

## Understanding, Diagnosing, and Coping with Slow Processing Speed

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In this article, Steven M. Butnik takes a look at a number of options regarding slow processing speed.

It's not unusual for gifted students to have slow processing speed. Of itself, slow processing speed is not a formal learning disability, but having it can frustrate students, teachers, and parents. As a clinical child psychologist specializing in assessing and treating students with attention deficit disorders and other learning problems, I often hear parents tell me their very bright child isn't finishing her classwork or that homework takes hours and hours to complete. Through observation or formal assessment of their child, these parents have been told that the child has *slow processing speed*.

Understanding the role of slow processing speed is essential. Gifted students with processing speed problems who are "missed," misdiagnosed, or mis-taught may become discouraged, depressed, undereducated, underemployed, or worse. By contrast, when these twice-exceptional (2e) children are understood and well-addressed educationally, they can become treasures who shine in unique ways.

In this article I will explain what sort of struggles children with slow processing speed experience; where slow processing speed comes from; how it can be identified; and what students, teachers, and parents can do to reduce or eliminate its impact.

### The Signs of Slow Processing Speed

At home, parents easily see slow processing speed in areas outside of homework. Aiden's mom asked him to get dressed ten minutes ago and when she checks on him, he hasn't even begun — and he has to be at the bus stop in five minutes! Nancy's family is in the car waiting for her and she, as usual, is still in the house, looking for her book. At school, Jack didn't finish writing his assignment in his planner when the bell rang, so he left out important information because he couldn't afford to be tardy again for his next class. When Emily didn't finish her classwork, her teacher sent the unfinished work home to be completed along with her usual homework. These children all have slow work pace, which leads to problems at school and at home. They need the understanding and help of parents and teachers so that they can succeed and so that their self-esteem is not damaged.

Understanding the source of the problem in children like these is a critical part of knowing how to help them. Thorough medical and psychoeducational evaluations are necessary because there are many sources of slow work pace. It can be associated with physical illness or injury such as low thyroid, epilepsy, or traumatic brain injury. It might be related to other physical problems such as lack of adequate sleep or reaction to medications. It might also be part of Attention Deficit Hyperactivity Disorder (ADHD), learning disorders, and/or emotional factors. We'll take a look at some of these possible causes.

### Slow Processing Speed Associated with ADHD

Children with the predominantly inattentive subtype of ADHD may have a *sluggish cognitive tempo*. They typically daydream, stare off, and appear spacey. They may be mentally foggy, underactive, slow moving, and lethargic. Their work is often slow and error prone. Their brain activity shows patterns of under arousal in the portion of the brain associated with focus and planning.

In addition, children with ADHD typically exhibit poor *executive functions*, brain-based behaviors that contribute to effective functioning. A useful model of executive functions (See the figure below.) has been developed by Thomas Brown, Ph.D., a psychologist at Yale University. These are the functions, according to Brown, that are impaired in attention deficit disorder syndrome.



(After T.E. Brown. (2001). *Manual for Attention Deficit Disorder Scales for Children and Adolescents.*)

Some children take more time to complete tasks due to trouble with *activation*. A student may not begin a task due to problems organizing time or materials, or due to reluctance, uncertainty, lack of confidence, or anxiety. Other children may take more time to complete tasks because of problems maintaining focus. While time is passing, these

children may take more time to complete tasks because of problems maintaining focus. While time is passing, these students may be distracted or daydreaming, drawn to other, more interesting stimuli.

*Effort* includes processing speed as well as mental stamina. When effort is a problem, the child's work pace is very slow and he may complain that his "brain is very tired." When the problem is emotional, on the other hand, children find it hard to regulate their feelings. They might melt down when starting to work or encountering a frustrating task; or they may refuse to work, be argumentative, or have tantrums.

Problems in *working memory* can add to the time it takes a child to complete tasks. After reading a paragraph, a child with poor working memory may forget what she just read and need to read it again; or he may stop working on a class assignment because he forgot the directions. Finally, when action is a problem, the child has trouble sitting still, fidgets with objects, or may want to stand or walk around when working.

