The NEW LITERACY

Only one thing is certain—that the written language of children develops in this fashion, shifting from drawings of things to drawings of words.

The entire secret of teaching written language is to prepare and organize this natural transition appropriately.... Make believe play, drawing and writing can be viewed as different moments in an essentially unified program of development of written language.... The discontinuities and jumps from one mode of activity to the other are too great for the relationship to seem evident.

-- Lev Vygotsky, *The Mind in Society*

This book coins the term the new literacy to describe the skills currently required by society. By educating children for this new literacy, we return an ancient set of skills. At the same time, we hand them the communication tools they need for the future. The new literacy is as old as picture writing on cave walls and as new as CD-ROMs.

The new literacy is the human brain's ability to integrate, cross-reference and transform information through a series of translation systems. In the most general sense, the two major translation systems are the right and left hemispheres of the brain. Visual and verbal systems are sub-groups of these two larger systems. For instance, drawing and graphing are spatial systems for representing meaning. Written words and algebraic notation are linguistic systems.

Joanne Quail, second grade teacher, defines the new literacy as "the freedom to see." As Joanne observes, Drawing/Writing frees student to see their objects on their own terms in new ways. Older "graduates" of the Drawing/Writing program report that they experience newfound freedom through choice and action.

The new literacy has a long history. Its genealogy includes art history, the development of writing, linguistics, child psychology, and neurobiology. Each field provides information on the naturalness, usefulness and power of integrative visual and verbal thinking skills. Neurobiology provides the clearest, most cogent support for integrative teaching strategies like Drawing/Writing as well as for complex mental skills like the new literacy.

4.1 Art History

An intimate relationship has existed between drawing and writing for thousands of years. The Drawing/Writing program deliberately recreates this relationship. Neuroconstructivist theory supports the naturalness of this connection as well as its usefulness for learning.

The history of art demonstrates that drawing alone and writing alone do not suffice to tell the tale. From about 15,000 b.c.e.11 until now, humankind has painted symbols on cave walls, carved inscriptions on stelae, or, most recently, painted flower-like frogs directly onto texts by Aristophanes (educator Tim Rollins' K.O.S., or Kids of Survival). A thoughtful discussion of the development of written language in the context of art history clarifies the genealogy of Drawing/Writing as a recapitulation of the history of human mark-making.

As recently as four million years ago, arboreal hominids left the forests and stood up. An enlarged brain pan accompanied bipedal locomotion. Climate changes and decreasing territory forced migrations. Hominids adapted to the hot, dry plains by lengthening their legs, slimming out and growing taller; then, according to the Single Origin theory, sometime between 150 and 100 million years ago, an ancestral African population began moving in successive waves into Europe and Asia.

By two million years ago, homo habilis—"handy man"—was using bones and stones as tools. Some tools were decorated. Many of the meaningful marks represent fertility.

Between 25,000 b.c.e. and 4,000 b.c.e. bits of clay and stone were crafted into hand-held sculptures. Sculpture preceded painting. Then, about 15,000 b.c.e. cave painting began. The subjects were mostly large animals, some of which were probably considered divine—horned cattle, woolly mammoths, sabre toothed tigers, bears, rhinoceros—along with horses and antelopes, and a few drawings and bas reliefs of shamanic, potent males and fecund females. Many of the hand-held statuettes were goddess figurines. These figurines were often monistic, clustering ovoid with elongated phallic forms in a unified expression of female/male generative power. Paleolithic grave goods suggest that this ancient society was egalitarian, gender-balanced, pacific and gynocentric. No man or woman had more or richer grave goods. While skeletons exhibited injury, the marks were not apparently made by weapons. Female statuettes were found in many graves. Underground holy places were constructed in the shape of a woman with large breasts and thighs, with a birth canal entryway,

creating womb-tombs for another kind of birth. This design provides the prototype for the Western basilican "cruciform" church.

As recently as 50,000 years ago, Homo sapiens produced speech. It is probable that humankind gestured with a stick in the dust before uttering a word. Speech captured and specified the gesture in the dust. Coinciding with the goddess sculptures, humankind began representing abstract thought in paintings and drawings on cave walls. Abstract thought eventually placed demands not only on speech, but on drawing. By about 2000 b.c.e.—about 4,000 years ago—in the ancient Near East, humankind's mark-making blossomed into systems of writing and calculation.

The exact relationship between drawing and writing varied depending on geography and chronology. In some instances drawing transformed itself into writing. In some instances, drawing and writing developed in parallel mode, demonstrating a syncretic, or mutually creative relationship. "Syncretic" comes from Greek roots and means "to join together in union." Highly schematic, abstract marks placed near optically convincing drawings of animals suggest this co-productive relationship. The cave painting from Lascaux called "The Chinese Horse" most probably demonstrates a syncretic relationship between drawing and writing.

Until recently, it appeared that "preliterate" cave artists developed drawing and writing 15,000 to 25,000 years ago in places like Lascaux, France. Now, it looks as if proto-writing goes back much further. In northwestern Australia, on the face of a sandstone mountain and on the surrounding boulders, scientists discovered thousands of small, carved circles. These circles were also found on button-like stones which average 1.2 inches in diameter. All of these circles date from more than 60,000 years ago. Archaeologists calculate that it would have taken 900 days for a person working alone eight hours per day to carve the buttons. The circles must have been "of enormous cultural importance" to those who carved them (Wilford, 1996). Mandala-like circles comprise some the earliest images children continue to produce. Explanations from psychology and neurobiology suggest that the circle and the oval are innate schemata, or hard-wired mental images. These carved circles are symbolic and, as such, approach proto-writing.

