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Practical Poetry: Metaphoric Thinking in Science, Art, Literature and, Nearly Everywhere Else

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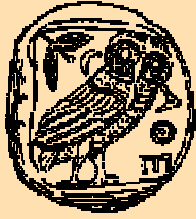
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PRACTICAL POETRY¹

Metaphoric Thinking in Science, Art, Literature and, Nearly Everywhere Else

by [Howard Pollio](#)

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Most of us would probably draw a sharp line between poetry and practical problem solving. Fortunately--or perhaps unfortunately--the history of creative human thinking offers a quite different view: Some of the most important scientific, philosophical and technical insights were first achieved in the form of a poetic or imaginative image well before they surfaced as a new empirical discovery, conceptual principle, or useful invention. Creative discovery does not seem to respect differences between poetic and rational thinking.

Consider a few examples. In engineering, Brunel reported that he first solved the problem of underwater construction by examining the behavior of a shipworm tunneling into a piece of wood. The worm first formed a tube for itself as it moved forward in the wood. From here it was but a short analogical step to the idea of a caisson, a step Brunel easily took in building the first tunnel under the River Thames in 1826.

In theoretical physics the initial model of atomic structure was developed by analogy to the solar system. Although later modified, this model was historically important in leading to modern atomic theory. A second example in physics concerns the case of Einstein, who sometimes visualized himself as a passenger riding a ray of light holding a mirror in front of himself. Such a situation yields no image, for light and mirror travel at the same speed, in the same direction. This is not the case for an outside observer and on the basis of these, and other equally fanciful, ruminations Einstein reports he was able to formulate certain early aspects of Relativity Theory.

Poetic imagery also appears in biology. As any introductory text will show, evolutionary development and differentiation are presented as a living tree; Darwin called it "The Great Tree of Life," a metaphor he simply borrowed from other biologists. A metaphor need not be original to be scientifically useful; all the thinker need do is see the world in its light and thereby see the world anew.

Immunology is not immune from metaphors. Within the popular press, metaphors related to this domain are frequently military in nature. Foreign organisms invade the body; the body has an advanced warning system to detect the intruder and put up a line of defense. Researchers hope to discover magic bullets, and the whole business sounds like a biochemical version of Star Wars.

Metaphor and analogy also occur in experimental psychology. In the 19th century, Von Helmholtz based a theory of hearing on analogy with musical instruments in which the fibers of the ear became strings of a harp, vibrating in tune with selected frequencies. In the 20th century, William McDougall-- not to mention Freud--developed a drainage theory of neural action to explain human motivation by analogy with a hydraulic system.

Sports has its metaphors, and they too change and offer new advice to the athlete. In the case of swimming, for example, Seals and Hastings (1987) note that until 1968 swimming was seen as a simple matter of "pulling and pushing one's way across the water"; the swimmer was advised to "press against the water for leverage." For this view, swimming took place according to principles derived from an analysis of a paddle-steamboat, tractor or rowboat. The swimmer was equated with the boat or tractor: the hand was a paddle, and the arm, a long-handled oar. About 1970, the metaphor changed: No longer is the swimmer a boat *on* the water; he or she now moves *in* the water much as an airplane moves *through* the air. Hands changed from oars to propellers that no longer straight-arm the water but move in S-shaped swings that mimic the movements of a propeller.

Moving from the philosophy of sports to the philosophy of ideas, the history of thinking about thinking provides another set of concepts rich in metaphor. Human thinking has long been described by visual metaphors such as *insight, illumination, reflection, speculation, introspection, outlook*. In terms of touch, we have *grasping, apprehending, comprehending, recollecting*. Satre noted that thinking has often been described in alimentary metaphors: The thinker *digests an idea, assimilates reality, or has food for thought*. Starting from a different portion of the anatomy, Plato conceived of thinking in terms of *seminal concepts, fertile ideas, and pregnant minds*.

Images for thinking frequently contrast natural and mechanical metaphors such as "stream of consciousness" or "mind as a machine." This dichotomy is significant not only for research on artificial intelligence, but also for the way in which human beings think about themselves. The stream of consciousness metaphor offered by William James in 1890 has sometimes been used in literary and philosophical works, e.g., by Joyce and Bergson, in support of the power and significance of acausal thinking. Proponents of the mind-as-machine metaphor attempt to realize human thinking in terms of modern technology. Although Mind originally may have been glossed as a telephone switchboard, more recent metaphors see it as a computer.

