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Did C.P. Snow Have It Right? David Mosey's Assessment of *The Two Cultures*

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Many a discussion in these pages has begun with a mention of C.P. Snow and his description of the chasm between the "two cultures" of science and the arts.[1] Recently, for example, we cited Snow in an essay on the novel *Cantor's Dilemma*, in which Stanford University chemist Carl Djerassi presents a fictional account of a scientist's quest for the Nobel Prize.[2] Snow also figured in our introduction to a recent reprint of a talk by University of Chicago statistician William H. Kruskal. In advocating cross-disciplinary research, Kruskal offered his own expansion on Snow's paradigm, describing an even more varied intellectual landscape comprising "*n* cultures."[3]

Although we have made numerous allusions to Snow and his thesis in general terms, we have not previously had the time or space for a detailed consideration of the ideas he originally put forward. Therefore, I was particularly struck by a recent article, which we are reprinting here, from the *Canadian Nuclear Society Bulletin*. In it, David Mosey, the journal's coeditor, offers a critical assessment of Snow's views.[4] As he notes, there has been little examination of Snow's actual assertions, despite the frequency with which the "two cultures" idea is invoked. In his discussion, Mosey touches on many themes that we have examined on previous occasions—particularly in essays dealing with science and its connections to art, poetry, metaphor, and creativity.[5-9]

David Mosey: A Brief CV

David Mosey was born and educated in England. Under the specialized English educational system, he left grammar school with "A" level qualifications in physics, mathematics, and applied mathematics. Despite this (or, as he notes, perhaps *because* of it), his undergraduate degree (1966) and his doctorate (1970) were both in English literature.[10] However, he maintained a keen interest in science and engineering. This interest was put to active use in late 1970 when, depressed by the academic employment statistics in England, he took a job in the Technical Information Branch at Canada's Chalk River Nuclear Laboratories, Ontario. In 1974 he moved to the National Research Council of Canada, Ottawa, Ontario, where, for two years, he worked for that institution's Energy Project, studying renewable energy technologies. In 1976 he joined Ontario Hydro, Toronto, a provincially owned utility with a strong nuclear power program. He currently works for that organization's Nuclear Safety Department, where his special area of interest is the study of the underlying causative factors in high-consequence accidents, both nuclear and nonnuclear, with particular reference to the part played by "institutional failure." Mosey recently completed a book on seven major nuclear accidents, which will appear early this year.

The *Canadian Nuclear Society Bulletin* began in 1979 as a typewritten newsletter for the newly formed Canadian Nuclear Society. It has evolved into a bimonthly, magazine-format publication containing technical articles, review articles, commentaries, and book reviews oriented to nuclear science and engineering in the Canadian context. With the expansion of the *Bulletin* in October 1988, the editors attempted to extend the scope to deal with wider issues, particularly those related to the relationship between science, technology, and society. Currently, as Mosey notes, the contents of a typical issue can range from a review and assessment of the reactor-dynamics aspects of the Chernobyl accident to a discussion of the anthropic principle to an examination of the nature and role of scientific research.[10]

With this article, Mosey has made a valuable contribution to the ongoing discussion concerning the interrelationships between the worlds of art and science. As recently noted, I have never believed in the "two cultures" dichotomy and have dedicated much of my work to demonstrating the connectedness of these seemingly disparate worlds.[2] I agree entirely with Mosey in rejecting Snow's assumption that science and the humanities occupy, in Mosey's words, "separate boxes." As we all go about the business of attempting to fathom ourselves and our universe, whatever our discipline or specialty might be, it is far more beneficial to consider the underlying commonality of our endeavors.

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My thanks to Christopher King for his help in the preparation of this essay.

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The affair of the two cultural corridors

David Mosey

In this critique, David Mosey asserts that C.P. Snow's idea of the two cultures of science and the arts has been invoked frequently, in many contexts—usually without examination of Snow's actual thesis. After briefly summarizing Snow's main points, Mosey points out that Snow, while implying an all-inclusive definition of scientists, was vague in defining the population of "literary intellectuals" and "the recent literary culture" that he criticized. Mosey also takes issue with Snow's interpretations regarding literature's concern with scientific and technical progress. Snow, he concludes, established an unnecessary class structure in intellectual and academic circles. A more useful starting point is to recognize that scientists and artists alike are engaged in essentially the same pursuit.

