Visualizing and Verbalizing®

by
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for
Language Comprehension and Thinking®

SECOND EDITION

This is a sample of the *Visualizing and Verbalizing® Manual*. For more information about the *Visualizing and Verbalizing* program or the *Visualizing and Verbalizing Manual*, please visit www.GanderPublishing.com.

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2 The Imagery-Language Connection for Cognition

Language comprehension is the ability to connect to and interpret meaning for both oral and written language. It includes the ability to recall facts, get the main idea, infer, conclude, predict, and evaluate. Language comprehension is a cognitive act. Instruction in comprehension must align with a theory of cognition.

The *Visualizing and Verbalizing* program (V/V) emerged from an experiential base, not a theoretical base. Years of experience teaching students to comprehend oral and written language eventually led to the sequential steps of V/V, a program specifically designed to develop language comprehension and thinking. In time I learned that the principles of the *Visualizing and Verbalizing* program align with one of the most prominent theories in cognitive psychology—Dual Coding Theory.

Allan Paivio, a cognitive psychologist, researcher, and the originator of Dual Coding Theory, has written extensively about the role of imagery in cognition. Paivio (2006) explains that, "As its name suggests, the theory is based on the assumption that thinking involves the activity of two distinct cognitive subsystems, a verbal system specialized for dealing directly with language and a nonverbal system specialized for dealing with nonlinguistic objects and events."

Paivio and Mark Sadoski (2001) specifically connect Dual Coding Theory to language processing for reading:

> Dual Coding Theory is the general theory of cognition that provides our unifying framework for literacy. This theory offers a combined

> account of both verbal and nonverbal cognition. The inclusion of nonverbal aspects of cognition such as mental imagery is the most novel facet of this approach in a modern context, but it provides a comprehensive account of the verbal, linguistic aspects of cognition as well. Accordingly, it provides an explicit psychological account of literacy's most central but elusive ingredient: meaning.

Sadoski (2006) simplifies the theory: "Dual coding theory is a theory of mind in which all cognition consists of the independent activity of, or interplay between, two great mental codes: a verbal code specialized for language and a nonverbal code specialized for knowledge of the world in the form of mental images." The theory that more than just a single, verbal code is needed for language comprehension is consistent with my numerous years of experience teaching students to comprehend and interpret language. Without the sensory information of imagery, words have no meaning, neither individually nor connected together to form concepts. The single code of language cannot do the job alone. Imagery plays a role in both concrete and abstract language comprehension.

Clinical research and experience over the last twenty-five years indicate that there is a language comprehension disorder that unfortunately is rarely identified. This separate comprehension weakness often undermines the reading process and goes beyond use of context, phonological processing, word recognition, oral vocabulary, prior knowledge, and background experience. It is a weakness based in the sensory system in creating an imaged gestalt.

The Gestalt and Language Comprehension

A *gestalt* is defined as a complex organized unit or whole that is more than the sum of its parts. The whole may have attributes that require a certain function for each part in the whole; these attributes may not be deducible from analysis of the parts in isolation. In the case of a language comprehension disorder, the weakness in creating a gestalt interferes with connection to and interpretation of incoming language. Mental imagery is a primary sensory-cognitive factor in an individual's ability to create a gestalt for oral and written language.

On the basis of fifty years of research, brain scientist Karl Pribram (1971) observed, "We cannot think about something of which we are not consciously aware, and we

cannot be aware of something not perceived sufficiently at the sensory level to come to consciousness." According to Pribram, cognition requires conscious awareness of sensory information. *Mental imagery is sensory information* that is available to us for language comprehension and thinking—imagery is the sensory mechanism that enables the creation of an imaged gestalt and stops language from going in one ear and out the other.

When individuals do not easily create a gestalt, they often process only parts of what they read or hear. A university graduate described listening to a lecture as words slipping in and out of his mind: "It is like the language was written on a blackboard and someone was going behind and erasing it, and I only got a few parts of what was said."

Processing a gestalt is necessary for language comprehension, reasoning, problem solving, and critical thinking. The only reason to read or listen to language, the verbal code, is to get meaning, and an imaged gestalt is prerequisite to that. Comprehension, interpretation, and higher order thinking skills cannot be accomplished if only a few parts have been processed. For example, a main idea cannot be discerned if only a few parts have been grasped. An adequate inference cannot be determined nor an accurate conclusion drawn from parts.

