TOWARD THE CONSTRUCTION OF AN INSTRUMENT TO ASSESS VISUAL-SPATIAL LEARNERS

Linda Kreger Silverman
The Gifted Development Center
1452 Marion Street
Denver, Colorado 80218
(303) 837-8378

Mailing Address:
29333 Spruce Canyon Drive
Golden, Colorado 80403
(303) 642-7712

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In the last decade, considerable attention has been given to the recognition of multiple intelligences, talents, and learning styles in the field of gifted education. The *visual-spatial learner*, a term coined in 1982 to describe a specific set of clinical observations and psychometric patterns, cuts through all of these categories (Silverman, 1989b). Visual-spatial learners learn primarily through imagery. They are adept at spatial visualization tasks, such as the Block Design subtest of the Wechsler tests, abstract visual reasoning items of the Stanford-Binet tests, mental rotations, and other related psychometric tasks, many of which correlate with mathematical talent. Contrary to the suppositions that these learners tend to be less able in verbal reasoning (Dixon, 1983; Gardner, 1983; West, 1991), the author has found that gifted visual-spatial learners usually obtain higher scores on verbal than on nonverbal measures. They excel in the Verbal Comprehension Factor (Vocabulary, Similarities, Information, and Comprehension) of the Wechsler intelligence scales and in verbally loaded intelligence tests, such as the Stanford-Binet (Form L-M). Their primary weakness tends to be in *sequential processing*, as indicated by significantly lower scores on such tasks as repeating series of unrelated digits (Digit Span), eye-hand coordination and speed (Coding), and auditory short-term attention and computation (Arithmetic).

Visual-spatial learners may excel in several different domains: mathematics, science, technology, mechanics, fine arts, human relations, chess, or any endeavor which requires powerful visual imagery. While different branches of these fields appeal more to those with high sequential skills, the most extraordinary creative advancements in these domains appear to have been made by those who had the capacity to visualize the field in a new way (West, 1991). Many highly gifted children have strong visual-spatial abilities coupled with excellent auditory-sequential processing skills (Silverman, 1989b). With full access to both processing systems, they can fall back on sequential, trial-and-error methods of problem solving if their first attempts to apprehend the gestalt of the situation are unsuccessful. However, the majority of visual-spatial learners we have seen at the Gifted Development Center over the last 16 years have had major discrepancies between these two processing systems. Children who had recurrent *otitis media* in their first three years appeared to be at higher risk for auditory-sequential deficits (Silverman, 1989a). Diagnostically, gifted visual-spatial learners attain superior range scores in abstract reasoning (e.g., Similarities) and spatial relations (Block Design), coupled with significantly lower scores on sequential tasks, such as Digit Span, Coding, sentence repetitions, spelling, reading recognition, and computation.

Visual-spatial learners often feel out of step in traditional educational settings, as schools are usually tailored to the learning style of auditory-sequential learners, who learn in a step-by-step manner. In contrast, visual-spatial learners reach correct conclusions without apparent steps, have a strong visual learning style, rely heavily on visualization, are astute pattern finders, grasp concepts and systems but may miss details, and are likely to have excellent ideas while being prone to mechanical errors in computation, grammar, spelling and punctuation. If the discrepancies between their spatial strengths and sequential weaknesses are very large, they may be both gifted and learning disabled. Many children with this uneven pattern of abilities underachieve in school and may be sent to clinics for a variety of therapeutic interventions.

The first clinical indicators of this learning style that became apparent were:

* ability to do advanced puzzles
* love of construction with Legos and other building materials
* fascination with numbers and counting
* interest in mazes, chess and other spatial activities
* recurrent *otitis media* (ear infections) before age 3

* poor grasp of phonics
* difficulties with spelling
* resistance to written assignments; illegible handwriting

Many children who fit these descriptors were referred for remedial services and interest in the phenomenon spread in the Denver area. In April of 1992, members of various disciplines began to meet regularly to gain a better understanding of the visual-spatial learner. Group members included a neuropsychiatrist, a psychologist specializing in attention deficit disorders, a behavioral optometrist, an occupational therapist, tutors of visual-spatial learners, a reading specialist, two social psychologists, a speech pathologist, two coordinators of gifted programs, psychologists specializing in the gifted, an artist, parents of visual-spatial learners, and a businessman (a visual-spatial adult). A major focus of the group was the creation of an instrument to identify these children.

