

Dysgraphia

What is dysgraphia? – Dysgraphia is a specific learning disability that affects how easily children acquire written language and how well they use written language to express their thoughts.

Dysgraphia is a Greek word. The base word *graph* refers both to the hand’s function in writing and to the letters formed by the hand. The prefix *dys* indicates that there is impairment. *Graph* refers to producing letter forms by hand. The suffix *ia* refers to having a condition. Thus, *dysgraphia* is the condition of impaired letter writing by hand, that is, disabled handwriting and sometimes spelling. Impaired handwriting can interfere with learning to spell words in writing. Occasionally, but not very often, children have just spelling problems and not handwriting or reading problems.

What causes dysgraphia? – Research to date has shown orthographic coding in working memory is related to handwriting. *Orthographic coding* refers to the ability to store unfamiliar written words in working memory while the letters in the word are analyzed during word learning. It also includes the ability to create permanent memory of written words linked to their pronunciation and meaning. Children with dysgraphia do not have primary developmental motor disorder, another cause of poor handwriting, but they may have difficulty planning sequential finger movements such as the touching of the thumb to successive fingers on the same hand.

Does dysgraphia occur alone or with other specific learning disabilities? – Children with impaired handwriting may also have attention-deficit disorder (ADHD)—inattentive, hyperactive, or combined inattentive and hyperactive subtypes. Some children with this kind of dysgraphia have shown positive response to a combination of explicit handwriting instruction plus stimulant medication. However, appropriate diagnosis of ADHD by a qualified professional and monitoring of response, to both instruction and medication, are needed.

Dysgraphia may occur alone or with dyslexia (impaired reading disability) or with oral and written language learning disability (OWL LD, also referred to as selective language impairment, SLI).

Dyslexia is a disorder that includes poor word reading, word decoding, oral reading fluency, and spelling. Children with dyslexia may have impaired orthographic and phonological coding and rapid automatic naming and switching. *Phonological coding* refers to coding sounds in spoken words in working memory. Phonological coding is necessary for developing phonological awareness—analyzing the sounds in spoken words that correspond to alphabet letters. If children have both dysgraphia and dyslexia, they may also have difficulty in planning sequential finger movements.

OWL LD (SLI) are disorders of language (morphology—word parts that mark meaning and grammar; syntax—structures for ordering words and understanding word functions; finding words in memory, and/or making inferences that go beyond what is stated in text). These disorders affect spoken as well as written language. Children with these language disorders may also exhibit the same writing and reading and related disorders as children with dysgraphia or dyslexia.

Why is diagnosis of dysgraphia and related learning disabilities important? – Without diagnosis, children may not receive early intervention or specialized instruction in all the relevant skills that are interfering with their learning of written language. Considering that many schools do not have systematic instructional programs in handwriting and spelling, it is important to assess whether children need explicit, systematic instruction in handwriting and spelling in addition to word reading and decoding. Many schools offer accommodations in testing and teaching to students with dysgraphia, but these students also need ongoing, explicit instruction in handwriting,

spelling, and composition. It is also important to determine if a child with dysgraphia may also have dyslexia and require special help with reading or OWL LD (SLI) and need special help with oral as well as written language.

What kinds of instructional activities improve the handwriting of children with dysgraphia? – Initially, children with impaired handwriting benefit from activities that support *learning to form letters*:

- playing with clay to strengthen hand muscles;
- keeping lines within mazes to develop motor control;
- connecting dots or dashes to create complete letter forms;
- tracing letters with index finger or eraser end of pencil;
- imitating the teacher modeling sequential strokes in letter formation; and
- copying letters from models.

Subsequently, once children learn to form legible letters, they benefit from instruction that helps them develop *automatic letter writing*, using the following steps to practice each of the 26 letters of the alphabet in a different order daily:

- studying numbered arrow cues that provide a consistent plan for letter formation;
- covering the letter with a 3 x 5 card and imaging the letter in the mind's eye;
- writing the letter from memory an after interval that increases in duration over the handwriting lessons;
- writing letters from dictation (spoken name to letter form); and
- writing letters during composing for 5 minutes on a teacher-provided topic.

Students benefit from explicit instruction in spelling and composing throughout K–12:

- initially in high frequency Anglo-Saxon words;
- subsequently in coordinating the phonological, orthographic, and morphological processes relevant for the spelling of longer, more complex, less frequent words;
- planning, generating, reviewing/evaluating, and revising compositions of different genre including narrative, informational, compare and contrast, and persuasive;
- self-regulation strategies for managing the complex executive functions involved in composing; and
- at all grade levels, in the most common and important words used for the different academic domains of the curriculum.