Thirty years ago C.P. Snow delivered the Rede Lecture on the "Two Cultures" which, with some additions, he subsequently published[1] and which dealt with what Snow perceived as an unbridged gap between the "science culture" and the "arts" or "literary culture." The lecture aroused a certain amount of controversy at the time (to put it mildly) and led to one of the most unpleasing and vindictive (on both sides) feuds in post-war academic circles. Since that time the shade of C.P. Snow has been unfailingly invoked in any discussions related to the relationship between science and technology and society, the role of the scientist, science policies (such as they may be), science education (or the lack of it) and so on and so on. The actual thesis Snow advanced is not explained in these invocations but rather fuzzy and undefined terms such as "the two cultures," "scientific illiteracy" and "non-numerate culture" are waved about the place like a rainmaker's bones in an attempt to bring about some kind of intellectual precipitation. It might not be a bad idea, 30 years on, to examine exactly what C.P. Snow did say: what was his thesis? does it stand up to scrutiny?

First let's summarize very briefly what Snow says in Two Cultures:

1. The intellectual life of all western society is increasingly being split into two polar groups with "Literary intellectuals at one pole—at the other scientists." Each group totally misunderstands the other. Actually Snow does admit that there are in fact more than two groups or "cultures" but decided against refining his argument further because "it would bring more disadvantages than it's worth."

2. Scientists do not feel that "the literature of the traditional culture" is relevant—they have their own culture which "contains a great deal of argument, usually much more rigorous and almost always at a higher conceptual level, than literary persons' arguments."

3. The "literary intellectuals" are more seriously impoverished than their scientific brethren. They pretend that the "natural order" does not exist and that any exploration of it is "of no interest either in its own value or in its consequences," they have no conception of "the intellectual depth, complexity and articulation" of the "scientific edifice of the physical world" and "Even if they want to have it they can't."

4. The "literary intellectuals" focus on the tragedy and isolation ("loneliness") of the individual human condition. Scientists accept the immutable nature of the individual human condition but are optimistic about the mutability of the human social condition and set themselves the task of working to improve it.

5. Literary intellectuals are "natural Luddites." Throughout the industrial revolution the "writers" refused to comprehend what was happening, although "plenty of them shuddered away...it is hard to think of a writer of high class who really stretched his imaginative sympathy.... The only writer of world class who seems to have had an understanding of the industrial revolution was Ibsen in his old age."

6. The educational system requires rethinking at the pre-university level to make it less specialized.

Now all of this must have been rollicking good stuff to his audience. Admittedly Snow does tut-tut mildly over the limitations of the scientists' literary diet, but then he goes on to zero in on the "literary intellectuals"—their voice is "restricted and constrained" as they ponder the tragic nature of the individual human condition, their intellectual impoverishment is such that not only are most of them unable to recite the Second Law

of Thermodynamics but they couldn't even define such fundamental terms as "mass" and "acceleration." They have absolutely no conception of the scientific edifice of the physical world—and even if they wanted to understand it they couldn't.

Scientists, on the other hand, are members of a sort of supranational fellowship with "common attitudes, common standards and patterns of behaviour, common approaches and assumptions" which cut across "religion, or politics or class." They "have the future in their bones," they actually get up and do something to alleviate the social condition[2] and (perhaps most importantly to Snow's audience) "young scientists know that with an indifferent degree they'll get a comfortable job, while their contemporaries and counterparts in English and History will be lucky to earn 60 percent as much."

Certainly good strong stuff this, immensely cheering to the neophyte scientists and, as a sort of morale booster for undergraduates who might be worried about career prospects, quite acceptable. However as a formally published document accorded the authority that went with a person in Snow's position it requires more rigorous scrutiny.

An initial and general observation is that while we can infer that in the category of "scientists" Snow includes everyone from the physicist exploring the quantum jungle to the chemist developing a detergent additive to preclude dishpan hands, it is difficult to infer just who is included among the "literary intellectuals" (or "literary persons"). Who does he mean? Novelists, poets and dramatists? Newspaper columnists with literary pretensions? Professors of English? Those representatives of the "literary culture" he mentions by name include Amis, Austen, Dickens, Eliot, Emerson, Ibsen, Lawrence, Orwell, Shakespeare, Rilke, Ruskin and Thoreau, although the contexts in which he mentions them differ. And at an early point in his discussion he refers to "the recent literary culture" without further elaboration. He does actually quote two lines of Eliot's "The Hollow Men" ("This is the way the world ends/ Not with a bang but a whimper") noting disapprovingly that it is one of the least likely scientific prophecies ever made, but this is about the farthest he goes in particularizing his characterization of the "literary intellectuals" or identification of "the recent literary culture." While Eliot was not a scientist he never, in his capacity as a literary critic, made the blunder of formulating a sweeping generalization on the basis of a single observation—and an inaccurate one at that.

