RD group, reading difficulties are similar to those seen in students with RD (decoding problems leading to comprehension problems), but the problems are magnified (Mayes et al., 2000) due to attentional difficulties. In contrast, students with ADHD *without* RD are as accurate as their peers in reading aloud, but they are slower and more variable in their silent reading (for a review, see Zentall, Tom-Wright, & Lee, in press). In the area of reading comprehension, students with ADHD have problems during the performance of long, descriptive reading passages that have interruptions in the sequence of the narrative and that require keeping events in mind related to “if-then” causality.

Math. MLD has been found in children with ADHD (31–60%) at about five times the rate of students in the general population (6–7%) (Zentall et al., in press). Even without LD in math, students with ADHD are less accurate at younger ages with addition and subtraction computational facts when required to “borrow” and with multiplication facts. Among the types of math procedures that are difficult for these children are those that require holding information in mind (e.g., for borrowing, negative numbers) and a greater reliance on finger counting (Zentall et al., in press). More specifically, through middle school, their retrieval speed of math calculations is slower and more variable and is the best predictor of attentional problems. These children also attempt fewer problems than do typical peers, even when the problems are self-paced using a computer, with accuracy and speed feedback, and when there are statistical controls for slower typing speed.

Slower math problem-solving performance can be explained by the poor reading recognition and reading comprehension of many children with co-occurring ADHD and RD. When these factors have been controlled, poorer performance can be explained by requirements to shift sets between two types of operations or actions (e.g., mixed operations) and to work with the nonverbal concepts of time, distance, and sets (for a review, see Zentall, 2007). These students are also less accurate when irrelevant verbal information is added, in contrast to students with math LD, who are more likely to be confused by nonrelevant numbers added to problems (Passolunghi, Marzocchi, & Fiorillo, 2005). Working memory problems are also a significant contributor to multi-step problem performance.

Skill deficit: Lack of ability or lack of educational experience in “how” to do something.

Handwriting. The typically illegible handwriting of students with ADHD appears to be the result of visual-motor **skill deficits**. Visual-motor skills are less well developed in children with the inattentive subtype than in typical peers and can be assessed as early as preschool (Resta & Eliot, 1994). Poor fine motor skills contribute to slower and less accurate typing, although failure to sustain attention to repetitive practice is

also a factor. The handwriting of students at risk for ADHD has been found to deteriorate over time and practice more rapidly than that of peers who were matched on initial handwriting (Zentall, Falkenberg, & Smith, 1985). The handwriting of students with the HI subtype has been shown to be even poorer than that of those with the IN subtype (Resta & Eliot, 1994). In particular, boys develop gross motor skills earlier and often at the expense of early fine motor skill development, which may explain why students with the HI subtype have poorer fine motor skills than their IN subtype counterparts.

SUMMARY OF STRENGTHS AND NEEDS

<i>Probable strengths</i>	<i>Probable needs</i>
<ul style="list-style-type: none"> • Attention to global or gestalt cues (“big picture” cues) • Attention to novelty (color, movement, high interest); can be good at multitasking • Good memory when there are visual cues and when information is precategorized • Greater performance and persistence on problem solving, divergent thinking, and creative storytelling tasks than peers with similar IQs • Prefer doing their best on academic tasks (i.e., more competitive goals than students with RD and than peers without disabilities) • Prefer to learn through their own interests and curiosities and to make independent judgments more than do students with reading problems (Zentall & Beike, 2012) 	<ul style="list-style-type: none"> • Accommodations that highlight neutral cues, detail in tasks (e.g., spelling), and the underlying organization of tasks and settings • Interventions that teach ways to reduce anxiety and emotional overreaction, especially in adolescent girls • Interventions that teach students how to categorize information for easier recall • Interventions that teach students how to use visual cues and pictures to reorganize or plan • Accommodations that allow for breaks or active responding during rote or long tasks • Accommodations that allow for alternatives to handwriting, such as typing or verbal responding • Accommodations that tell students exactly what behavior is expected (“do rules”) and under what circumstances (structure), while also providing variation in teaching methods, materials, and response opportunities • Interventions for high school and college students that teach study strategies, note and test taking, outlining, and time management (see Reaser, Prevatt, Petscher, & Proctor, 2007) • Accommodations in schoolwide homework guidelines that include the amount of time students are expected to work on homework and consequences for failure to complete homework (e.g., turn it in the following day or by Friday without consequence or with a loss of points) • Accommodations in grading policies based on equivalent content (e.g., information, performance objectives) but with changes in directions, responses required, amount of content per unit time (e.g., breaking assignments into smaller parts) (see Beyda & Zentall, 1998)

DISABILITY IN THE CLASSROOM

A case conferencing committee may place a child with ADHD who is eligible for services within the OHI category of IDEA. However, the OHI category is not tied to teacher licensure or funding. Thus, a student with ADHD could be placed with a teacher certified with any exceptionality in any categorical or a multicategorical setting; these placement decisions often vary by state. When categorical placement is needed, students with inattentiveness but not hyperactivity are more often placed in LD classes or in resource rooms (Barkley, DuPaul, & McMurray, 1990). Regardless of placement, school systems spend “approximately \$15 to \$22 billion per year to educate children with ADHD,” some of which may be related to co-occurring conditions (Hart, Massetti, Fabiano, Pariseau, & Pelham, 2011, p. 55).