The first draft of *The Visual-Spatial Identifier* (*VSI*) has been completed. The *VSI* emphasizes the *strengths* of the visual-spatial learning style. Each strength is followed by the types of school problems which could result from that strength for visual-spatial learners who suffer from significant sequential deficits. The *VSI* contains 37 positive characteristics of the visual-spatial learning style and 66 concomitant school problems which are rated according to a five-point Likert-type scale by teachers or parents. The study group has also designed a companion 50-item instrument, *The Visual-Spatial Identifier: Self Report*, for use by middle and high school students.

The descriptors are grouped into eight clusters:

1. visual rather than auditory
2. spatial rather than sequential
3. holistic rather than detailed
4. focused on ideas rather than format
5. pattern-seeking
6. divergent rather than convergent

7. sensitive

8. asynchronous (i.e., large disparities between strengths and weaknesses)

Sample questions from the *VSI* are as follows:

2. **Thinks primarily in images, not words**

2a. Needs extra time to translate pictures into words

2b. Has trouble expressing self in words

The following questions are from the *VSI Self-Report*:

2. I am an excellent visualizer.

3. I think primarily in images instead of words.

4. I have trouble expressing myself in words.

5. I learn better from seeing than from listening.

While the two instruments are in a rudimentary stage of development, the initial response has been encouraging. Students were selected for the first pilot study on the basis of a documented visual-spatial learning style. Most of the subjects were high school students. The majority of the items were endorsed by both the students and their parents. There was a fair amount of agreement between parental ratings of their children on the *VSI* and student ratings on the *VSI Self-Report*. Feedback was solicited on the clarity of the items from all of the participants. After these improvements are incorporated, the next version will be administered to a group of students with a documented auditory-sequential learning style and their parents. Then the forms will be pared down to those items which discriminate best for the next phase of validation.

The *VSI* and the *VSI Self-Report* will serve only as screening tools; comprehensive assessment will still be needed to determine if the degree of discrepancy between performance on spatial and sequential tasks is sufficient to warrant educational modifications. Several instructional strategies have been explored with visual-spatial learners for the last 13 years. The following appear to be the most promising teaching techniques:

1. Present ideas visually on the chalkboard or on overheads.
2. Teach to the student's strengths. Help the student learn to use these strengths to compensate for weaknesses.
3. Employ a computer for both instruction and student assignments.
4. Give untimed tests. Students with severe processing lags can apply to take their college board examinations untimed if the disability is documented through IQ and achievement testing within three years of the exams, and if teachers have provided extended time for tests.
5. If a bright student struggles with easy, sequential tasks, see if the student can handle more advanced, complex work. Acceleration is more beneficial for these students than remediation.
6. Teach the student to visualize spelling words, math problems, etc.
7. Give more weight to the content of papers than to format. These students often suffer from deficits in mechanics.
8. Use inductive (discovery) techniques as often as possible.
9. Avoid drill, repetition, and rote memorization; use more abstract conceptual approaches and fewer, more difficult problems.
10. Be emotionally supportive of the student. Visual-spatial learners are keenly aware of their teachers' reactions to them, and their success in overcoming their difficulties appears directly related to their perception of teacher empathy.

School is often an unpleasant experience for visual-spatial learners. Yet, their learning style may be uniquely suited for our technological future (West, 1991). With appropriate detection and classroom modifications, these students can be highly successful, particularly as they tackle more complex subject matter in high school and college (Silverman, 1989b). They are our quintessential "late bloomers."

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