The way in which Snow uses the Eliot quotation seems to typify the Snow approach which is that of the benevolent, if unimaginative, bureaucrat: Eliot says the world will end with a whimper rather than a bang; the world has not yet ended either detonatively or otherwise, therefore Eliot is predicting a future event and one which is scientifically unlikely. Presumably Snow would have equally deplored the meteorological inaccuracy in *Twelfth Night* where Feste sings "the rain it raineth every day."

An even bigger blunder Snow makes is his dismissal of the literary treatment of the industrial revolution. "It is hard to think of a writer of high class who really stretched his imaginative sympathy, who could see at once the hideous back streets...and also the prospects of life that were opening out for the poor." Snow can't have read Dickens. The realization of the liberating and civilizing forces that the industrial revolution generated pervades Dickens' novels—*Our Mutual Friend* and *Dombey and Son* leap to mind. Explicitly, in a concluding Note to *Martin Chuzzlewit*, Dickens records his admiration for such progress in the United States. And it is significant that in *Little Dorrit* one of the key characters (and one of Dickens' most sympathetic) is an engineer. Dickens reserves his condemnation for the abuses of the tool, not the inventors of the tool or the tool itself.[3]

To argue as Snow does that literature's concern with technical development (call it science, engineering or technology) has been to ignore it or reject it with horror and loathing is simply at odds with the facts. Particularly since the time of the Metaphysical Poets, through Emily Dickinson, Wells, Shaw, Kipling and Auden to Tom Stoppard, scientific speculation, scientific discoveries and the impacts of the application (or mis-application) of science have not only provided themes for poets, novelists and dramatists, but also provided a rich source of powerful imagery.[4] Allan Danzig[5] has compiled an extended anthology of poetry and excerpts from plays, essays and novels (a total of 40) dealing with science and technology. They range from the Bible, via Swift, Wordsworth and Dickens to E.E. Cummings and Stephen Spender. None of the authors mentioned above is obscure, yet Snow either ignores them or hasn't read them. Interestingly, Danzig discusses the treatment of technology in literature and, using railways as his example, notes:

> *For every metaphorical use of the railroad to indicate the senseless mechanization of*

man's life or the materialism of his spirit there may be found two or three referring to the railroad as a symbol of new, open perspectives, of powerful beauty, or of civilization, law or comfort.

All this going-on may seem like employing an excessively large steam hammer to crack a very small nut, but in view of the authority accorded Snow (if not claimed by him) as both scientist and literary man it is very important to establish quite clearly that Snow completely fails to support his assertions about the general antipathy or indifference to science he claims to find in literature.

Snow's background is popularly regarded as providing him with unique authority on both the "scientific" and "literary" spheres. He received a doctorate in physics from Cambridge and was made a Fellow of Corpus Christi in 1930. During the next decade he was engaged in scientific work and college administration. During the Second World War Snow served as the Chief of Scientific Personnel at the Ministry of Labour and was subsequently appointed a Civil Service Commissioner. Following the War he achieved critical and commercial success as a writer with the Strangers and Brothers series of novels which concerned themselves with men in their public capacities negotiating the "corridors of power."

The phenomenon of a person with a scientific or technical background achieving success as a writer is not unique to C.P. Snow. Arthur Conan Doyle was trained in medicine, Charles Ludwig Dodgson (a.k.a. Lewis Carroll) was a mathematician and Nevil Shute Norway was an eminent aeronautical engineer. While the "literary value" (however you define it) of their various works may be debated, those works are still widely read and probably will be for very many years. Yet not one of these three has been accorded the authority of a literary scholar (nor did they ever claim such authority). There are no grounds for according it to C.P. Snow.

Having said all this we must now observe that Snow has identified a real problem. The term "cultural impoverishment" may not be strong enough to apply to a situation in which very large numbers of people (including "literary intellectuals") remain ignorant of some of the most basic laws and forces of nature and the manner in which these laws and forces of nature (incompletely understood though they may be) influence their daily lives. This ignorance is dangerous in a strictly material sense since society as a whole is required to make enormously important decisions in which scientific and technical considerations play an important, if not dominant, part. And such decisions should not simply be left to the technocrats. An example with which most readers will be only too familiar is that set of decisions relating to energy policy.