Metaphor in Rhetoric.

These examples suggest that poetic language is a useful and ubiquitous aspect of human speaking and thinking whether for scientific or literary purposes. Many thinkers, however, have derogated metaphor, viewing it as a mere ornament of more correct language usage. Plato viewed poetic diction with such disdain that he banned it from the brave, new Republic he hoped to found.

Plato was not alone in this view of metaphors. Hobbes, for example, noted:

To conclude, the light of human minds is perspicuous words, but by exact definitions first snuffed, and purged from ambiguity; reason is the pace; increase of science, the way; and the benefit of mankind, the end. And, on the contrary, metaphors, and senseless and ambiguous words, are like *ignes fatui*; and reasoning upon them is wandering amongst innumerable absurdities; and their end; contention and sedition, or contempt.

John Locke was not any nicer when he wrote:

...if we would speak of things as they are, we must allow that all the art of rhetoric...are for nothing else but to insinuate wrong ideas, move the passions, and thereby mislead the judgment; and so indeed are perfect cheats and therefore, however laudable or allowable oratory may render them in harangues and popular addresses, they are certainly, in all discourses that pretend to inform or instruct, wholly to be avoided; ...It is evident how much men love to deceive and be deceived, since rhetoric, ...has its established professors, is publicly taught, and has always been held in great reputation.

The curious aspect to these denunciations is that metaphoric language is I clearly used in promoting the theorist's point of view. Plato discussed truth in terms of the allegory of the cave; Locke was not ashamed to have "rhetoric insinuate," "passions be moved," and metaphoric diction "cheat"-all in the first few words of his denunciation. The case for Hobbes is more dramatic. Of the 67 words in his polemic, there are at least eight figures of speech. At that rate, Hobbes could be counted on for 13 per hundred words spoken or about 35-40 per printed page.

Locke offers us a reason for his negative view, and this concerns the role "of metaphor in public rhetoric. Is Locke right? Does rhetorical metaphor cheat and deceive? Although we no longer have much in the way of regular public rhetoric, recent history provides a possibly instructive example in the Kennedy-Nixon Debates. Both candidates began the opening debate with a prepared statement. Kennedy started off with:

In the election of 1960...the question is whether the world... will move in the direction of freedom; in the direction of the road that we are taking, or whether it will move in the direction of slavery...think it's time America started moving again.

Throughout most of his opening remarks Kennedy contrasted some form of moving with some form of standing still, and it came as no surprise, therefore, when Nixon's opening remarks took this contrast into account:

There is no question but that this nation cannot stand still because we are in a deadly competition...We're ahead in this competition...We're ahead

in this competition as Senator Kennedy, I think, has implied, but when you're in a race, the only way to stay ahead is to move ahead...

The significant addition made by Nixon to the idea of movement figuratively conveyed by Kennedy, was to talk about movement in terms of competition. In doing this, he joined the idea of movement and competition A into the metaphor of a race--a race the United States was in need of--winning--and it was this figure Nixon developed in the opening moments of his initial statement.

While no one will be surprised that politicians engaged in public debate use figures of speech, it is surprising to see how clearly these figures convey not only the style but the substance of the speaker. From our point in history, who would deny Kennedy's diffuse restlessness or Nixon's obsessive concern with beating some enemy or opponent in an athletic event such as a race? An examination of the text, and the subsequent history of both speakers, suggests that Nixon did intend to use the figure of a *race* as standing in contradistinction to Kennedy's more open figure of diffuse movement; what is not clear is that he intended to invoke the possibility of losing as well. Nixon's implicit concern with losing was not something he necessarily wanted to share; despite this, the idea surfaces as a consequence of the metaphor. His strategic purpose involved only one of these two implications: to portray movement plus competition in vivid language. The second implication appeared uninvited but revealingly.

A Small Summary and a New, Nicer Approach

One aspect of poetic language used in public rhetoric is that it is supposed to convince listeners of one's point. To determine whether poetic language can be used for practical purposes other than self-aggrandizement or advertising, let us return to the domain of creative problem-solving and see what poetic imagery accomplishes in such contexts.

To discover the way in which creative people actually solve problems, the industrial consultant, William J.J. Gordon (1961) examined the biographies and autobiographies of numerous creative thinkers as well as reports of people in the process of invention. From these data he concluded that the essence of any creative act involves trying to make something strange or unknown into something familiar or well-known or in trying to make something originally familiar or well known into something new or strange.

