I Think in Pictures, You Teach in Words: The Gifted Visual Spatial Learner

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My introduction to visual spatial learning was a walk around the Melbourne zoo with Linda Silverman many years ago when she handed me an article she'd written and said "Here, you may be interested in this". Three months later I saw my first gifted visual spatial learner and I learned a lot from him. Since then I have worked and studied with Linda in Denver and have seen nearly 200 such children and adults. Gifted visual spatial learners keep coming to see me and I am still learning.

Dr Linda Silverman, the pioneer of the Visual Spatial Learner concept identifies two types of gifted visual spatial learners. The first is children identified as gifted who score extremely high on an IQ test because of their great ability both with tasks using visual spatial processing and those requiring auditory sequential thinking processes. The second is children who are brighter than their IQ scores, who have great ability in visual spatial processing and marked weaknesses in auditory sequential processing. These children are often not identified as gifted and they struggle at school because their intelligence is not recognised and neither is their unique learning style. This paper will concentrate on the second type of gifted visual spatial learner who is "at risk" in the school environment unless their learning style is identified and appropriate modifications are made to learning and teaching practices.

The visual spatial style appears to be hereditary. In all the visual spatial learners I have seen, there is always at least one parent who shares this learning style with the child. However, it can also originate as compensation for auditory sequential processing difficulties associated with multiple ear nose and throat infections in early childhood (Silverman, 1998).

Identification

There is to date no formal assessment instrument for identifying gifted visual spatial learners. Identification is best done by taking a comprehensive history that includes the early and current health of the child, using a checklist of characteristics and asking the child to complete tasks involving auditory sequential processing and those utilising visual spatial abilities and comparing the results. When their IQ is assessed, visual spatial learners typically have a large amount of scatter on the IQ sub-tests and their scores on non-verbal tasks are frequently higher than their scores on verbal tasks. Also another useful indicator of a visual spatial learning style is low scores on auditory sequential tasks such as mathematical computation and repeating digits from memory and high scores on visual spatial tasks such as block design and similarities. However, diagnosis by means of an IQ assessment is complicated by the fact that a gifted visual spatial learner who has been struggling with underachievement for many years tends to present a flatter profile.

The following characteristics will help in the identification of gifted visual spatial learners. However it should be noted that not all gifted visual spatial learners will match all these characteristics:

- Likes complex ideas and tasks and does well on them, yet often fails at simple things
- Is physically sensitive, often has acute hearing and intense reactions to loud noises.
- Poor listening skills, often seems not to be listening
- Has difficulty finishing tasks/school work
- Has poor handwriting or difficulty keeping in the lines or grips the pen very hard and presses on the paper when writing
- Loves Lego, puzzles, jigsaws, computer games, television, making things
- Likes art and/or music
- Has a poor sense of time
- Is extremely sensitive to criticism
- Is emotionally very sensitive
- Has difficulty with spelling/times tables
- Can remember the way somewhere after going there only once
- Has a vivid imagination and/or disturbing dreams
- Is distractible
- Is very disorganised.

Major Risk Factors

There are four main factors that put gifted visual spatial learners at risk. They have well above average intelligence. They are creative and divergent thinkers. They are physically and emotionally sensitive. Lastly they have an extreme visual spatial learning style coupled with an auditory sequential information processing weakness.

High Intelligence

The children I see are of well above average intelligence and are often identified as such by their parents using a checklist of early childhood characteristics of giftedness.

When high intelligence is coupled with an auditory sequential processing difficulty, these two exceptionalities tend to mask one another so that neither the giftedness nor the difficulty is readily apparent. Their learning difficulty depresses these students' IQ and achievement scores and, as they are frequently not identified as gifted, their educational needs in this area are not met. Their high intelligence enables them to compensate well enough for their weaknesses to maintain year level expectations and so their learning difficulty goes undetected. They are in a "Catch 22" situation where their giftedness and their learning difficulty cancel each other out and they are perceived as average. In addition, some IQ tests put so much emphasis on processing speed that the IQ of a gifted child with a learning difficulty is likely to be depressed and so the result is an under-estimate of the child's intelligence.

These children struggle to achieve and with each passing year the struggle gets harder until finally they give up**.** When this happens, these students are caught up in a spiraling web of underachievement and failure, believe they are stupid, lose all motivation, and hate school. Teachers then often assume that the student doesn't care or is being lazy, and, in response, these students often develop behaviour problems. Meanwhile, the whole cycle creates a very deep chasm in the student's self-esteem (Silverman, 1994).

Divergent Thinking – Creativity

Spatial (right brain) and sequential (left brain) thinking are two different mental organisations that affect the way people view the world.

The following table sets out the difference in “right” and “left” brain thinking.

