Visual-Spatial Giftedness

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Dual coding theory notes that humans code information in two ways

- imagery or 'episodic' encoding converts information to imagery and permits the ability to visualize
- linguistic encoding converts information to verbal semantic knowledge.

These lead to two ways of organizing knowledge.

verbal sequential processing	visual-spatial processing
auditory-sequential learners aware more of time than space.	visual-spatial learners are often preoccupied with space at the expense of time
Sequential learning involves • analysis of information into smaller units, • orderly progression of knowledge from simple to complex, skilful categorization and organization of information, and • linear, deductive reasoning.	Spatial learning involves • the synthesis of ideas, • intuitive grasp of complex systems (skipping "steps"), • simultaneous processing of concepts, • inductive reasoning, use of imagery and idea generation by combining disparate elements in new ways.
Thinking • is sequential, temporal, analytic, cause and effect is are stressed, • leads to languages constructed from non-meaningful elements--letters of the alphabet	Thinking • is spatial and holistic, with unrelated events linked and synchronised in time and space. • leads to languages traditionally composed of pictorial representations.

Gifted individuals show strong integration of sequential and spatial functions, but some favour innately or naturally one over the other mode. Although one can gain more facility with one or the other mode through learning, it is unlikely that a person with sequential dominance can learn to perceive the world in exactly the same way as an individual with spatial dominance or vice versa.

Characteristics of visual-spatial giftedness

Visual-spatial learners exhibit stronger visual-spatial than auditory sequential abilities.

Learning characteristics of visual spatial learners

Strengths	Weaknesses
prefer open-ended challenges and difficult puzzles	hate drill and repetition
good visual memory	poor auditory memory
creative, imaginative	not good at rule learning
focus well on topics of interest to learner	inattentive for topics decided by others
systems thinkers	disorganized; forget details
high abstract reasoning	difficulty memorizing facts
good at analysing complex problems	poor at applying taught procedures
high reading comprehension	low word recognition
prefer to be self managing and directing	happy to be directed externally

The learning characteristics of these students can be better seen by contrasting them with those of auditory sequential students.

visual-spatial learners	auditory-sequential learners
prefer whole-part learning strategies	prefer step-by-step learning strategies

show visual strengths	show auditory strengths
learn concepts all at once in large chunks of information in intuitive leaps	learn by trial and error
synthesize ideas well	analyse ideas well, take in isolated facts in small steps
see the big picture; may miss details	attend well to details
learn well by seeing relationships	learn well by rote memorization
recall well from long-term memory	use short-term memory well
generate their own methods of organization	learn the culture's ways of organizing well
develop own methods of problem solving	learn from model by imitation, often vicarious
learn difficult concepts easily; struggles with easy skills	progress sequentially from easy to difficult material
solve problems intuitively	shows components of problem solution easily
learns well (eg., other languages) through immersion	learns well through structure in classes
learn concepts easily, turned off by drill and repetition	may need some repetition to reinforce learning
are better at math reasoning than computation	do well at arithmetic
read diagrammatic information, maps well	follow oral directions well
learns sight words better than phonics	learn phonics easily
must visualize words in order to spell them	can sound out spelling words
perform better in untimed situations	perform well in timed tests
generate unusual solutions to problems	convergent, generate expected responses
develop asynchronously, may have uneven grades	develop in a uniform way, consistent across grades
enjoy geometry aspects of maths	enjoy algebra aspects of maths
are creative mechanically, technologically, or emotionally gifted	are academically talented

Identification of these learners

These learners do well on tasks that involve spatial processing and manipulating visual imagery information, for example, solving spatial puzzles, tracing mazes, duplicating block designs, counting three-dimensional arrays of blocks, visual transformations, mental rotations, envisioning how a folded and cut piece of paper would appear opened up, and similar items. Indicators of this style include

- Block Design subtest of the Wechsler Intelligence Scale for Children (WISC)
- Abstract Visual Reasoning section of the Stanford-Binet Fourth Edition and the
- Raven's Progressive Matrices
- Mental Rotations Test

Their learning is wholistic and occurs in an all-or-none fashion. They use sequential skills as a back-up system when they cannot grasp a concept by taking in the entire gestalt. They may create visual models of reality that are multi-dimensional. Visualization is a key element in their mental processing.