Four techniques have been used in making the familiar strange or the strange familiar and each involves a poetically playful use of language.

1. Personal analogy, in which the problem solver becomes an object and tries to feel, think, and act like that object. It goes beyond role playing and often involves the poetic category of personification. Keats reported using this technique in writing the poem "Endymion":

I leaped headlong into the sea, and thereby have become better acquainted with the sounds, the quicksands, and the rocks, than if I had stayed upon the green shore and piped a silly pipe and took tea and comfortable advice (cited in Gordon, 1961, p. 24).

2. Direct analogy, in which the problem solver attempts a comparison of parallel facts, knowledge or technology. In actual problem solving situations, Gordon found that analogies from biological science usually were the most fruitful; for example, Brunel solving the problem of underwater construction by watching a shipworm tunnel into a timber.

3. Symbolic analogy, in which the problem solver attempts to devise a highly compressed description of the problem. It is a poetic statement summing up what has been said in other phases of problem-solving, often taking the form of an oxymoron. For example, Pasteur sometimes spoke of anti-toxins as a form of "safe attack" (Gordon, 1961, p. 270).

4. Fantasy analogy, in which the problem solver attempts to solve a problem by wish fulfillment. This technique usually occurs at an early stage of creative problem solving in which the problem has not yet been made strange enough.

Although these techniques may sound like magical incantations, unorthodox and/or poetic language has been shown to be quite helpful in a number of different industrial problem situations ranging from compressing air out of Kleenex boxes to reduce packaging and shipping costs to developing new ways of getting rid of garbage on a Polaris submarine (Prince, 1970).

Perhaps the most unique set of problems to be solved poetically point up the role of figurative language in psychotherapy. As one example

Perhaps the most unique set of problems to be solved peculiarly point up the role of figurative language in psychotherapy. As one example, consider the following excerpt (quoted with permission) from the case of a student seen at a university counseling center. The therapist is a graduate student and although not particularly attuned to metaphor knew a good thing when he heard it. The therapist speaks first:

T: I think I felt a little of your sadness,...and what came to mind to me was this idea of somehow deep inside of not wanting to change...like it's better to keep on wearing the white hat...that sort of confirms the suspicion you had about yourself all along...it's hard to take it off [the white hat].

P: It seems like it's sort of turned grey [faint laugh].

T: Your white hat, you mean?

P: Yeah [both chuckle]. A little dirty.

T: Getting a little dirty, huh?

P: I find myself on...like uh...when you know, like, selling my car. It's sort of like [unclear] I'm not the nice little...uh...I don't find myself wearing a white hat...[pause] I don't know.

T: Are you afraid if you take your white hat off you are gonna end up being an angry monster?

P: Yeah, I think I might.

T: Yeah, let's look at it this way...maybe the angry monster...

P: [Interrupts]...Is a little mouse about this big [holds index and thumb close together, laughs nervously]. The mouse that roared.

T: That would be frightening, wouldn't it? Maybe the angry monster is just as much an illusion as the white hat. The mouse that roared.

Two different views of the way in which metaphor facilitates change in psychotherapy have been proposed. Murray (1986), for example, suggests that the essence of the therapeutic endeavor is to promote personal integra-

tion in terms of the narratives we believe describe our lives. People are their stories, and these stories are constantly in the process of revision. As such, we author our own incomplete understandings of ourselves. Metaphor (with myth) helps us to gather together the strands that we are, and were, and to project into the future what we will become.

Shell, Pollio, and Smith (1987) take a somewhat different point of view. Although they, too, view the development of a new and meaningful narrative as crucial for the patient, they see it as being possible only within the context of a significant relationship between patient and therapist. Both relationship *and* narrative cures, and metaphor serves not only to define the narrative we are and will be (e.g., the mouse that roared), but to facilitate intimate dialogue in which problematic aspect of personal existence are dealt with and resolved. Metaphor not only solves problems, it helps build a shared reality.

