OF FALLACIES, FERRIS WHEELS, AND FIGURATIVE LANGUAGE: METAPHOR IN SCIENCE AND TECHNICAL WRITING

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Insofar as poetry, or any other of the arts, can be said to have an ulterior purpose, it is, by telling the truth, to disenchant and disintoxicate.

—W.H. Auden

I've been here before. The elevator doors close behind me, echoing the news of my arrival throughout the tomb-like silence of these narrow corridors. Serious business is conducted here: science, technology, proprietary research. They don't call unless there's a problem. Someone has a deadline. Someone needs a text. Someone can't find the words.

He's been expecting me. From his corner office at the other end of the hall, he hears the elevator and checks his Rolex. Ten-thirty. Good. His rhetorical "hit man" has arrived—the writer. He's been looking for a little anonymous assistance, and he's familiar with my work, with my reputation. I'll come in, listen to his needs, assess the situation, analyze the facts, identify the audience, cut the exist-

ing copy, subordinate a few ideas, turn a clever phrase or two, and, finally, deliver a few precisely-aimed technical bullets into the body of the text, indenting it in several places with cold, hard clarity. Then I'll get away, clean. Later, when the graphics guys show up to copyfit what remains and take the document away, they'll know it was a professional job. But they won't know me, and that's just the way he wants it.

We've never actually met, but I've worked for this corporation, and others like it, in the past. If he's anything like his peers, he seldom thinks of himself as a writer, as someone communicating with readers. Yet now, through various promotions over the years, this is how he spends much of his day. He sees himself as a scientist, an engineer, or perhaps a technologist—in any case, as a numbers man. On his embossed business cards, his name precedes punctuated letters of highly-technical scholastic achievement and a prestigious corporate title. Now in his mid-forties, he is respected for his expertise, secure in his disciplinary identity, comfortable with its language norms and jargon, and, today, afraid to express himself as a person, as a writer conveying a new idea from a humanistic perspective.

"The problem," he laments from behind his large, L-shaped, executive desk, "is that they have been looking at the construction of this unit all wrong. We need to change the way they look at the mechanics—create a whole new thought process. We need to show them that this (he holds up a small metal assembly) currently rotates from these angles, like a fan, but it needs to be a Ferris wheel. I need to say that, you know, write that, without actually writing 'Ferris wheel.' How can I do that? I don't want to come off like some kind of half-baked poet here. You know what I mean. I can't talk about Ferris wheels."

I nod, slowly, respectfully, and offer a look of puzzlement and concern, squinting a bit, raising lines in my forehead, as if I haven't encountered this type of problem before. He reluctantly hands me a double-spaced draft that has been etched in the margins with illegible images of frustration and uncertainty. He gropes the pockets of his sportcoat, finds a fresh pack of cigarettes, lights up, pulls a large glass ashtray toward his chair, and tells me more about the device.

He extends the metaphor, explaining in great detail each facet of his new mental and subsequently physical construct, carefully

relating each aspect of its technical design to the unique balance and movement of the famous carnival attraction. As his description of this otherwise uninteresting little device becomes more lively and animated, I learn that this new approach was actually conceptualized on a crowded midway, far from the sterile silence of his regular nine-to-five. They—the people he needs to convince—really do need a Ferris wheel. Yet, this kind of figurative language, he insists, is not acceptable among his peers—not in writing. He wants me to find another method: no metaphors. He makes it clear that this is why he called me, and I have mixed feelings about it. Sure, I'm glad he contacted me, glad to get the work. But once again, I have to ask myself where these barriers originate. Why do these clients feel an obligation to think in one manner, in one form of language, and communicate in another? And why are metaphors so threatening?