Implications for Accommodations in General Education Settings: Tier I

In the past, schools have attempted to change or “normalize” the child with ADHD; this can be seen in studies implementing behavior modification interventions (for a review, see Hart et al., 2011). More recently, the principles of Universal Design for Learning in have been applied in general education settings, where most of these students are educated (Loe & Feldman, 2007). Applications of the principles of UDL have been labeled “antecedent interventions.” Typically these involve task or instructional modifications that form the basis of the activity- and novelty-based curriculum (ANBC), which has been field-tested by teachers with effectiveness documented (Zentall & Javorsky, 1997).

The primary components of ANBC are aimed at providing an active and interactive curriculum:

- *Use technology* (e.g., allow use of calculators, especially for multiple step problems in math, and use of computers for keyboarding of compositions). Use computer-paced instruction to improve math and *computer-assisted instruction* (CAI) that involves combinations of stimulation (individual rapid pacing, active engagement, practice with multiple sensory input) and increased information (instructional objectives, incentives, immediate feedback/reinforcement, small chunks of academic material).
- *Provide active responding opportunities*. For example, children with and without ADHD have been found to attempt more words and to read with greater accuracy in an active condition (holding and flipping word cards to be read) than in a passive condition (teacher control of word cards) (Zentall & Meyer, 1987). Furthermore, in that study improved attention and behavioral gains (impulsive errors, talking/noisemaking, activity) were seen in the active

conditions only for the ADHD group. In addition, *reading aloud* has been shown to improve the comprehension performance of students with ADHD relative to reading silently (for a review, see Zentall et al., in press).

- *Increase opportunities for activity (recess) between lessons* to improve duration and focus of attention and reduce fidgeting (for a review of the empirical data, see Ridgway, Northup, Pellegrin, LaRue, & Hightshoe, 2003).
- *Reduce delays* by providing self-paced instruction (Tseng, Henderson, Chow, & Yao, 2004).
- *Use classwide peer tutoring (CWPT)*, with the entire class divided into two teams and individuals taking turns tutoring one another (e.g., Greenwood, Horton, & Utley, 2002). Correct responding on the first attempt achieves two points, whereas incorrect responding achieves feedback and another chance to answer the question for one point (for a review, see DuPaul et al., 2006).

The secondary components of the ANBC are intended to alter the nature and timing of task performance:

- *For selective attention tasks*, increased practice helps, but since these students avoid repetition, provide opportunities to practice tasks at different time periods or days (distributed practice), or change the nature of the information by chunking or grouping similar categories of information, using global cues (e.g., analogies), or by visually highlighting important information. For example, these students performed better on spelling with color added to inconsistent sound/symbol letters (e.g., in the word *receipt*) than when added randomly (Zentall, 1989; Zentall & Kruczek, 1988). Similarly, color-highlighted operation signs have been found to improve math accuracy relative to a nonhighlighted condition (Kercood & Grskovic, 2009).
- *For working memory*, visual cues (e.g., pictures) can be used as prompts to tell or write stories. It is also helpful to reduce the demands of sustained attention through the use of interesting or action-oriented books, chapters rather than whole reports, and short poetry rather than long narratives. For multi-step math problems, students will need ordered steps that can be checked off. For tests, they may need to memorize these steps with single words that are set to a favorite tune, such as Twinkle twinkle little star.
- *For sustained attention*, reduce time on task (e.g., completing small components of an exam or a composition on successive days) and reduce the length of instruction and repetition. Add novelty directly to parts of tasks. For example, research has found that children with ADHD produced more correct addition problems with computer-administered colored numbers and movement than with black numbers on a gray computer screen and when problems were printed on brightly colored cards relative to performance on

gray cards (Lee & Zentall, 2002). When information from a light source (e.g., contrasts, transparencies, shadows) was added to geometric figures to be calculated and compared to geometric figures presented with only a single value and no input from the light source, students with ADHD actually performed better than their peers (Kang & Zentall, 2011). The addition of auditory stimulation (but not conversational noise) may also be useful: Boys with ADHD have been found to perform more problems with greater accuracy with background music than with silence (or with speech)—effects not found for comparison peers (Abikoff, Courtney, Szeibel, & Koplewicz, 1996). In reading tasks, active verbs, unfamiliar characters, surprising story endings, and vivid adjectives have been shown to improve the reading comprehension of boys with ADHD but not that of their classmates (Beike & Zentall, 2012). Casey is a good example of this: “Casey’s behaviors avoid reading comprehensions tasks (head hanging and ignoring the teacher) . . . [yet] Casey also loves to read, when the content is interesting to her. She likes reading romance and adventure stories.”