Metaphor and Modes of Human Awareness

Analyses such as these validate some of the major points made by Gordon in his description of creative problem solving. Based on these, and other similar examples, Pollio (1980) concluded that there are two basic modes of human consciousness and that much of human experience, creative or otherwise, involves a combination of the two. Although it is difficult to convey exactly what these modes might be, perhaps a listing of some of the more important historical and contemporary concepts dealing with this contrast will help: Husserl discussed unreflected and reflected consciousness; Freud spoke of primary and secondary process; James gave his stream of consciousness both a fringe and a focus; Langer talked of presentational and discursive symbol systems; Polanyi delineated tacit and explicit knowledge; Oppenheimer discussed eternal and

...of presentational and discursive symbol systems, Polanyi demarcated tacit and explicit knowledge, Oppenheimer discussed eternal and historical consciousness, and the vast majority of the rest of us use concepts such as intuitive and analytic thinking. Although we tend to value analytic (explicit) knowledge over intuitive (tacit) knowledge, the scientist-philosopher Michael Polanyi offers a different point of view:

This exalted valuation of strictly formalized thought is self-contradictory. It is true that a traveler, equipped with a detailed map...enjoys a striking superiority over the explorer who first enters a new region--yet the explorer's progress is a much finer achievement than the well-briefed traveler's journey. Even if we admit that an exact knowledge of the universe is our supreme mental possession it would still follow that our most distinguished act of thought consists in producing such knowledge; the human mind is at its greatest when it brings uncharted domains under its control (Polanyi, 1959, p.18).

This insight, that partially intuitive aspects of mind such as occur in metaphoric thinking help to bring uncharted domains under control, forms one cornerstone of *Metaphors We Live By*, a widely discussed book by George Lakoff and Mark Johnson (1980). They contend that figurative imagery is at the base of both our everyday and our more abstract conceptual systems because human concepts are built up, little by little, in terms of experiences having their origin in our continuing interactions in, and with, the world.

To ground their theory in contemporary language use, Lakoff and Johnson analyze ordinary expressions concerning familiar situations. Consider, for example, "Argument," a topic dear to the hearts of linguists (and most college professors) and consider the underlying metaphoric concept: ARGUMENT IS WAR. We say "your claims are indefensible," "he attacked weak points in my argument," "her criticisms were right on target," "I demolished his argument," "Use that strategy, and he'll wipe you out," and "she shot down all of my major points." Not only do we talk about arguments in terms of war, we actually win and lose arguments. The person we are arguing with is an enemy or, at least, an opponent; we attack his or her positions and defend our own. We use strategies; if we find a position indefensible, we abandon it. Although we do not fight in a physical sense, there is a verbal battle, and an argument consists of attack, defend, counterattack. The ARGUMENT IS WAR metaphor is one we live by; it structures and organizes what we do when we argue.

If arguments were not viewed in terms of this implicit metaphoric prototype, no one would win or lose an argument. Lakoff and Johnson propose an imaginary culture in which arguments are structured as a form of dance. Within this context, participants are performers and the goal is to argue in a balanced and graceful way. In this culture, arguments would be experienced differently and we might not even recognize what was being done as "arguing." They conclude: "Perhaps the most neutral way of describing differences between their culture and ours would be to say that we have a discourse form structured in terms of battle and they have one structured in terms of dance (p. 5)."

This example offers some insight into what it means for an implicit metaphor to describe an activity. Arguments are not war, but war defines the contemporary social concept of argument. Lakoff (1986) has gone so far, in recent years, as to claim that metaphors are not figures of speech but figures of thought. We talk about arguments as war because we conceive of and experience them in that way, and we act both in arguments, and elsewhere according to the way we conceive of things. Metaphors do not enliven or explain our concepts; they frequently are our concepts.

Metaphor Goes to College

Since metaphor does all sorts of wonderful things, you might expect a grand reception for it in higher education. This is not the case, and when metaphor has made an appearance in higher education, it usually has been used as a way of diagnosing implicit concepts rather than as a productive activity in its own right. A recent article by William Laramie (1987), for example, examined metaphoric images conveyed by contemporary administrative practices in higher education. Within this context, he discerned seven different styles: (1) the Public Utility Metaphor (serve the customers); (2) the Factory Metaphor (how many units can we turn out?); (3) the Rational Enterprise Metaphor (have computer, will divide and conquer); (4) Plato's Cave Metaphor (the world needs philosopher-kings); (5) the Save the World Metaphor (convert evil doers and evil thinkers); (6) the Political Animal Metaphor (compromise, compromise, compromise) and (7) the Union Shop Metaphor (students need take a back seat to where the action really is-- between employees and employers).

These metaphoric prototypes are meant to describe a variety of administrative styles and atmospheres. What is important about them is not that they exist, but that they guide administrative action as well as faculty (and student) reaction. As Laramie notes, a Factory Metaphor entails additional concepts such as: "Setting targets," "marshaling forces," "maximizing profits," and "specialization"; to which we might add "a bottom line," "generating credit hours," "management by objective" and an executive water closet full of others.

