Poor Handwriting: A Major Cause of Underachievement*

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> "Handwriting disastrous." "His handwriting is unreadable." "Her handwriting is so terrible they have created an IEP so she can keyboard." "Handwriting was really hard. I type now." "I have really messy handwriting, too."
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These are typical of the comments we received in response to a list of characteristics of the visual-spatial learner that we posted on our website. Visual-spatial learners think in pictures and need more time to translate their pictures into words. If they have sequential weaknesses, they have difficulty with word retrieval, and struggle with sequential tasks, such as reading, spelling, calculation, writing, and organization. They are 3-dimensional thinkers who can see objects from different perspectives. They excel at puzzles, mazes, map reading, construction, art, science, music, mechanics, computers, problem solving, creativity, and empathy. Their abilities are well-suited to our technological era, and actually enhance employment opportunities in adulthood. However, they are not well-suited to the demands of school. Up until the 21st century, education focused on left hemispheric, sequential skills, and right hemispheric spatial skills were seen as irrelevant. While this is beginning to change, visual-spatial learners still feel stupid in school and are frequently counted among the underachievers.

We often attribute underachievement to motivational and psychological factors. We blame the child for being lazy and not trying hard enough. We blame the parents for being poor disciplinarians. However, my research over the last two decades, with over 4,000 gifted children, has led me to the conclusion that the majority of bright underachievers suffer from hidden disabilities. My first observation was that gifted underachievers often had a high incidence of ear infections in the first few years of life. My second observation was that many had had difficult births. Both of these factors impair fine motor planning, which is essential for smooth, rapid, comfortable writing. I have now investigated several disabilities that can cause underachievement: sensory-motor integration dysfunction, central auditory processing disorder, visual processing deficits, attention deficit/hyperactivity disorder, and dyslexia. Many of these disabilities affect left hemispheric, sequential processing, and enhance the chances that the child will become a right hemispheric, visual-spatial learner.

The remainder of this paper consists of excerpts of my book, *Upside-Down Brilliance: The Visual-Spatial Learner*, which pertain specifically to difficulties mastering handwriting or handwriting speed. I've included a diagnostic checklist and a list of recommended adaptations. The main accommodation is quite simple: *allow these children to use a keyboard.* Keyboarding is an essential life skill in this new millennium, whereas handwriting is not. Some highly successful executives tell me the only use they have for handwriting is to write their names on checks. If the major issue in underachievement is handwritten assignments, and the solution is as simple as providing a child with a keyboard, what is preventing us from solving the problem?

Birthing Issues

We've found a surprising number of gifted children with sensory-motor delays at the Gifted Development Center. Many of these children were the product of very long labors, emergency C-sections, a cord wrapped around part of the body, or the need of oxygen at birth. Recently, another potential culprit has emerged. One of our staff psychologists, Helen McVicar, noticed a relationship between long hours of pitocin and sensory integration problems in children. In her research, Helen learned that pitocin was developed to be used for up to three or four hours to induce labor, but it is commonly used for longer periods. In an extensive study in Wales, Elizabeth Hitchfield found that gifted children tend to have larger heads. These heads are difficult to get through the birth canal—especially firstborns. Many mothers of gifted children with learning disabilities reported exceptionally long labors, sometimes with as much as 20 or 30 hours of pitocin, before emergency C-sections were performed. Pitocin causes harder contractions. What does hour upon hour of hard contractions do to an infant's brain? We don't know, but we want to find out, so we've started collecting data from all our clients on how much pitocin (if any) was used to induce labor. Dr. Eric Hollander of New York's Mount Sinai School of Medicine is also investigating the effects of pitocin. He observed that 60 percent of the autistic patients in his clinic had been exposed to pitocin in the womb. He is now studying 58,000 children whose mothers were monitored during pregnancy.

In *The Right Mind,* Robert Ornstein (1997) explains why children with difficult births often suffer from left hemispheric weaknesses:

> An important key to hemisphere differences is that the left is *far more vulnerable than the right*... The right hemisphere develops first… So if there is a shortage of oxygen, the left hemisphere suffers first.
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> …One of the things that can harm the left hemisphere is the male hormone testosterone. If too much is produced it can slow down development. Then during birth, because of the normal position of the baby's head, the blood supply to the left hemisphere is more likely to be temporarily cut off. Any damage of this sort to the left hemisphere can cause a switch to the right brain…such as cesarean, breech birth, forceps delivery, being born premature, etc. (p. 84, italics in original)

Motor delays must be attended to early, since the best time period for their correction is under the age of eight. Too many educators and pediatricians adopt a "wait and see" attitude with children who seem advanced in other areas. They notice that the children are "not that far behind" the norms for children their age in fine motor or gross motor development, and they assume that the children will simply "outgrow" the delays, and "catch up" with their agemates. Unfortunately, the window of opportunity for correcting sensory-motor dysfunction may be over before anyone takes the problem seriously. A pediatric occupational therapist should be contacted to evaluate any signs of clumsiness, switching hands when engaging in activities, inability to cross the midlines of their bodies, or difficulties with writing or drawing.