When C. P. Snow delivered the Rede Lecture at Cambridge in 1959, he made some straightforward observations concerning, among other things, some of the polemic attitudes in academia. The transcript of those remarks, a book entitled *The Two Cultures and the Scientific Revolution*, reached nearly a dozen reprints over the next four years. The book formally recognized and served to promote a dichotomy which still exists today. Ironically, this was not Mr. Snow's intention, for early in his presentation he warned that "the whole of Western society is increasingly being split into two polar groups . . . literary intellectuals at one pole—at the other, scientists—and as the most representative, the physical scientists. Between the two—a gulf of mutual incomprehension—sometimes (particularly among the young) hostility and dislike . . . " (4).

From the elementary school science class to the private sector practitioner behind an L-shaped desk, this "two cultures" mentality, this invisible divide between the sciences and the humanities, is created, in part, by the language—and perhaps, more significantly, the forms of language—each is willing to consider. The humanities have profited from a long history of metaphoric development—creating new words, new concepts, and new connections between otherwise disparate ideas. But the sciences, in the daily practice of producing written communication, have shunned the use of metaphor and other forms of figurative language in the name of precision and objectivity. This disciplinary divide is nonproductive at best, limiting learning potential within and beyond the university

while subtly reinforcing a number of pedantic social attitudes.

"To talk in metaphor to serious men and women," Cynthia Ozick observes, "To talk *of* metaphor to serious men and women, is to disengage oneself from the great necessary bond of community . . . all for the sake of a figure of speech . . . first, because they associate metaphor with writers and artists of every sort, and, secondly, because they associate writers and artists with what we always call inspiration" (63).

Should we, as writers and teachers of writing, encourage those who do not see themselves as writers to occasionally leave behind their disciplinary and institutional norms, toss convention to the wind, and join the asymmetrical ranks of the truly inspired? Or, would this request beg the question? Mr. Ferris Wheel found inspiration on the midway. His only real fear was that the resulting technical accomplishments would be overshadowed by a seemingly poetic treatment of the text. His question, in return, would be more pragmatic: why risk the acquisition of a major contract "all for the sake of a figure of speech"?

Identities are definitely at stake within this "two cultures" mentality. Theodore Roszak claims, in *The Making of a Counter Culture*, that Mr. Ferris Wheel's apprehensions about being perceived as "half-baked" are quite justified in the science and technical arena. Scientists will "see fit to assign him a special status, a pigeonhole: call him 'poet' and . . . ," Mr. Roszak contends, "in such a fashion [they] confidently discount and denature the visionary experience, and the technocratic order of life rolls on undeterred, obedient to the scientific reality principle" (239). From the scientists' point of view, then, we can remain analytic and hope to be taken seriously, or we can use metaphors and become instant poets, who are obviously not. This entire use-of-metaphor question may be seen as a kind of "freedom of speech" issue, encumbered as it is by the underlying politics of pejorative disciplinary attitudes.

How does a simple figure of speech become, at once, so symbolic and so misunderstood? From the Greek—metapherein, meaning "to transfer," dictionaries tell us that metaphor is a figure of speech in which a word or phrase literally denoting one kind of object or idea is used in place of another object or idea to suggest a likeness between them. Metaphor creates "as being" relationships between specific concepts and abstract ideas. In the practice of analogy, a pen is *like* a sword, but in the practice of metaphor, a pen *is* a sword.

To offer additional information, extended metaphors allow readers to understand new ideas within specific contexts, such as this definition of the term 'metaphor':

> From the fertile soil of figurative language grow concepts called analogies. They grow from the seeds of inference and yield the solid fruit of metaphors. A metaphor is something you can sink your teeth into; it is of lasting substance—it nourishes thoughts, giving color and taste to new ideas while occasionally dropping new seeds of inference.

This extended metaphor describes our topic in relation to analogy, inference, and figurative language in general. While this is not a suitable replacement for the dictionary definition, it conveys a new type of contextual information, beyond denotative values, through a demonstration of relative meanings and causal relationships. Writers may use extended metaphors to develop new patterns of understanding, but these patterns must rely on a contextual fabric that is tightly woven with individual threads of universal experience. By pushing at the limits of language, metaphors challenge readers to accept unfamiliar connections and unique ideas, but they also challenge writers to maintain a clear sense of audience.