Rating Scale for identifying high visual-spatial intelligence

Please rate the child on the following factors from never (1) to always (5)

	never always 1 2 3 4 5
High performance on spatial tasks: Block Design, Block Counting, Rotations, Transformations, Orientation Problems	r r r r r
Good math conceptualization	r r r r r
May have excellent sequential skills, but prefer to see the gestalt and use a holistic method of problem solving; they use their sequential abilities as backup when spatial skills don't work.	r r r r r
Learn in great intuitive leaps, often skipping many of the simpler steps.	r r r r r
Often form correct conclusions in maths (and in other areas) but cannot "show their working" because they did not take a series of steps to get to their conclusions.	r r r r r
Often develop their own methods of problem solving.	r r r r r

Systems thinkers--they are comfortable with complexity and see complex inter-relationships. They often thrive on complexity.	r r r r r
Like to invent shortcuts, often unusual, in problem solving.	r r r r r
Solve spatial puzzles and mazes very efficiently.	r r r r r
Comprehend metaphors and analogies, satire at a high level	r r r r r
Good problem finders. See discrepancies between what is and what ought to be.	r r r r r
Astute questioning ability.	r r r r r
Recall visual information at a high level, remember detail in earlier experiences, can "see" where information is on the page when they recall what they've read.	r r r r r
Original, creative thinking with sophisticated end results.	r r r r r
Can view from many different perspectives in imagination.	r r r r r
Learn complex systems easily, but struggle with easy work (especially Gifted/LD)	r r r r r
Sophisticated sense of humor. (Also true of gifted sequential learner.)	r r r r r
High imagery and spatial abstract reasoning ability.	r r r r r
Penetrating insights; perceptiveness. (Also true of gifted sequential learner.)	r r r r r
Synthesize ideas well, particularly imagery ideas.	r r r r r

Developmental trends : They enjoy novelty and challenge.

- As toddlers, they explore how things work and pull things apart to attempt to rebuild them. They play with toys long enough to figure out how they works and may not play with them again.

- They are drawn to puzzles and mazes and solve them efficiently. They spend time building (with blocks, lego sets, tinker toys or other materials), often producing sophisticated and intricate designs. The are often intrigued with numbers and numerical relations.

Instructional procedures

Spatial abilities underlie maths talent and creativity and are essential in mathematics, science, computer science, technological fields, architecture and creative endeavours (visual arts, music).

Teaching that stresses lecturing, rote memorization, drill and practice exercises doesn't stimulate abstract visual reasoning abilities	--->	Visual-spatial learners often dislike school

Gifted spatial learners need to be taught abstract concepts, complex ideas, inductive learning strategies, multi disciplinary studies, holistic methods and activities requiring synthesis, given more stimulating, advanced, complex material to learn with the material presented at a faster pace, they are natural pattern finders and problem solvers.

Effective teaching procedures for children with visual-spatial strengths include the following:

instructional feature	Example
Stimulate what they know about a topic	Have them tell you what they know about a topic before beginning to change this knowledge through teaching
Clarify the goals of instruction.	Visual-spatial learners are more attentive if they understand the goals, purposes of the teaching.
Use imagery during learning	Teach ideas through constructing, drawing, creating visual representations of concepts.
Use visual aids and models of ideas	Use manipulative materials that allow hands-on experiences to help students represent key information in imagery.
In literacy learning, focus on visual features in parallel with phonics	• in reading words, encourage 'sight' strategies. • in spelling use a visualization approach : show a word; have students close their eyes and visualize it; then have them spell it and write it.
Allow self managed learning	These students learn better if they have the opportunity to make decisions about their learning

Allow them develop their own methods for solving problems	Instead of teaching multiplication step-by-step, present a word problem, have them solve it using what they know, identify their procedure and then learn the intended their solution procedure
Avoid rote memorization	Have them automatise procedures they have learnt based on imagery and meaning
Avoid drill and repetition	Have them talk about the procedures they are learning and have them apply the procedures to harder tasks in a unit. Give them advanced, abstract, complex material at a faster pace.
Emphasize mastery of higher level concepts	Teach mastery of higher level concepts rather than perfection of simpler concepts in competition with other students.
Emphasize creativity	Encourage students to be creative and to use their imagination, new insights, new approaches rather than acquisition of knowledge. Creativity should be encouraged in all subject areas.
Manage discipline problems privately	Discipline must be private, as these children often have difficulty responding to verbally presented disciplinary feedback.
Open ended research project work	Allow students to learn through independent studies or group projects which involve problem-finding as well as problem-solving.