The impact of early ear infections

Frequent ear infections block out the higher frequencies. The higher frequencies appear to organize speech and the fine motor sequences of handwriting. The twin deficits of speaking and writing are often seen in average children who have suffered recurrent ear infections. In advanced children, however, the effects on speech and language development are far less apparent, because a bright child can use abstract reasoning to figure out words that are not heard clearly. As there is very little correlation between general intelligence and handwriting or spelling, abstract reasoning doesn't help much. Therefore, gifted children who had many ear infections in the first few years of life may develop speech "on schedule," but perform very poorly on written tasks.

Here is an exercise to help you understand the connection between chronic ear infections and underachievement.

> *Put your fingers in your ears as hard as you can and then listen to what someone is saying.*
>
> ***(Try it!)***

This exercise lets you experience what the world sounds like to a child who has had frequent ear infections. Notice how everything sounded muffled as if you were listening in a tunnel? What range of sound were you unable to hear? Could you tell that it was the *higher frequencies* that got lost in the bargain? High frequencies are processed in the left hemisphere. When those frequencies are blocked during the critical learning period, the left hemisphere receives less stimulation and less development.

> The right hemisphere seems to "get" the low frequency sounds, and the left hemisphere also seems to become more highly specialized for handling the high auditory frequencies. (Ornstein, 1997, pp. 153-154)

These higher frequencies are responsible for *sequencing* as well as other language functions. What is the most sequential task we can ask children to do? Writing! First they have to figure out what direction the letters go, then they have to link those letters together in a particular sequence to spell words. Then they have to link those words together in a particular order to make sentences. Then they have to link those sentences together in a particular order to make paragraphs. Then they have to link those paragraphs together to make reports, stories and essays. No wonder underachieving visual-spatial learners hate to write!

> Why is the hemisphere that controls speech also the one that usually controls a person's dominant hand? Is it a coincidence, or is there a profound relationship that should tell us something about what is involved in both speech and manipulative skills? Doreen Kimura and her colleagues have obtained evidence that the left hemisphere may be essential for certain types of hand movement…. [It] is specialized for motor control of both oral and manual musculature…

> It is possible that the evolutionary advantages offered by the development of a hand skilled at manipulation also happened to be a most useful foundation on which to build a communication system, one that at first was gestural and utilized the right hand but later came to utilize the vocal musculature. As a result, *the left hemisphere came to possess a virtual monopoly on control of the motor systems involved in linguistic expression, whether by speech or writing.* (Springer & Deutsch, 1998, pp. 304-305, italics added)

And the right hand—the writing hand for most individuals—is controlled by the left hemisphere, which is weaker than the right hemisphere for nonsequential, visual-spatial children.

> Ever since the first Sumerian had pressed a pointed stick into wet clay five thousand years ago, one dominant hand, controlled exclusively by the dominant hemisphere, had dictated the mechanics of writing. It made no difference whether the implement used was a stylus, a chisel, a brush, a quill, a crayon, a pen, or a pencil, the…left lobe of the brains of *both* men and women directed the muscles of the…right hand to write. (Shlain, 1998, p. 391)

Why is written work so difficult?

The writing process consists of several inter-related skills: forming ideas; putting the ideas into words; using interesting, diversified language to express the ideas; organizing the thoughts in such a way that they communicate to the reader; spelling; grammar; punctuation; capitalization; correct word usage; sentence structure; and handwriting. Only the first of these skills is easy for visual-spatial learners. They excel at producing ideas—wonderful ideas, novel ideas, fabulous stories, inventions, problem-solving. But the rest of the skills involved can be so overwhelming to them that they completely turn off to the writing process. And so their ideas may be bottled up inside of them, with no way to get them out. This is destructive to the Self.

Visual-spatial learners have a more difficult time putting their ideas into words than auditory-sequential learners who think in words. They may see the image clearly in their minds, but not be able to retrieve the words that go with the picture. It often takes them more time, and school, for them, is often a race against time. When the words fail them, they become anxious, and the anxiety further blocks the translation process from image to words. Timed situations skyrocket their anxiety.