When we are "under a lot of pressure" because our "cash flow" has been restricted by a lack of "liquid assets," we seldom consider ourselves to be thinking metaphorically. As language grows in response to our changing needs, metaphors like these appear constantly in all forms of communication. Jeremy Campbell, author of *Grammatical Man—Information, Entropy, Language, and Life*, finds metaphors "an essential part of everyday speech, not mere decoration, because they often contain multiple connections among ideas and therefore communicate a great deal of information in a brief phrase" (251). From this linguistic perspective, metaphors are not the ornate, brass-plated figures of speech that most technical writers fear. As an inherent component of the English language, metaphors represent an important tool for the construction of new ideas.

The principal objection to metaphor in the scientific community has been its association with ambiguity. Scientific writing has enhanced scientific achievement through clarity, precision, and objectivity, and scholars in the humanities will not dispute the need for this approach to understanding the unknown. But the introduction of

metaphor to scientific and technical prose will only promote ambiguity if used improperly, just as improper use of statistics will achieve the same result. Unfortunately, however, the comments of writer-philosopher Jean-Paul Sarte represent the opinions of many science and technical writers:

> What distinguishes literature from scientific communication is that literature is ambiguous. The artist of language arranges words in such a way that, depending on how he emphasizes them or gives weight to them, they will have one meaning, and another, and yet another, each time at different levels (7).

While the depth of meaning in some forms of literature may coincide with Sarte's description, his observation is clearly not indicative of writing in the humanities in general. This misconception, however, is at the center of scientific concern about the use of metaphoric language. Herman Weisman, author of *Basic Technical Writing*, tells us that "the technical writer is obligated to be precise in his communication . . . in those instances when he needs to refer to a color . . . the technical writer will describe colors by their chromatic or achromatic scales" (255). Professional writers in favor of figurative language are not likely to describe a chemical compound, beam of light, or soil sample as merely "red." It is equally unlikely that they prefer descriptions such as "barn red" or "Indiana University red." On the contrary, humanistic elements may be incorporated in science and technical writing in broader contextual terms that do not impede clarity or precision, and metaphor is often an appropriate tool to achieve this end.

Another common argument against the humanistic perspective found in metaphor concerns objectivity. In *Writing for Technical and Professional Journals*, John Mitchell suggests the following approach to scientific and technical composition:

> Perhaps the only way to differentiate between informative and persuasive writing . . . is to determine the purpose of a specific piece of writing. Writers of both types present and explain facts. The informative writer, however, does so objectively. He exposes, as it were, data for consideration. The persuasive writer, on the other hand, selects his data subjectively and arranges it in a pseudo-logic designed to lead the reader into accepting the writer's evaluation. The use of pseudo-logic permits the

> introduction of human elements . . . the writer of professional and technical articles must avoid those techniques which signal the use of human elements (89.90).

These assertions regarding "pseudo-logic" and "human elements" clearly illustrate the kind of unprecedented, elitist attitude that continues to split the sciences and humanities. In a recent article published in *College English*, David Dobrin, Assistant Professor at the Massachusetts Institute of Technology, observes that "there is no standard of objectivity which could make one group of people or judgements more or less objective than the other. The objectivity of technical writing can only be different in kind, not in degree from other kinds of objectivity" (240).

The scientific "kind" of objectivity that Mr. Mitchell promotes is based on the use of nominalizations, passive voice, and a lack of "first person" perspectives and figurative language. To preserve objectivity, he offers a plug-in-the-facts framework for all professional and technical journal writing—eliminating any hopes for originality while implicitly diminishing any sincere concern for the reader. In further promotion of "fixed-formula organization," designed to project an "aura of objectivity," Mr. Mitchell finds it "interesting to note tht writers who object to such writing-by-formula as suppressing their own identity are in effect complaining that they are not allowed use of the human elements which belong to persuasive rather than informative writing" (90). The irony of this bias against "human elements" is that Mr. Mitchell's book was published as part of the Wiley & Sons *Human Communications Series*, further testimony to the cliche' "you can't tell a book by its cover."