Another way in which metaphors implicitly define university administration concerns faculty evaluations. As Riegler and Rhodes (1986) point out, the evaluation of faculty seems to take place on the basis of five different metaphors; metaphors which frequently are mixed much to the chagrin of the person being evaluated. These five are: the evaluator as a judge who delivers a verdict about *defendants* after listening to evidence; the evaluator as a critic who provides analytic reviews after observing *performers* for possible flaws; the evaluator as an appraiser who determines the current market worth of *objects* by checking their weight, purity and/or other characteristics; the evaluator as an assessor who determines the value of *parcels of land* for investment purposes; and, finally, the evaluator as a rater who handicaps *horses* to predict how they will do in future races depending upon their past performance and the quality of present competition. On the basis of this analysis, faculty members are defendants, performers, objects, parcels of land, and either nags or thoroughbreds.

The problem with so many different prototypes for faculty evaluation is that they frequently get mixed and leave the candidate bewildered as to what went on. Both Handicapping and Rating Metaphors seem to be in operation when we discuss a colleague in the following way: "I say no; there are at least three to five other people who have better records and who will do a better job!", or "Look, this is not Cal Tech; Joe's a good guy and fits in here." As a way of clearing up the evaluation mess, Riegler and Rhodes propose that we make explicit each of these implicit metaphors, and use the most relevant one for a particular evaluative purpose: Issues of salary might use an appraiser's approach; issues concerning termination might use a judge's approach; evaluations dealing with personal improvement might use a critic's approach, and so on.

A more extensive collection and analysis of metaphors in higher education is provided by David Deshler (1985). This multifaceted description of the metaphoric university comes from an analysis of 315 different figures of speech appearing in 83 interview transcripts of conversations with administrators, faculty members, and departmental secretaries at a large state university. While Deshler's article is rich in data and interpretive nuance, the following major points--with some marginal commentary--seem to capture his conclusions.

1. Seventy-five percent of the metaphors in interview transcripts expressed negative emotions, 20% positive, and 5% neutral. Does this mean college professors are unsatisfied, or does it mean that human beings tend to be more colorful in describing complaints than blessings? As Deshler points out in an aside: "Dante was much more graphic in his visualization of hell and purgatory than of paradise."
2. Metaphoric images reflect a cry for increased recognition and status. Check the following list and Deshler's interspersed commentary: "The metaphors, 'slave labor,' 'shophands,' 'cattle,' 'industrial labor force,' 'plumbers,' and 'home-bred boys and girls,' refer to ways some faculty members feel they are treated by administrators who 'ride herd' and 'look down their noses at them.' ...They are 'on the short end' of attention and recognition. All too many are 'prophets that go unrecognized in their own countries.' Younger faculty feel 'squeezed out' and their new ideas are 'squelched' or 'tossed into the wastebasket.' Part-time faculty members are 'warm bodies for spots' and 'feel kicked around' (p. 23)."
3. Many metaphors express a desire for reconciliation and unity. Here, the negative figures include "gaps in communication" and "communication breakdowns"; positive figures stress "the university as family" and "building bridges."
4. The administrative process also comes in for a metaphoric rendering: Administrators live "in their own little world," have a "gestapo attitude," and a "suicidal aristocratic style" in dealing with "life and death trivial issues."
5. When the topic gets to academic responsibility, the metaphors fly. First of all, there are "eroded academic qualities and standards" which "betray the intellect." Some departments go so far as to offer "prostitute courses" which attempt to meet a "smorgasbord approach" to the curriculum. The solution is to have the "guts to require rigor," especially since higher education needs a "transfusion of new blood."

Deshler also examined the specific images used to construct these metaphors; what in literary circles would be called their metaphoric vehicles. Four groups stood out. The first concerned games and gaming; it incorporated metaphors such as the "embarrassment game," the "shell game," the "disappearing carrot game," and the "Catch 22 game." A second group borrowed from corporate life: an "MBA accounting mentality"; a "K-Mart of higher education" where students are treated as "cash paying customers" who have "a shopping-center attachment (to the university)." The final two vehicles consisted of medical and psychiatric concepts: The university is a "sick patient...measured for vital signs" who is "sterile" from an "over-dose of bureaucracy."

