

# Procedural Memory

*Is your child forgetting the steps to complete a task?*



Is your child:

- Saying, “Brush my teeth, get my shoes and then what?”
- Having major difficulties following multi-step directions?
- Struggling to tie shoes and get dressed in the morning?
- Not remembering the procedure to solve that long division problem?
- Getting lost partway through a task?
- Not doing what you asked at all?
- Doing procedures out of order; eating breakfast with one sock on and a t-shirt from yesterday?
- Wandering around the classroom as other students follow the morning routine?

## LET’S TALK ABOUT IT

If your teenager is having difficulty learning to drive a car, procedural memory may be an issue. Maybe you reminded your child 100 times, “put your seatbelt on, foot on the brake, key in the ignition,” but your teen is still doing things backwards. Your child may also have trouble following a recipe or completing homework. Some children often say, “I can’t remember what to do next.” They may need to have a single instruction provided

and then reminders every two minutes until that one thing gets done. Some children practice tying their shoes for a year and still can't quite get it right. You may expect your child to follow the same steps and routine each morning, and he still doesn't do it.

***You call him down for breakfast, expecting him to be dressed for school, and then you find him or looking at a picture, organizing toys, or just studying his fingernails.***

The morning routine may take triple the time it should. For some families, the procedure of get up, get dressed, make your bed, eat breakfast, and brush your teeth requires constant reminders, despite the fact that you've had the same routine for the past two years. For other children, it's completing a multi-step math problem that is difficult.

In the classroom, a student with challenges following procedure will be easy to spot. While others have put their lunches in cubbies, gotten out writing folders and are completing the morning journal, a child with these challenges may be swinging his lunch bag and wandering around the classroom, chewing the tip of a pencil, spinning the globe, or staring out the window.

## **CLINICAL DESCRIPTION**

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Following procedures can be challenging for many children. The difficulty could come from challenges remembering, challenges paying attention, or challenges completing the actual tasks that are part of the routine. Challenges *remembering* and completing sequential steps could be related to procedural memory.

***Procedural memory refers to the type of long-term memory we use for remembering the procedure of tasks and activities that we do all the time, such as tying our shoes or driving a car.***

Procedures may have motor components but may also be the steps to solving a problem. They are things that we do over and over until they become automatic.

Tulving's 1984 memory taxonomy says that procedural memory *involves the acquisition of sensorimotor and cognitive skills and habits.*

Initially, it takes memory storage to sequentially order information and to hold onto that information cognitively (in your head) until the tasks are completed. Once those tasks become automatic, it does not take memory storage to remember how to do them. For example, as an adult you do not have to concentrate on driving your car in most scenarios. If traffic is heavy or you are following a new route, then driving may require concentration; however, your typical drive to work could be done with virtually no mental effort. Often times you probably find yourself reviewing your grocery list, remembering what your kids' activities are for the day, or thinking about what movie you might want to see this weekend, rather than actually concentrating on driving a car.

***This reason you can drive a car without thinking much about it is because driving has become a part of your procedural memory.***

Children who get stuck completing a task like tying their shoes or making their bed are not able to step through the procedures automatically. For a child who cannot complete the procedure, it is possible that memory is the problem. *Memory for the procedure has not become automatic.*

Some children need to be shown the process and need to practice the steps over and over. If a child is possibly having difficulty with procedural memory, the task is not automatic, and therefore it takes thought and effort to complete it. A task is often not completed, or it is not done correctly.

While we would like children to encode (put into memory) the steps of basic procedural tasks so they become automatic, sometimes children have trouble doing that and need a lot more coaching. Some children don't learn to tie their shoes for years. These challenges are significant and need proper attention. A child with these challenges may have cognitive delays. Memory could be globally (generally) impacted, and learning may be difficult in many subjects. A child with these memory challenges is likely trying hard but just cannot remember and carry out the steps.

*Sustained attention* is also an important area to assess if your child has these procedural memory problems. A potential root cause of challenges with multiple steps is an attention deficit. If your child is not able to attend to the information, he or she will not hold the steps in memory long enough to complete them, and it will be harder for these steps to become automatic.

