TOWARD SOCIOCULTURAL SENSITIVITY IN RHETORICAL STUDIES OF ANALOGY: THEORETICAL AND METHODOLOGICAL CONSIDERATIONS

JOSEPH LITTLE
University of California, Santa Barbara

ABSTRACT
In their macroscopic approach to analogy, rhetorical studies project the latent assumption that sound analogical reasoning is a universal property of human consciousness rather than a socioculturally inherited practice that varies over time and place. After drawing briefly from landmark work in the social sciences to show notable cases of cultural variation in analogical reasoning, I present Lev Vygotsky’s concept of internalization and Dedre Gentner’s structure mapping theory of analogy as fruitful theoretical and methodological avenues through which to detect sociocultural variation in analogical reasoning practices in science.

INTRODUCTION
At the heart of classical rhetoric lies the syllogism. Introduced by Aristotle in the fourth century BC, it provided Athenian orators with structural guidance for constructing valid deductive arguments in the polis [1, p. 40; 2; 3]. Here, I offer its simplest form through the canonical example involving Socrates:

All men are mortal.
Socrates is a man.
Therefore, Socrates is mortal.

The conclusion that Socrates is mortal is not without qualification in classical rhetoric: In fact, it follows necessarily from the premises only for an audience
comprised of men acting in accordance with orthos logos, or “right reason” [4, pp. 1935, 1936; 5, pp. 1766, 1797, 1798, 1808, 1812, 1819]. Right reason was not thought of as an innate ability “present in us from birth” but a developed property of consciousness that “comes to us if growth is allowed to proceed regularly” [4, pp. 1939-1940]. When such growth does proceed regularly, the prudent man, replete with a sort of cultural wisdom and acting in accordance with orthos logos, emerges [5, p. 1748]. Put more generally, then, the validity of Aristotle’s syllogism rests not upon a bedrock of universal logic but on intersubjective agreement, implicit as it might be, among the enculturated Athenian citizens of his time.

Today, we seem to overlook the significance of orthos logos in our own work. As we apply, without qualification, the terms of classical rhetoric to an increasingly complex cadre of sociocultural situations, we project the latent assumption that the constituent cognitive processes, such as syllogistic and analogical reasoning, are universal properties of human consciousness. For example, the conclusion that Socrates is mortal seems so evident to us from the premises that we assume the concept of syllogistic reasoning can be rightfully divorced from sociocultural context. Such an assumption, however, is a mistaken one: In The Making of Mind, Alexander Luria describes the cultural differences in syllogistic reasoning that he observed among the remote villagers of Uzbekistan and Khirgizia, “where great discrepancies between cultural forms promised to maximize the possibility of detecting shifts in the basic forms, as well as in the content of people’s thinking” [6, p. 60]. Although the villagers were adept at reasoning from practical experience, concludes Luria, they were unable to reason syllogistically for three reasons.

The first was a mistrust of initial premises that did not arise out of their personal experience. This made it impossible for them to use such premises as a point of departure. Second, they failed to accept such premises as universal. Rather, they treated them as a particular statement reflecting a particular phenomenon. Third, as a result of these two factors, the syllogisms disintegrated into three isolated, particular propositions with no unified logic, and they had no way in which to channel thought into the system.... Although our nonliterate peasant groups could use logical relations objectively if they could rely on their own experience, we can conclude that they had not acquired the syllogism as a device for making logical inferences [6, pp. 79-80; my emphasis].

That the villagers were unable to reason syllogistically does not contradict the Rhetoric once we recognize the significance of orthos logos in Aristotle’s work. Instead, it simply underscores the need for us to acknowledge the sociocultural origins of reasoning as we venture further in time and place from the original setting in which the Rhetoric was conceived.

In this article, I sketch a sociocultural path for future rhetorical studies of analogy. I begin by reviewing a portion of the rhetoric of science literature to
illustrate our present predilection for treating analogy as a universal concept. Afterward, I draw briefly from landmark work in the social sciences to show notable cases of cultural variation in analogical reasoning before suggesting Lev Vygotsky’s concept of internalization and Dedre Gentner’s structure mapping theory of analogy as fruitful theoretical and methodological means through which to acknowledge and act upon, in our own work, the sociocultural variation that exists in analogical reasoning in science.

PORTRAYING ANALOGY AS A UNIVERSAL DEVICE

That rhetoricians of science implicitly portray analogy as a universal device owes at least in part to the macroscopic conception of analogy inherent in their approach [7, p. 69]. By treating analogy macroscopically, that is, as a fundamental device that operates in a collective way, rhetoricians of science seem inclined to focus their analyses solely on the varying rhetorical effects of what they see as a cognitively invariant device; this eclipses from critical examination the possibility of cultural variation in the interpretation of the analogy itself. In short, our macroscopic conception of analogy lacks the “resolving power” necessary to detect the nuanced yet profound differences in analogical reasoning that exist across cultures and within cultures over time.