The imaged gestalt is the elusive entity needed in cognition—and the nonverbal code of imagery is the sensory processing that creates and stores the gestalt. Bringing the sensory information of imagery to consciousness, as Pribram suggests, is necessary when you teach your student to comprehend language.

Imagery is the sensory base of language and thought, connecting us to incoming language and linking us to and from prior knowledge, accessing background experiences for us, establishing vocabulary, and creating and storing information in both short-term and long-term memory. Researchers in reading and imagery have produced direct evidence linking reading and mental imagery, and have studied the relationship of imagery to prior knowledge and thinking processes (Kosslyn, 1983; Levin, 1973, 1981; Marks, 1972; Paivio, 1969, 1971, 2007; Peters and Levin, 1986; Pressley, 1976, 2002; Richardson, 1969; Sadoski, 1983; Sheehan, 1972; Stemmler, 1969; Tierney and Cunningham, 1984).

Imagery and Cognition

Dual Coding Theory was formed during the "cognitive revolution" in psychology in the 1960s and 1970s. Reacting to behaviorism, a school of psychological thought that focused on external stimuli and their external responses, Dual Coding Theory was among those theories that returned to the study of inner mental processes. Sadoski and Paivio (2001) make the following statement about this transition:

> Behaviorism classified reading as one kind of verbal operant, which means that the occurrence of a verbal response was tightly controlled by the printed stimulus word. Thus, behaviorism held that subvocal speech and other covert and overt behavior was the medium of human thought and memory…. Literacy was a matter of being conditioned to written language…. Cognitivism shifted attention to the inner world of mental experience; it focuses attention on internal representations and processes as well as external stimuli and responses.

Imagery has a long history in the field of cognitive psychology, a history that was rekindled by cognitivism. Here are some historical perspectives on the relationship between imagery and cognition, beginning as far back in history as Simonides. All italics are mine.

Simonides (556-468 B.C.) taught people to use imagery to improve their memories. His system was taught to many Greek and Roman orators who, without notes or cue cards, sometimes spoke for several hours.

Aristotle in 348 B.C. referred to the role of imagery in thinking and memory. In his work *On Memory and Recollection*, he wrote, *"It is impossible even to think without a mental picture."* In summarizing the section on memory, he continued, *"Thus, we have explained that memory or remembering is a state induced by mental images related as a likeness to that of which it is an image."*

After I read Aristotle and Simonides, I wondered what had happened to the practice and art of imagery. I found that Simonides' memory system and Aristotle's theory of memory and recollection, both emphasizing the critical role of imagery, had comprised the classical art of memory for over a thousand years. Then Neo-Platonic ideas, resurgences of Plato's ideas, began to gradually remove imagery from prominence.

In the 11th and 12th centuries, memory systems again became useful for purposes of remembering and making memorable central Christian ideas. Thomas Aquinas was largely responsible for the renewed interest in the classical techniques for stimulating memory. He wrote, *"Man's mind cannot understand thoughts without images of them."*

Although the relationship between imagery and memory was well understood in those early centuries, in post-Renaissance time, imagery related to memory training declined. Perhaps the Protestant Reformation, which disparaged the use of images in sculpture and the arts, also diminished it in schools. Fortunately, since the 1950s, there has been renewed interest in imagery and markedly increased interest in the last few years.

Jean Piaget (1936, cited by Bleasdale, 1978) wrote in favor of a perceptual base to memory. According to Piaget, knowledge structures, or *schemata*, are acquired when the infant actively manipulates, touches, and interacts with the environment. As objects are manipulated, sensory-motor schemata are developed and changed to accommodate new information. *"Over time, schemata become internalized in the form of imaged thought."* Piaget further stated, *"It is clear that imaginal representations are not formed with the same facility in each case, and that there is therefore a hierarchy of image levels, which may correspond to stages of development…the evolution of images is a kind of intermediate between that of the perceptions and that of the intelligence."*

Rudolf Arnheim (1966) wrote, *"Thinking is concerned with the objects and events of the world we know…when the objects are not physically present, they are represented indirectly by what we remember and know about them. In what shape do memory and knowledge deliver the needed facts? In the shape of memory images, we answer most simply. Experiences deposit images."*

Arnheim (1966) quoted the psychologist Edward B. Titchener, *"'…[My] mind, in its ordinary operations, is a fairly complete picture gallery, not of finished paintings, but of impressionist notes. Whenever I read or hear that somebody has done something modestly, or gravely, or proudly, or humbly, or courteously, I see a visual hint of the modesty or pride or humility.'"* Titchener's reference to a visual hint alludes to how we process abstract material.

