Of Blind Men and Elephants: Some Thoughts on a Learning-Centered Approach for Bridging the Gulf Between the Arts and Sciences

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Abstract

More than forty-five years after the publication of C.P. Snow's essay on *The Two Cultures and the Scientific Revolution*, the "gulf of understanding" he described between scholars in the sciences and humanities appears to have grown ever larger, with disciplinary knowledge becoming more specialized and incomprehensible to those outside of the field. Suggestions for bridging the gap have often been perceived as attempts by one side to colonize another's intellectual territory, further increasing the level of distrust and misunderstanding between scholars of the various disciplines.

Yet from a learner's point of view, exposure to a variety of discipline-based viewpoints and methodologies can still have great value within a broadly based liberal arts education, provided that there is a degree of coherence in their presentation. Centered on the Buddhist parable of the Blind Men and the Elephant, the author of this paper offers an example of a learning-centered approach to highlighting areas of common intellectual ground, while preserving the strengths found in distinct areas of disciplinary expertise.

Introduction

A version of this paper was originally presented at the 2006 Oxford Round Table on Arts and Science, held at Harris Manchester College on July 9-14, 2006. Loosely organized around C.P. Snow's 1959 Rede Lecture entitled, *The Two Cultures and the Scientific Revolution,* the discussion included participants representing various aspects of the arts and sciences from a range of American educational institutions at the elementary, secondary, and post-secondary levels. The goal of my paper is to present a very brief discussion of some of the issues raised in Snow's essay and subsequent responses, and to offer one possible method for helping to bridge the cultural gap between practitioners of the arts and sciences in academia, through an emphasis on the development of critical and creative thinking skills within the framework of a general education program. In keeping with the paper's theme, techniques in both critical and creative thinking are utilized throughout, and the discussion begins with a (hopefully useful and relevant) metaphor.

According to a sutra from the *Udana*, one day the Buddha was approached by a group of

his followers, who inquired about the many ascetics and holy men living in the area with their widely varying and often contradictory views about the nature of reality and spirituality. The Buddha responded with a parable about an earlier king, who had ordered that all of the local men who had been blind from birth be brought together and presented with an elephant. After each of the blind men had explored a different portion of the elephant, they were asked by the king to describe the beast.

Those among the blind who had touched the head of the elephant replied, 'an elephant, your majesty, is just like a water jar.' Those who had felt the ear of the elephant replied, ‘an elephant… is just like a winnowing basket.' Those presented with the tusk of the elephant replied, 'an elephant… is just like a plowshare.' Those confronting the trunk replied, 'an elephant… is just like a plow pole.' The ones at the hindquarters pronounced, ‘an elephant… is just like a mortar.’ Those feeling the massive body replied, 'an elephant… is just like a storeroom.' Those touching the foot replied, 'an elephant… is just like a post.' And those at the tail of the beast responded, 'an elephant, your majesty, is just like a broom.'

The blind men proceeded to debate among themselves about the true nature of the elephant, each believing passionately that their answer was the only true one, based (literally) on the evidence at hand. Eventually the disagreement became so heated that the participants began beating one another with their fists. According to the story, the king had been delighted with the spectacle, while the Buddha saw the tale as a metaphor for the disputations of the local holy men, saying:

> Some recluses and brahmans, so called,
> Are deeply attached to their own views;

People who only see one side of things
Engage in quarrels and disputes. (Udana VI.4)[1]

While acknowledging that the story depicts a rather cruel and arbitrary abuse of power by the monarch in treating his blind subjects in such a way for his own amusement, the parable does admirably demonstrate the shortcomings of an exceedingly narrow focus, or to mix in another well-known metaphor, of 'not being able to see the forest for the trees.'

In the publication of his 1959 Rede lecture entitled, *The Two Cultures and the Scientific Revolution*, Charles Percy Snow articulated his perception of a growing cultural divide between scientists and literary intellectuals. Snow wrote that he had observed, "a gulf of mutual incomprehension – sometimes (particularly among the young) hostility and dislike, but most of all lack of understanding."[2] The idea struck a nerve within the intellectual community at the time, and Snow expanded on his original thesis in the second edition of his work, published in 1964.[3] In this expanded edition, Snow acceded to those who had criticized his lack of mention of the disciplines comprising the social sciences,[4] and in response proposed that these fields constituted a potential "third culture" within the academic community, which could serve as a bridge across the chasm separating the original two groups.[5] In the following years, subsequent authors have elaborated on Snow's observations, expanding the "two cultures" to include the sciences and humanities in general, and the issue remains a periodic source of debate and concern within the academic community to the present day.[6] As many of these writers have