Do children with dysgraphia make reversals or other letter production errors? – Some children do make reversals (reversing direction letter faces along a vertical axis), inversions (flipping letters along a horizontal axis so that the letter is upside down), or transpositions (sequence of letters in a word is out of order). These errors are symptoms rather than causes of handwriting problems. The automatic letter writing instruction described earlier has been shown to reduce reversals, which are less likely to occur when retrieval of letters from memory and production of letters have become automatic.

What kind of instructional strategies improve spelling of children with dysgraphia? – If children have both handwriting and spelling problems, the kinds of handwriting instruction described earlier should be included along with the spelling instruction.

Are educators in public schools identifying children with dysgraphia and providing appropriate instruction in public schools? – In general, no. Although federal law specifies written expression as one of the areas in which students with learning disabilities may be affected, it does not clearly identify the transcription problems that are the causal factors in dysgraphia—impaired handwriting and/or spelling—for impaired written expression of ideas. Some of the tests used to assess written expression are not scored for handwriting or spelling problems and mask the nature of the disability in dysgraphia. Content or ideas may not be impaired. All too often, the poor writing or failure to complete writing assignments in a timely fashion or at all is misattributed to lack of motivation, laziness, or other issues unrelated to the real culprit—dysgraphia. Children who are twice exceptional—gifted and dysgraphic—are especially under-diagnosed and underserved. Teachers mistakenly assume that if a student is bright and cannot write it is because the student is not trying.



Are there research-supported assessment tools for diagnosing dysgraphia? – Yes. For assessing handwriting problems associated with dysgraphia, here are some resources to check out:

- *Process Assessment of the Learner, 2nd Edition. Diagnostic for Reading and Writing*; by Virginia Wise Berninger, PhD
- *Test of Handwriting Skills-Revised*; by Michael Milone

For more information on using these tests and other evidence-based assessment procedures in early identification, prevention, and diagnosis for treatment planning and linking them to evidence-based handwriting and spelling instruction, check out these resources:

- *Process Assessment of the Learner II User's Guide*; by Virginia Wise Berninger, PhD
- *Research-supported differential diagnosis of specific learning disabilities and implications for instruction and response to instruction*; by Virginia Berninger, Louise O'Donnell, and James Holdnack
- *Instruction and assessment for struggling writers: Evidence-based practices*; by Gary Troia

In summary, dysgraphia is a specific learning disability that can be diagnosed and treated. Children with dysgraphia usually have other problems such as difficulty with spelling and written expression, as well as dyslexia and, in some cases, oral language problems. It is important that a thorough assessment of handwriting and related skill areas be carried out in order to plan specialized instruction in all deficient skills that may be interfering with a student's learning of written language. For example, a student may need instruction in both handwriting and oral language skills to improve written expression. Although early intervention is, of course, desirable, it is never too late to intervene to improve a student's deficient skills and provide appropriate accommodations.

What parents can do? – Children with learning disabilities often need extra support at home from their families. Here are some suggestions for helping a child who is struggling with writing.

- Be patient and encouraging with your child at home in order to avoid a meltdown.
- As needed, write as your child dictates information to help reduce the frustration of writing.
- Help organize your child's writing by discussing what he or she will write about. Thinking out loud will help your child plan and organize thoughts before writing. You may want to jot down some notes.
- Encourage your child to use word processing and/or speech-to-print technology.
- Make sure directions are clear.
- Discuss accommodations with your child's teacher.

Help in school – Susan Jones, M.Ed., author of "*Accommodations and Modifications for Students with Handwriting Problems and/or Dysgraphia*" (Learning Disabilities OnLine: www.ldonline.org), explains that children with writing problems need accommodations, changes in assignments and expectations, and direct instruction. Listed below are examples she recommends for teachers and other professionals.

Accommodations for changing the demands of writing rate.

- Allow more time for written tasks including note taking, copying, and tests.
- Enable students to begin assignments early.
- Encourage keyboarding skills to increase speed and legibility of written work.

Next, think about "adjusting the volume" of work.