By 3300 b.c.e. Sumerians were writing cunieform on tablets; from 3100 b.c.e. Egyptians were carving and painting hieroglyphs on beetles' backs and plastered tomb walls. The Indus River script developed around 2500 b.c.e. Chinese characters developed in about 1200 b.c.e. Starting from about 250

b.c.e., Mayan glyphs codified astral anxieties using a calendrical system that took forecasting backwards in time 5 billion years (Robinson, 1995). The Runic alphabet developed in the 2nd century c.e. Japanese script flowered in the 5th century c.e. In all of these instances, writing included pictorial components.

Art history and the history of language: Cave art

"The Chinese Horse," Lascaux.
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The histories of art and of writing show that from before recorded time (understood to be before the emergence of organized systems of writing like cunieform and hieroglyphics), humankind combined representational drawings on cave walls with abstract drawings. These drawings can be classified as proto-writing or, in some cases, as proto-mathematics. Whether the marks are identified as proto-writing or proto-mathematics, they constitute an order of symbolic representation distinct from optically accurate drawing. The cave painting from Lascaux called "The Chinese Horse" demonstrates the combined used of an optically accurate drawing (the horse) with pro-writing (the rectilinear "tectiform" to the right, hovering above the horse).

A pictograph is a "word-picture"; it is an optically accurate, if stylized, drawing of a person, place, or thing. A phonogram is a "sound-picture"; it is a drawing of a sound. This is usually achieved by drawing a picture of an object whose name includes the represented sound. The Sumerians and Egyptians created phonograms. The hieroglyph of a falcon evolved to represent the sound that starts the word "falcon" in Egyptian. Hieroglyphics employed homophonic

cues. The picture sounded the same as the object it presented. For instance, the picture of an arm also stood for the sound for "arm" in Egyptian. Eventually, the picture of an arm was read as standing for the sound "a." A pictogram functions as a logogram or as a phonogram in Egyptian, depending upon the context.

Some written records—including hieroglyphics, cunieform, calligraphy, Navajo petroglyphs, and Mayan glyphs—demonstrate increasing stylization and simplification; a transition is made from a pictograph to a letter-like symbol. In some cases, the symbol becomes a phonograph, standing for a sound. During this evolutionary process, the pictorial content retreats and is eventually lost.

About 25,000 b.c.e., long before Sumerians developed cunieform (c.3,300 b.c.e.), paleolithic cave artists were creating both pictographs and logographs. We do not know if drawings of animals, hands, and cryptic symbols also stood for sounds, like consonants and vowels, or for quantities. We do accept that these drawings represented things and ideas with strong spiritual overtones. Because the drawings of animals and other marks were located deep in caves, away from the light, where people did not live on a daily basis—literally in the womb of the earth—many of the animal images probably related to the spiritual and physical rebirth of slain animals. Australian aboriginal people report that their marks on stone have important spiritual dimensions and are located in places with spiritual properties and energy. The fact that contemporary hunter/gatherers live an expressive life characterized by a ritual dimension may not mean that paleolithic rock painters lived the same kind of life, but conjectures can be made from communicating with aboriginal people, including the Lakota Indians, about the interconnected nature of the physical and spiritual world (Archeologist and Northfield Mount Hermon School teacher, Cosimo Favaloro, in conversation). The more abstract symbols accompanying these animals may have represented rebirth via the female principle. The earth was most probably understood as Mother, with life
organized by a female principle. Whatever the exact meanings, the intent behind the marks was to communicate a serious idea, not just to decorate.

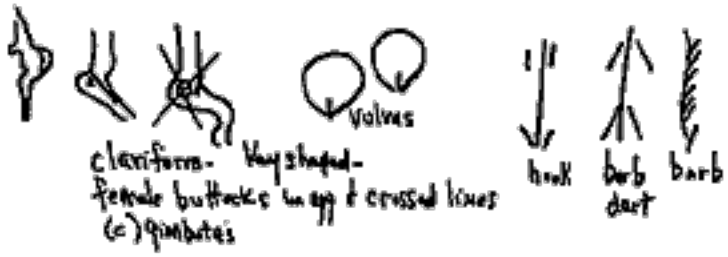
Paleolithic cave paintings reveal two distinct systems. One system is clearly drawing. The other is clearly not. Whether the second system is defined as full-blown writing, or pre-writing, proto-writing, or mathematical notation—or as highly stylized, minimalist drawing— this mark-making system is not the same as the optically accurate drawings of horses, bison, mammoths, reindeer, cattle and saber-toothed tigers. This book designates the second non-representational

system of marks as the earliest examples of writing, or "proto-writing." This notation system is linguistic in the broadest sense, just as the drawing of the horse is a spatial representation in the broadest sense.

By 20,000 b.c.e., drawing and proto-writing coexisted. The relationship was syncretic and synchronic, that is, the two systems created each other more or less at the same time. The proto-writing accompanies certain animals—mostly horses and bison—in repeated patterns. Female signs often accompanied this animal dyad. Proto-writing and drawings evolved in tandem, undergoing parallel stylistic transformations. It is unlikely that proto-writing was slipped in among drawings of animals with no connection to them (Bonnefoy, 1993). We do not know for sure what paleolithic readers understood when they looked at grouped bison, horses and abstract signs but we can make inferences. The message may have been, "As horses and bison are fruitful and multiply, so may we and the whole earth be fruitful and multiply," or it may mean, "There are many horses and bison in our area." It may mean that the male principle as represented by horses and bison coexists with the female principle represented by the chevron. At least some of these symbols deep within the cave-womb of the earth signify rebirth.

The coexistence of two distinct systems clearly exists in "The Chinese Horse," a wall painting from 15,000 b.c.e. in Lascaux, France.