[1] Adapted from: John D. Ireland, trans., *The Udana: Inspired Utterances of the Buddha* (Kandy, Sri Lanka: Buddhist Publication Society, 1990), 91-4.
[2] C.P. Snow, *The Two Cultures and the Scientific Revolution* (Cambridge: University Press, 1959), 5.
[3] C.P. Snow, *The Two Cultures: and A Second Look* (Cambridge: University Press, 1964).
[4] See especially Asa Briggs' review of Snow's lecture in *Scientific American* 201 (1959), and the review published in the *Bulletin of the Atom Scientists* 16 (1961).
[5] Snow 1964: 69-71.
[6] E.g. Roger Kimball, "The 'two cultures' today," *The New Criterion online* 12, no. 6 (1994), Hhttp://www.newcriterion.com/archive/12/feb94/cultures.htmH; Roy Porter, "The Two Cultures Revisited,"

observed, academic specialists in the sciences and humanities still seem to be talking past one another much of the time, and speaking different languages as they do.

From the time of its publication, another criticism of Snow's work has been that, although taking some pains to appear even-handed in its treatment of the two cultures, his initial essay actually served as an indictment of the humanities and an *apologia* for the sciences. Snow portrayed literary intellectuals as synonymous with "traditional" culture, the members of which he considered to be "natural Luddites," who were "unscientific… on the point of turning anti-scientific," and "wishing the future did not exist."[7] Beginning with F.R. Leavis in 1959, critics have pointed out that Snow's characterizations of literary culture tended to be poorly defined, overly generalized, and even dismissive.[8] While a full discussion of these critiques is beyond the scope of this short presentation, they do appear to represent a view held by many scholars in the humanities, that Snow understood the nature and details of their work poorly if at all - much as Snow had posited a lack of comprehension among literary intellectuals for the ideas and achievements of scientists.

In the years since the publication of Snow's works, there have been periodic calls for a variety of additional and alternative "third culture" solutions to bridging the divide between the

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boundary 2, Vol. 23, No. 2 (Summer, 1996) , pp. 1-17; Raymond Tallis, *Newton's Sleep: The Two Cultures and The Two Kingdoms* (New York: St. Martin's Press, 1996), with bibliography; Benjamin R. Cohen, "On the Historical Relationship Between the Sciences and the Humanities: A Look at Popular Debates That Have Exemplified Cross-Disciplinary Tension," *Bulletin of Science, Technology and Society* 21 (2001): 283-295; David P. Barash, "C.P. Snow: Bridging the Two-Cultures Divide," *Chronicle of Higher Education: Chronicle Review*, November 25, 2005, B17.

[7] Snow 1964: 10-11.

[8] F.R. Leavis, *Two Cultures? The Significance of C. P. Snow* (New York: Pantheon Books, 1963). See also: George Levine and Owen Thomas, eds., *The Scientist vs. the Humanist* (New York: Norton, 1963); David K. Cornelius and Edwin St. Vincent, eds., *Cultures in Conflict: Perspectives on the Snow-Leavis Controversy* (Chicago: Scott, Foresman, 1964); Thomas Pinchon, "Is It O.K. To Be A Luddite?," *The New York Times Book Review*, October 28, 1984, Hhttp://www.nytimes.com/books/97/05/18/reviews/pynchon-luddite.htmlH; David Mosey, "The affair of the two cultural corridors," *Canadian Nuclear Society Bulletin* 10 (1989): 11-14.

arts and sciences, ranging from proposals for interdisciplinary frameworks centered on the study of ethics and theology,[9] to the discipline of the history of science,[10] to computer-based models for the intellectual blending of cultural hardware/science with software/humanities.[11] Many of these proposals have sprung from disciplinary perspectives embedded within one of the two cultures, eliciting protests that they, like Snow's work itself, often appear to be less efforts at outreach and understanding than attempts at colonizing the other side's intellectual territory, and thus have been greeted with considerable skepticism and controversy.