To illustrate this point, consider the work of Alan Gross. “[A]nalogy,” he explains, “has had a long history in the sciences. An important device in Aristotle’s scientific writing, it is still very much in use today: the concept of the genetic code is a scientific analogy” [8, p. 22]. Gross then examines the function of analogy in the political oration of Franklin Delano Roosevelt, the scholarly debate between Karl Popper and Thomas Kuhn, and the scientific theorizing of Francis Crick and company to show that analogy functions differently in each domain, representing different disciplinary communication strategies [8, pp. 21-32]. However, nowhere in the analysis was the analogy itself dissected and examined; what is more, I am suggesting that insofar as Gross remains indebted to a macroscopic conception of analogy, he is unable to do otherwise. Because his conception of analogy lacks a sufficient level of methodological granularity, he is virtually forced to tacitly assume that analogy is a universal device, perhaps used differently in different contexts, but interpretively stable over culture and time.

Indeed, analogy has had a long history in the sciences. But how do we know that the analogy of Aristotle’s day approximates the analogy of today, that is, that analogy has been interpreted uniformly over the history of science and across the three domains of interest to Gross? In fact, as rhetoricians of science, we do not, and therein lies the latent assumption of interpretive invariance.

Likewise, in his work on the Origin of Species, John Angus Campbell investigated Darwin’s domestic breeder-natural selection analogy insofar as it served Darwin’s supposed strategy of portraying natural selection through everyday language. But again, I find it interesting that at no time throughout his work [9-13]
does Campbell disassemble the cardinal analogy of natural selection and ask what the audience might have construed as logical consequences of the constituent correspondences individually. Without such work, we are left to our imaginations in understanding the set of candidate inferences the analogy was likely to suggest to Darwin’s Victorian society, to Darwin’s proximate audience, and to Darwin himself, or to detect any variation in analogical inference across these domains.

In neuroscience, the tendency remains the same. Edwin Clark and L. S. Jacyna examine the heuristic role of several analogies within neuroanatomy and neurophysiology in *Nineteenth-Century Origins of Neuroscientific Concepts*. Here, we learn of the paradigm shift effected by the encephalon-spinal cord analogy, which not only interjected the term “ganglion” into cerebrospinal terminology but also recast the brain as a “conglomeration of ganglia” [14, p. 31]. This set the stage for Franz Gall and Caspar Spurzheim’s attempt to unify all vertebrates under the ganglion concept through an analogy between ganglion system growth and plant system growth [14, pp. 36 and 45]. Clark and Jacyna also tell the story of Gustav Valentin and Jan Purkyne’s “imaginative leap” by analogy to show that ciliary motion, which was known to occur on the external surfaces of invertebrates, also occurs inside vertebrates, particularly on the ventricles of the brain [14, p. 66]. However, like Gross and Campbell, Clark and Jacyna resist detailed explication: Rather than disassemble the driving analogies in their subject, they approach them macroscopically, which precludes from examination the possibility of cultural variation in analogical reasoning.

To summarize so far, rhetoric of science has come a long way in the past three decades in understanding the probative, heuristic, explanatory, cognitive, and epistemic value of analogy in science. Because of our macroscopic conception of analogy, however, we have tended to approach analogy as a universal device divorced from sociocultural influence. Only by reorienting ourselves theoretically and methodologically toward a sociocultural approach to analogy will we be able to begin to investigate the possible variations that exist across cultures and within cultures over time as well as their subsequent rhetorical effects. In the following section, I attempt to begin such a reorientation through Lev Vygotsky’s concept of internalization and Dedre Gentner’s structure mapping theory of analogy.

**TOWARD A CULTURALLY SENSITIVE APPROACH TO ANALOGY IN SCIENCE**

If analogical reasoning did not admit of cultural variation with respect to interpretation, then a universal conception of analogy, which the macroscopic approach seems to suggest, would be appropriate, even ideal. However, such is not the case: In Andrew Ortony’s anthology *Metaphor and Thought*, for example, Dedre Gentner and Michael Zajonc acknowledge the sociocultural variation in analogical reasoning through their examination of its dramatic shift in interpretation in 17th-century chemistry:
The alchemists relied heavily on similarity and metaphor in their investigations of the nature of matter; but their use of similarity differed sharply from that of modern scientists. In particular, the alchemists lacked a sense that analogy in the modern sense had any advantage over surface similarity or over metonymic, richly interconnected but unclarified forms of similarity and metaphor. . . . The marked difference in the style of analogizing between the alchemists and later scientists suggests that the uses of analogy and similarity are in part culturally defined [15, p. 475].

