

“THE CART BEFORE THE HORSE: THE PRIORITY OF SCIENCE AND POLITICS”

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Abstract

In 1959, C.P. Snow claimed that contemporary society had become divided into two distinct cultures – the arts and sciences – and showed how this academic divide was connected to a real world economic split between the haves and have-nots. Today, the division is more often between science and politics, creating a rift between empirical fact and public policy. When facing global challenges such as resource depletion, dwindling biodiversity, escalating populations, and increased CO₂ levels, should popular opinion be allowed to trump empirical data? Or should policy makers be forced to rule along scientific guidelines? And is there a danger of losing civil liberties to the dictates of scientifically-run government bodies? Throughout human history we have struggled with the distinction between “is” and “ought”: whether facts should (or even can) determine values. In communities of open inquiry, we must also consider the relation between education and social order: whether to require that citizens be educated in the sciences in order to vote on matters of public concern, or to allow the will of an uninformed populace to take precedence over matters of sheer fact. Genuinely democratic society requires an educated public, but raises questions of intellectual freedom: what should we teach? The global society of the 21st Century will face this issue in a variety of ways. If our differences matter less than our commonality – and even threaten it – nothing may matter more than that our public policies reflect our collective scientific understanding. So, a world-wide community must entail increased focus on education.

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In 1959, the English chemist and novelist C.P. Snow published an essay claiming that contemporary society had become divided into two

distinct cultures: The Sciences and The Humanities.⁶ While the former is concerned with an objective understanding of natural phenomena, the latter is especially interested in the effects, artifacts, and creations of people. Snow's contention is that in earlier times an intellectual was expected to be familiar with such subjects as History, Foreign Languages (including dead ones), as well as the Arts (particularly Music, Literature, and Painting). In an earlier age, a person of culture was assumed to be familiar with the works of such figures as Herodotus, Shakespeare, Mozart, or Michelangelo. Not being acquainted with such names and their accomplishments signified a lack of education, a need for refinement, and limited the social circles into which one might be admitted. Apart from such rare figures as Da Vinci or Goethe, those steeped in the humanities had little acquaintance with the principles of science, and little reason to gain such acquaintance. To the detriment of everyone, according to Snow, science was neither understood nor respected by the dominant culture of the age.

In more recent times, of course, the tables have turned: what matters today is that a well-educated person comprehend the basic principles that govern the natural world. In the present age, a well-informed person is expected to have an understanding of Mathematics, Physics, Chemistry, and Biology. Being unaware of The Periodic Table, The Laws of Thermodynamics, or The Theory of Natural Selection constitutes a definite gap in a person's education (while familiarity with such historical figures as Boyle, Newton, or Darwin is nice, but far less essential than understanding the ideas they contributed to each field). The focus now is less on whom you know than on what you know, with personal details falling by the way in favor of ever more universal laws and principles. With computer servers that are now able to store particular facts on billions of people (and which can be retrieved at a moment's notice), trying to personally memorize them all seems a misuse of one's own time and carrying capacity. Given the rate at which knowledge has accumulated over the past few centuries, it's more than enough if one can cram just the most essential aspects of the natural sciences into a single skull. If there is ever any spare time, of course, each of us would love to learn to play an instrument, try our hand at painting, or finally write the novel that has been brewing inside of us all along. But life, sadly, is short, and it requires that we make choices – choices of both theoretical and practical import, about what matters most to us in life, about which course of action seems most promising at the time, which will ultimately lead to the person each of us will become.

⁶ C.P. Snow's "Two Cultures" (Snow, *The Two Cultures and the Scientific Revolution*, 1959).