The degree to which metaphoric language is effective or worthwhile depends largely on the extent of the metaphor, the receptivity of the audience, and the purpose it is designed to achieve. Technical information in each of the natural and applied sciences may take the written form of reports, proposals, journal articles, dissertations on non-experimental research, or experimental and descriptive studies. Purposes vary; many texts are written to inform and persuade—equally. Individual writers must accept the responsibility of judging the appropriate level of metaphoric language within a particular genre. Problems arise when science and technical writers find themselves so bound by disciplinary conventions that they allow these norms to annul their commitment to readers, thus compromising a concern for the effective conveyance of meaning in favor of

language norms. The text suffers, and linguistic stereotypes are propagated.

Writers must feel free to define rhetorical aims and choose the methods of development that best suit those aims. The choice to use figurative language should be no exception. According to Frank Smith, in *Essays Into Literacy*, "models and paradigms are more than perspectives; they are all-encompassing all-confining nets within which thought is organized and trammeled. Thus, metaphor can limit what inquiry will consider" (117). Mr. Ferris Wheel wanted to sell a metaphorically conceived idea, and he knew that he needed "to change the way they look at the mechanics." He wanted to "create a whole new thought process," to use his metaphor, to share his process of discovery, to expand the limits of inquiry. But poets, he has learned along the way, don't receive major government contracts. Yes, by declining to use figurative language in his text, he made a required judgement—but on what grounds?

This "two cultures" mentality, this "identity crisis," should be a topic for discussion among students and faculty in college-level cross-disciplinary writing courses. At lower grade levels, teachers can work to dispel associated misconceptions through writing assignments that encourage metaphoric thinking—in all disciplines. We are, after all, simply writers and readers, expressive and receptive, learning what we can. We should know by now that many more students will eventually pursue careers as writers than those who will be formally referred to as such, and, as individual readers, our continuing intellectual maturity will be the result of a constant, sincere, and inmost desire to know—hopefully leaving grand disciplinary allegiances somewhere on the periphery.

Many of the writings of Ruldolf Arnheim illustrate the cross-disciplinary directions of metaphor. As disciplinary barriers are broken and all forms of language are free to move throughout the realm of inquiry, metaphor will play a stronger role in the conceptualization of new scientific and technical ideas. Mr. Arnheim explains:

> Words are monuments to the close kinship between perceptual experience and theoretical reasoning. They can promote the cross-fertilization between the two when, in the use of language, attention is paid to the perceptual matrices from which intellectual terminology is derived. This is the specialty of poets and other writers . . . Their services are needed for the survival of productive thinking in the sciences . . . decisive

> relations between components must show up: cause must aim at effect, correspondences, and symmetries; hierarchies must be clearly presented—an eminently artistic task, even when it is used simply to explain the working of a piston engine or shoulder joint . . (Maimon 317, 318).

This attention to perceptual matrices creates metaphor, allowing us to see Ferris wheels in new ways. We need—we have a responsibility—to share these discoveries with others, so that they too will attempt to see things differently and find new meanings for themselves. "The humanists, for their part, might take considerable satisfaction watching their scientific colleagues confess openly to not knowing everything about everything," says Lewis Thomas, "and the poets, on whose shoulders the future rests, might, late nights, thinking things over, begin to see some meanings that elude the rest of us" (155). In any case, scientists and poets should be able to think of themselves first as writers. They should be free to speak the same language without apprehension, and perhaps we can begin to dismantle a few disciplinary barriers by changing the way we, and others, think about this particular figure of speech.

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