Paivio (1969) wrote, "As every psychologist knows, imagery once played a prominent role in the interpretation of associative meaning, mediation, and memory. It was widely regarded as the mental representative of meaning—or concrete meaning at

least. William James, for example, suggested that *the static meaning of concrete words consists of sensory images awakened* (1890)."

Paivio (1971) further illuminated the role of imagery in classifications of information. He attempted to demonstrate how imagery can affect the acquisition, transformation, or retrieval of different classes of information. His Dual Coding Theory of cognition emerged to define imagery as one of the two cognitive coding systems. The other system was the verbal code. *Paivio suggested that linguistic competence and linguistic performance are based on a substrate of imagery. Imagery includes not only static representations of objects, but also dynamic representations of action sequences and relationships between objects and events.*

Karl Pribram (1971) stated, "Recently the importance of the image concept has started to be recognized: cognitive psychologists analyzing the process of verbal learning have been faced with a variety of imaging processes which demand neurological underpinnings…neurological research as well as insights derived from the information-processing sciences, have helped make understandable the machinery which gives rise to this elusive ghost-making process." He further hypothesized that *"All thinking has, in addition to sign and symbol manipulation, a holographic component."*

Stephen Kosslyn (1976) conducted a developmental study on the effects and role of imagery in retrieving information from long-term memory. In two blocks of trials, first graders, fourth graders, and adults were asked to determine whether or not various animals are characterized by various properties, first upon the consultation of a visual image and then without imagery. *He reported that imagery provided the most opportunity for retrieval.*

Related research came from Joseph Wepman's (1976) studies on aphasia. Aphasia is described as any partial or total loss of the faculty to articulate or understand speech, usually due to a brain lesion. *Wepman observed dramatic improvement in expressive language when he stimulated the "embellishment" of thought through images.* Departing from standard speech and language therapy, Wepman approached aphasia and aphasia therapy from the viewpoint that the disorder was one of impairment of thought processing and that therapy should therefore concentrate on embellishment of receptive language. He reported that *he had never seen such dramatic results prior to using imagery.* This study indicated that imaging was critical to actual thought processes—a conclusion that is compatible with my experience, in that stimulating imagery often develops expressive language. Individuals consciously using imagery

from which to verbalize become more organized in their expressive language. They are more concise and more able to monitor their language for a relevant, sequential, and logical expression of their thoughts.

M.C. Wittrock (1980) stated, "Reading comprehension is the generation of meaning for written language…we found that reading comprehension can be facilitated by several different procedures that emphasize attention to the text and to the construction of verbal and imaginal elaborations." In a controlled study with fourth graders given the same time to learn with the same reading teacher, he noted, *"The generation of verbal and imaginal relations or associations between the text and experience increased comprehension approximately by fifty percent."*

Oliver (1982) conducted research with three experiments to determine if an instructional set for visual imagery would facilitate reading comprehension in elementary school children. He concluded, *"These findings indicate that teachers should try to help children develop the metacognitive skills of visual imagery as a strategy for improving comprehension…visualization enhances comprehension."*

Mark Sadoski (1984), in an abstract from a study with third and fourth graders, states, "Paivio (1983) and Sadoski (1983) have theorized that certain *images evoked by stories and stored in memory can serve as 'conceptual pegs' for the storage and retrieval of story information*…Anderson and Kulhavy (1972), Kulhavy and Swenson (1975), and Gambrell (1982) have found that school-age readers instructed to image while reading recalled more and made significantly more predictive inferences about story events than did control group subjects." The study supported the "contention that *imagery can serve as a comprehension strategy, as a mental peg for memory storage, retrieval, and reintegration, and as a repository of deeper meaning that utilizes text information."*