"The Chinese Horse" looks like a Sung dynasty ink brush painting. Thus, the name. The drawing of the horse is optically convincing, clearly standing for "horse." Like most cave drawings, it shows the animal in strict profile, providing the most complete and characteristic representation. A frontal drawing of a horse would show two legs, a chest, no back, no tail, and no long muzzle. The distinctive shape of a horse's head and body would be indeterminable. Below the horse are some wheat-like or feathered arrow, or barbed, dart-like symbols. The scholars Abbe Breuil and Leroi Gourhan identify linear symbols, whether barbed, arrow-like or spear-like, as phallic and male. Female symbols, on the other hand, are curvilinear; some are vulvic, or oval with pointed ends, or "claviform" (key-shaped), representing the protuberant buttocks of a standing woman in profile. UCLA scholar and archeologist Marija Gimbutas maintains that the barbed, geometric shapes can as easily be recognized as female, containing the pubic triangle and bird-like angular wings, beaks and clawed feet—bird characteristics associated with the goddess in her owl-like, or death aspect. This point of view accepts the life-in-death, death-in-life duality of generative power.



Barbs, claviforms: male and female symbols, sketches,
SR Sheridan, 1997
After figures in LANGUAGE OF THE GODDESS by
Marija Gimbutas
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Above and to the right of the horse in the Lascaux painting is a hovering tarantula-like from called a tectiform or covered form. The drawing is linear and geometric. Sometimes the tectiform is rectilinear, as it is here, sometimes more pentagonal, constructed from interlocking chevrons or v's.

Some scholars believe that this symbol stands for a house, or for the number 13: the box represents 10 and the 3 legs add this number of items (Cosimo Favaloro, in conversation). Gimbutas conjectures that, like the curvilinear symbols, the geometric tectiform also represents the Goddess and her "life-giving body parts" (Gimbutas, 1989, 15). Whatever the exact meaning of the marks, two systems developed to provide mutual clarification as well as an extended message. In this case, the tectiform, the barbs or wheat, and the horse are meant most probably to be read together.

Cave artists apparently did not use the X-ray technique, a strategy in which invisible objects are shown as visible. If cave artists had used X-ray strategies, "The Chinese Horse" might have included a foal inside her belly. Still, a blade of feathered grass crosses the contour of the horse's abdomen. Cave artists did overlap images. The degree to which the overlaps (palimpsest) are intentional as debated. Pregnancy? Or a bounteous year for wild grasses? The proto-writing around "The Chinese Horse" to provide what Roland Barthes describes as the correct level of analysis (1985). The dilemma is that we lack a Rosetta Stone for decoding tectiforms. An X-ray drawing of a foal would have clarified our reading of "The Chinese Horse." Without such clarification, the tectiform, the barbs, or feathered grass, extend the reading in several provocative directions.

Furthermore, a dashed line above the horse's tail points directly at the rump. By pointing to the point of sexual entry of a mare, that line may bear on the double dashes below the horse's nose reinforcing its meaning as "the power of two" in a generative sense. The combined message may be: "This mare is in estrus," or "This mare is pregnant," or, "May this mare be pregnant," or, "May the females in our clan be pregnant." Our contemporary symbol for women combines the oval, the tectiform, and the dash in a highly stylized form, carrying additional visual memories of the Egyptian ankh, or symbol for eternal life and happiness.

Research with Australian aboriginal children supports the fact that preliterate peoples have astonishingly accurate eidetic memories. Paleolithic hunter/gatherers, including their artist/shamans, most probably shared this ability. These artists carried accurate mental images of animals into the caves. The close association of accurate drawings of animals and abstract marks depicts a world view where animals are sacred, and fertility, pregnancy, procreation and generation are focal concerns.

Whether the tectiform stood for a dwelling, water, nets, femaleness, the impregnated womb, fertility, or the earth goddess herself standing in a highly stylized pose, it does not constitute a "drawing" in the same way that the lines, colors and values used to represent the horse constitute a drawing. It is even possible that the tectiform stands for the sound paleolithic people used for mother. The sound for mother probably comes from appreciative noises made by babies during nursing. It is the easiest sound for babies to make. This appreciative sound may have become the initial consonant in the name of the Magna Mater herself. It is not beyond the range of possibility that the tectiform may represent the image, name and concept of the Mother/Mother-Home/Female - Male/Sex/Fertility/Abundance/Goddess/Mater/Mum.

However it may have been read, the tectiform stands as a pictogram, a picture of a complex idea. We cannot know for sure what original object gave rise to the tectiform. But we believe the drawing is an abstract symbol.

We do not know if the tectiform or the double dashes above the horse are concrete or abstract symbols. But we do know that these minimal, non-pictorial marks represent a "well constructed ideographic system" and an "elaborate ideology" (Honigsblum et al, 1993, 16).

The fact that cave artists developed two mark-making systems more or less simultaneously suggests that drawings alone would not suffice for the level of communication required by Stone Age lives. A cooperative approach to symbolic language-use has been a driving force in the human enterprise since

humans embarked on speech. As Roland Barthes suggests, one system allows us to read another at the proper level. We may never know whether the tectiform is the goddess or the balloon frame for a dwelling. We do know that the tectiform allowed the Stone Age reader to interpret the drawing of the horse in specific ways. Whatever their marks on bone and stone were meant to communicate, paleolithic people used systems distinguished by different levels of schematization or abstraction. Experts agree that two distinct mark-making systems existed in the caves and grew
in a mutual relationship. We must conclude that the two mark-making systems suggest considerable intellectual powers as well as an elaborate social system (Honigsblum et al, 1993, 16). The repertoire of written words may have been limited, but human beings were drawing words on cave walls as well as pictures at least 30,000 years ago.

4.2 The History of Writing

There are implications to writing systems which maintain visual clues to verbal meaning: the calligraphic model provides clues to the effectiveness of the Drawing/Writing strategy.

