historicizing an ahistorical idea

Philosophers and historians of science face a paradox: An objective fact is inherently beyond history, yet the idea of objectivity arose under specific circumstances. Research into the background of ideas, as discussed at a recent conference, complicates our understanding of scientific truths

Science and history: Do the claims of science transcend time and place?

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THE PARADOX of scientific history: How do absolute truths appear?

Can objectivity have a history? A *history* is, by definition, a story of change the object of a historical investigation was once one thing, then time passed and it looked different. Objectivity this idea of "things in themselves" would seem to float, fixed and eternal, above the shifting sands of historical change.

The puzzle can be extended: If science is anything, it is a kind of knowledge that claims to be universal and timeless; if history is anything, it is a kind of knowledge that specifies the uniqueness of particular times and particular places. Viewed this way, scientific knowledge is distinguished precisely by having *transcended* local conditions. Maybe past mistakes in science (say, an Earth-centered universe) can be explained by reference to a smattering of historical facts (religious ideas of the time, reliance on classical sources), but history alone can not explain the right answer. This answer, we assume, just *is*. Eventually someone notices. History and science, from this perspective, would seem to be diametrically opposed.

Sound tricky? The conundrum is dear to the heart of those who pursue the history of science, a dynamic field that seeks to understand how science has become such a powerful way of making sense of the world. While Lorraine Daston, Robert Richards, and Peter Galison each explore different episodes in that history, they share a taste for the philosophical questions that hover around the study of science and society. When these scholars met at Columbia[1] to present papers exemplifying research in this field, they took listeners through the 18th, 19th, and 20th centuries, shedding light on figures already luminary in the pantheon of science: Goethe, Darwin, Einstein. But the diversity of the topics always orbited around that massive question: How best to do the history of science? It is a question with deep roots on the Columbia campus, which has been home to a number of the greatest scholars in the field: from Lynn Thorndike, whose work shaped our understanding of medieval magic and science, to Robert Merton, whose sociological investigations of the rise of scientific method and practice continue to influence all those who try to understand where science came from and how it works.

The science of colors: truth and objectivity

Lorraine Daston not only posed that hard question as her title ("Can Objectivity Have a History?") but answered it in the affirmative. Her argument challenged the assumption that objectivity is a transcendent intellectual virtue: self-generating, eternal, a veritable "category of thought." Objectivity itself, she set out to show, is better understood as a creature of the sublunary flexible, subject to change not as an allegorical figure cast in stone, standing in our cultural

pantheon among symbols of divine knowledge.[2]

For starters, Daston showed that the word itself has a history. Remarkably, it once meant almost the exact opposite of what it means now: We think of *objective* meaning "out there in the world" while *subjective* means "in the mind," but from the 12th century to the Enlightenment *objective* meant something like "an object of thought" while *subjective* meant "existing as a subject; existing in itself."

There is more to the story than a mere shift in terminology. For Daston, the codification of the term's meaning in the early 19th century marks an *epistemic* shift, a shift in techniques for seeking knowledge. Whereas earlier investigators had thought of themselves pursuing truth and trying to avoid (or explain away) illusions, later ones understood themselves to be investigating a world that could be resolved into two kinds of phenomena: objective and subjective. These were not just new words for the same "truth" and "illusion" categories; these were new categories. Adopting the new paradigm had real implications for how you did science.

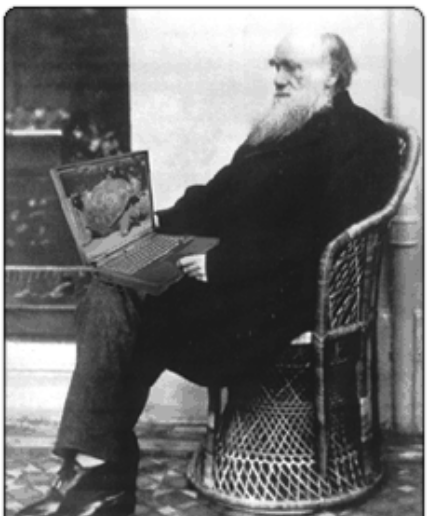
As an example, Daston described the different ways that investigators explored the science of colors before and after this miniature revolution. If you thought in

terms of truth vs. illusion, it would never occur to you to investigate the particularities of individual seeing beings -- I see blue, you see green. Instead, one tried to formulate color laws that were universal; the idea that the differences among people's perceptions of color could *itself* be interesting to study never came up. Such differences had to be explained away as illusions.