As a result, we live in a world divided roughly in two, in which the cultures of the sciences and humanities are separated, often ignorant of one another, and occasionally even antagonistic. Those in the humanities often feel that science is too reductionistic, heartless or unfeeling, lacking the human characteristics that make life most worth living. Those in the sciences, by contrast, often think of the humanities as “soft,” more a matter of childlike play than serious work or study, and even demean the so-called “social sciences” for not being genuine or “real”. According to Snow, this divide impoverishes both sides (in much the same way that someone today might consider people impoverished who are only able use the right or left side of their brain), leaving us unwilling to acknowledge the value contained in the very opposition between the two. Mingling with both cultures (as a scientist as well as a novelist), he recounts his own experiences of the rift between them, noting that while either side may be ignorant or derisive, because of the effects that not knowing about science can have on a person’s life, there is a special onus on the humanities to learn about what the sciences have discovered. In Snow’s words:

A good many times I have been present at gatherings of people who, by the standards of the traditional culture, are thought highly educated and who have with considerable gusto been expressing their incredulity at the illiteracy of scientists. Once or twice I have been provoked and have asked the company how many of them could describe the Second Law of Thermodynamics. The response was cold: it was also negative. Yet I was asking something which is the scientific equivalent of: *Have you read a work of Shakespeare’s?*

For some people, not having read *Romeo and Juliet* is like not having experienced a first love of one’s own: you are ignorant of something essential about the human condition. Part of Snow’s contention is that those who deride science are ignorant of everything that causes the human condition in the first place, including how The Second Law ensures that all lovers stars are bound to cross, that *no one’s* love - however sincere - can possibly last forever (not only is that tragic, but you can bet on it)! But another, more significant, part of Snow’s contention is that what appears to be a merely academic matter has important real-world consequences: that the division between these two cultures is exacerbating the economic split between the haves and the have-nots. Long before anyone understood the details behind a parent’s desire to have their child study law or medicine, people have known that (by and large) what you know equates with how well do in life. Indeed, history contains very few instances of parents begging their children to become poets or (now) lead guitarists. And because we live in an ever more technological age, understanding the details of human physiology, astronomy, or robotics (for example) is much more

likely to increase one's bottom line than a life in the theatre, on stage, or in the studio. And while the arts and humanities may be more personally rewarding for some, Snow's point is about the collective impact of such inequity. For it's not just the ability to earn money which divides the haves from the have-nots; it's all of the things that money can buy, such as healthcare, decent housing, or better food (in some cases, any food at all), as well as access to the very education which makes it possible to earn a living (and all of these other things) in the first place. Add to that the psychological well-being that comes from believing that tomorrow might be better than today – because you can now provide food and shelter for your family – and it's little wonder that anyone enters the humanities at all.

But why should people who are relatively affluent care about any of that? And even if we do, isn't it just a matter of redistributing wealth, of reallocating resources in order to feed the hungry and alleviate poverty? Not according to Snow – his contention is that this split between the sciences and humanities has not only increased the divide between rich and poor, but that the divide between rich and poor has in turn become a major hindrance to solving the world's most pressing problems (problems which have only grown more pressing in the half century since the time of Snow's essay). For among the issues affected by this are increased concentrations of CO₂, increased populations of *Homo sapiens*, the depletion of rainforests and non-renewable resources, as well as a severe loss of biodiversity. Poverty, it would appear, is not just a poor person's problem anymore, but one that negatively affects everyone in the world. And because the rift between the sciences and the humanities exacerbates the divide in income, the real-world problems increased by that poverty are problems which even academics have had a hand in. For, by isolating ourselves from one another, we academics have inadvertently added not only to the increasing gap between rich and poor, but to the practical problems from which education alone might save us. Remaining hold up in ivory towers not only does not exempt us from responsibility for these problems, but increases the amount we contribute to them (thereby insuring that they continue to grow). Yet, because these problems require both cooperation and education, they are also problems we academics can arguably do something about.

Knowing we have a problem, though – even knowing that we can do something about it – isn't enough to compel us to actually *do* it. That is, knowledge alone appears insufficient to motivate action – at least, that's the line held by the philosopher, historian, and economist David Hume. His famous dictum – that “reason is and ought only to be, the slave of the passions”⁷ – was meant to overturn the traditional notion that knowledge is

⁷ David Hume, *Treatise on Human Nature*, (2.3.3) p. 415.

necessary in order for action to be something other than a species of event. By asserting that what he called “the passions” are the motivating force behind human behavior, Hume restored emotion to the place of pride it had enjoyed before Plato’s take-over of the mind as purely rational. To Hume’s way of thinking, our passions compel us to act, and the mind (or reason) is charged with the job of figuring out how to do it. As a precursor to the Darwinian conception of people as a species of animal whose emotions drive their behaviors, and whose neo-cortex determines the most effective means of achieving those ends, Hume showed us that simply knowing about the world doesn’t cause us to change it. Rather, we have to *care* about the way things are – and want them to be different in some way – in order to be motivated to do something about them. Hume was led to this insight by reading works that contained factual claims which at some point transitioned into statements about value. As he puts it,