A third component of ANBC involves altering the environment and the consequences to the child from the environment:

- *For behavioral management*, reward effort and persistence and gradually increase expectations with self-graphing (self-monitoring/self-instruction) for skills that are inconsistently performed (i.e., **performance deficits**). For middle school students with ADHD, mirrors in a “homework station” improved homework production to levels equivalent to their peers (Hall & Zentall, 2000). Mirrors were especially beneficial for those children with ADHD who looked at the mirrors (i.e., were “distracted”) and less beneficial for those who did not, relative to comparison children (Zentall, Hall, & Lee, 1998). Applications of this research could be made in small-group settings. Mirrors increase attention to the self and also appear to bring a child’s own behavioral standards to the forefront, but they are effective only when the student knows what to do or knows the relevant standards (Zentall et al., 1998).

Performance deficit:
Lack of motivation or attentional ability to sustain effort to an area the child already has the skills to perform.

Implications for Interventions in Small-Group and Individual Settings: Tiers II and III

Tier II

- *For working memory*, use technology or intensive computer training with graduated practice involving holding information in mind (e.g., 5 weeks of practice). This approach has been shown to improve verbal and visual-spatial WM capacity and to improve (a) listening capacity relative to a control condition, (b) math

reasoning at a 6-month follow-up to baseline, and (c) reading comprehension. However, no improvements in IQ or reading recognition have been seen with this technique (Dahlin, 2011; Holmes, Gathercole, & Dunning, 2009). Assistive reading software (Kurzweil 3000) that presents a combined visual and auditory input of text with highlighting and provides note-taking options has been found to produce faster reading for longer periods of time and with less fatigue for college students with attentional problems, but only those students with very poor comprehension improved their reading comprehension (Hecker et al., 2002).

- *To improve memory*, giving students brief experience sorting words they need to remember has been found beneficial, with performance improving to a level equivalent to non-ADHD peers (August, 1987). The use of materials that are precategorized by time chronology, topics, or cause-and-effect relationships has also shown some success.
- *For off-task behavior*, teach self-monitoring strategies. Asking children to self-monitor their task-unrelated thoughts as they proceed through a practice task has been shown to improve their immediate memory scores (French, Zentall, & Bennett, 2003). That is, when students know they need to report their numbers of task-unrelated thoughts (internal interferences), this appears to act as a form of self-monitoring. Self-monitoring also has applications for producing improved quality of written language (Linemann & Reid, 2008).

Tier III. Psychostimulant medication increases neurotransmission of impulses (DuPaul, Ervin, Hook, & McGoey, 1998), specifically through increases in dopamine, which produce sufficient brain activation needed for sustaining attention and working memory (McNab et al., 2009). This intervention is considered Tier III because most students with characteristics of ADHD can be successfully accommodated in the classroom without medication. However, for those students currently taking medication, teachers can help by monitoring the effects and side effects of medication, such as irritability, sadness, tics, and stress, in collaboration with other personnel and parents. While it is important to remember that each student has a right to privacy about his or her medications, it is also important to communicate to the child that the pill can improve attention, but it is the child's effort and not the pill that is responsible for improved skills. Table 9.2 presents the pros and cons associated with the use of medications by children with ADHD.

Assessments of the use of medication and behavioral interventions, singly and in combination, have initially shown promising findings, but they have failed to show greater long-term gains than routine care. In the 1990s, the National Institute of Mental Health's Collaborative Multisite Multimodal Treatment Study of Children with ADHD (known as the MTA study) compared three treatment groups: a group that received carefully managed and monitored medication treatment, a

Table 9.2 Pros and Cons of the Use of Medications as an Intervention for ADHD

<i>Pros</i>	<i>Cons</i>
<ul style="list-style-type: none"> • Medication is the single and most effective intervention for inattention and excessive behavior for 75–80% of ADHD students, with performance improvements on rote practice tasks. • Children with co-occurring behavioral disorders or LD show gains in reading and math achievement with medication (Zentall et al., in press), but medication must be used in conjunction with effective instruction and behavioral strategies and cannot be considered a “magic pill.” <ul style="list-style-type: none"> ○ Use of medications has been associated with decreased absenteeism and retention in grade (Advokat, 2009). However, these findings could be related to sample bias. 	<ul style="list-style-type: none"> • Approximately 25–35% of students are nonresponders, and some have risk factors (e.g., heart issues, possible stimulant abuse) that preclude the use of some types of medications. (Nonstimulant medications include atomoxetine, clonidine, guanfacine, desipramine, deprenyl, and bupropion.) • Children without co-occurring learning or behavioral disabilities have <i>not</i> demonstrated gains in math or reading achievement in response to medication (Zentall et al., in press). • No long-term gains in social or vocational outcomes have been documented. • In general, long-term compliance with medication regimens is poor.