If attention is the problem, global (general) memory challenges may not be a concern. If your child can attend to and remember interesting information well but struggles with academic tasks and chores, the prefrontal cortex may be the part of the brain that is implicated. The prefrontal cortex is the part of the brain that helps us plan and organize information. If working correctly, a child can pay attention to one thing while filtering out other distractors.

When a child pays adequate attention to a task, a new procedure can be mastered. If the prefrontal cortex is impaired, like in ADHD, it will be hard for a child to stay focused. If a child is distracted and is not able to pay attention to the task at hand, it will be challenging to learn a new procedure.

*Motor Planning* is the ability to plan and execute motor movements. As procedural memory often involves motor tasks, like tying shoes or driving a car, some children may struggle because of motor skill deficits. Some children who appear clumsy or struggle to write or draw may have trouble with motor planning. It will be hard for a child to complete a procedural task like tying shoes, running or learning a dance routine if he or she struggles with motor planning. If a child struggles with the actual task, not with

procedural memory, it may be helpful to work on the motor skills associated or to modify the task to fit with the child's motor skills.

## WHAT TO DO WHEN YOUR CHILD FORGETS HOW TO DO THINGS

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If the issue is learning the procedure itself, then practice, practice, practice is the best strategy. Show your child how to tie shoes, step by step. Think of a rhyme or song to carry him through the task. If the task is cleaning a bedroom, put it to music. One song is for picking up dirty clothes, one for putting toys in containers, one for making the bed and one for putting away clean laundry. Make the tasks concrete and systematic, and practice with your child. Have organized bins for toys and a hamper for laundry.

If attention is the issue, it will be helpful to be consistent, keep routines predictable and help your child learn and practice the sequence. Use visual chore charts, such as a morning routine poster that is in the bedroom and bathroom, and tie the completion of these charts to immediate reward. An example of an immediate reward is "When you get your routine finished I will turn on the TV, and you can watch until it is time to get in the car." Alternately, your child may be able to use his or her iPad in the car, provided that all of the morning tasks are done. Provide reminders and be sure your child is listening. See that you have eye contact, and have him or her repeat the task so you know you have his full attention.

For challenges with motor planning or actually completing a task, your child may need therapy. Physical Therapy is often required for gross motor movement like running and climbing. Occupational Therapy can help for tasks like tying shoes, writing and completing fine motor tasks. Professionals cite interventions for error-free learning, physical guidance, and hand-over-hand procedures. Essentially, a therapist assists a child in completing the task, and with repeated practice this task becomes automatic [1].

## SIMILAR SYMPTOMS

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*If your child is struggling with a similar problem, not directly addressed in this section, see the list below for links to information about other related symptom areas.*

- [Attention problems \(Focusing\)](#): difficulty with attention will often lead to challenges following directions or remembering the task at hand
- [Perseverating](#): challenges changing tasks due to excessive interest or focus on a certain topic. This challenge is common in autism and can impact a child's ability to follow directions and tendency to become distracted
- [Executive Functioning \(Organizing\)](#): difficulties related to planning, sequencing, organizing information and carrying out a task in a timely manner

- [Motor deficits or delays \(Moving & Sensing\)](#): difficulties with motor skills may result in challenges tying shoes, kicking a ball, and/or sitting in a chair in the classroom
- [Depression](#): underlying feelings of sadness and depression can lead to being forgetful or distracted and being unable to follow a sequence
- [Processing speed](#): difficulties thinking quickly and fluidly can interfere with following instructions. The child may not hear or encode information if he or she is processing very slowly. It may be important to provide verbal and visual reminders and to repeat directions

## POTENTIAL DISABILITIES

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*Children who have significant problems in this area may have any of the following potential disabilities. \*Note, this information does not serve as a diagnosis in any way. See the 'Where to Go for Help' section for professionals who can diagnose or provide a referral.*