For example, the last quarter of the twentieth century witnessed the development of semiotics, deconstruction and other forms of literary critical theory, based on the works of Jacques Derrida, Ferdinand de Saussure and others, which centered in part on the concept that meaning is arbitrary, socially constructed, and open to interpretation. While not directly responding to Snow's work, the popularity of these and other postmodern methodologies spread rapidly among the humanities, and proponents eventually turned their attention to the sciences, arguing that postmodern literary theories were equally applicable in these fields. This was met with some considerable resistance among scientists, and the issue eventually came to a head in 1996, when physicist Alan Sokal submitted a paper to the postmodernist journal *Social Text*, in which he argued in essence that physical reality is an arbitrary social and linguistic construct, and that science should be subordinated to political ends.[12] After the article was accepted and

[9] Oskar Gruenwald, "The Third Culture: An Integral Vision of the Human Condition," *Journal of Interdisciplinary Studies* 17 (2005): 139-60.
[10] D. Graham Burnett, "A View from the Bridge: The Two Cultures Debate, Its Legacy, and the History of Science," *Daedalus* 128 (1999) 193-218.
[11] William Buxton, "Snow's Two Cultures Revisited: Perspective from Design in Human-Computer Interfaces," in *Cyberarts: Exploring Art and Technology*, ed. L. Jacobson (San Francisco: Miller Freeman, 1992): 24-31; Dan Dewey, *C.P. Snow's Two Cultures: Hardware and Software, Discovery and Creation* (1999), Hhttp://space.mit.edu/~dd/ECON/two_cultures.htmlH.
[12] Alan D. Sokal, "Transgressing the Boundaries: Toward a Transformative Hermeneutics of Quantum Gravity," *Social Text* 46/47 (Spring/Summer 1996): 217-52.

published, Sokal revealed it to be a satirical hoax, filled with deliberate factual and scholarly errors.[13] Sokal's publication and the resulting imbroglio have had positive effects, for example highlighting the importance of critical analysis of arguments with which one agrees, as well as those with which one does not.[14] On the other hand, they appear to have done little to bring about reconciliation between the "two cultures," and in fact subsequent exchanges between the parties involved have often been referred to as the "science wars."[15]

In direct response to the perceived incursions of critical literary theorists, some scientists have proposed disengaging entirely from further dialogue with their colleagues in the humanities, and instead supplanting them in the realm of public discourse, by forming a "third culture" with the goal of "taking the place of the traditional intellectual in rendering visible the deeper meaning of our lives, redefining who and what we are."[16] However, in projecting themselves into subjects outside their own areas of expertise, these "third culture" scientists have themselves become subject to criticism, with respondents pointing out factual, historical and philosophical inaccuracies on the scientists' part, much as had been the case with the critical theorists, or in fact Snow's original essay.[17] Thus the "two cultures" debate appears to have involved, at least from Snow onward, a degree of intellectual conflict and hegemony, with

[13] Alan D. Sokal, "A Physicist Experiments with Cultural Studies," *Lingua Franca* 6 (1996): 62-4.
[14] See e.g. Terry Eagleton, *The Illusions of Postmodernism* (Oxford: Blackwell, 1996); Raymond Tallis, "Sokal and Bricmont: Is this the beginning of the end of the dark ages in the humanities?," *PN Review* 128 (1999): Hhttp://www.physics.nyu.edu/faculty/sokal/tallis.htmlH.
[15] For reactions from both sides of the controversy, see *The Sokal Hoax: The Sham That Shook the Academy*, edited by the editors of *Lingua Franca* (Lincoln: University of Nebraska Press, 2000); Keith M. Ashman and Philip S. Baringer, eds., *After the Science Wars* (London & New York: Routledge, 2001).
[16] From John Brockman, "*Edge:* The Third Culture," Hhttp://www.edge.org/3rd_culture/H; see also John Brockman, *The Third Culture: Beyond the Scientific Revolution* (New York: Simon & Schuster, 1995); David L. Alles, "The Third Culture: Exploring the Relationship between Biology and Philosophy," seminars on biology and philosophy presented to the biology faculty at Western Washington University (1995): Hhttp://fire.biol.wwu.edu/trent/alles/TheThirdCulture.pdfH.
[17] E.g. Jay A. Labinger and H.M. Collins, eds., *The One Culture?: A Conversation about Science* (Chicago: University Press, 2001); Philip E. Johnson, "Engaging the Third Culture," *Access Research Network* (1996): Hhttp://www.arn.org/docs/johnson/brockman.htmH.
Victoria Vesna, "Toward a Third Culture: Being In Between," *Leonardo* 34 (2001): 121-5.

proponents of each side seeking to make points and expand their domain at the expense of the other. Not surprisingly, the net result of this exchange appears to be that the two intellectual communities have become increasingly competitive and polarized, with deepening suspicion and hostility on both sides of the divide.