In every system of morality which I have hitherto met with, I have always remarked that the author proceeds for some time in the ordinary way of reasoning...when of a sudden I am surprised to find, that instead of the usual copulation of propositions – *is* and *is not* – I meet with no proposition that is not connected with an *ought* or *ought not*.

The question is: how does one get from “is” to “ought,” from “is not” to “ought not”? Many ancient and medieval thinkers held either a religious or secular version of what came to be called the theory of natural law: the idea that what *is* the case *ought to be* the case (either because God willed it to be so – a form of deism or pantheism, or simply because the laws of nature can never be altered – a form of determinism or even nihilism). Hume, though, was simply pointing out the difference between a matter of fact and a human value (the same kind of fact/value distinction we see between the sciences and humanities today). In his own day, Hume was surrounded by discussions about whether matters of moral interest were decided by “the head” or “the heart,” about whether values were determined through rational calculation or by what was then referred to as the sentiments, passions, or humors. Of course, if one takes the side of emotion or “the heart,” one seems committed to a form of ethical hedonism: the notion that we each act for the sake of our own welfare, and expect others to do the same. But if we’re only moved to help ourselves, knowing how things are for others – that we are “the haves,” and they “the have-nots,” for example – won’t motivate us to make a difference in their welfare. Fortunately, however, we live in the same world, so that my self-interest compels me to improve the same world that you live in, compels “the haves” to improve the world of “the have-nots” if only to make a better world for *themselves*. Building enclaves for the rich may appear to be a good short-term solution, but since

we can't make air and water pollution stay in one place, or concentrate greenhouse gases only in someone else's atmosphere, we may end up helping each other in order to get the world we want for ourselves – along with nicer, healthier, and more cooperative neighbors who feel the same way about *their* world.

In order to ensure cooperation, though, we have to do what we can to see that we and our neighbors are on the same page, that we look at things the same way and have the same priorities. We know we share the same biology, but we can differ when it comes to ideology: the poor have needs that for the rich are already satisfied, the religious have dreams which secular society claims not to share, and various ethnic groups view themselves as either oppressed or chosen (and so, feel either disgruntled or entitled). So, while the motivation to improve the world is shared by everyone, our understanding of its problems – how they are produced and how they can be remedied – differs from one group to another. But here in the 21st century, we are fortunate to have at our disposal the means of addressing these differences, of educating ourselves about the nature of the world and communicating that understanding with others – and so, of getting everyone on the same ideological page (at least in terms of their own self-interest). For, over the past 500 years the methods of science have led not only to ever-more astounding discoveries about the nature of the universe, but to ever greater cooperation among the people of Earth. While we have been making agreements and forming alliances for as long as we've been able to communicate with one another, nothing has increased our ability to form consensus and establish social contracts better than the empirical methods of science. Through these empirical processes, we have not only figured out the workings of a vast amount of non-human phenomena, but about how our own species fits in among all these things as well. Having a better understanding of human needs and desires – as well as the various constraints on their satisfaction – enables us to formulate strategies to satisfy as many people as possible. The application of science in our daily lives (including the lives of those in the humanities) allows us to solve both personal and communal problems, bringing collective thought to bear on problems any one of us may face as individuals.