group that received intensive behavior therapy, and a group that received a combination of the two. The control group received routine community care. Some of the study’s findings were as follows:

- At 36 months (22 months after treatments stopped), there were no longer any treatment group differences in ADHD/ODD symptoms or in any other aspects of children’s functioning.
- An 8-year follow-up study of 21 different measures was assessed for 436 of the original 579 participants, who now ranged in age from 13 to 18. Findings were that all treatment groups of children maintained improvements relative to baseline? but that none of the treatment groups was more or less successful than any of the others. In addition, there was a steady decline in the use of medication by the children over time.

However, more recent studies (conducted in 2008 and 2009) have reported higher math and reading achievement for students with ADHD who had self-selected to continue the use of medication beyond a year. Unfortunately, these effects could be explained by initial differences between those students who continued to use medication versus those who discontinued (e.g., in IQ or initial response to medication; for a review, see Zentall et al., in press). Thus, the

gains in achievement documented from the use of stimulant medication are short-term and primarily for those students with co-occurring LD.

Long-Term Outcomes

Clinically referred students are three to seven times more likely than typical peers to be retained at grade level, to be suspended/expelled, or to eventually require special education services (LeFever, Villers, Morrow, & Vaughn, 2002), with significantly higher dropout rates and increased frequency of failure. For example, it is estimated that 37% of students with ADHD do not finish high school versus 9% of teenagers in the general population, and only 5% of students with ADHD get a college degree in comparison with 35–40% of typical students (Barkley, 1998). (Retention in grade has been reported for 72% of the IN subtype versus 17% of the HI subtype; Lahey et al., 1994.) Students with the combined subtype typically obtain about 2 years less schooling than their peers and have poorer vocational outcomes, such as lower-ranking positions (APA, 2000, p. 88). On the positive side, those children with only the IN subtype are *less* likely than those with the HI subtype to develop **delinquency**, to be expelled from school, or to become substance abusers (see Wenar & Kerig, 2006).

Delinquency:
Involvement with the
legal system.

Adults with the combined subtype are more likely to make changes of vocation, residence, and schools attended than comparison populations; they are more likely to be fired and do not rise up the economic or employment ladder as quickly as others from the same neighborhoods with the same IQ and educational level. Many adults with ADHD need vocational support, such as job coaches.

Continuance. For those with the combined subtype who are identified in elementary age levels, ADHD persists into adolescence for 35–80% and into adulthood for 49–66% (Advokat, 2009).

CHAPTER SUMMARY

- ADHD is separated into two subtypes: inattentive (ADHD-IN) and hyperactive/impulsive (ADHD-HI); a third combined group is also recognized (ADHD-C). Each of these is formally defined by *DSM-IV-TR*, whereas IDEA defines only ADHD-C under the category of OHI. This chapter summarizes information on ADHD-IN and ADHD-C subtypes, which frequently co-occur with LD and internalizing disorders, such as depression.
- The prevalence of this disability is 8–20% of students within general education settings. Elementary school boys and girls with the inattentive subtype are identified at similar rates, whereas the ADHD-C subtype overrepresents boys four to one.

- The etiology of ADHD is genetic, with environmental factors (e.g., maternal smoking, ingestion of lead), explaining only one in five cases. Genetics may specifically contribute to the temperament trait of underarousal in these children, which results in their seeking stimulation through changes in attentional focus of thought, task, and activity. Functional assessments reveal that the triggers or antecedents of inattention for this group are (a) long, repetitive, familiar, and “boring” tasks; (b) tasks that require delays, sustained attention, and holding information in mind; and (c) tasks involving visual search within an embedded context. Students with other types of disabilities will also show inattention (e.g., GT, ID, LD), but only when their tasks are too easy (GT) or too difficult (ID, LD).
- Educators can informally identify children with ADHD through observations of their behavior, which is often off task and task avoidant at the start of assignments and especially over time. Language is another indicator, with more frequent changes of conversational topics. Also, these children produce less information when asked to talk about one subject but they talk too much or too loudly when freely conversing and associating ideas.
- Children with the IN subtype are more likely to show internalizing social behavior than are those with the HI subtype. In addition, those with the IN subtype are more likely to overreact emotionally.
- Lower intellectual functioning is not common to these students, unless they have been identified in clinical settings or have co-occurring LD. EF deficits have been documented and may contribute to these children’s difficulties in planning and anticipating the consequences of their actions, similar to other mild disability categories. Creativity and originality have also been documented.
- Academic failure is a common outcome of attention problems. Generally, students with ADHD have difficulty starting tasks, organizing task information, accurately responding to and persisting on tasks, and producing sufficient work. In both math facts and reading decoding, they exhibit slower and more variable performance than their non-ADHD peers. Whereas accuracy of reading aloud is not a problem for students with ADHD (without RD), accuracy of basic math calculations is. Math problem-solving difficulties are typically explained by verbal factors related to reading, although some deficits may be found with nonverbal concepts of time, distance, and the like. Finally, even more severe problems may be found in written compositions; some of this is due to poor handwriting, organizational problems, and the need to sustain focus on one topic.
- Accommodations should include active response opportunities, novel assignments, frequent feedback, computers for keyboarding and performing rote operations, highlighted or reduced directions, picture cue prompts, and shortened or subdivided assignments.