Those who worked in the objective-vs.-subjective framework thus found new things to be investigated, among them, these variable impressions and the human beings experiencing them. A new problem arose: How to map the distance between the subjective and the objective. This meant trying, perversely, to see the subjective objectively: to graph *this person's* physiological response, to experiment on one's own *experience* of perception. One of Daston's most remarkable examples described a Czech scientist in the early 19th century who tried to train himself to see objectively; he wanted to perceive the images made by his eyes without any of the filters of his culture or education. He was trying to learn to see like an animal, or (as he put it) like a primitive man.

It is a somewhat nutty idea, but it tells us a great deal about the 19th century. It suggests, perhaps, why people found the idea of the sublime so exhilarating, as such experiences transcended the subject/object divide; it helps explain why really nasty self-experimentation (shocking sensitive organs, swilling down poisons and infectious material) was so important in the same period; it may cast light on that century's best-known objective science of subjectivity, Freudian psychoanalysis.

Critically, Daston's story has a message for practicing scientists. Within this thing we all call science, there are multiple aims for knowing: truth, objectivity, mathematical deep structures, theoretical elegance. Most of the time these blur together for us, but a more detailed look can tease out how these projects can sometimes differ. Daston suggested that some of the recent high-publicity cases of alleged scientific fraud might be better understood as conflicts that have resulted from insufficient attention to the multiple (legitimate) aims for knowledge that we sweep together in the catch-all term *science* . In sum, Daston showed that conceiving of scientific inquiry as monolithic not only clouds our historical view but risks impoverishing the intellectual enterprise we call science.



The Origin of Species **is not Bio 101**

The word for what Daston warns against is *anachronism* , the name for a number of sins against time, the most deadly of which is assuming the past was just like the present. Anachronistic accounts erase historical difference. The result is a muddle. It is precisely this sort of muddle that Robert Richards tried to clear up in his paper, which argued that modern biologists

have had a tendency to read too much of modern biology into the work of Charles Darwin.

For Richards, the challenge for the historian of science is to see Darwin's theory in its "sepia tones," no easy task when an author's ideas remain so entangled with current science. A bracing splash of historical context can help. By situating Darwin in the world of Romanticism, by detailing his fascination with the Prussian explorer-naturalist Alexander von Humboldt, by excavating the purposeful, intelligent, and even moral character of Darwin's conceptions of natural selection, evolution, and nature itself, Richards gave the audience a new picture of the most celebrated scientist of the last century. This was not the Darwin some commentators have tried to paint: a tedious empiricist seeking to suck the soul out of nature. In fact Darwin's "nature" is emphatically not the amoral, unanimated, random mechanism of the modern evolutionary biologist. Richards successfully countered an unfortunate tendency to treat *The Origin of Species* as if it were basically the same as Biology 101.

Richards went after the big question too: How do you do the history (contingent, local) of science, which defines itself by claiming to be necessary and universal? In hazarding an answer he pointed to the middle ground: an approach that would take seriously both transhistorical truths and historical contingency. He admitted that this was never easy.

So true. Having taught Darwin myself, Richards' talk reminded me of a comment in a student paper I received several years ago. After I had energetically laid out how Romanticism worked in the *Origin*, I went home to grade the essays and discovered this thoughtful little barb:

> "When I hear about metaphors, about travel writing, about Romanticism in this class, I feel as if the professor is picking small, bright flowers and showing them to us, as a mammoth diesel locomotive thunders by behind him..."

Her point, of course, was this: What about the staggering magnitude of what Darwin appears to have "gotten right" about nature? What does that have to do with Romanticism?

Tough question. Richards' talk suggested he might accept a version of the answer I tried to give then. Of the relation between Darwin and modern biology, Richards has written: "that the offspring should look like the parent is not strikingly unusual." Indeed. What if we take this biological metaphor a step further? Darwin taught us to think of a living organism in two ways simultaneously: first, as a working solution to a particular problem of existence (surviving in this place in the economy of nature), but also as a text overwritten with its own evolutionary history. Let us, for a moment, turn the model on itself: What if we work to understand Darwin's theory both as a successful solution to a particular kind of problem account for the patterns of taxonomy, biogeography, embryology, and the like while never losing sight of that solution as a tissue of its own history, marked, as it were, by the vestiges of its own past states? Modern scientific theories never escape their histories, but this need not imply

that the theories are wrong.