However, while everyone has the ability to employ these methods, not everyone has access to the information necessary to do so. For, the poverty which prevents people from gaining access to better food and healthcare also prevents them from getting the education necessary to appreciate the value of scientific methodology. Ignorance of the methods of science prevents a person from understanding the true nature of their *own* situation (and so, from grasping why and when they should do something about it, as well as how the situation might best be handled). But a *general*

ignorance of science also enables political leaders to manipulate public opinion, to misrepresent, obscure, or even eliminate data which run counter to their own agenda or evidence important to the public interest. Though science is sometimes maligned as the domain of an elite few, in a very real sense science is the most egalitarian endeavor human beings have ever undertaken, opening a world of information to anyone willing and able to look at it. The methods of science prevent political interests from dictating their own truth and hijacking public welfare, from putting the cart before the horse and causing us do things that run counter to our own best interests. For that reason, denying people access to the education necessary for science is tantamount to denying them the right to think for themselves. For, in order to evaluate claims about the world, and understand their implications for both themselves and society as a whole, they must be educated in disciplines essential to empirical inquiry. The poverty which prevents people from gaining access to education prevents them not only from taking a more active role in their own lives, but from becoming part of the solution to the global problems which unite us all. Perpetuating that poverty (even if unintentionally) is among the most inhumane things we do (not merely to them, but – because we have but one planet – to ourselves as well). As intractable as some of these problems may be, we only make them more difficult by denying education to billions of minds which might be more gainfully employed.

In the meantime, some have suggested that we should have scientists govern the world, requiring that those in public office be not only our best and brightest, but be thoroughly trained in the ways of science as well, thereby enabling those who know most about the condition of things to determine what would be best for us all. This kind of top-down approach, clearly defended by well-intentioned theorists since Plato, has its merits: it places government in the hands of those who understand best how nature operates, what kinds of things are most and least likely to occur, and which options would serve the state's best long-term interests. While individual citizens might be hoodwinked by the manipulative rhetoric of politicians, the country as a whole would be protected from those who seek to pass partisan opinions off as factual information. However, forming what one might call a "Scientocracy" – in which scientists establish public policy – has its down sides as well: for such a government would sacrifice the will of the people to the better judgment of those who know most about established methods, generating a paternalism which could deprive those with less understanding from doing as they please. While the system as a whole might run smoothly and efficiently, in order to ensure the protection of the state, the freedom of individuals wanting to deviate from established norms might have to be too tightly restricted. Though curtailing individual liberty for the sake of group

cohesion is sometimes necessary, a state that too closely restricts its members not only limits what Mahatma Gandhi called “the freedom to err,” but threatens the very openness of inquiry essential to science itself.⁸ Such a “scientocracy,” in other words, might even prove fatal to science (by constraining imaginative efforts to reconceptualize what is already understood and discouraging research into barely articulable ideas someone may have for as yet unexplained reasons).

By contrast, one of the most commendable features of a democratic state is its constant barrage of new ideas, creating the variation of thought necessary to the process of cultural selection. While many hypotheses will be weeded out as ineffective, the exchange of ideas itself often leads to new insights which might otherwise never have occurred to anyone. The freedom of thought engendered by a democratic state and the openness of scientific inquiry are not only naturally compatible, they are the same thing: a contest of hypotheses about which ways of behaving will work best for a specific purpose. Of course, not all hypotheses pan out, and those that don’t are discarded in favor of more promising alternatives. We stick with what works best until someone suggests an option more effective for achieving that purpose. But how are we to know which purposes to pursue? Which goals to place before ourselves? Which hopes to realize? A democratic system of government can seem *too* open-ended, too liable to hijack by the whims of disparate trends. If people are free to speak their minds on any and every subject, who’s to say what we should teach our children? Which things should they be required to learn, and which should they be denied? And why? Should classes in the arts and humanities be taken seriously, or dropped in favor of an all-math-and-science curriculum? Should states fund only those courses which will guarantee a uniformity of understanding (what I described earlier as “being on the same page”)? Should our children seek conformity or novelty? Uniformity or individuality? Should we encourage them to chase the acceptance of others or to follow their own dreams?

According to Snow, “there is only one way out of all this: it is,” he says, “by rethinking our education.”⁹ Snow suggests that the questions I have been asking are themselves a product of these divided cultures, and that the dichotomies I have presented here are false. For they presuppose that one culture is necessary and the other simply optional, that one deals in unimaginative discovery while the other is occupied with mindless invention. But scientists lack creativity no more than their artistic cousins, and those in the humanities are no less physically engaged than their scientific

⁸ “Freedom is not worth having if it does not include the freedom to make mistakes.” - Mahatma Gandhi.