Although not major categories, war and fighting also appeared as vehicles. So we have "battles for truth (and turf)," "dog-eat-dog fights," and faculty getting "stabbed," "shafted," and "zapped" by administrators and students who "blitz" faculty by classroom ratings. As an historical aside,

many of these same metaphoric vehicles were found to occur in figures of speech culled from recognized English and American literature written in the period from 1675- 1975 (Smith, Pitts and Pollio, 1981). Although the language in both contexts may be colorful, the selection of metaphoric vehicles providing enlightenment is reasonably constant; perhaps higher education is not in any real danger of imminent conflagration or collapse.

These analyses suggest it is possible to analyze metaphors and have them tell us something we did not know about beforehand. Such analyses compliment the philosophical and linguistic line taken by Lakoff and Johnson (1980) who view the human conceptual system as "fundamentally metaphorical in nature in which figures of speech both specify and create realities." Even though metaphor creates new realities, Lakoff and Johnson feel that normal language competence is adequate to deal with it since neither speaking nor understanding takes place in a vacuum but depends upon the physical, cultural, and perceptual interactions speakers and listeners have with, and in, their world. On this basis a theory of meaning cannot be purely objective, i.e., independent of use, nor purely subjective, i.e., private; instead, it must emphasize specific people in specific situations.

Perhaps the vigor of this argument has impressed scholars; perhaps it just offers a new way of using metaphors to see (or say) something unfamiliar about familiar topics. Whatever the reason, a number of recent articles have attempted to understand one or another domain of experience in terms of the metaphors used to render it. For example, Tomlinson (1986) examined what authors and teachers of creative writing say about creative writing and found that gardening, cooking, mining, and hunting metaphors were used quite frequently. The success of this empirical analysis, coupled with Lakoff and Johnson's more theoretical approach, suggests it would be worthwhile to examine what metaphors college students and professors use in talking about teaching and learning. We now know you can learn a lot about a university on the basis of its metaphors, and we also all know figures don't lie.

Current Metaphors for Teaching and Learning

To examine the implicit metaphors of learning and teaching currently in vogue, a group of graduate students and professors at The University of Tennessee, Knoxville was asked to produce cliched expressions concerning the college classroom. As it turned out, this was an easy task; everyone asked was able to produce at least six or more different expressions or ideas. Within no time at all, a list of over 130 words and phrases was assembled including such unexceptional items as: to cram for an exam, to master course material, ; to jump to conclusions, to move too fast (slow), and so on.

When these figures of speech were examined more analytically, a few combinations were easily apparent, suggesting that many of the figures could be grouped into related categories based on the same underlying theme. The 130 or so figures seemed to organize themselves into three major and a number of minor categories (or models) of teaching/learning. One of these involved containers and dispensers, a second suggested journeys and guides, while a third related to masters and disciples. While these models were not always discrete (sometimes the Journey or Container model suggested an implicit Master), they did incorporate many of the expressions produced.

The Container-Dispenser model turned out to be a conceptual prototype for the largest number of expressions. Within this model, knowledge is viewed as a *substance, material, or source of power*. The instructor is viewed as a *container (filled with content, material, facts)* and the student is viewed as a *vessel (wanting to be filled up)*. Knowledge (the substance) is often rendered as a *food* the instructor *spoon feeds* or just *feeds* to students, who so *cram* for exams that they are no longer *hungry for* knowledge. Students may be requested to *regurgitate* facts on an examination. If the professor *dispenses* knowledge, he or she becomes a *fountain* of information who asks you to *spout* facts on a test. Knowledge is sometimes rendered as a powerful energy source that *turns* you on if you get *struck* by a thought. If *turned on*, you are *enlightened or bright*; if not, you are *dim, dull, or in the dark*. A class deals with its *content or material* which may be *hard (heavy), simple (light)*. The student not only eats knowledge but often is asked to *grasp, get, or retain it in mind*.

Further items filling out the Container model require the student to *swallow an idea*; have *food* for thought, *sink* his or her *teeth* into (an idea), and/ or to *stew over brain food* for a while. The teacher (as dispenser) *gives* information, *puts it into* your head, *throws out* ideas, or may even *hand* it to you on a *silver platter*. The student, as container, may *soak up* or *absorb* facts, *hold* others in memory (mind), *store* information; if the student does none of these, he or she is likely to be *empty-headed*, or just plain *vacuous*. Finally, there is a large residue of *undigested information* we as professors all aspire to possess in the form of a Ph.D. (the letters, as the old joke has it, mean *Piled High and Deep*). Discretion prevents a description of more pejorative definitions for B.S. and M.S.