In 1989, Shirley Long, Peter Winograd, and Connie Bridge summarized their research findings regarding imagery and reading. *"Our results suggest that imagery may be involved in the reading process in a number of ways. First, imagery may increase the capacity of working memory during reading by assimilating details and propositions into chunks which are carried along during reading. Second, imagery seems to be involved in making comparisons or analogies—that is, in matching schematic and textual information. Third, imagery seems to function as an organizational tool for coding and storing meaning gained from the reading."*

Sadoski, Ernest Goetz, and others (1990) investigated "the spontaneous use of imagery and its relationship to free verbal recall with community college students,

who read a 2,100-word story under one of the three sets of instructions and then recalled the story and reported their images immediately, and 48 hours later… *Images of the story were much more prevalent in memory two days later than verbal recall, further suggesting a distinction in processes and the power of imagery in reading a story*…this study contributes to a series of studies that suggest that imagery is a distinctive aspect of reading viable for study in its own right…during the last twenty years, mental imagery has become a topic of increasing interest to cognitive researchers, to the extent that it is 'one of the hottest topics in cognitive science' (Block 1981). Led by Paivio (1971, 1986), Shepard (1978), Kosslyn (1980), and others, *the study of imagery in cognition has risen from the status of a secondary or 'epiphenomenal' mental process to one which rivals propositional network theories as a basis for cognition*."

Allan Richardson (1994) wrote extensively about individual differences in imaging. *"Individual differences in imaging ability and differences in the strength of (imaged) stimulus situations interact to produce predictable differences in experiential, behavioral, or physiological responses."*

Kosslyn (1994), stated, *"For present purposes, all that is important is that imagery relies on topographically organized regions of the cortex, which support depictive representations."*

Michael Pressley (2002) wrote, "Canadian cognitive psychologist Allan Paivio (e.g., 1971, 1986; Clark & Paivio, 1991) proposed that knowledge is composed of complex associative networks of verbal and imaginal representations. This led to work on how children could be induced to construct mental images that would increase their memories of text content through dual imagery and verbal coding (Levin, 1973; Pressley, 1976). In general, *when children were taught to construct mental images representing the content of texts, there was increased memory* (e.g., as tested by literal, short-answer questions) and understanding (e.g., as tested by questions tapping inferences that could be made during reading of the text) compared to when same-age students read as usual (Pressley, 1977)."

In 2002, Michel Denis and others conducted a study "aimed to establish how representational neglect might affect immediate recall of (a) recently perceived, novel visual layouts, and (b) immediate recall of novel layouts presented only as auditory verbal descriptions…. Overall, the results indicate that representational neglect does not depend on the presence of perceptual neglect, that *visual perception and visual mental representations have similar functional characteristics whether they are derived from visual perception or from auditory linguistic descriptive input."*

Frank Werblin and Botond Roska (2007) reported on experiments that indicate *"the retina actually performs a significant amount of preprocessing right inside the eye and then send a series of partial representations to the brain for interpretation."* They noted, "Overall, we have found that specialized nerve cells, or neurons, deep within the retina project what can be thought of as a dozen movie tracks—distinct abstractions of the visual world…. Each track is transmitted by its own population of fibers within the optic nerve to higher visual centers in the brain, where even more sophisticated processing takes place…. *It could be that the movies serve simply as elementary cues, a kind of scaffolding upon which the brain imposes constructs. This notion is not dissimilar to the well-described 'mind's eye' that knits the words of a novel into a meaningful narrative."*

Summary

The *Visualizing and Verbalizing* program is grounded in the evidence that cognition, including reading, requires two codes, not one. Most comprehension programs only give credence to the verbal or linguistic code. However, imagery is a silent partner in cognition, as Paivio (2007) elaborates:

> I have quite a different view on the language-intellect relation. I accept the obvious truism that language played a critical role in our giant intellectual leap as a species, but language never worked its magic alone and it cannot do so now. Instead, it has always depended on a silent partner that provides it with something to talk about, a general cognitive system that had evolved to a high level before it invited language in as a coplayer in the evolutionary scene. I see language as a benevolent, octopus-like parasite whose tentacles invaded the brain and was empowered by it to survive and thrive to the point where it could contribute something useful to its host. Nonverbal mind and verbal mind thus became interlocked in a synergistic relation that evolved into the nuclear power source of our intellect.