⁹ Snow, op. cit., p.19.

counterparts. We may take sides in academic debates, but none of us wants to choose between reality and imagination, between invention and discovery, because none of us truly believe that imagination is *not* part of the real world, that picturing something that has never actually happened is not part of what has led to some of the greatest scientific breakthroughs in human history. It's not just that we often have our "Eureka! moments" while singing in the shower, but that they are often generated through analogy and metaphor, by mixing descriptions of one topic with that of another, by combining things in ways that haven't been tried before (ways which would not have been tried still had the person not been exposed to a variety of topics, disciplines, and subjects). It's not only travel that broadens the mind, but gaining entry into the thoughts and feelings of others, whether expressed in paint and marble, poetry and song, or theatre and dance. In the humanities we find not only expressions of our commonality, but individual circumstances we might never otherwise encounter, from different places and times, all of which become part of our own experience, providing us with a broader palate for our own expression, thereby increasing the likelihood of our yelling "Eureka!" at any given moment. Thinking of the humanities as expressing not only the breadth of human experience, but the analogical thinking in science itself is one way of getting at what Snow means by a rethinking of our education. As he says,

All the lessons of our educational history suggest [that] we are only capable of increasing specialization, not decreasing it. Somehow we have set ourselves the task of producing a tiny *elite*...educated in one academic skill.¹⁰

Life, as I mentioned before, is sadly short, and yet the wealth of information in every field only increases with each passing day. What's a person to do? You can't know everything. Increased specialization is necessary when dealing with complex phenomena, even commendable given what it enables certain individuals to accomplish in a specific area. And yet, it's a mistake when it comes to the individual in general. For, it prevents the person not just from experiencing all that life has to offer, but from learning about the purposes others consider important. When we think about which means we should take to achieve some end, how are we to know which end we ought to pursue? "This will most quickly get me to that – but how do I know that that's where I ought to go? What's really needed? What matters most to others? What am I doing this for?" Not everyone can fulfill their dream of singing with the opera, or dancing with the ballet, but all of us can study the arts and appreciate their beauty. Only some of us go on to make discoveries in physics, chemistry, or biology, but we can all be amateurs of

¹⁰ Snow, op. cit., pp.51 & 53.

the sciences, learning how integral they are to the lives of everyone on Earth. What appears to be lacking on both sides of the divide is an appreciation of what the other culture has to offer, of the role each already plays in the formation of the other. As the educator John Dewey once said,

Pupils learn a ‘science’ instead of learning the scientific way of treating the familiar material of ordinary experience...Since the mass of pupils are never going to become scientific specialists, it is much more important that they should get some insight into what scientific method means.¹¹

Dewey’s point is that, because all of our interactions are empirical, even if someone is not going to become a professional scientist, they will still benefit from learning about the methods of science, since those methods can be employed in every aspect of their own life. In the same way, even if someone is not going to become a writer, actor, or painter, they will still benefit from learning about the humanities, since these express the multitude of ends which others have pursued and provide examples of ends to which we ourselves might aspire. While our common humanity may suggest ends we might pursue, it is our common empiricism which provides us with the means, making the divide between the sciences and humanities as illusory as that between the head and the heart: as if one could do without either. Instead of a divide between factual objectivity and individual subjects, what Dewey is contending is that...

Knowledge is humanistic in quality not because it is about human products, ...but because of what it does in liberating human intelligence and human sympathy.¹²

Whether we think of ourselves as belonging to one culture or another, we can always benefit from our differences in perspective. If we give our allegiance to the discoveries of science, we shouldn’t lose sight of the imaginative element in each of us so well fostered by the humanities. And if we throw in our lot with inventiveness of the humanities, we should not forget that science is the very process through which we bring those most human ideas to life. For, the sciences and humanities are never permanently divided, never any further apart than creativity and hard work, foresight and logic, dreams and the recognition of obstacles to their realization. Rather, the sciences and humanities permeate one another - like “mind and body,” emotion and reason, left brain and right, or male and female, they constitute parts of what in reality is a much more interesting whole. And if we are to keep the horse before the cart, and drive the common lot of humanity

¹¹ John Dewey, *Democracy and Education*, pp.220-1.

¹² Dewey, op. cit., p.230.

forward, we will have to ensure not only their consensual integration, but that everyone on earth has access to them all.

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