The ignorance is also dangerous in a non-material sense. If a large segment of a society lacks even the most rudimentary sense of the way things work in the physical universe and the way in which our understanding of the way things work is evolving, then that segment is isolated from an immense range of intellectual experience. Spiritual and intellectual growth is stunted or distorted. A sense of wonder at and delight in the complexities and mysteries of the universe (using that term to mean everything "out there" and our own concepts of what it is) is part of the stock in trade of the good scientists, the good engineer—and the good writer. And the civilised human being.

So what do we do about it? Snow himself doesn't really suggest anything specific save that the educational system needs "rethinking" in order to decrease the level of early specialization. It is possible that Snow regarded the problem as insoluble since he states quite explicitly that non-scientists are incapable of comprehending the nature of science "even if they want to." Certainly the way Snow has defined the problem—a clash between two irreconcilable "cultures" one of which is on the retreat—leaves no solution but the elimination of the retreating culture. Then, *voilà*, one "culture" only!

Perhaps the first question to ask is if the division of human intellectual activity into Snow's two categories reflects actual, fundamental differences in the nature of the activities. It will be argued here that, taking the widest view of these activities, it does not. Two years before Snow delivered the Rede Lecture, William S. Beck (Professor of Medicine at Harvard) wrote:

We must recognize for what it is man's predilection for dividing things into tidy categories, irrespective of whether clarity is gained or lost thereby. Learning, thus, is scientific or humanistic.... We will come to realize that these boundaries have been established by us for our own reasons. They are man-made, and despite their long tradition, despite the problems of university organizers, book classifiers and curriculum planners, despite the tribal instincts of professional men, fields of learning are ultimately surrounded only

by illusory boundaries—like the "rooms" in a hall of mirrors. It is when the illusion is penetrated that progress takes place. To the cell or the atom, it matters little whether its pursuer is a bio-chemist, philosopher or diplomat. Likewise science cannot be regarded as a thing apart, to be studied, admired or ignored. It is a vital part of our culture, our culture is part of it, and its continued separateness from what is fondly called "the humanities" is a preposterous practical joke on all thinking men.[6]

The last two centuries have seen what can be fairly described as a major scientific revolution. If one takes physics as an example, then "cataclysm" might be a more apt word. Was this "revolution" confined to what C.P. Snow would call "the science culture"? Looking at developments in literature (particularly poetry) and literary criticism over the same period one sees some interesting parallels.

Starting in the nineteenth century, poetry began increasingly to explore the conjectural nature of the universe—in both theme and imagery. The concept that the act of observation changes what's observed saw expression, initially by Emily Dickinson. In the twentieth century Eliot exploited the concept in his critical essays (particularly in his discussion of the Metaphysical poets) and in discussion of his own poetry (the meaning of his poems must "lie halfway between the poet and the reader"). By the post-World War II period it was becoming an accepted axiom among literary critics that the Heisenberg Uncertainty Principle applied, in all its implications, as well to the world of poetry as it did to that of physics.

Literary criticism itself underwent a revolution. At about the end of the nineteenth century academic literary criticism—that is, studied discourse on works of literature—had begun to evolve from the vague invocation of absolute (but ill-defined) principles of what literature should be, to a more specific examination of specific texts. For a while criticism had two major aspects which are often informally defined by a contemporary *Punch* cartoon caption:

O cuckoo shall I call thee bird, or but a wand'ring voice?
State the alternative preferred with reasons for your choice.

Coincident with the abandonment by science of the absolute we see the start of critical focussing on items of literature *per se*. The literary equivalent of the luminiferous aether was discarded. This process started with rigorous Shakespearian textual scholarship (interestingly enough led by German academics) and, over the next three or four decades, evolved into the highly disciplined technique of practical criticism in which profitless (if mellifluous) speculation on the transcendental was replaced by the exercise of examining the words of the works themselves. An important feature of this method of analysis is in the fundamental requirements it makes of the practitioner—the ability to approach a problem with a good all-around critical awareness, to carry out a rigorous systematic analysis and to reach conclusions that are well supported by the evidence. These abilities seem to be not altogether dissimilar to those of the scientist.

An interesting (and surely not coincidental) parallelism between science and literature may be seen when the following two passages are compared:

People like us, who believe in physics, know that the distinction between past, present and future is only a stubbornly persistent illusion.