A language system organizes a brain in certain ways. The range of the language and its grammar constrain the brain's logic and thus the depth and breadth of that brain's thought. A language system that includes visual as well as verbal strategies for meaning-making, like drawing as well as writing, allows greater depth and breadth of expression than a language system which is entirely visual or entirely verbal.

There is evidence that people who speak more than one language score higher on some verbal intelligence tests. These people are identified as balanced bilingually. Cultures whose written language system retains visual cues may produce a certain kind of brain, too, identifiable as balanced bilaterally. A specific system for written language, say, Chinese calligraphy, may or may not be responsible for apparent aptitudes with mathematics and science. Whether culturally coded neural networks are suited to certain kinds of symbolic manipulations is investigatable.

Whatever the specific academic outcomes may be, dual systems for thinking encourage a broader range of possibilities for expression. It is probable that the "balanced bilateral" neurobiological profile describes bilingual brains as well as the brains of people who grow up writing calligraphy, or even drawing and writing. In a technological society, a brain organized for image and text is desirable and adaptive. If it becomes apparent that the balanced bilateral brain

is desirable, to what degree can we educate brains for the challenge of a new literacy?

Whatever the pedagogical position on bilingual education, children can learn to use their whole brains. Balanced bilateral brains and cross-modal teaching and learning are logically related. As Drawing/Writing demonstrates, strategies for implementing WholeBrain education need not be costly or complicated.

Thought and language are reciprocal. Sixty years ago, researcher Count Alfred J. Korzybski observed that language-use determines mental flexibility.13 According to Korzybski, if words are thought of as absolute, meaning turns rigid and agreement becomes difficult if not impossible. If words are intolerant, people are, too. On the other hand, if words are accepted as relative, tentative, responsive to adjustment and qualification, then a possibility remains for agreement through discourse.

Although the innate grammar for any language may not be modifiable, the language-learning environment is modifiable. How students use a culturally inherited code for organizing information is modifiable: students can learn to use language rigidly or flexibly.

The cross-modal Drawing/Writing approach teaches students that there is more than one way to express meaning. One way is universal and can be equally accessed: drawing. Other methods are culture-specific and carry with them certain approaches to codifying information. Drawing/Writing students learn that meaning—visual or verbal, culturally coded or not—is cumulative, personal, and relative, requiring translation from inner speech to some form of adjusted expression that meets the other speaker halfway (Faith, 1989).

A compulsion toward language

The changing relationship between the two hemispheres of the brain in paleolithic humankind resulted in image and text on cave walls. Humankind as mark-makers may have never been "pre-literate."

How many people crawled on their bellies into the caves to draw, write or read? Probably only a few, including those with shamanic power. Stencils of hand prints—some of very small hands belonging to children who were most probably lifted into place—as well as the imprints of bare feet, provide mute testimony to ritual gatherings. Who the artists, writers and viewers/readers were is not as important as the fact that Stone Age people were making marks of significance on walls in special places and gathering to read them.

Once humans stood up on their hind feet and looked out over the grasses, they were compelled to describe what they saw. They learned to scan the ground for clues. They scanned the middle and far ground, too, all the way to the horizon. They were not the only great apes to stand up on their hind feet and look out. But, once they did, they had to express what they saw. They were compelled to such a degree that their jaws and larynxes changed, their brains grew, and they invented language. They learned how to touch things at a distance with their eyes. They learned to translate touch with their eyes into touch at a greater distance by making marks. They learned to make marks for touching things no longer near them; finally, they learned to touch things that cannot be touched.

The compulsion to invent language endures. Children invent language over and over again. They babble and they scribble. Children experiment with drawings; they invent spellings; they devise fresh metaphors. Born with the compulsion to language, children arrive pre-programmed with certain schemata. As the art historian E.H. Gombrich comments, "The Egyptian or the child in us remains stubbornly there" (The Story of Art, 1989, 562). The ancient Egyptian convention of drawing combined profile/frontal views persists in children. Conceptual drawing—as opposed to optically correct drawing—persists. Conceptual representation, or drawing "in the Egyptian manner," is more natural for children than optically accurate drawing.

Gombrich describes another human impulse in connection with sculpture. He writes, "We must go back to our childhood, to a time when we still felt able to make things out of bricks or sand, when we turned a broomstick into a magic wand, and a few stones into an enchanted castle. Sometimes these self-made things acquired an immense significance for us,...an intense feeling for the uniqueness of a thing made by the magic of human hands" (585). Like cave artists and sculptors, when children make objects, they practice magic. With time, image and form become the incantation of writing.

Several stages exist in the history of writing. One is the development of pictographs, or pictures, like The Chinese Horse; another is the spontaneous invention of abstract signs, like the "power of two," and the tectiform; a third are specific instances of these abstract signs, like the logograph, or word-drawing like the tectiform; and a fourth, the creation of phonographic writing, or pictures of sounds like the letters "ph." Eventually, drawings were reduced to the barest essentials and abstracted, becoming the minimalist system we call writing. Some forms of writing retain visual clues to meaning. For example, pictorial content remains subtly embedded in Chinese characters. In English, it does not.

Chinese and Japanese writing systems

In traditional Chinese writing, forming letters engages the writer in an aesthetic as well as intellectual exercise. In some instances, the characters retain enough visual clues to be accessible as pictographs. Calligraphy, or a "beautiful writing," is an aesthetic/cognitive activity.

Chinese characters for man, woman, child, SR Sheridan, 1997

In The Story of Writing (1995) Andrew Robinson writes, "Chinese students learn the technique early, beginning with the simplest characters and moving progressively to more and more complex ones. Following the teacher, a class of young students traces characters rhythmically in the air with broad gestures of arm and hand. As the students trace, they name each element—bar, leg, dot and so on—and at the end they pronounce the character. Then, when the gestures have been learned, the students write the character down, again broadly, rhythmically and collectively. In due course, they learn to write the character small and on their own" (194). This approach to writing is kinaesthetic and multi-modal; it starts with the body and includes the voice in naming. The Drawing/Writing program re-creates this process in a somewhat less dramatic fashion. As a warm-up exercise, students are invited to draw their objects in the air with broad gestures and then to trace them.