Educational interventions include training aimed at improving working memory, categorization strategies, and self-monitoring of attention and of performance.

CHAPTER QUESTIONS

1. Create an accommodation plan for a second grader who daydreams so much that she cannot complete the spelling of a single word without being redirected—she even daydreams in small teacher-led groups.
2. How can you identify what is relevant within a task or skill to be achieved? For example, what is the relevant distinction between bossiness and leadership, and how could you highlight these differences for a child with combined ADHD?
3. Why are students with the IN subtype of ADHD and students with LD more likely than other children to experience anxiety and depression?
4. Inattention seems to be a marker of children with mild disabilities; can you explain why this is so?
5. What kinds of tasks increase the likelihood of inattention for students with the IN subtype?
6. How is working memory related to sustained attention?
7. How can educators help children to get “on track”?
8. How can educators help children to stay “on track”?

TRUE/FALSE AND MULTIPLE-CHOICE

1. Children with ADHD produce better work in handwriting when they are asked to redo it immediately.
2. An educator’s knowledge about the heritability or genetic basis of a disability is more important than his or her knowledge about the situational dependence and response to intervention of that disability.
3. Talking too much when asked to talk and talking too little spontaneously are typical for ADHD.
4. Children who have problems with sustained inattention
 - A. get bored faster than other children
 - B. have difficulty with repetitive and long tasks
 - C. have difficulty directing their attention to neutral cues

- D. have difficulty directing their attention to internal cues
 - E. A & B
 - F. C & D
5. Children who have difficulty with selectively attending
 - A. change activities frequently
 - B. have problems with maintaining routines
 - C. are less aware of feelings, strategies, intentions, and so on
 6. Students with the inattentive subtype of ADHD, more than the hyperactive-impulsive subtype
 - A. have academic skill problems
 - B. are less likely to be disruptive
 - C. are more likely to have specific learning disabilities
 - D. all of the above
 7. Preferred activities offered as rewards for students with the inattentive type of ADHD might include
 - A. time to daydream
 - B. talking time
 - C. creative projects
 - D. all of the above
 8. Psychostimulant medication is especially useful for ADHD students who have problems with
 - A. selective attention tasks that have embedded information, like spelling
 - B. sustained attention tasks that are rote and repetitive, like math facts
 - C. neither A nor B
 - D. A & B
 9. Placing students with ADHD away from windows and doors is a *not* a good accommodation, since these students need additional stimulation, especially during repetitive tasks.

SHORT ANSWER

1. Ignores important stimuli and _____ attends to what is novel
2. Inattention is a *primary* characteristic of ADHD and a _____ characteristics of LD.
3. Loss of function (academic/social/vocational) is also termed an _____.

4. “Rule-outs” in a definition, which describe what a disability is not, are also termed _____.
5. A child who gets bored quickly may fail to _____ attention.

PROBLEM-BASED CASE APPLICATIONS AND QUESTIONS

CASE STUDY 9.1: ZEB

“Watching the frog.”

(adapted from a report submitted by Konie Hughes)

Background. Zeb is an 8-year-old male in second grade at a local elementary school. He is diagnosed with LD in reading, math, and written language. He is also labeled ADHD—inattentive subtype. His mother has withdrawn his medication, preferring that he spend more time receiving special educational services without medication. The general education teacher has complained about Zeb’s lack of attention, arguing, and disturbances during whole-class instructions, not knowing the homework assignments, and not completing these assignments.

Zeb’s positive attributes are his outgoing personality, his personableness, and his desire to please the teacher. Teachers and students generally like him. Although he struggles in all academic areas, he likes math. He is an active participant, particularly during instruction in math, and continually attempts to complete his work. He likes the computer and recess, and he was very interested in a frog that was in the classroom.