Left Brain Model	**Right Brain Mode**
Verbal: Using words to name, describe, define	Nonverbal: Awareness of things but minimal connection with words
Analytic: Figuring things out step-by-step and part-by-part Symbolic: Using a symbol to stand for something e.g. the sign + stands for the process of addition	Synthetic: Putting things together to form wholes Concrete: Relating to things as they are at the present moment
Temporal: Keeping track of time, sequencing one thing after another	Nontemporal: Without a sense of time
Rational: Drawing conclusions based on reason and facts	Nonrational: Not requiring a basis of reason
Logical: Drawing conclusions based on logic: one thing following another in logical order	Intuitive: Making leaps of insight, often based on incomplete patterns, hunches, feelings or visual images
Digital: Using numbers as in counting	Spatial: Seeing where things are in relation to other things and how parts go together to form a whole
Linear: Thinking in terms of linked ideas, one thought directly following another, often leading to a convergent conclusion	Holistic: Seeing whole things all at once; perceiving the overall patterns and structures, often leading to divergent conclusions

(Springer & Deutsch, 1989)

The sequential system involves analysis, progression from simple to complex, organization of information and linear deductive reasoning. It is influenced by hearing and language and an awareness of time. Temporal, sequential and analytic functions are thought to be associated with the left hemisphere of the brain.

In contrast, spatial thinking involves synthesis, an intuitive grasp of complex systems, (often missing the steps) simultaneous processing of concepts, inductive reasoning (from the whole to the parts), use of imagination and generation of ideas by combining existing facts in new ways (creative thinking). It is influenced by visualisation and

images and an awareness of space. Spatial, holistic and synthetic functions are thought to be associated with the right hemisphere of the brain (West, 1991).
Whereas left brain thinking is step by step linear thinking over time, right brain thinking is an holistic system where all knowledge is interconnected in space. When left brain thinkers are asked the answer to a question, they will look for the right answer based on the facts at their disposal. When right brain thinkers are asked a question, they usually respond with some form of “Tell me more/it depends”. As all their knowledge is connected, they can see many paths to differing answers and they want more information to help them decide which path to take to the required answer.

This divergent thinking is the hallmark of creativity but may not be understood in school where achievement is often seen as having the right answer.

As Jeffery Freed says “Because one of the attributes of right brained thinking is a non-sequential divergent form of thinking, their minds often veer into unusual and different territory. This can result in illogical or often unsubstantiated conclusions. On the other hand, they may view a problem from an entirely different angle, leading to new breakthroughs and discoveries” (Freed, 1996, p16).

Extreme Sensitivity

Gifted visual spatial learners appear to have supersensitive nervous systems that enable them to assimilate extraordinary amounts of sensory stimulation. To varying degrees these children experience extreme sensitivity to physical stimuli, particularly sound, light and touch (Blackburn & Ercikson, 1986).

These children have very sensitive hearing and can hear sounds that would simply be background noise for other people. They can hear whispered private conversations from a great distance. Repetitive sounds such as fluorescent lights seem to them very loud and can drive them crazy. It can be very difficult for many of these children to discriminate foreground sound from background noise. “My ears are like a microphone that picks up and amplifies sound. I have two choices: turn my ears on and get deluged with sound or shut my ears off. Sometimes I act like I was deaf” (Grandin, 1996, p1).

Many children report extreme sensitivity to brightness and glare. These children try to shade their eyes from bright sunshine or overhead lights, especially fluorescent.. This sensitivity can result in a tendency to skip words or lines while reading, to lose their place, become fatigued or distracted, become restless and fidgety, get headaches, watery or itchy eyes and lots of blinking (Masson, 1996). These children usually prefer to read under dim, indirect or natural light and as adults wear sunglasses, even in winter.

Of all the physical sensitivities, touch is the one that draws the most response from parents and children alike. These children must have all labels removed from their clothing. They are very picky about what they will wear and often cannot not bear wool next to their skin. They like to hug and be hugged but only on their terms; they hate being touched without warning.

Visual spatial learners with extreme physical sensitivities will be acutely aware of everything and everyone in their environment and they are often overwhelmed and exhausted by the effort of functioning in the world. These sensitivities alone can operate in a classroom as a learning difficulty.

Piechowski (1999) explains the sensitivities in terms of Dabrowski's "Overexcitabilities"; a term chosen to convey the idea that the stimulation is well beyond the average in intensity and duration.
Overexcitabilities can be thought of as an abundance of physical, sensual, creative, intellectual and emotional energy that can result in creative endeavours as well as advanced emotional and ethical development in adulthood.

Overexcitabilities are assumed to be innate and appear in five forms:

Psychomotor - surplus of energy: Rapid speech, pressure for action, impulsive actions, nervous habits, competitiveness

Sensual – sensory and aesthetic pleasure: Seeing, smelling, tasting, touching, hearing, appreciation of beautiful objects, writing etc

Intellectual – learning, problem solving: Curiosity, concentration, analytical thinking, introspection, moral thinking

Imaginational – spontaneous imagery: Facility for invention and fantasy, poetic and dramatic perception, elaborate dreams, fears of the unknown

Emotional – intensity of feeling: Complex emotions and feelings, extremes of emotion, identification with the feelings of others, difficulty adjusting to change.