Other analyses of the teaching/learning process have also discerned variations on the Container-Dispenser model. For example, Gregory (1987)

discussed this view of higher education under the catch-phrase "learning is storage." As he put it: This metaphor "gives us the picture of the mind as a container like a box or a warehouse; a picture that turns learning into storage." In addition, Gregory notes, this metaphor yields a number of correlated metaphors, the most significant of which is that (instructors) are "morally neutral conduits of information." Under this guise, student questions of the type: "How do *you* feel about that?", are sloughed aside in favor of Professor A telling the students what Professor X has said on this topic, what Professor Y has said, and so on. Professor A, thus responds with "just the facts ma'm; just the facts."

A prototype Journey-Guide model also appeared in expressions produced by students and colleagues. For this model, the instructor is someone who *guides* a student who is asked to *follow* the *course* of a lesson if he or she is not to get *lost*. Sometimes the instructor goes too *fast* (*slow*) in *driving* at an important *point*. Despite the fact students are expected to be on the right *track*, the instructor *directs* students to *look for* answers as the *boundaries* of an idea are *explored*. Sometimes, students see the light at the *end of the tunnel*, especially if they haven't *wandered off* and *missed* the *point*. If an instructor is benign, and the topic difficult to *follow*, the professor may *walk* you through it. In some *accelerated* classes you *go over* topics *rapidly* and *cover* a lot of *ground*; in other classes you *slow* down and *mark time*. The student may *fall* behind, and have trouble in *catching up*. Good tests, like good instructors, *move* you to the *next* topic.

Other clichés belonging to this group see teaching as a *step-by-step process that leads* you to a new idea. Sometimes students *stray* from the main *point* or *go around* in circles; at other times, they make good *progress*. Students may get *lost* or *go off* in a *wrong direction*, get *mired down* in facts, and never get to the *center* of an idea. Knowledge, however, *shows* the way, *eases* the journey, and *gives direction*; if only we would *map it* on to the real world.

The final model, which was a bit less consistent than the other two, suggests an aggressive, somewhat martial or athletic Master-Disciple relationship not unlike that between a *tough drill sergeant* and newly *enrolled* recruits. In this model, the *Master drills* the student-*apprentice* in relevant *skills* and *abilities*; these abilities are regularly *examined* as either *attaining* some *standard* set by the *discipline* or some other *authority*. Students do *drills* and/or *exercises* to *master skills* or to learn a (some) *discipline*. After *performing* in a *test* situation, students are *ranked* from best to worst; a student may *live up to potential* and *benefit* from *training* or the student may *fail to achieve* the *required standard*. Through *rigorous and strict apprenticeship*, the mind is *disciplined* and *trained*; the good student becomes *rigorous* and *mentally tough*. Being *tough-minded* is better than being *tender minded*. *Testing* puts students *through their paces* and/or requires them to *jump through hoops*. Students *whip* an exam, *blow it away*, and are required to *defend* their points of view. Good *grades* denote *skill*, *mastery*, and *toughness* according to the *standards* of the Master and/or the *discipline*.

While fragments of other conceptual prototypes also could be discerned in expressions produced by respondents (e.g., an agricultural or gardening metaphor that has *fields* of study, *seeds* of ideas and requires us to *dig* for facts and/or to nurture student *growth*), the three major models seemed to have the most *substance* to them, *cover the ground* best, and to *pass muster* more skillfully than other, will-o'-the-wisp, prototypes. Which metaphorical model professors live by in the college classroom reveals itself in the clichéd words and phrases he or she uses to discuss teaching and learning. While none of us is a pure dispenser, guide, or master, we all tend to feel more comfortable with one or another of these prototypes.

Table 1 offers a convenient schema for summarizing major aspects of these models as they relate to important concepts in higher education such as teaching, learning, knowledge and mind. So, for example, in the Container Model, teaching is pouring (or filling), learning is absorbing, knowledge is a substance or material, and the mind is a container.

Each model also yields a different style of testing. For the Container Model, facts, facts, and more facts are crucial. Testing determines how many facts the student has stored away and is able to produce on demand—it provides his or her level of learning. For the Journey Model, plans of approach to knowledge—which never are attainable since there always are new paths to find or follow—are crucial, and the instructor sets an intellectual course for the student. Testing is a journey of discovery, and facts are neither as important nor as interesting as the student's final approach to the problem. Partial credit is always possible. Finally, the Master-Disciple model sees the instructor as training students who practice until proper mental skills are learned. Testing evaluates the pupil's ability to attain or exceed a standard. If the standard is derived from a quasi-dispenser model, facts are crucial; if the standard is derived from a quasi-journey model, modes of approach and the discovery of new ways of doing things are crucial.