Behavioral Observation

The general education classroom contains approximately 24 students, with student desks grouped in rows of two. Generally the teacher is calm, has a good rapport with students, and encourages engagement. The resource room is divided into sections, with desks and bookshelves delineating teaching areas. The special education teacher works with one group in one area; in another, a child works at a group of desks with a paraprofessional; and two corners are arranged for small groups, with a paraprofessional working with each one. Zeb works in one of these groups at a table with one other student and a paraprofessional.

Setting 1: Transitions

Transitioning into a task or waiting is difficult for Zeb, whether he’s at his seat or in the hallway. He’s in constant motion (getting out of his seat, playing with things, moving

his desk, touching the walls) or talking and having fun (using a book as a puppet, turning on a water faucet by leaning into it). As students from other classes enter the room for ability-group lessons, Zeb acts as the class greeter (he sits nearest the door).

<i>Behavior</i>	<i>Antecedent</i>	<i>Response</i>	<i>Payoff</i>
He puts paper into folder and puts it away.	Transition: end of task		Get competence
While waiting to go to resource room and sitting at desk, he gets out of seat and plays with math manipulatives in cart.	Transition		Get stimulation: activity
The teacher tells kids to sit down and wait; he pushes his desk and seat around.	Transition	Peer response	Get self-determination: control
As soon as he sits down, he asks to go to bathroom. Told no and told to listen. He follows directions.	Transition		Avoid task
Sitting in hallway. Folds up book and uses it as puppet's mouth talking to others and students exiting bathroom.	Transition	Peer response	Get stimulation: fun Get relatedness
Standing in line, he leans on the water faucet, turning it on.	Transition		Get stimulation: fun

Setting 2: Whole Group

Whole-group instruction of the Daily Oral Language (DOL) worksheet (total of 10 short problems in language and math); math occurs with the teacher at the front of the room going over the assignment and asking questions. Zeb appears not to be listening, because he is constantly moving in his seat, playing with objects, talking, or making noises. However, he does hear more than is at first apparent, because he raises his hand at times in response to questions and follows *some* of the instructions. He isn't able to stay with the teacher step by step. I have noticed in math that he will go ahead and write an answer to a problem he can do, which is further down the worksheet, while the teacher and class work on an earlier problem. When he finally notices that the class has finished the earlier problem, he simply looks at his neighbor's sheet and copies. Of course this disrupts that student, because Zeb is talking and leaning into him. If he needs an eraser, he'll grab the pencil from the neighbor's hand or talk out about needing an eraser, disturbing everyone around him. They don't complain and quickly accommodate him! When he starts talking inappropriately (about lunch or whether he likes another student) during a lesson, his neighbors will turn to him but largely don't respond.

During a whole-group instruction of writing, the teacher stands at the front of the class as she goes over sentences, asking students what corrections are needed. The students have the assignment on their desks; they make the corrections on their papers as the teacher guides them. Again, this requires a lot of attention, listening, and waiting. Zeb’s behavior—whistling, singing, and pushing his desk around—serves two purposes: avoidance of the prolonged listening and waiting task, and getting stimulation, both sensory and activity. Unless he disrupts the entire class (singing or whistling), the teacher ignores most of his behavior. When he does disrupt the class, he gets a consequence (pulls a card), but this seems ineffective.

<i>Behavior</i>	<i>Antecedent</i>	<i>Response</i>	<i>Payoff</i>
Throws down pencil and talks to neighbor: given a warning.	Daily Oral Language worksheet	Teacher response	Avoid task
As the teacher talks and asks questions, he whistles and is told to pull a card.	Correcting sentences	Teacher response and punishment	Avoid task Get stimulation: sensory
Plays with desk, picks it up, and slides around on chair. Starts singing and is told to pull second card.	Correcting sentences	Teacher response and punishment	Avoid task Get stimulation: activity
Raises his hand and tries to answer question but answers incorrectly. As the teacher talks with other students, he sticks his pencil into a crayon and waves it around.	Daily Oral Language worksheet		Get competence Get stimulation: sensory
Follows direction to get dry-erase board.	Following directions		Get competence
Talks to neighbor and sits on knees as he is told to clear the board; instead plays with manipulatives.	Math calculations		Get self-determination: control
Told to count with teacher; he has marker top in his mouth and watches an adult on the computer in the corner.	Math oral calculation		Avoid task Get stimulation: sensory

NOTE: All activities involve listening.

Setting 3: One-on-One

In the resource room Zeb gets structured reading and writing. The paraprofessional guides him in a reading program that begins with sounds or words that she models, followed with responses from Zeb. Next he reads aloud a short story and

then independently completes a worksheet while she helps another student at the table. I notice that he can sit still for longer periods of time even during these shorter and more varied lessons, and there isn't anything to play with other than a pencil. Generally, there is nothing on the table for him to grab. However, one day a teacher placed a frog in a container on the table; he kept touching it and asking questions about it until the teacher threatened to take it away.