Content for Visual-spatial ways of knowing

Describe your day dreams, act out what you imagine. Lie or sit in a relaxed posture, close your eyes and let your mind take you for a walk or a journey.

Forming mental images. Listen to a story read and make pictures in your mind. What did you see, feel ? What helps you to make pictures in your mind ? Does making pictures help you to think better ? Look at a picture that shows an action. What might have happened ten minutes earlier ? What might it have been like two hours earlier ?

Acting on mental images. Make a picture in your mind of a blue carpet. You are sitting on it. It is a magic carpet. It starts to move, to carry you in the air. It starts off slowly. You move around the room. You are looking down. The window is open. The carpet carries you out of the window and carries you around your street. What do you things that you see ? It asks you where you would like to go. It carries you there. Then the carpet takes you back to your room. How did you feel ? What happened ? You can have pupils imagine themselves being some of the concepts they are learning (for example, Mars, an electron, a worm, etc.)

Acting on visual information; looking at a visual representation from different perspectives and angles, looking at a picture that can be interpreted in different ways. Looking at various problems and concerns that the students might have from different perspectives. If this is an interpersonal conflict, the student can take turns to imagine how each person would feel, what each person might do, etc.

Understanding, manipulating visual-spatial patterns and relationships

Using visualisations for learning new ideas. Each time the student learns a new concept, symbol or relationship, the student can associate a mental picture with it. In mathematics, visualizing decomposition, mixed number conversion, algebra.

Using visualization to imagine your feelings, moods. See yourself when you are happy / nervous / sad. What colours do you think of ? Match up colours with the feelings that you like and don't like. If you don't like the feeling, think of a colour that goes with your better feelings.

Using schematic maps and other visual representations to help you to organize what you know, how to plan your way through a research activity, while you read, etc. Examples include

1 using schematic, mind maps or concept maps that provide a framework for the key ideas, for example, What I know about plants

Plants that grow in water Trees Flowers Weeds

What types of plants are there ? How do plants live?
What do they need to grow ?

What I know about plants

Why do we say that plants are living ? What do we use plants for ?

2 using concept walls, useful where knowledge has a hierarchical structure so that later ideas depend on earlier ideas, for example

What I know about fractions.

Adding fractions with different denominators		Subtracting fractions, different denominators
Adding fractions with the same denominators		Subtracting fractions with same denominators
Equivalent fractions	Cancelling and simplifying fractions	
Parts of a fraction number; numerator and denominator		
Using fractions like 1/4, 2/3	Fractions in everyday life	

3 using an 'excitement chart ' useful for showing what pupils know about a book, for example, for Roald Dahl's The Witches one pupil drew

Roald tries to escape, is caught and turned into a mouse

Bruno is turned into a mouse

The witches meeting

Roald meets a witch at his home

Roald's grandmother tells him about witches Summer holidays -the hotel

4 using time-lines to show what pupils know about a sequence of events in history (or wherever time is important).

5 using network diagrams to show how ideas are made up of subordinate ideas; these are useful for classifying knowledge and representing ideas in a vertical way

Animals with backbones

Mammals Birds Fish Reptiles

dogs cats possums

Use ideosyncratic pictures to show what you know about an idea that you are learning. Do these pictures help you to learn / show what you want to say / remember what you have learnt better ? Greenhouse picture. Could you use pictures to 'unload' your ideas ?

Action / kinaesthetic ways of knowing

1. Observing, copying, remembering and demonstrating a sequence of actions. What things can you do to help you to learn and remember action sequences. When will you use this type of learning ?

2. Communicating ideas through actions, for example, miming, charades. How far can actions go to communicate ideas ? When, where and how can actions be used best to communicate ? Advantages and limitations of using actions. Building up a communication system based on actions.

3. Taking on different roles. Pupils engage in a range of drama activities in which they imagine how people might act in these roles and carry them out. Imagine yourself in various contexts, for example, watching your favourite football team being beaten.

4. Acting out key feelings. Change how you act when you hear each of these words; "happy, angry, excited, depressed, scared, waiting for something to happen" . How do the actions that you do affect how you feel ? Can you change how you feel by changing how you are acting ?

5. Reading other people's actions and body language.

6. Matching actions with key ideas that you are using. What actions might you match with concepts, relationships that you are learning ? Do the actions help you to understand, remember what you are learning ?

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