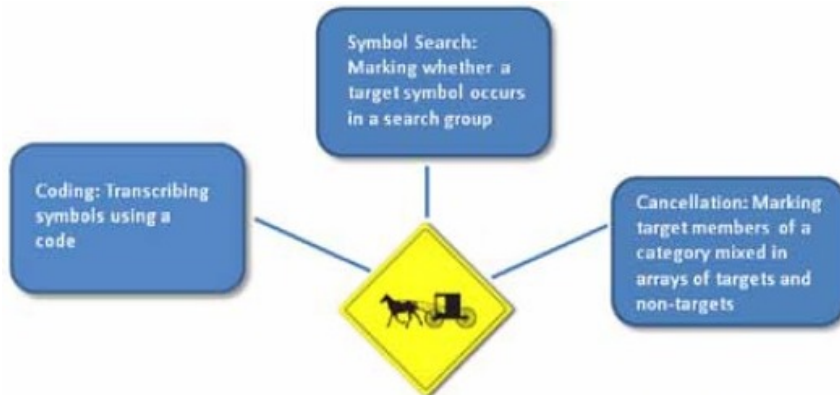
An additional issue that children with ADHD face is having a poor sense of time. For them, time seems to go more slowly during the tasks they feel are boring while moving more quickly for tasks they find interesting. When planning work tasks, a child with ADHD may underestimate how long the task will take; and when playing, the child may be unaware of how much time has passed. Taken together, poor executive functions and poor time sense can make homework take hours to complete and create major stress.

### Slow Processing Speed Associated with Cognitive Functioning and Learning Problems

Processing speed is an element of intelligence, as measured by many tests of cognitive ability, including the Wechsler Intelligence Scale for Children (4th Edition). Scores for both the Working Memory and Processing Speed subtests make up the WISC-IV's Cognitive Proficiency Index. These abilities are separate from the WISC-IV's General Abilities Index, a measure of core intelligence derived from an individual's Verbal Comprehension and Perceptual Reasoning Indices (verbal and nonverbal abilities).

Many 2e children show substantial differences between their verbal abilities and working memory capacity and/or between their nonverbal abilities and processing speed. Working memory and processing speed scores are often low in 2e children.

The WISC-IV's Processing Speed Index is calculated from the *Coding* and *Symbol Search* subtest scores. A supplemental subtest is *Cancellation*. These three subtests, described in the next paragraph, rely on rapid visual/motor analysis and output. Because processing speed can be affected by a number of factors, it is not a unified construct like other parts of the WISC-IV. See the figure below.



Each of these three subtests taps different abilities that contribute to the Processing Speed score. *Coding*, which requires children to draw symbols, is heavily influenced by grapho-motor demands. Children with poor handwriting or dysgraphia may struggle with this task. *Symbol Search* has less emphasis on motor output but requires rapid differentiation of abstract symbols. *Cancellation*, the supplemental Processing Speed subtest, makes use of concrete images rather than symbols.

Tests of educational achievements make use of processing speed on subtests that measure academic fluency. For example, the Woodcock-Johnson Tests of Achievement include three subtests of fluency:

- Reading Fluency. For three minutes the student quickly reads simple sentences and answers yes or no to each.
- Writing Fluency. Using three words and a picture, the student quickly writes simple sentences for seven minutes.
- Math Fluency. The student rapidly performs simple calculations for three minutes.

2e children who have trouble activating, are inattentive, or have sluggish cognitive tempo may struggle on all of these tasks. 2e children with slow motor output would have less trouble on Reading Fluency but would do more poorly on the Math and Writing Fluency tests. Working memory problems would likely have a greater impact on Math Fluency than on the other fluency tasks.

Slow processing speed is not a learning disorder. To be considered to have a learning disorder, a student must have the following:

- Average or better intelligence

- Patterns of substantial processing differences
- A significant difference between abilities and achievements.

However, research has shown that processing speed is linked to reading development and reading performance. Specifically, processing speed may be a factor in these situations:

- Reading disorders such as dyslexia
- A subset of reading disorders in which individuals display marked difficulties with verbal and visual processing speed
- Grapho-motor problems (dysgraphia). Individuals with dysgraphia have serious trouble forming letters and numbers; their handwriting is slow and labored; they may have trouble with spacing between words; they mix upper- and lower-case letters; etc. Because neatness only comes with their taking much time, their written work can be very strained and painful.

#### **Slow Processing Speed Associated with Emotional Interference**

In addition to cognitive and attentional variables, a number of emotional factors can increase how much time it takes for students to complete work. When students are anxious, their processing speed can slow due to self-doubt, uncertainty, second-guessing, and self-consciousness.