The paraprofessional continually has to redirect him, as he still likes to talk and initiate inappropriate conversations with her (questioning whether she smokes, wanting to get on the computer when someone else has earned it). As he completes one worksheet, she gives him positive reinforcement and gives him another worksheet. He is still easily distracted by anyone entering the room and by changes in the music. In this setting he really doesn't have to be organized because he sits at a table and the teacher places the necessary materials in front of him.

<i>Behavior</i>	<i>Antecedent</i>	<i>Response</i>	<i>Payoff</i>
He follows paraprofessional's directions as she points to words.	Guided reading		Get competence
Told to sit down and do work after getting Kleenex. He begins talking to paraprofessional.	Worksheet	Teacher response	Avoid task Get self-determination: control
After three more prompts to begin a second page, he keeps touching the frog container, asks paraprofessional if she smokes, and asks again about the frog.	Worksheet	Teacher response	Avoid task Get self-determination: control
Gets reminder to get back to work; asks if he can get on computer when he's finished after hearing another student has earned it.	Worksheet	Teacher response	Avoid task Get self-determination: control
Paraprofessional working with another student; he talks out, giving the answer.	Worksheet		Get competence

ABC Analysis

Consequences

Effective strategies:

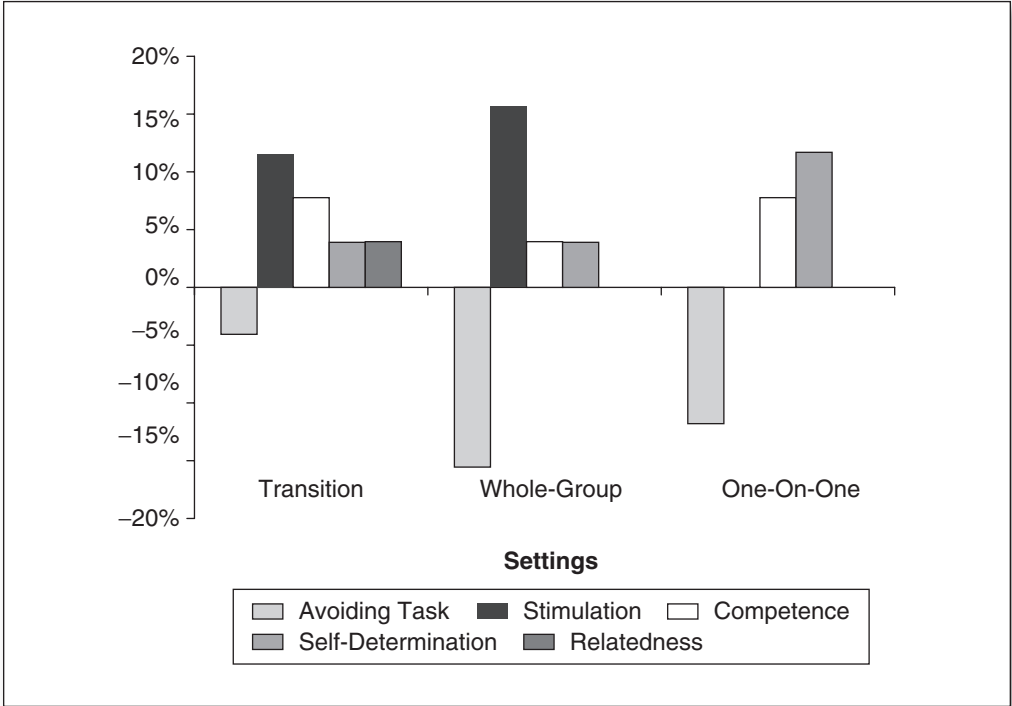
- One-on-one/personal attention
- Frequent verbal reinforcement
- Short segments of instruction
- Incentives (recess, computer)

Ineffective strategies:

- Punishing bad behavior (pulling card)
- Ignoring bad behavior
- Responding to bad behavior (reminders)

Zeb’s overall payoffs were 71% gets and 31% avoids (some behaviors had more than one payoff (see Figure 9.2). Whole-group instruction was the setting where Zeb had the highest frequency of payoffs—avoiding and escaping tasks that required a lot of listening, waiting, and sustained attention. He successfully avoided most of these tasks and replaced task performance with seeking stimulation.

Figure 9.2 Zeb’s Payoffs Within Three Settings



Zeb’s high-frequency payoffs were as follows:

1. Avoiding tasks (leftmost bar in Figure 9.2) that required sustained listening, attention, or waiting and also at the same time getting stimulation: sensory (whistling), activity (pushing his desk around, playing with objects), and fun (using book as a puppet, turning on water faucet).