Another possible factor in this enduring cultural polarization may reside within the physiology of our brains. Studies by Roger Sperry and other neuroscientists have proposed that the two hemispheres of the human brain tend to operate in strikingly different ways. While noting that human neurophysiology is complex, with both hemispheres of the brain typically working together and interacting in all activities, these researchers have produced a substantial body of work indicating that the left hemisphere tends to specialize in analysis, text (literal meaning), and recognizing serial events, while the right hemisphere tends to specialize in synthesis, context (inference), and recognizing patterns simultaneously.[18] While the left hemisphere excels at written language, logical deduction, categorization, and performing actions sequentially, the right hemisphere excels at metaphor, non-linear thinking, resolving incongruity, and "seeing the big picture." It is interesting to note that "left-brain" skills tend to correspond with those often deemed necessary for success in mathematics and the sciences, while "right-brain" skills tend to be favored in the arts and humanities.[19] Thus, while the "right-brain/left-brain" dichotomy undoubtedly represents an oversimplification of neurological function, it does

[18] Roger W. Sperry, "Brain Bisection and Mechanisms of Consciousness," in *Brain and Conscious Experience*, ed. John C. Eccles (New York: Springer, 1966): 298-313; "Mental Phenomena as Causal Determinants in Brain Function," in *Consciousness and the Brain: A Scientific and Philosophical Inquiry*, ed. Gordon G. Globus et al. (New York: Plenum, 1976): 163-77; with Jerre Levy-Agresti, "Differential Perceptual Capacities in Major and Minor Hemispheres," *Proceedings of the National Academy of Sciences* 61 (1968): 1151. See also Betty Edwards, *Drawing on the Right Side of the Brain* (Los Angeles: J. P. Tarcher, 1979); Robert E. Ornstein, *The Right Mind: Making Sense of the Hemispheres* (New York: Harcourt Brace, 1997); I.C. McManus, *Right Hand Left Hand: The Origins of Asymmetry in Brains, Bodies, Atoms, and Cultures* (Cambridge, MA: Harvard University Press, 2002).
[19] Daniel H. Pink, *A Whole New Mind: Why Right Brainers Will Rule the Future* (New York: Riverhead, 2005): 13-23.

appear that aspects of the "two cultures" are paralleled to a degree in the very structure of our brains.

Another factor often linked with the "two cultures' divide is the phenomenon of increasing academic specialization. The last several decades have seen an explosion of ever more specialized disciplines and sub-disciplines in both the sciences and humanities. Specialization has become the primary road to academic publication, distinction and promotion, which in turn has developed academic subcultures that are self-reinforcing and self-perpetuating.[20] There is of course good reason for this. As the sheer volume of knowledge has increased exponentially, so has the necessity for specialized expertise. It is no longer possible for a single individual to acquire all of the information necessary for thorough expertise in numerous disciplines, let alone pursue the polymath ideal of Leonardo Da Vinci, who was expert in areas as diverse as painting, sculpture, anatomy, architecture, urban planning, mathematics and engineering. But with the multiplication of specialties, each containing its own distinct knowledge base, methodology and technical language, disciplinary knowledge has also tended to become increasingly specialized, to the point of seeming incomprehensible to those outside of a given field.[21] With the passage of time, academic specialization has also permeated undergraduate education, further reducing opportunities for students and faculty to experience alternative ways of thinking beyond that of their own field. As a consequence, meaningful

[20] Jerry G. Gaff and Robert C. Wilson, "Faculty Cultures and Interdisciplinary Education, *Journal of Higher Education* 42 (1971): 186-201.
[21] E.g. Scott Savitz, "The Masters of History: The Intellectual Dimension" (1998): Hhttp://www.geocities.com/savitz_1999/intdim.htmH.

knowledge-based dialogue between the disciplines, and between academics and the general public, has tended to become more difficult and less common at all levels of academic life.[22]

Let me take a moment to emphasize that I do not in any way mean to disparage the pursuit of concentrated knowledge in areas of academic specialization, the benefits of which have been discussed previously at this roundtable, and are manifest daily all around us. With exponential increases in data, disciplinary expertise requires the mastery of ever more sophisticated, detailed and specialized realms of knowledge, and entirely new fields and subfields appear with increasing rapidity. And after all, it is at the frontiers of knowledge where the exciting new discoveries tend to be made. On the other hand, from a societal perspective it is also important that these discoveries be effectively communicated from the frontier back to the heartland, where the bulk of the population resides. Or to return to the original metaphor, as each academic specialty becomes more expert in the detailed study of its particular piece of the elephant, it is also vital that we as a society understand how those pieces fit together, so that we may collectively form a better overall picture of the beast.