Obsessive-compulsive disorder (OCD) can cause even more slowing. Here are some examples of how children with OCD might behave in this context:

- One child has developed a "rule" that if he hesitates when reading, he "has to" reread the entire passage.
- Another child spends inordinate time when writing, laboring to form letters and numbers so that they are "perfect."

#### **The Difference Slow Processing Speed Can Make**

A few years ago, the parents of a gifted high school junior, Sean, sought an evaluation because he earned a surprisingly low score on the Critical Reading portion of the SAT. My evaluation showed Sean to have a very superior Verbal Comprehension Index (in the 99<sup>th</sup> percentile), but a significantly lower Processing Speed score. This situation had a significant impact on his measured Reading Rate, a key academic skill. The evaluation also revealed that Sean had ADHD, predominantly inattentive type. An anxious youngster by nature, Sean's slower processing speed caused him additional anxiety, which slowed his work pace even more.

These findings were shared with the Educational Testing Service, and they granted a request from Sean's school for additional time for the next SAT. Sean was in my office when he checked online to find his score. With the additional time, he was able to finish the Critical Reading portion, and his score was 100 points higher! His grin was priceless.

—SB

#### **How to Address Slow Processing Speed**

After a thorough psychological and educational evaluation, a plan can be developed to reduce the impact of slow processing speed. Intervention strategies fall into three categories: school-based, home-based, and child-based.

##### *School-based Strategies*

A public schools' child study committee can provide an evaluation to determine a student's eligibility for accommodations and modifications. If a formal learning disorder is identified, an Individual Education Program (IEP) can be provided, following provisions of the Individuals with Disabilities Education Improvement Act. Students without formal learning disorders, but who are having trouble learning due to ADHD, may receive services under Section 504 of the Americans with Disabilities Act. Schools may also provide services before determining formal eligibility through Response to Intervention (RTI). [For information on RTI, see the November, 2012, and January, 2013, issues of 2e: Twice-Exceptional Newsletter.]

Regardless of the category of services for which the gifted student qualifies, it's important to prevent slow processing from interfering with a child's success. Teachers should be aware of how slow processing speed can affect the performance of bright students and strive to differentiate their instruction. Gifted students with slow work pace should not be denied gifted education opportunities.

To provide suitable interventions, a teacher or school needs to determine the source of the problems and tailor interventions to the individual student's needs. To the right are examples of interventions that can address them.

Other school accommodations or modifications may include:

- Increased time to complete tasks including quizzes, tests, and exams
- Providing a method of prompting the student to increase time awareness
- Eliminating unnecessary clerical tasks (e.g., transcribing math problems from a textbook to a work sheet) and making use of brief response formats
- Eliminating timed tests such as "Mad Math Minute" tests
- Reducing the number of tasks required to demonstrate competence (such as 5 math problems instead of 25)
- Monitoring time spent on homework and adjusting assignments as necessary.

Type of Problem	Examples of Interventions
Activation	Investigate the cause. For example, see if the student: <ul style="list-style-type: none"> <li>• Is engrossed in another activity</li> <li>• Is confused about what to do</li> <li>• Has missed the instructions</li> <li>• Is anxious about failing.</li> </ul>
Emotional factors (i.e., "It's too much...")	<ul style="list-style-type: none"> <li>• Encourage.</li> <li>• Support.</li> <li>• Provide help getting started.</li> </ul>
Cognitive factors (i.e., "I don't even know where to begin.")	<ul style="list-style-type: none"> <li>• Develop a plan.</li> <li>• Break a task down into smaller chunks.</li> <li>• Use graphic organizers.</li> </ul>
Focus/attention	<ul style="list-style-type: none"> <li>• Reduce distractions.</li> <li>• Provide white noise.</li> <li>• Recognize on-task behavior.</li> <li>• Prompt the student when she drifts.</li> <li>• Provide incentives for completion of work.</li> </ul>
Working memory	<ul style="list-style-type: none"> <li>• Repeat directions.</li> <li>• Encourage questions.</li> <li>• Give gentle reminders.</li> <li>• Provide templates of completed work, written copies of directions, word banks, etc.</li> </ul>
Handwriting	<ul style="list-style-type: none"> <li>• Determine if dysgraphia is present.</li> <li>• Give advance copies of teacher notes.</li> <li>• Provide access to word processing and/or speech-to-text software (such as Dragon's Naturally Speaking).</li> <li>• Have another student share copies of notes.</li> </ul>

#### Home-based Strategies

Parents should become aware of the impact of slow processing speed on their child's daily living and develop plans to reduce that impact. Because students with slow processing speed often have major problems with homework, parents should work with the teacher to determine how much time the student should spend on each homework assignment and what to do if the time is exceeded. The goal is to avoid homework battles. If handwriting interferes with work pace, some of the school-based suggestions in the table can be implemented at home.