Even more pertinent is Gentner’s finding that literary communities are more accepting of nonclarified similarity than are scientific communities; likewise, Shen [15, p. 476] has argued that the rich, many-to-one mappings of literary metaphor are met with skepticism in modern scientific discourse, where clarified, one-to-one correspondences are preferred.

What, then, can account for the relative stability of analogical interpretation within individual discourse communities (e.g., modern physics or English literature) while simultaneously acknowledging its instability across communities (e.g., physics compared to English literature) and across time (e.g., alchemy compared to modern chemistry)? If rhetoricians of science are to begin to orient themselves toward such cultural contingencies, then attending to these fundamental questions seems the most appropriate place to begin. To do so, I turn to Lev Vygotsky and Dedre Gentner for theoretical and methodological assistance, respectively.

Vygotsky’s concept of internalization is best understood within the context of language development in children. Unlike Jean Piaget, who conceived of language as originating in the individual and proceeding outward toward social interaction, Vygotsky reversed the trajectory of development: “The primary function of speech,” he explains, “in both children and adults, is communication, social contact. The earliest speech of the child is therefore essentially social” [16, pp. 34-35]. For Vygotsky, language develops in response to a social impetus; presumably, children realize their dependence upon the services of their caregivers, and any system of gestures, symbols, or cries that facilitates receipt of those services will do. Over time, children and caregivers negotiate a mutually acceptable system of language, predominantly oral, through which to interact, and it is within this interaction that the origin of socialization lies.

At some later point in the development process, children begin to use their language of social interaction for personal activity; when confronted with a problem, for example, they begin to talk to themselves, that is, they begin to engage in egocentric speech. This form of speech does not merely accompany

1 Likewise in the West, Harry Stack Sullivan espoused an interpersonal theory of psychiatry which held that buried deep within each individual, before speech is learned, are “certain gross patterns of relationship” that are acquired through early social interaction with caregivers, and upon these patterns of relationship “a great deal more is superimposed or built” [19, p. 6].
personal activity; rather, it directs it, becoming “an instrument of thought in the proper sense—in seeking and planning the solution of a problem” [16, p. 31]. Echoing the ontological relativism of Edward Sapir, Vygotsky remarks:

By means of words children single out separate elements, thereby overcoming the natural structure of the sensory field and forming new (artificially introduced and dynamic) structural centers. The child begins to perceive the world not only through his [sic] eyes but also through his [sic] speech. As a result, the immediacy of “natural” perception is supplanted by a complex mediated process . . . [17, p. 32].

Still later in the development process, egocentric speech diminishes and ultimately disappears altogether; however, again in stark contrast to Piaget, Vygotsky insists that egocentric speech does not merely atrophy but “goes underground” to form the condensed language of inner speech, which continues throughout adulthood in shaping thought and subsequent action [16, p. 33]. This entire process of internalization, from social to egocentric to inner speech, is one that Vygotsky does not take lightly:

The greatest change in children’s capacity to use language as a problem-solving tool takes place somewhat later in their development, when socialized speech (which has previously been used to address an adult) is turned inward. Instead of appealing to the adult, children appeal to themselves; language thus takes on an intrapersonal function in addition to its interpersonal use. When children develop a method of behavior for guiding themselves that had previously been used in relation to another person, when they organize their own activities according to a social form of behavior, they succeed in applying a social attitude to themselves. The history of the process of internalization of social speech is also the history of the socialization of children’s practical intellect [18, p. 27].

The implications of the social origins of inner speech are paramount when we consider the relation between language and thought that Vygotsky held. Language, for Vygotsky, is the primary prerequisite for conceptual thought; it is the conceptual quality of the word that mediates our sensory perceptions of the immediate moment to enable a “generalized reflection of reality” [16, p. 6]. This frees us from the immediate moment both visually and temporally. According to Vygotsky, language enables children to reorganize and reconstruct their visual perception, thus “freeing themselves from the given structure of the [visual] field” [16, p. 35]. He continues:

With the help of the indicative function of words, the child begins to master his [sic] attention, creating new structural centers in the perceived situation. As K. Koffka so aptly put it, the child is able to determine for herself [sic] the “center of gravity” of her [sic] perceptual field [17, p. 36].

Visual perception aside, language also enables children to construct a temporal continuum from past through present to future. This enables the child
to “view changes in his [sic] immediate situation from the point of view of past activities, and he [sic] can act in the present form from the viewpoint of the future” [17, p. 36]. Vygotsky continues:

Through verbal formulations of past situations and activities, the child frees himself [sic] from the limitations of direct recall; he [sic] succeeds in synthesizing the past and present to suit his [sic] purposes. The changes that occur in memory are similar to those that occur in the child’s perceptual field where centers of gravity are shifted and figure and ground relationships are altered. The child’s memory not only makes fragments of the past more available, but also results in a new method of unifying the elements of past experience with the present [17, p. 36].