The current writing reform movement in China pursues a policy of "digraphia," or the use of two scripts, Pinyan and calligraphic characters. Pinyan is best suited for inputting Chinese into computers (197). Calligraphic characters are used for other traditional forms of written communication like newspapers and books and for simple signs and instructions. Speakers of Cantonese and Mandarin can read the same newspaper because of a shared pictorial writing system. In a similar way, students of Drawing/Writing can read each other's abstractions through training in a drawing system.

The Japanese base their writing system on the system of Chinese characters called Kanji. The embedded, pictorial aspects of Chinese characters are not accessible to the Japanese. This makes learning Kanji an incredible feat of memorization. For the Chinese, the semantic or embedded pictorial quality

persists, easing the daunting task of memorization. The Navajos produced pictographs too, carving them in rocks.

Even picture writing requires textural explanations for most contemporary readers. Still, an expressivity persists with pictures. Drawing/Writing returns expressivity to language. For students who find text empty of meaning, experience with drawing allows them to transfer expressivity to text.

Implications of logographic and phonologic systems for science and mathematics

Approximately 50% of Chinese characters have a phonetic component (Shaywitz, 1997). Children reading Chinese access meaning visually and phonetically. Chinese characters train children in phonologic processing as well as in visual processing for "semantic" meaning. Chinese children acquire a system for language that is cross-modal, visual/verbal and balanced bilaterally in terms of interhemispheric exchange. If Chinese children excel with highly abstract symbol systems like mathematics and physics in which graphs, models, and computer simulations enrich understanding, design cues from Asian language systems combining visual and verbal elements could re-structure English language programs. By giving equal weight to visual literacy, image/text productions appropriate to cross-modal mental processes will become standard. It will not be enough cognitively to down-load images for text. If the intent is to structure neural nets appropriate to effective performance, say, in the maths and sciences, training in a combined visual/verbal system like Drawing/Writing will be necessary. This training allows early, ongoing and persistent participation in the creation of images and text.

4.3 Child Psychology and Drawing

Just as paleolithic people needed to express what they saw and felt and believed, so do children. If many children are not drawing and writing and reading naturally and easily, some fundamental instinct is being thwarted. By recapitulating the history of language-based thought, it should be possible to provide a natural return to the instinctual and emotional use of language.

At the scribbling stage, young children spontaneously devise two kinds of marks—drawing marks and, if they see people around them writing, writing marks. Children produce pre-writing as wavy scribbles but they do not spontaneously generate the alphabet. Writing has to be learned. On the other hand, children generate drawings without coaching or instruction.

Young children not only know more than they can show but more than they care to show. Young children use drawing more schematically than older children.
The motives of the third grader are different from those of the kindergartner which, in turn, differ from those of the high school student for whom a realistically detailed drawing is the goal. Adults for whom optically accurate drawings are also desirable must temper
their expectations about children's drawings by validating and appreciating children's intents as well as their skill levels.

Respect for children's drawings

Children's brains require a constant stream of engaged adult speech to develop language skills including abstract reasoning skills. The fields of art history, the history of writing, the study of linguistics, child psychology, and neurobiology document humankind's impulse toward conceptual representation—the drawing of ideas rather than things. Many of these representations have had magical or holy properties. Children's utterances, including children's drawings, deserve the respect we accord other serious images.

Children not only produce conceptual drawings, they also produce drawings of astonishing truthfulness and accuracy. By providing children with traditional images, we may short circuit vision and expression. As Robert Kegan of Harvard suggests, as teachers we can "attend on the child," saying in an interested, gentle manner, "Tell me about your drawings." If adult drawings are passed along to the child, or if the adult offers to redraw the image, or if the adult defines the drawing, the child loses control, and may become confused or discouraged.

Very young children may not know what their drawings are about. They are simply doing them. The doing is all, and its intent is neural networking. Meaning emerges in the very act of telling.

My daughter, Sarah, drew a portrait of me when she was about five, feeling the first stirrings of one of her intellectual birthrights, the visual power of the Expressionist artist. She drew with a fearless disregard for symmetry, recording the differences she saw in eye size. Sarah skipped right past the conceptual tadpole stage, moving directly into realistic drawing.

Children's brains require exposure to images of power. The history of art is children's visual heritage.

Profile, frontal and innate schemata

Children and Paleolithic artists share certain representational strategies. Early humankind and young children naturally invent and acquire and combine several symbol systems in their determination to express meaning.

Paleolithic artists generally drew animals in profile. The profile view provides a distinctive outline of an animal's head and identifies it more clearly than a view from the front. Grazing animals seen from afar are recognizable in profile. Approaching animals do not provide the best opportunities for storing mental images, especially if they are coming fast. Children also draw in profile, particularly animals. On the other hand, children's earliest drawings include the frontal "tadpole." Children see people's faces coming directly at them for the first few months of their lives. The frontal tadpole drawing may reflect this frontality and indicate the child's intent to draw on a "need to know" basis. Close up, the child needs to record certain kinds of information. At a distance, the child can afford to record other views, and other kinds of information.

No one teaches children to draw mandalas or tadpoles. On a mental level, tadpole drawings show what children need to know about themselves and other human beings; they are heads/bodies. These drawings represent that aspect most important for children to record: the face.

Tadpole drawings are described as conceptual, rather than optical. To distinguish between the two kinds of drawings from the point of view of the child's brain is probably spurious. The very young child may see human beings as heads/bodies, filtering out other aspects. The point is, children draw. They are drawing in ways that make sense to them. What very young children are intent on expressing through tadpole and mandala drawings goes deeper than words and may serve to construct neural nets necessary to abstract spatial thinking just as hearing language from the age of birth to six months is now said to build the baby's neural nets for abstract linguistic thought.