- [ADHD](#): children with ADHD often have trouble with multi-step directions based on challenges with focusing and sustaining attention. Children with ADHD may have more difficulty learning certain tasks, or they may seem to need more support in certain areas of adaptive functioning than do other children.
- [Developmental Coordination Disorder](#): children with motor planning problems may also have trouble with sequencing and procedural memory
- [Autism Spectrum Disorder](#): often, children with autism also seem to be in their own world and become internally distracted, which leaves less focus for the external environment. Your child who sits on the floor staring into space may be focusing on something internal. This focus could be related to a plan they have to make a certain Lego tower or to a detail they're focusing on related to a certain type of dinosaur.
- [Intellectual Disability or Learning Disability \(Educationally Identified Disabilities\)](#): a child may have difficulty comprehending and sequencing information, which will impact their ability to complete procedural tasks

## WHERE TO GO FOR HELP

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*If your child is struggling with this symptom to the point that it is getting in the way of his learning, relationships, or happiness, the following professionals could help; they may offer diagnosis, treatment, or both.*

- [CLEAR Child Psychology](#): to obtain a *customized profile* of concerns for your child, or *consult 'live'* with a psychologist

- [Executive Functioning Coach/Tutoring](#): to work on academic weaknesses and/or work completion, planning and organization; nice to take this role off the parent
- [School Psychologist](#): to determine learning needs based on the child's neuropsychological profile; perhaps an IEP, 504 plan or RTI is warranted to help your child
- [Occupational Therapist](#): to treat motor challenges that may make the procedures harder to follow because of skill weaknesses
- [Psychologist or Neuropsychologist](#): to consider a full assessment to consider possible symptoms in a mental health and/or behavioral context
- [Psychiatrist](#): to prescribe and manage psychotropic medication for inattention, impulsivity; stimulant medication for ADHD is effective in a high percentage of children with focus and impulsivity challenges

*These professionals may recommend the following tests for this symptom:*

- [BASC-3, Clinical Interview, Brief Projective Measures](#): emotional assessment through drawing tasks, open-ended questions, interviews, rating scales (Neuropsychological or psychological evaluation)
- [WISC-V](#): cognitive assessment to establish a baseline of intellectual abilities, which can help us understand cognitive processing and determine what interventions may work best. (Psychological or School Psychological evaluation)
- [Vineland-II](#): adaptive skills assessment in communication, daily living skills and socialization to determine areas of weakness and what interventions may work best (Psychological or School Psychological evaluation)
- [WIAT-III/WJ-IV](#): academic assessments in components of reading, writing, math, and oral language can help us understand learning processes and see the impact of any executive functioning, processing speed or attention deficits on learning. (Neuropsychological, Psychological, or School Psychological evaluation)
- [TOL-2, CTMT, WCST, TOVA](#): executive functioning assessment to determine the skills and resources a child has, such as the ability to plan, organize, and attend (Neuropsychological evaluation)
- [ADOS-2; Social Responsiveness Scale](#): social skills assessment for concerns related to social cognition that may interfere with following directions or multi-step procedures.

## LEARN MORE

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[1] Kroncke, Anna P., & Willard, Marcy & Huckabee, Helena (2016). *Assessment of autism spectrum disorder: Critical issues in clinical forensic and school settings*. Springer, San Francisco.

Springer: <http://www.springer.com/us/book/9783319255026>

Amazon: <https://www.amazon.com/Assessment-Autism-Spectrum-Disorder-Psychological/dp/3319255029/>

[2] Barkley, Russell A. (2013). *Taking charge of ADHD, 3rd edition: The complete, authoritative guide for parents.*

Amazon: <https://www.amazon.com/Taking-Charge-ADHD-Third-Authoritative/dp/1462507891/>

[3] Dawson, Peg & Guare, Richard (2009). *Smart but scattered: The revolutionary “executive skills” approach to helping kids reach their potential.*

Amazon: <http://www.amazon.com/Smart-but-Scattered-Revolutionary-Executive/dp/1593854455/>

[4] Dawson, Peg & Guare, Richard (2010). *Executive skills in children and adolescents: A practical guide to assessment and intervention, second edition.*

Amazon: [https://www.amazon.com/Executive-Skills-Children-Adolescents-Second/dp/1606235710?ie=UTF8&ref\\_=asap\\_bc](https://www.amazon.com/Executive-Skills-Children-Adolescents-Second/dp/1606235710?ie=UTF8&ref_=asap_bc)

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