For writing to be interesting, the writer has to be able to express similar ideas in many diverse ways. For auditory-sequential wordsmiths, this is not a problem. If they don't automatically come up with several different ways to express an idea, they push the thesaurus key (shift F7) or pull the thesaurus off the shelf. There are endless ways to say the same thing. This is actually a novel concept for the visual-spatial learner. I learned

from Gerald Grow, a professor at Florida A & M University, that visual thinkers tend to use words as labels for pictures. Each picture bears one label. It would no more occur to a visual-spatial learners to use a variety of ways to express a single idea than it would be to go around and change the names of all the pieces of art in an art gallery.

Organizing thoughts in ways that communicate clearly to the reader is another sequential task that is quite simple for auditory-sequential learners and an utterly mystifying art to visual-spatial learners. Pictures come to mind as a whole. They are not sequential. Outlining ideas before writing is totally sequential. Gerald Grow explains that to the visual thinker, all ideas are equally important, and all the details of their picture are inter-related, so it's difficult to decide in what order to express them. Unraveling a picture in some kind of orderly manner so that it can be reassembled and viewed by a reader seems completely undoable.

Then there's spelling, grammar, word usage, sentence structure, punctuation and capitalization. None of these details have correlates in pictorial thought. And last, but not least, we have the issue of handwriting—the personal nightmare of so many visual-spatial learners—even those who are able to draw quite detailed pictures. The fine motor sequences involved in writing may be so difficult to master that they never become automatic and useful as tools of learning and expression.

Poor handwriting

The following list contains the symptoms of what is known to special educators as *dysgraphia*, to occupational therapists as *sensory-motor integration dysfunction*, to optometrists as *visual-motor impairment*, or to psychologists as *developmental coordination disorder*. In more teacher-friendly language, I call it a ***writing disability***.

Table 13. 1
Diagnostic Checklist of Writing Disability

1. Is his writing posture awkward? (like a scrunched up pretzel)
2. Does he hold his pencil strangely?
3. Can you see the tension run through his hand, arm, furrowed brow?
4. Does it take him much longer to write than anyone else his age?
5. Does he fatigue easily and want to quit? (Are you hearing a lot of groans?)
6. Does he space his letters on the paper in an unusual way (too close, too far apart, no spaces between words)?
7. Does he form his letters oddly (e.g., starting letters at the top that others would start at the bottom and vice versa)?
8. Does he mix upper and lower case letters?

9. Does he mix cursive and manuscript?
10. Are his cursive letters disconnected?
11. Does he prefer manuscript to cursive?
12. Does his lettering lack fluidity (looks sort of like chicken-scratching)?
13. Does he still reverse letters after age 7?
14. Is his handwriting illegible?
15. Is his spelling terrible?
16. Does he avoid writing words he can't spell?
17. Does he leave off the endings of words?
18. Does he confuse singulars and plurals?
19. Does he mix up small words, like “the” and “they”?
20. Does he leave out soft sounds, like the “d” in gardener?
21. Is his grasp of phonics weak? (Is it difficult to decipher what he was trying to spell?)

I use the generic “he” because this particularly disability strikes many more males than females. If you see half or more of these symptoms in a student you are tearing your hair out over, send the student for comprehensive assessment and provide modifications in the classroom. No matter which label you use, you are looking at a real disability.

Here are the solutions we usually recommend in our reports at the Center:

1. Reduce writing assignments.
2. Let the student use a computer for written assignments.
3. If the student cannot master a keyboard, allow him or her to use a voice-activated computer, such as Dragon Naturally Speaking.
4. Allow the student more time for in-class tests and assignments.
5. Encourage the student to use a tape recorder for note-taking.
6. Ask another student to act as recorder and take notes during lectures.
7. Have the student dictate assignments to an aide or parent.
8. Give the student oral tests.
9. Enable the student to demonstrate mastery of material by other means besides written tests (e.g., making a videotape, diorama, mural, etc.)
10. Grade on content separate from mechanics, with more emphasis on content.
11. Try calligraphy! This sometimes works, particularly if the child is artistic.

Neat, fast handwriting vs. keyboarding

Do you happen to have anything written in your grandmother's hand? Do you remember how beautiful penmanship was in that generation? When writing is taught as an art form, *with plenty of time,* artistic visual-spatial learners develop beautiful handwriting. In fact, some children with terrible handwriting improved considerably when they studied calligraphy. The secret is slowing down and allowing sufficient time to create beautifully formed letters. In our fast-paced world, writing is supposed to become automatic, a means to an end, rather than an end in itself. So instead of just practicing penmanship, children are supposed to use the skill in the service of learning, which means doing two things at once. This coordination is extremely difficult for many visual-spatial learners.