(Piechowski, 1979)

Gifted visual spatial learners frequently appear to have all of Dabrowski's overexcitabilies and this can have both positive and negative effects. These children often exhibit excessive physical energy, overactive imagination, intense reactions that can hinder their interactions with others and extreme sensitivity. However, on the positive side, they have endless energy, a vivid imagination, an insatiable love of learning and an unusual capacity to care. As Michael Piechowski says "Overexcitabilities feed, enrich, empower and amplify talent". (Piechowski, 1999, pp325-6)

Extreme Visual Spatial Style – Auditory Sequential Information Processing Difficulty

Children who exhibit strong visual spatial abilities combined with auditory sequential weaknesses are considered visual spatial learners. Visual spatial learners are excellent visualisers and must visualise in order to learn.

Visualisation is the key element in the mental processing of visual spatial learners. They think primarily in images or pictures - either still like photographs or moving like videos. Visual thinking is very fast, complex and not sequential.

Some visual spatial learners report a complete absence of sound or self-talk in their heads; others experience some sound. "Thinking in language and words is alien to me. I think totally in pictures. It is like playing different tapes in a video recorder in my imagination" (Grandin, 1996, p5).

Often Visual spatial learners usually have a history of childhood illnesses, such as allergies, food intolerance, colic, tonsillitis, asthma, sinusitis or ear infections, that resulted in ear blockages so that they experienced difficulty in hearing during their first years of development. Since these children have faint and distorted sound input, they use their eyes as a means of compensation and develop high visual spatial abilities.

While their hearing is not permanently affected by these blockages, the development of auditory information processing is impaired and these children commence school with a learning difficulty.

They have difficulty with sequential thinking and poor auditory short term memory. In particular, visual spatial learners have difficulty in hearing, remembering and repeating auditory sequential instruction of three or more steps. They can, however, process six step direction when the information is presented in a manner suited to their visual learning style.

Being a visual spatial learner with an auditory sequential processing weakness is like living in a foreign country with some grasp of the language but no proficiency. When information is presented to them in the auditory mode, they have to translate the information back into their primary visual mode. This requires them to leave reality temporarily in order to do this translating i.e. be unable to hear the current information that is being presented. Once the translation is complete, they return to external reality and continue to switch from taking in external information and closing off external reality in order to translate. The result is that they have a series of gaps where they know certain information and miss other bits of information. These gaps are especially apparent during review and on tests at school. Also the translation process takes time and this means that they have difficulty finishing tasks and tests in the time allotted.

Visual spatial learners frequently have difficulty with language. In order to communicate their thoughts, first they have to grab particular images in their heads and place them in order. Then they have to hold them in memory. Then they have to find the words to describe their images. Then they have to hold the images of the words in order long enough to speak them aloud.

This difficulty is magnified if they then have to write the words down. Letters must be placed in a particular sequence to spell words. Words must be placed in a particular order to make sentences. Sentences must be linked together in order to make paragraphs and paragraphs must be linked together to make essays and assignments. It is understandable why most visual spatial learners that I see will tell me wonderful stories in rich and graphic detail and yet won’t write them down.

Visual spatial learners thrive on complexity and often fail at simple tasks e.g. math concepts Vs times tables. Because they focus on the larger picture, they often don't know how they have arrived at a conclusion or solved a problem. They do poorly on timed tests.

Also, they tend to be disorganised and have difficulty meeting time limits. This is not a behavioural issue but a significant difficulty for which they need assistance to develop appropriate strategies and skills. They need structure and predictability, clear limits and time frames and assistance with project planning. It is important that they are praised for their effort rather than concentration on achievement as it takes considerable time for them to develop organisational strategies and skills.

The following table lists the strengths and weaknesses of the visual spatial learning style.

Strengths	Weaknesses
• thrives on complexity	• poor auditory memory, does not remember three step instructions
• systems thinker	• difficulty memorising facts; poor at subject areas that require rote memorisation e.g. biology, foreign languages
• high abstract reasoning	• struggles with easy material
• loves difficult puzzles	• poor at calculation
• keen visual memory	• difficulty learning phonics
• creative, imaginative	• difficulty with spelling
• good sense of humour	• low word recognition
• better at mathematical analysis than computation	• performs poorly or not at all on timed tests
• better at reading comprehension than decoding	• difficulty learning mathematical facts
• better at geometry than algebra	• inattentive in class, easily distracted
• better at physics than chemistry	• disorganised, forgets details
• fascinated by computers, especially computer graphics	• hates drill and repetition
• avid television watcher	• "forgets" written homework assignments
• loves music	• submits short, sloppy work of poor quality
• day dreamer - rich fantasy life	• handwriting laboured and difficult to read
• elaborate doodler	• impulsive, tends to act first and think later

Source: Linda Silverman (1997)

Education

In most cases, the visual-spatial learning style is not addressed in school, and these students' self-esteem suffers accordingly. Firstly, and importantly, these children need to have their giftedness recognised and their educational needs in this area met. Secondly, they need understanding of their learning style, allowances for their weaknesses and modifications in the way information is presented to them.