Parents should avoid personalizing, punishing, and reacting emotionally, remembering that slow processing speed is not purposeful and can improve. Parents can help by providing more structure, using schedules, timers, clocks, alarms, and incentives. With older children, it can pay to involve them in the problem-solving process.

Children with ADHD may benefit from stimulant medications such as Ritalin, Concerta, Adderall, or Vyvanse. This type of medication may not directly increase actual processing speed but can often help with activation and focus, increasing a child's work pace. Once a child is properly diagnosed, parents can explore the medication option with their child's pediatrician or medical specialist. It's also important for parents to monitor and address any sleep problems that may occur and to encourage sound nutrition as well as frequent, vigorous exercise.

#### Child-based Strategies

Because some very bright students with slow processing speed do not see themselves as smart, it's important to help them understand the nature and pattern of their abilities. It may help to remind them that all people have strengths and weaknesses and that having a slower pace does not mean one is not smart. One student loved that I referred to him as an intellectual tank — not very fast, but extremely powerful.

Some students make good use of timers and alarms to help them track time. A teenager I worked with began using an alarm clock in the bathroom to remind him to get out of the shower. It can also help to conduct a time study. Parents can use a stopwatch to determine how much time it takes the child to complete routine tasks like doing a chore or getting dressed for school. These times can be used as goals to work toward and rewards can be provided when the student completes a task within the allotted time.

#### Conclusion

When they go unrecognized and their needs go unaddressed, gifted students with a slower pace can feel discouraged and demoralized. However, once they are understood and efforts are made to help reduce the impact of the slower pace, these students' best abilities can shine. Parents may need to take the lead and arrange for evaluations, educate those involved in their children's lives, and provide their child with unwavering support and encouragement.

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## Comments

### Contributed by: Other on 5/23/2014

How do I increase my visual processing speed, not just find ways to cope? I need to fix the problem. I have completed graduate school, now that I am in the work force people are not at all understanding like they were in college.

### Contributed by: Parent on 5/1/2014

I just found the timer in question - Joseph Joseph Pie Kitchen Timer via Amazon. approx. \$15.

### Contributed by: Other on 4/15/2014

I am also very interested in finding out what more can be done to support the adult person on the job with a slow processing speed, particularly with working memory problems. Or can you go on disability for this problem? It always took me a long time to get my homework done when I was in school. Now I'm always late clocking out to finish my charting at work. I'm late most everywhere I go because I'm hurrying to finish up. I'm 59 years old and never have been able to work any faster. It takes me longer to study my patients' charts, then carefully organize my notes. Receiving a verbal report on my patients is difficult when they have talked at a fast pace on the recorded tape. Please help! My work exhausts me but I love being a nurse.

### Contributed by: Other on 4/2/2014

Any ideas on how to address slow-processing speed at the workplace? I recently did some testing for myself and one major outcome was slow processing speed. I work in a fast-paced environment. Any suggestions?

### Contributed by: Parent on 4/2/2014

Thank you "Parent" for your very helpful comment. I was wondering what the clock was called and where you got it. It would be very helpful for my son.

### Contributed by: Parent on 3/28/2014

Very good article with great suggestions. If I could add a couple more strategies...My son's processing speed is in the impaired range. I found an analog clock that is made for kids with processing speed "deficits." It gives a visual indication of time (i.e., the face of the clock is like a pie so, say, 6:50 is indicated by a red (or any color) "slice" of the hour with the 50 minutes already elapsed in white. Telling him he has ten minutes before the bus arrives means nothing to him but a visual representation does. At school, he is in a fully inclusive classroom but the teachers are required to have their daily lesson plans summarized with bullets highlighting main points. It's in a Powerpoint format that runs in the background as the teacher talks. My son is given a hard copy at the end of class.

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