X-ray art

Besides mandalas and tadpoles, children produce another kind of conceptual drawing, the X-ray drawing: an item which would be invisible is shown as if it were visible. Although a man's legs are invisible when he stands in a boat, a child will draw the legs. In a Piagetian sense, legs are conserved. Eskimo art uses the X-ray technique; prey is shown inside the belly of the predator.

X-ray drawing, man in boat,
fish in fish

Cave artists used a somewhat similar technique, the "palimpsest" or overlapped image. The overlapping may have been accidental, or intentional, indicating ritual relationships or time sequences; the animal placed in front may have been more important or one animal may have been more numerous at a certain time of year or one animal may have been painted simply at another time.

Blind artists

Recent studies with blind artists (Kennedy, 1997) show that the blind represent objects much as sighted artists do. They feel an object and then produce a contour line drawing from one point of view. Touch allows the blind to draw, just as touch allows them to read, using Braille. Whether we are sighted or blind, touch informs our mental images. Using touch, the blind may construct more accurate mental images than sighted people who assume they know how things look without confirming or modifying these notions through direct tactile and visual exploration. Drawing/Writing keeps us connected to touch as a source of seeing.

The unfolding of language as conceptual and metaphorical first and optical and literal second

The unfolding of the human embryo recapitulates mammalian embryonic development. Similarly, children's drawings recapitulate the history of art, including both conceptual and optical phases; children's writings appear to parallel that progression. As schematic drawing is natural for young children, so simile and metaphor—a conceptual use of language—is natural, too. Young children often spontaneously generate metaphor and burst into poetry.

If we appreciate children's drawings as expressions of the human drive toward meaning, we will respond appropriately to them. We will value scribbles, dashes, dots, circles, tadpoles, cartoons, doodling in the margins, decorated text book covers and graffiti as expressions of the human impulse toward symbolic language and we will provide appropriate environments for expressing this pressing need. The more attentively children learn to draw, the more clearly they will express and communicate their ideas—optically or conceptually, literally or metaphorically.

Drawing/Writing recapitulates the history of drawing and of writing for children, allowing them to reclaim their powers of expression.

4.4 Language Education

Invented spelling as a transitional symbol system

Invented spelling provides a transitional stage in children's writing. Similarly, each drawing step in the five-step program provides a transitional step in children's drawing. Still, each drawing step exists in and of itself as an authentic piece of word: invented spelling enjoys the same complex authentic/transitional status in connection with writing.

By providing practice with legitimate, serious, dignified abstract drawing (the CA), Drawing/Writing reassures children about transitional stages. The CA provides practice not only with abstraction but with transition. Because the Composite Abstraction is abstract, it prepares the mark-maker for writing, including both invented and standard spelling. Aligning invented spelling with abstract drawing allows invented spelling to take on an exploratory character. A drawing-based literacy program that accepts abstract drawing as preparatory training for written language preserves invented spelling as an authentic, exploratory and important activity.

Acquisition of the alphabet and invented spelling

Unlike the mandala or the tadpole drawing which apparently exist in the brain as templates and appear spontaneously on paper, the alphabetic code does not appear spontaneously on paper. Still, with exposure to writing, children learn to write. Using a sound-to-letter correspondence, children crack the alphabetic code, recording what they hear. Like children's early drawings, this early writing deserves respect. As soon as "invented spelling" is read aloud, it is evident that children hear more complex sounds than traditional spelling

accounts for. Remember how six year-old Nate Gorlin Crenshaw spelled the word “plastic”: “pelasteck.”

Travis’ invented spelling produced this sentence: “It looks like a soard. It looks like a brege chrosing. It looks like a house because it has a dravy-a, barn and a tree haus.” Travis wrote that his Composite Abstraction of the sprayer head “looks like a tellaskop.” Travis’ mother, Molly O’Shaughnessy, reports that Travis was drawing aerial views and complicated mazes from about the age of four. “He drew floor plans of houses and buildings when other kids were drawing the classic square with a triangle. In kindergarten, he drew a floor plan of my clinic very close to scale.”

Children are able to sound out words. For confidence in this ability to develop, they need praise, support and leeway. Very young children may not know exactly what their writing-like marks mean. As with their drawings, an appropriate conversational gambit with young children’s writing is: “My, this looks interesting. Tell me about this.” This approach lets children decide what the marks are saying. A child’s belief that his tentative marks are interesting and meaningful lays the foundation for the child’s confidence in his writing and reading—as well as in the world as an intelligible place. Once children become confident as writers, spelling rules can be introduced.

Sometimes, there is an obvious difference between children’s drawing and their writing marks. Some children use sure, strong, dark marks for drawing and then switch to tentative, sketchy marks when they are asked to write. This switch suggests that these children—like John Kozema—may think drawing and writing are two very different and distinct tasks.

Second-grader John Kozema wrote about his “Perfect” whole drawing of a can opener, “It was easy to draw.” For his CA, he wrote, “My CA tells me that it looks like an alien ship firing a gun. Looks like a robot. And I play and play with it.”

With children who exhibit hesitancy with writing, spelling and reading, it is especially important to praise and encourage their drawing marks. Ideally, equal support is given from the beginning for all marks made by a child. The brain accords equipotentiality to both hemispheres, at least, initially. The classroom can accord the same equipotentiality to emerging mark-making systems. The common goal for the brain and the classroom is effective communication.

Children hear, see and think differently from adults. Their confidence in their ability to make sense of the world is fragile. I cannot underscore these points too strongly. For years, I have listened to the painful stories of adults whose confidence in their ability to draw, write, read or think was annihilated by one ill-considered adult judgment about their drawing. Children's drawings must be respected.