Traditional teaching techniques are designed for auditory sequential learners. Concepts are introduced in a step-by-step fashion, practiced with drill and repetition, assessed under timed conditions, and then reviewed. This process is ideal for sequential learners whose learning progresses in a step-by-step manner from easy to difficult material. For visual spatial learners, concepts are rapidly understood when they are presented within a context and related to other concepts. Once spatial learners create a mental picture of a concept and see how the information fits with what they already know, their learning is permanent. Repetition is completely unnecessary and irrelevant to their learning style.

However, without easily observable connecting ties, the information cannot take hold anywhere in the brain--it is like learning in a vacuum, and seems to the student like pointless exercises in futility. Teachers often misinterpret the student's difficulties with the instructional strategies as inability to learn the concepts and assume that the student needs more drill to grasp the material. Rote memorisation and drill are actually damaging for visual-spatial learners, since they emphasise the students' weaknesses instead of their strengths (Silverman, 1994).

There are two keys to teaching gifted visual spatial learners: understanding that if these children are not visualising they are not thinking and so are not learning and teaching to their strengths not concentrating on remediation for their weaknesses. It is imperative that material be presented visually wherever possible and that motivation for these students be switched back on by their experiencing success.

Felder & Silverman (1988) list the following general teaching principles for visual spatial learners that are also of benefit to all students:

- Motivate learning by relating material to what has come before and what is still to come and to the students' own personal experience

- Provide a balance of concrete information (facts, data, experiments) and abstract concepts (principles, theories, models)

- Balance material that emphasises practical problem solving methods with material that emphasises fundamental understanding

- Use pictures, schematics, graphs and simple sketches liberally, show films, provide demonstrations, hands-on where possible

- Use computer assisted instruction

- Provide intervals during lecturing and writing on the board for students to think about what they have been told

- Use small brain-storming sessions to provide opportunities for students to do something active
- Provide open ended problems and exercises that call for analysis and synthesis to balance drill exercises

- Relish and reward diversity and divergent thinking, applaud creative solutions, even incorrect ones

- Talk to students about learning styles in class. Students are reassured to hear that their academic difficulties may not all be due to personal inadequacies.

In addition, my specific recommendations for the gifted visual spatial learners that I see usually include the following:

- offer subject acceleration and/or extension and enrichment activities to engage their interest and to maximise their intellectual potential
- seat them at the front of the classroom to minimise distraction
- write directions on the board , on overheads or on paper
- oral directions of more than 2-3 steps be written on the board
- use a sight approach to spelling and reading rather than phonics
- use books rich in visual imagery to enhance interest and ability in reading
- teach maths visually using discovery methods
- give class notes, as copying from the board will be difficult
- use a diary for the classroom teacher to record specific instructions and homework
- do all school work, including class work, be done on computer wherever possible as they find it difficult to produce neat handwriting and to process information at the same time
- give extra time to complete tasks and assignments when necessary
- avoid timed tests
- Allow use of a tape recorder when necessary, to record class teaching and discussion.

Conclusion

I have learned much about gifted visual spatial learners from the children themselves and from Linda Silverman and Jeffrey Freed so it is fitting that I end this writing with quotes from these three important influences.

“I just wish I had a projector on my head and you had a screen on yours and then you would understand what I am trying to tell you” (Adam aged 9, a gifted visual spatial learner).

We must respect the differences in children and act on them positively. There is both hope and help for the right-brained visual spatial gifted child. Earlier identification and more understanding will result in less ostracism and shaming. Society will benefit from their formidable brain power as well, as we better tap into their abilities to see, take on and solve problems in fresh and creative ways (Freed, 1996).

Visual spatial learners are more attentive if they understand the goals of instruction. They are more co-operative at home and at school if they are allowed some input into decision making processes and some legitimate choices. Discipline must be private as these children are highly sensitive and easily humiliated. If they are respected they will learn to treat others with respect. These children thrive on complex, abstract ideas; they are natural pattern finders and problem solvers. Therefore they are ideally suited to the types of experiences in gifted programs and activities. When they are placed in the right learning environment, where there is a good match between their learning style and the way they are taught, visual spatial learners can actualise their potential to become innovative leaders in our society (Silverman, 1994).

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