I'm not against the teaching of penmanship, when it is taught for its own sake, like our grandparents learned it. Certain handwriting techniques actually help integrate the two hemispheres. It's when handwriting is considered in the grading of other subjects that the child is unfairly penalized. Grades should be based on mastery of information, not on handwriting skills. If we want visual-spatial learners to be skilled note-takers, it makes more sense in to teach them to use a keyboard, which will be much more useful in their adult lives.

The keyboard allows an individual to access both hemispheres, so a visual-spatial learner's powerful right hemisphere can assist his weaker left hemisphere. If Leonard Shlain's hypothesis is accurate, allowing a student to use the keyboard not only helps the individual, it also helps raise the consciousness of the planet!

> Since the 1970s, …males have rushed in droves to learn what their fathers and grandfathers contemptuously dismissed as a skill for women and sissies—typing. Unlike all the scribes of past cultures, men now routinely write with both hands instead of only the dominant one. The entry into the communication equation of millions of men's left hands, directed by millions of male right brains tapping out one half of every computer-generated written message, is, I believe an unrecognized factor in the diminution of patriarchy. (Shlain, 1998, p. 417)

A visual-spatial child should be taught to use a computer as early as possible. I've had consultations with two sets of parents who taught their toddlers to use the computer when they were a little over a year old! Keyboarding skills are essential for today's visual-spatial learners: they enable these students to have greater school success and prepare them for the technological fields that many of them will enter in adult life. If a child is unable to master keyboarding, then a voice-activated computer, such as Dragon Naturally Speaking, is recommended. This is likely to be the way computers operate in the very near future.

There probably are great benefits in perfecting one's handwriting, but I always tell parents that if their children's penmanship is abysmal, encourage them to become doctors. It seems to be a pre-requisite for the medical profession!

> As a physician, I am often criticized for my handwriting, but perhaps it is being a visual-spatial learner as opposed to being a physician that resulted in the illegible script.

The question of time

In our busy worlds, in which there never seems to be enough time, it's hard to find extra time for students who can't keep up with the others. "If they would only concentrate and work harder, they could get the work done in a reasonable amount of time," we think about these "dawdlers." But many visual-spatial learners panic the minute they know they are being timed and literally can't think straight. They can't access their knowledge and they can't find the words. They need a less pressured learning environment.

If you have a student who shuts down during timed tests, seems to think slowly, is always the last one to complete an assignment written in class, or whose handwriting is slow and labored, refer the child for diagnostic assessment. A student with a processing speed deficit needs accommodations in the classroom such as the following:

- No timed tests
- More time for in-class assignments
- Being allowed to do assignments on a keyboard
- Being allowed to complete assignments at home

Record all modifications you make in the student's permanent record, so that he or she can use that documentation to apply for more time on the SAT or ACT. The small adaptation of simply allowing more time for in-class assignments can dramatically change a student's life's path—not only during the year in your class, but in assisting the student in gaining acceptance to a challenging college.

The future of education

Handwriting, once essential to recording information so that it could be preserved and handed on, is now a very inefficient method of notetaking—rarely used for that purpose in adult life. Most of us prefer to type than to write. So handwriting is likely to follow the same path as sewing. Do you remember when sewing was a requirement rather than an elective? For girls, that is. When I was in 8th grade, I had to take sewing and home economics, while the boys took woodshop. For thousands of years, sewing was an indispensable part of the curriculum of girls. The sewing machine rendered it

obsolete. Now, inexpensive, ready-made clothes are readily available, and sewing is considered an art form.

I predict that soon the amount of time we spend teaching manuscript and handwriting is going to be drastically reduced. Each child will have his or her own computer, so keyboarding will replace handwriting as the most important life skill we can teach children—that is, of course, until voice-activated computers become so inexpensive that they replace keyboards in the classroom. Penmanship may come under the umbrella of art in future classrooms, with lots of time to develop one's own artistic hand.

We are now in the 21st century. It is time to set aside the prejudices of the 20th century that marginalized visual-spatial learners in school and society, and to help them develop in their own unique way. In our research with the *Visual-Spatial Identifier*, we have found that *one-third* of the school population is visual-spatial. They do not have to be headed toward underachievement. With simple adaptations available in our technological era, these students can become highly successful.

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