- Instead of writing a complete set of notes, provide a partially completed outline so the student can fill in details under major headings, or provide details and have the student provide the headings.
- Enable the student to dictate to another individual (a scribe).
- Remove neatness and/or spelling as a grading criteria for some assignments giving consideration to the purpose.

Consider changing the complexity of work the child must complete.

- Provide a writing binder that includes models for forming letters and templates for written formats.
- Break writing into stages and use the computer to revise assignments. Print out rough drafts in order to show the difference with and without revisions.



- Allow child to use spellchecker.

Use current writing tools to accommodate the physical aspects of writing.

- Allow students to use graph paper for math, or to turn lined paper sideways to help with lining up columns of numbers.
- Allow students to use a writing instrument that is most comfortable for them, such as mechanical pencils or a pencil grip.
- Enable the child to use word processing. Some keyboarding programs address the needs of students with learning disabilities by teaching the keys alphabetically or using a sensory approach.
- Consider using speech recognition software, if the student is willing to invest the time to learn it.

Modify or change assignments or expectations to meet a student's needs.

- Reduce the amount of copying on assignments and tests. Let the student answer in phrases or words.
- Decrease the length of written assignments; stress quality over quantity.
- Use different grading procedures for written assignments; on some grammar may not count, on others spelling may not count.
- Develop cooperative writing projects.
- Work on structuring assignments and due dates with students and parents.
- Offer an alternative project, such as an oral report or visual project.
- Use a rubric or grid to guide expectations.
- Provide models for paragraph and essay formats.

Children with dysgraphia benefit from direct instruction or remediation.

- Build handwriting instruction into the student's schedule.
- Provide occupational therapy or other special education services based on the child's individual needs.
- Teach alternative handwriting methods, such as "Handwriting Without Tears."

The ultimate goal is to help students with dysgraphia write without conscious effort. When a student is able to write automatically, he or she can think and develop ideas effortlessly, solve problems, and develop an individual writing style. It is also important to acknowledge the struggle students with dysgraphia experience and affirm their hard work. With appropriate help, Jack can learn to write more easily and feel better about being in school.

Information provided by: From Vermont Family Network; www.vfhn.org; Janna Osman, M.Ed., Learning Disabilities Consultant, Vermont Department of Education; "What to do when children have trouble with writing" and The International Dyslexia Association (IDA); <http://www.interdys.org>; publication: "Just The Facts"; ©Copyright 2009, IDA. IDA encourages the reproduction and distribution of this fact sheet. If portions of the text are cited, appropriate reference must be made. Fact sheets may not be reprinted for the purpose of resale. Fact sheet revised December 2008.

References: Berninger, V. (2007a). *Process Assessment of the Learner, 2nd Edition. Diagnostic for Reading and Writing (PAL-II RW)*. San Antonio, TX: The Psychological Corporation; Berninger, V. (2007b). *Process Assessment of the Learner II User's Guide*. San Antonio, TX: Harcourt/PsyCorp. (CD format) ISBN 0158661818. Second Edition issued August, 2008.; Berninger, V. (2007). Evidence-based written language instruction during early and middle childhood. In R. Morris & N. Mather (Eds.), *Evidence-based interventions for students with learning and behavioral challenges*. Philadelphia: Lawrence Erlbaum Associates.; Berninger, V., O'Donnell, L., & Holdnack, J. (2008). Research-supported differential diagnosis of specific learning disabilities and implications for instruction and response to instruction (RTI). In A. Prifitera, D.; Berninger, V., & Wolf, B. (in press-a). *Teaching students with dyslexia and dysgraphia: Lessons from teaching and science*. Baltimore: Paul H. Brookes.; Berninger, V., & Wolf, B. (in press-b). *Helping students with dyslexia and dysgraphia make connections: Differentiated instruction lesson plans in reading and writing*. Baltimore: Paul H. Brookes. [Spiral-bound book with teaching plans from University of Washington Research Program.]; Henry, M. (2003). *Unlocking literacy. Effective decoding and spelling instruction*. Baltimore: Paul H. Brookes Publishing.; Milone, M. (2007). *Test of Handwriting Skills-Revised*. Novato, CA: Academic Therapy. Distributed by ProEd, Austin, TX.; Troia, G. (Ed.). (2008). *Instruction and assessment for struggling writers: Evidence-based practices*. New York: Guilford.; Susan Jones, M.Ed., author of "Accommodations and Modifications for Students with Handwriting Problems and/or Dysgraphia" (Learning Disabilities OnLine: www.ldonline.org).



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