It is through this conceptual reflection of reality, acquired through the internalization of social discourse, that we acquire such cognitive processes as syllogistic and analogical reasoning. What constitutes a valid interpretation of analogy in a given time or place, then, is not only genetically but also culturally inherited through the tacit structures of the ambient discourse of that time or place, from infant caregiving through primary, secondary, and advanced schooling. To communicate as infants, we must adhere, to some degree, to the local norms for symbolic activity, which we, in time, turn inward as tools for our own problem-solving activities. Yet the process does not stop there: To communicate as adult members of a particular discourse community, we must adhere, to some degree, to the local norms for symbolic activity as well, which we, in time, turn inward as tools for our own problem-solving activities2. And therein lies the sociocultural origins of analogical reasoning, which explains, at least conceptually, the relative stability of analogical interpretation within individual discourse communities while simultaneously acknowledging its instability across communities and across time.

To the extent that rhetoricians of science wish to investigate such variation in interpretation, they are unable to do with without incorporating a more socioculturally sensitive theory of analogy that is capable of detecting the nuanced differences in analogical interpretation. To this end, I suggest through the remainder of this article Dedre Gentner’s structure mapping theory of analogy as a fruitful means through which to begin to engage sociocultural variation3.

One of the dominant theories in the current cognitive psychology literature, Gentner’s structure mapping theory of analogy is a theory of analogical interpretation. It is structuralist in the sense that it assumes that knowledge may be adequately represented as propositional networks of nodes and predicates. As

2 A particularly interesting example is the relatively cloistered use of what Platt [20, p. 347] calls the “strong inference.”
3 It should not be surprising that Gentner and Jeziorski are among the few to study sociocultural variation in analogical reasoning; Gentner’s structure mapping theory is one of the few theories of analogy sufficiently granular in its approach to detect such differences.
such, the structure mapping theory requires only three terms: objects, attributes
assigned to objects, and relations between objects.

Attempting to “capture . . . the descriptive constraints that characterize the
interpretation of analogy and similarity” [15, pp. 448 and 450], Gentner’s structure
mapping theory of analogy sets forth six principles that, she claims, account for
analogical interpretation among modern Western scientists:

1. Structural consistency. Objects are placed in one-to-one correspondence
and parallel connectivity in predicates is maintained.
2. Relational focus. Relational systems are preserved and object descriptions
disregarded.
3. Systematicity. Among various relational interpretations, the one with the
greatest depth—that is, the greatest degree of common higher-order rela-
tional structure—is preferred.
Further relations and associations between the base and target—for
example, thematic connections—do not contribute to the analogy.
5. No mixed analogies. The relational network to be mapped should be
entirely contained within one base domain. When two bases are used, they
should each convey a coherent system.
6. Analogy is not causation. That two phenomena are analogous does not imply
that one causes the other [15, p. 450].

What I am suggesting is that these six principles provide a methodologically
rigorous (e.g., falsifiable) means through which to begin to investigate socio-
cultural variation in analogical interpretation and its subsequent rhetorical effect.
No longer confined to discussing how analogy operates collectively and uni-
versally, rhetoricians of science may begin to perceive analogical activity through
the lens of Gentner’s theory: through structural consistency, which separates
to some degree traditionally medieval from traditionally modern thought proc-
tesses; through relational focus; through systematicity, which seems to vary
with respect to the intellectual maturity of the disciplinary context in question
(cf. early to modern cell biology in terms of increased mathematicization and
its effects on appropriate reasoning processes); through extraneous and mixed
correspondences; and through causation, which seems to separate to some degree
mystical reasoning from what is traditionally considered modern reasoning.

Put another way, I am suggesting an alternative to nomothetic idealizations
of cognitive processes, such as syllogistic and analogical reasoning, by way of
Vygotsky’s theoretical guidance and Gentner’s methodological tool for discovery.
Ultimately, however, whether or not we embrace the specifics of Vygotsky or
Gentner, it seems necessary to strive for increased sociocultural sensitivity in our
work if we hope to keep up with the changing social dynamics of that multicultural
enterprise we call science.
ACKNOWLEDGMENTS

I would like to thank Chuck Bazerman of the University of California, Santa Barbara, for his deeply insightful course on sociocultural learning theory. Also, I
would like to thank Alan Gross and Art Walzer of the University of Minnesota for ensuring I received an education in classical rhetoric that would sustain my future endeavors.

REFERENCES


**Other Articles On Communication By This Author**


Direct reprint requests to:

Joseph Little
133 Deforest Road
Toronto, Ontario
Canada M6S 1J7