2. Getting self-determination: control (talking, asking questions).
3. Getting competence: mastery (attempting to answer questions, following directions, giving answers out of turn).

Diagnosis Versus ABC Analysis

Zeb's behavior meets the six minimum criteria of *DSM-IV-TR* for ADHD-IN. Zeb has problems, particularly in the general education classroom. He is unable to stay focused on instructions and tasks and completing his work, as other children are able to do. He struggles to sustain attention on a task in the resource room until an adult gives him a direct reminder to return to his task. During transitions, he continually needs and finds stimulation to get through difficult waiting times. Another requirement for a diagnosis of ADHD-IN is that the behaviors be present in more than one setting; Zeb does have behavior problems at home, and his mother would rather have the school address these difficulties. Furthermore, teacher interviews support the criterion that his disability affects his social and academic functioning. Zeb does exhibit emotional outbursts, has poor academic performance, and has conflicts with adults and peers. Though other children seem to like Zeb, perhaps they are also afraid of him because he can be aggressive.

Zeb's negative behavior increases during instruction in subject areas that give him the most trouble (math and writing) and when he must listen during group discussions. Sustained attention problems are also apparent in math, even though Zeb likes math. In the observation period, he avoided counting with the class, instead getting stimulation from the marker top in his mouth (and watching an adult using the computer). During writing his need for stimulation (and avoiding the writing task) increased, and he reacted by disrupting the class and getting negative teacher responses (and pulling two cards).

Zeb accomplished more and was not disruptive in the resource room even with difficult subjects. The difference was getting one-on-one instruction and shorter amounts of instruction (which, in turn, required shorter amounts of listening). Immediate incentives were in place for him—smiley faces for good behavior, a reward of recess for finishing his homework, getting to use the computer when he finished work, and watching the frog.

Zeb avoided transitioning into a lesson by (a) asking to go to the bathroom right at the start of the lesson, (b) trying to get control by asking to do something else, or (c) by talking to the teacher or to students around him. Transitions allow him to get needed stimulation, without getting into trouble, through activity (getting out of his seat or moving his seat back and forth, going over and playing with the math manipulatives). Sitting and waiting in the hallway for 15 minutes to go into the library wasn't boring

for Zeb; he stimulated himself and got others' attention by using his book as a puppet. Standing in line next to the doorway, he had some last-minute excitement by leaning into the water faucet and turning it on.

Interventions

Interventions with Zeb are aimed at teaching him replacement behavior so that he can get stimulation appropriately (social stimulation from peer tutoring) and at increasing his approach behaviors in subjects that he avoids (writing). Zeb needs to change his behavior in small steps and receive incentives that he enjoys. Possible incentives include opportunities for adult and peer social interactions, time on the computers, and time with the classroom's frog. He is active, so he might respond to earning activity time to draw or play with manipulatives, clay, or Legos. Finally, he likes getting smiley faces, so earning stickers toward a longer-term goal would be worthwhile. Giving Zeb a job to be in charge of some classroom supplies will help him feel important and successful and help him learn skills in organization.

Step 1: Zeb will complete a self-monitoring chart of on-task behavior during one lesson of his choice (DOL, writing, or math). Reinforcement with smiley faces will be given for appropriate behavior—to be defined for him.

Step 2: Zeb will be assigned a peer tutor during lessons to help him check his work.


Step 3: Zeb will spend time with the teacher learning to identify the times he is frustrated, learning appropriate ways to deal with those times, and learning to ask for help.

Step 4: Zeb will be in charge of supplies (pencils and erasers) for the classroom.

A peer tutor for Zeb will not only make it easier for the teacher to spend time helping other children but will also address Zeb's copying and disruption (talking and grabbing). A peer tutor should be a good role model for Zeb, and since he is very sociable, he should do well with this personal attention. The self-monitoring chart of on-task behavior has been shown to be helpful for students with ADHD and should reduce troublesome behaviors and allow frequent feedback. Zeb will be in charge of handing out or collecting papers during assignments or transitions to allow activity for him.

Case Questions

1: Under what conditions does Zeb show the greatest amount of disruptive behavior? What might explain Zeb's relatively high level of avoiding tasks, even in a one-on-one setting? What specific tasks are difficult for Zeb?

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- 2: In what ways does Zeb show creativity/originality?
 - 3: What is the focus of Zeb's teacher's writing instruction?
 - 4: What is a topic that Zeb might enjoy learning and writing about? How might a teacher accommodate and intervene in the instruction of composition to improve Zeb's writing difficulties?
 - 5: How might a teacher accommodate for Zeb's reading difficulties beyond teacher or peer individual tutoring?