Time present and time past
Are both perhaps present in time future,
And time future contained in time past.
If all time is eternally present
All time is unredeemable.
What might have been is an abstraction
Remaining a perpetual possibility.

The first is from a letter by Albert Einstein written in March 1955 some four weeks before his death.[7] The second is from T.S. Eliot's "Burnt Norton" (1935), the first of the Four Quartets.[8]

Snow founded his discourse on the assumption that something called "science" and something else called "literary culture" live in separate boxes, that the contents of the "science" box are accessible only to card-carrying scientists (see above, "even if they want to, they can't") and that science aims at bettering the material lot of human kind while the literary types gaze moodily into the existential void and wait for death. That

initial assumption does not seem justified and *The Two Cultures*, at best, makes the scientists feel good, the "literary intellectuals" annoyed and establishes an unreal and unnecessary class structure in the intellectual/academic environment.

On the other hand Beck gives us a rather more plausible, useful and optimistic starting point. That all—physicists, painters, chemists, dramatists, biologists, novelists, mathematicians and poets (to name a small but representative selection)—are labouring in the same vineyard. The universe is a marvellously puzzling, ambiguous, paradoxical, frightening and exciting sort of place. Everyone's trying, if not to make sense out of it, at least to illuminate it—however flickering that illumination may be. The thing called "science" (not to mention the thing called "engineering") has, over the last two centuries, evolved some formidable tools that can help in that. Those tools belong to and are usable by everyone—not just the inhabitants of one of Snow's cultural boxes.

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1. **Snow C P.** *The two cultures and the scientific revolution*. New York: Cambridge University Press, 1959. 58 p.

2. The motivation cited by Snow, essentially improvement in material welfare, is certainly not one to be sneered at. It seems to be most directly that of engineering—one of the simplest and most noble descriptions of any profession is one of the *Oxford English Dictionary*'s definitions for "engineer": one who designs and constructs "works of public utility." Science generally could also be said to have as its ultimate aim the betterment of humankind's welfare. And such a worthy aim undoubtedly impels many people towards careers in science or engineering. But is [it] what drives them when they're actually "doing" science or engineering? It is plausible to suggest that while doing the work (rather than considering it in an abstract and generalistic way) attention and creative drive are focussed on the actual project in hand—the project itself becomes the motivation and the results can be quite wonderful. This may be one of the closer relationships between art, particularly poetry, and engineering.

3. It's somewhat ironic when reviewing the progress of the industrial revolution in Britain to note that the people who actually drove that revolution through were not the scientists, but the engineers—many of them self-educated—and even more ironic to observe that they did so in spite of the scientists. The most notable example of this is the case of the railways where the received wisdom was that such contraptions clearly defied the laws of science as well as the laws of God. Snow's assertions about the lack of appreciation of the nature and significance of the industrial revolution exhibited by the "literary culture" should be applied to the nineteenth century scientific establishment. Snow doesn't really talk about engineers, indeed he seldom uses the words "engineer" or "engineering" and certainly not in the context of the "science culture." Perhaps he took them for granted—a not uncommon oversight.

4. The Metaphysicals made particular use of Newton's physics (especially in the areas of gravitation and optics). Dickinson's poetry is so strongly marked by the use of scientific and technical concepts and images that it is difficult to suggest individual references; however, her much-misinterpreted poem "I like to see it lap the miles" could be cited as a representative comment on technology, "Safe in their alabaster chambers" an exploration of the concept of an expanding universe and "Before I got my eye put out" as the employment of a scientifically accurate comparison of monocular and binocular vision for an extended metaphor. The writings of H.G. Wells are well enough known to all. Shaw's exploration of scientific themes might be best exemplified by *The Doctor's Dilemma*. Kipling, a writer who has been quite incorrectly labelled as a leading celebrant of British Imperialism (and hence received until recently little serious critical attention), is remarkable in his celebration of engineers and engineering (especially marine engineering)—perhaps the best example is *The Devil and the Deep Sea*. Auden, unarguably a major literary figure of the twentieth century, originally wanted to become a mining engineer and always maintained a more than ordinary interest in geology (see "In Praise of Limestone"). Tom Stoppard's latest play, *Hapgood*, is a remarkable use of the quantum theory as an extended metaphor for counter-espionage activities involving double (and perhaps triple) agents. Or it may be the other way around.

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