Words seen and not heard

By looking carefully, we record images in our brains. For many of us, drawing "fixes" the image. In aboriginal, preliterate cultures, attentive visual study—unaccompanied by drawing—produces accurate mental images. Children from literate cultures lose this power. Drawing provides a way to retrain the brain to store accurate visual images. If children think of writing as a kind of drawing, they should be able to store words as accurate mental images, too, by copying them. When writing involves copying overheard sound, the writer's spelling may exhibit inaccuracies due to "overhearing" (like Nate's "pelasteck"), or to actual "phonological processing deficits," or mishearing. While recognizing the considerable usefulness of phonics to writing, Drawing/Writing focuses on writing as word-pictures. Because of the neural possibilities for self-remediation, training in drawing as careful seeing may remediate inaccurate hearing. Learning to draw accurately may not cure a tendency to confuse sounds and letters, but honing one sensory system hones another. If a child sees more accurately, he may hear more accurately.

In addition, spelling is not logical. For example, the "f" sound can also be represented by "p" and "h"—as in the word phonograph. Because the human mind is enthralled by uniqueness and weirdness, most students will accommodate additional spelling rules as a mental challenge, especially after flexibility training with the Composite Abstraction. Spelling anomalies are easiest to store as pictures.

Each experiment with drawing and writing constructs knowledge and scaffolds it on a preceding layer. The Regular Contour drawing constructs knowledge about the outline of an object and scaffolds itself upon the initial exploration in outline achieved by the Blind Contour drawing. In a sense, standard spelling imposes knowledge about letter-to-sound on the child's personally constructed knowledge expressed through invented spelling. Still, the child will be more willing to accept standard spelling if her own inventions have been honored.

No matter how flexible or willing the mind of the child, a sound-to-letter miscorrespondence may persist. As useful as phonics are to learning to spell,

copying words as if they were pictures may make more sense for children with hearing problems than persisting in a sounding-out approach. For these children, writing and reading are best taught as visual rather than as aural coding tasks. Drawing/Writing provides this visual training automatically, as well as providing ample aural training through peer pair sharing and group critiques.

4.5 Drawing/Writing and Language Learning

Language learning consists of a progression from one mode to another. Drawing/Writing examines and recreates this progression for students.

The Russian scholar, psychologist and educational theorist Lev Vygotsky provides support for the progressive Drawing/Writing program in several ways. First, Vygotsky defines the linguistic progression as moving from speech to play to drawing to writing (1978). Vygotsky describes the move from drawing to writing in the following way: meaningful marks change from "pictographic to ideographic writing" (114), moving "from drawings of things to drawings of words." The goal of this continuum for Vygotsky is written language because it allows the mind to move into abstraction. In Vygotsky's continuum, writing enjoys a privileged position. Writing is not just a fine motor skill, but an entirely new way of thinking. As Vygotsky states, "Its mastery heralds a critical turning-point in the entire development of the child," because it allows abstract thinking (106).

In the Vygotskian scheme of things, drawing does not remain a co-equal participant in the linguistic continuum. Even though children's drawings "designate" (112) or gesture toward meaning, drawing—for Vygotsky—is not a tool for abstraction in the way writing is. Still, he appreciates the fact that drawing and writing exist as "different moments in an essentially unified program of development (116)."

According to Vygotsky, "jumps and discontinuities" occur between play, speech, drawing and writing. The child moves abruptly between these activities. The separate acts do not appear connected. As Vygotsky notes, "The discontinuities and jumps from one mode of activity to the other are too great for the relationship to seem evident" (116). It is easy to miss the continuity in the general meaning-making process. The connections between drawing and writing have been invisible. For this reason, it has been easy to exclude drawing from writing curricula.

According to Vygotsky, students will naturally move through the historical phases of mark-making, including the move from drawing to writing. To do so, they must be allowed to draw as well as to write. In addition, Vygotsky suggests that writing should enter children's lives by age three or four, and urges that once writing is acquired, it be taught as an activity that is "necessary and relevant to life" (118). According to this timetable, drawing should be encouraged by age two or three as serious preparation for writing and writing should become a relevant and possible activity soon thereafter. This moves literacy education firmly into the "preschool" period of education.

Vygotsky stresses an additional point of importance to the Drawing/Writing program. He maintains that teaching and learning strategies that prove effective with dysfunctional or delayed children work as well or better with "normal" children. The Italian educator, Maria Montessori, made the same observations (1912). Special education belongs in the regular classroom precisely because it provides optimal educational learning opportunities for all children. Remediation is enrichment; enrichment is remediation. Strategies like Drawing/Writing designed with this dual intent serve an entire student population.

Most importantly for Drawing/Writing, Vygotsky validates the role of drawing in the mental progression toward abstraction: "Only one thing is certain—that the written language of children develops in this fashion, shifting from drawings of things to drawings of words" (114). Young children's scribbled drawings are gestures toward meaning: "Children do not draw, they indicate, and the pencil merely fixes the indicatory gesture" (108). The indicatory gesture represents an intention toward meaning. Students' drawings are in fact "a particular kind of child speech" (112). There is substantial support for the part drawing plays in the prehistory of writing (Montessori, 1912/1964; Luria, 1979; Ferreiro, 1979; Scinto, 1987).

The Vygotskian legacy is this: the appropriate way to teach written language is to prepare and organize the natural transitions from speech through play to drawing and writing. Vygotsky would have recognized Drawing/ Writing as a unified language program in which drawing re-introduces the organic unfolding of symbolic language, thereby reclaiming natural transitions between systems of abstraction. The fields of linguistics, psychology, education, and neurobiology share an appreciation for this continuum.

Drawing/Writing makes the Vygotskian progression visible and available to students who might not otherwise have the chance to construct this progression.