Each model is, of course, an oversimplification. We all use aspects of all three models in developing our own unique styles of teaching and testing. What we all may not do is think about which model we value most, and which model best suits our particular topic and the particular students

we teach. The important point is not that there are one, two, three or more models; the important point is that we become aware of the pedagogic models we live by and thereby come to a reasoned decision about what we do and value in our classrooms.

TABLE 1

**Relationships between Metaphoric Prototypes
and Educational Concepts**

Metaphor Prototype	Educational Concept			
	Teaching	Learning	Knowledge	Mind
I. Container	pouring	absorbing	material (substance)	container (holds)
II. Journey	guiding	making progress	horizon (perspective)	inner eye (sees)
III. Master-Disciple	training	doing exercises	skill (habit)	muscles (acts)

A Final Word About Metaphors and Instruction

There is a famous quote from Lewis Carron concerning Humpty Dumpty and Alice that seems appropriate to the situation we find ourselves in with regard to metaphors, teaching, and learning:

"When I use a word," Humpty Dumpty said, in a rather scornful tone, "it means just what I choose it to mean -- neither more nor less."

"The question is," said Alice, "whether you can make words mean so many different things."

"The question is," said Humpty Dumpty, "which is to be master--that's all."

If we substitute *metaphor* for *word* in Humpty and Alice's dialogue, we have a good start toward understanding what to do with (and about) metaphors of the college classroom. First of all, we have to realize that metaphors and other figures of speech are perfectly ordinary aspects of how we talk and think. There is no way to expunge them from our classrooms without our language becoming stilted, and without interfering with the ordinary flow of conversation that characterizes much of what goes in the classroom whether we teach in the sciences, the arts, or the humanities.

A second point is that often we are unaware of the positive effects metaphoric concepts exert on our ordinary and specialized ways of talking about issues and ideas, and that these (often implicit) concepts shape our way of thinking about and expressing our ideas. Perhaps the major stumbling block to accepting this view is the belief that rational usage can be separated from poetic usage and that rational usage is better. If there is one conclusion to be reached on the basis of what we know about creative human thinking, it must be that both analytic and intuitive processes bring about solutions to problems. We might even go so far as to say that if we restrict ourselves and our students to the seemingly pure language

of analytic thought, we are putting them and ourselves at a disadvantage. In a former day we might have said we are asking them to do something with one hand tied behind their back; we might now say we are asking them to think with only half a brain.

Figures of speech educate in another way. They reveal the often implicit bases on which we think about important issues, such as the nature of the university or what we might have in mind when we reflect on teaching and learning. In the former case, relationships between faculty and administrators (who may adopt one of a number of different styles) seem foremost. In the case of teaching and learning, our clichés indicate professors dispense a knowledge substance, guide students on academic journeys, or help them, master a discipline. Each (implicit) prototype emerges quite easily from an analysis of clichéd figures, and each imposes a different style on the college classroom.

When we turn to novel figures--which are more unpredictable in use but often more significant in application--we soon become convinced that figures of speech are not only nice but also necessary for innovative thinking. A reasonably careful review of the history of creative human thought reveals that metaphors are prominent in all fields of human intellectual endeavor. It seems unfortunate that some thinkers--Plato, Hobbes, and Locke, to name three--have seen fit to stress only the negative in rhetorical uses of figurative language. It is as if, in our own day, we were to take into account only the pernicious effects of metaphors in politics and advertising and not take into account their role in creative thinking, more generally, and in poetry, more narrowly. Like so many other human capabilities, metaphors may be used to obscure as well as to enlighten. The solution is not to turn language into a facsimile of mathematics nor to abandon the attempt to be precise where precision is called for. Mathematics is no more the savior of language than poetry is its confounder. Each language user--the teacher, the scholar, the experimental scientist, the conceptual theorist--will use figurative expression in the presentation of his or her discipline as well as in the way in which that discipline is conceptualized and taught to the next generation of scholars. Figurative usage affords powerful benefits if we understand its advantages and its limitations. The crucial issue is, as Humpty-Dumpty says: "Which is to be master--that's all."

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