Given the historical situation as outlined above, I suspect that a solution to the "two cultures" gap is unlikely to be found within the confines of any single academic field, however interdisciplinary it may be. However, I do think that one set of potential bridges may be found among those intellectual skills deemed necessary for success across the academic disciplines, and in a learning-centered approach to those skills. In fact, such bridges are already in existence, typically located within a university's general education curriculum. Although often disparaged

[22] Paul A. Brinker, "Our Illiberal Liberal-Arts Colleges: The Dangers of Undergraduate Overspecialization," *The Journal of Higher Education*, 31 (1960): 133-138; Michael Bisesi, "Historical Developments in American Undergraduate Education: General Education and the Core Curriculum," *British Journal of Educational Studies* 30 (1982): 199-212.

by students and faculty alike as "time-filling" courses that must be endured prior to the "real learning" that takes place within the specialized academic majors, within many American universities the general education core remains the principal, and sometimes only, realm in which there is interaction between students and faculty across the disciplines. As specialists within a particular discipline, each of us has an interest in seeing to it that our future students possess the intellectual skills necessary for success within our own field. And as academics and intellectuals, we all have a stake in helping to insure that our student, along with the general public, are well informed enough to understand and appreciate the value of knowledge, and are able to distinguish well-researched and supported ideas from those that are less so. With that in mind, a comprehensive, coordinated curriculum emphasizing skills common across the disciplines can help make a positive contribution toward bridging the gulf between the "two cultures."

For this presentation, I would like to focus on a single, brief example. Fundamental to many, if not all, academic disciplines are skills related to higher-order creative and critical thinking, i.e. the making or invention of ideas on the one hand, and the evaluation or assessment of ideas on the other.[23] Specific critical thinking skills include identifying and analyzing the elements of thought, and the application of standards for clarity, accuracy, relevance, depth, significance and other factors. Specific creative thinking skills include synthesizing ideas, exploring multiple solutions (lateral thinking), brainstorming, forced analogy, and others.[24] Skills such as these are fundamental for success in a wide variety of disciplines throughout the

[23] Richard Paul and Linda Elder, *The Thinker's Guide to the Nature and Functions of Critical and Creative Thinking* (Dillon Beach, CA: Foundation for Critical Thinking, 2004): 3-4.

[24] E.g. Susan Wilks, Critical and Creative Thinking: Strategies for Classroom Inquiry (Portsmouth, NH: Heineman, 1995); Vincent Ryan Ruggiero, *The Art of Thinking: A Guide to Critical and Creative Thought*, 8th ed. (New York: Harper Collins, 2006); The Critical Thinking Community: Hhttp://www.criticalthinking.org/H; Washington State University Critical Thinking Project: Hhttp://wsuctproject.wsu.edu/H.

sciences and humanities, and a systematic effort to develop them would benefit students and faculty across the curriculum. Studies by Kathleen Cotton and others indicate that programs and practices designed to improve specific critical and creative thinking skills have made a positive difference in the achievement levels of participating students, especially when presented in conjunction with content-based knowledge.[25] And while knowledge-based white-collar jobs are increasingly being outsourced to India, China, and other emerging countries, employees trained in holistic, flexible thinking who can adapt quickly to rapidly changing technological and economic situations are coming into greater and greater demand.[26]

Conclusion

By emphasizing a focused, systematic programs for the development of critical and creative thinking skills within an existing general education curriculum, colleges and universities can help insure that students will be better prepared for the rapidly-changing job market, while at the same time helping them develop skills necessary for success in disciplines within the arts and sciences alike. Teaching such skills in concert with disciplinary knowledge would also have value for academics, by helping to communicate the fundamentals of our knowledge to students who may soon be entering our respective fields of specialty, and by providing potential common ground for interdisciplinary study with students and colleagues from other fields, while retaining the specialized skills and knowledge necessary for further progress within our respective disciplines. And all would benefit from an educated population better equipped with the skills

[25] Kathleen Cotton, "Teaching Thinking Skills," *Northwest Regional Educational Laboratory's School Improvement Research Series* 11 (1991): Hhttp://www.nwrel.org/scpd/sirs/6/cu11.htmlH.
[26] Pink 2005: 36-40; Richard M. Felder, "A Whole New Mind for a Flat World," *Chemical Engineering Education* 40 (2006): 96-7.

needed to generate powerful new ideas, as well as to analyze the strengths and weaknesses of the ideas and arguments with which they are confronted on a daily basis.

In closing, I would like to return again to the metaphorical elephant with which I began my paper. For while there is value in being one of a handful of leading experts on the anatomical structure of an elephant's trunk, or the poetry in the curve of an elephant's tusk, there is also value in teaching the fundamentals of our knowledge in concert with those of our colleagues exploring other aspects of the elephant, so that a more complete and accurate picture may emerge for those who are just beginning to see one.

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