Students of Drawing/Writing accept drawings as approximations, not replicas. As Alfred J. Korzybski observed in the 1930's, without corrective training, children grow up with the notion that words are exact replicas of things and, as such, are absolute and fixed. This attitude about language reinforces rigid thinking. Words are, in fact, approximate and variable, and, above all, personal. Through the ongoing experience of peer sharing and group critiques, as well as through the experience of a series of transitional and approximate drawings, Drawing/Writing students recognize the variability of words. They learn that shared understandings can only be achieved through discourse and the continual adjustment of meaning.

Drawing/Writing clarifies the Vygotskian progression from speech to play to drawing to writing as more lateral than hierarchical, more parallel than sequential. In neural terms, "embeddedness" is the most appropriate descriptor for linguistic development. One skill grows within the matrix of another and it remains part of that skill, requiring its neural and procedural contributions to function. Mental events occur globally and simultaneously, not in isolated, parallel strings. Instead of using the word "taxonomy" with its hierarchical overtones, the word "constellation" better describes how mental skills self-organize.

Children who learn to draw conceptually and optically, to write poetry, and prose, music and mathematics know that a variety of meaningful marks are natural and necessary. No system need be higher or lower, harder or easier, more abstract or less abstract than another. Usefulness to the child is the criterion.

The brain treats concrete and abstract ideas simply as mental objects (Minsky, 1985). It is the degree to which the mind is able to manipulate the object that matters. Systems for abstraction are, in the final analysis, only different. In and of itself, as a system for abstraction, drawing is no lower- or higher-order than writing, dance no higher or lower than music, music no higher or lower than poetry, mathematical understanding no higher or lower than poetry or prose. Levels of abstraction are ordinate, like numbers, not value-laden in a monetary sense. A number taken to the fourth power is no more valuable as an operation than a number taken to the first power. The ability to take numbers to powers is what matters.

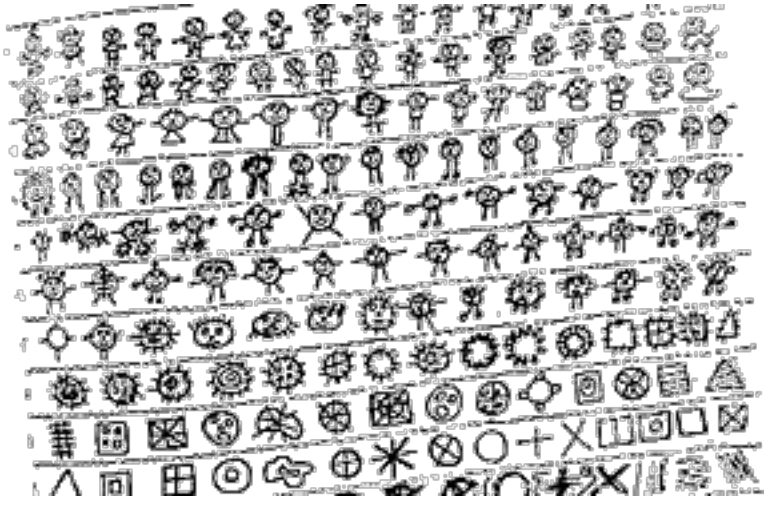
The ability to recognize all marks as abstractions and to produce abstractions from abstractions is the skill Drawing/Writing teaches. It is a basic mental operation. By equipping students with a visual language before introducing a

verbal language, abstract symbolic thinking is encouraged in brain-appropriate ways. The more visual and verbal languages children acquire, the more thoroughly they will be able to express themselves, increasing their chances of understanding and of being understood.

Training and exposure largely determine the mind's expressive modes. Educational theorist Howard Gardner describes these modes as "intelligences," or "frames of mind," and includes in his list: linguistic, musical, logical-mathematical, spatial, bodily-kinaesthetic, and personal intelligences (1983). Drawing/Writing takes as given that all children possess spatial and linguistic intelligence as the legacy of the human bicameral brain. These two categories include and subsume the other categories of intelligence listed by Gardner. This book adds that children's brains are designed to be scientific, artistic, literate, aesthetic and philosophical. Children's brains are designed to discover, express, evaluate and interpret meaning. Children's minds are "framed" for the development and application of these overarching intelligences.

Language development is personal and social, sequential and simultaneous, discrete and cumulative. There is no single blueprint for the development of language skills nor is there any absolute set of developmental milestones. Cooperative and reflective practice with at least two symbol systems encourages the unfolding of the expressive human mind.

4.6 Children's Representational Strategies



Tadpoles and mandalas
From ARTFUL SCRIBBLES by Howard Gardner
Image 60, copyright (c) 1980 by Howard Gardner

Sets of coordinates for physical and mental worlds

Getting around in the physical world requires coordinates for the body's proprioceptive system. Getting around in the mental world of ideas requires the acquisition of symbol systems, including written language.

This book suggests that the tadpole and the mandala are schematic manifestations of a deeper spatial location system designed to locate the human body in a physical universe determined by certain conditions expressible as coordinates (Changeux, 1985; Churchland, 1986). For this reason, a study of children's drawings illuminates the degree to which the human brain employs these spatial coordinates—as well as linguistic "coordinates"—to navigate meaningfully. The brain's spatial location system—where is it?—provides the framework for the brain's naming system—*what is it?*

The child's tadpole drawing is an expression of a mental template for creating intelligible order. By including all the child needs to know—in this case, about a human being—no more and no less, the tadpole drawing demonstrates the parsimony of this system for order. It is on this deep and conservative predisposition toward order that the child constructs language. The tadpole is not just a picture: it is a procedure for spatial order and, by translation, a system for linguistic order, too. Drawing/Writing is also a procedure for meaning, not just exercises in pictures and words.