Einstein in the Patent Office

Few scientists have the cultural significance of Einstein, whose fuzzy-headed image has become a symbol of a mind working in ethereal realms far beyond the hum-drum of daily life. So radical were his insights into the relativity of space-time that they seem plucked from another universe. In an exhilarating paper, Peter Galison showed that this most otherworldly of ideas can not be separated from a set of thoroughly worldly concerns.


GENTLEMEN, synchronize your watches (if you can!)

At the crux of Einstein's most famous paper lies the realization that there is no way to establish the simultaneity of two distant events without taking into account the time that it takes information about the events to travel to some timekeeper. Two events might *look* simultaneous to that figure, but given that light travels at a finite speed, he might be "seeing" as simultaneous events that happened at different moments at different distances. This observation set Einstein to thinking about other techniques for synchronizing times at a distance, investigations that led ultimately to a radical challenge to conventional ideas about space and time.

In a paper that had, at times, the spirit of an unfolding mystery, Galison showed that Einstein's extraordinary clock problem bore an uncanny resemblance to a very practical set of clock problems raised by the need to synchronize railway timetables and a host of other urban, national, and international time systems. The problem of distant simultaneity was on the minds of a great number of European politicians, military leaders, and inventors at the turn of the century. Moreover, a fair number of patent applications designs for webs of mutually regulating clocks had to pass through the Bern patent office, where they were reviewed by a second-class patent clerk named Albert Einstein.

One must not oversimplify. Galison's paper did not at all try to diminish Einstein's discovery or suggest that Einstein had his "Eureka" walking under the synchronized clocks he passed on the way to work. Rather, the point is to show that the fanciest theories and the most mundane technological artifacts are interconnected. If some would like to tell the history of science as a history of disembodied ideas (gravity, relativity), and others would like to tell the same history by focusing on instruments and technology, Galison declares a pox on both houses. We must, he advised, "reduce the untenable either/or of things and thoughts."

Science: in history or beyond?

Facing the challenges posed by the history of science, the symposium

participants suggested (and exemplified) different approaches. Daston pulled "objectivity" from the pantheon of the timeless, unmoving verities, but she never claimed that this pantheon was somehow empty, only that we ought to be careful when we kneel at the portal. Richards counseled the historian of science to seek some middle ground between taking scientific claims at face value and reducing science to some contest of egos, wills, or interests. At the appropriate midpoint we gain a unique vantage point from which to survey how some individuals and communities come to claim a special relation to the really real and succeed in being believed. Finally, Galison, in a felicitous astrological metaphor, urged us to "look up to see down, and down to see up." The metaphysical heavens will be reflected in the historical and technical minutiae, and vice versa. The task of the historian of science becomes this: to stage an enlightening dialogue between improbably distant but sympathetically orbiting realms.


METAPHYSICS, the queen of the sciences

Where do these methods leave the historian of science in relation to the pursuit of the sciences proper? Here, as another scholar in the field, I speak for myself. To the degree that the ideal of scientific knowledge remains a peculiar fantasy of the world as it would be, somehow, without us to the degree that it remains a dream of transcendence to that degree the historian of science (who continually returns to the human in science) must remain a kind of gadfly, thrumming in the pantheon, reminding us that we cannot ever erase ourselves.

"We find metaphysics in machines and machines in metaphysics," Galison concluded, and I was reminded of the image of Metaphysics, "the queen of the sciences," in Jean Baudoin's icon book of 1644. She is depicted poised between a table-clock and a globe, those powerful tools for thinking about time and space. Is she transcending them, or is she stuck between them? The image flip-flops for me. At one moment I see her as inextricable from these technical artifacts, inseparable from local places and specific moments. The next moment she seems the immortal figure of allegory with whom Daston began: a figure who transcends space and time, who does not come into being and who does not pass away.

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1. Robert Richards, "Scientific Transcendence and Historical Reality: The Case of Darwin's Romantic Biology"; Lorraine Daston, "Can Objectivity Have a History?"; and Peter Galison, "Einstein's Clocks: The Place of Time," presented at the symposium "Nature/History: Thinking about History and Knowledge of the Natural World," April 7, 1999, at Columbia's Italian Academy . The original talks and commentary in RealAudio are available online.

2. The "sublunary" means literally the "region below the moon." Aristotle thought that the orbit of the moon traced a dividing line in the universe: below, all was corruptible, subject to change; above, all was eternal, pure, unchanging.

Related links...

- Columbia University Seminar on the History and Philosophy of Science
- Press release for the "Nature and History" conference

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