Science Surveys and Histories of Literature

Reflections on an Uneasy Kinship

By Laura Otis*

ABSTRACT

With their common focus on narrative, literary scholars and historians of science share a close relationship with language and can offer each other valuable interpretive insights. Particularly revealing in each field are scientists' and literary writers' changing uses of metaphor, which is critical to each kind of scholarship since both disciplines place such a high value on cultural context. Any cross-disciplinary help, however, needs to take into account the essential differences between the fields: contrasting views of what constitutes evidence and varying relationships with the past. Since both kinds of scholarship involve creating as well as analyzing narratives, each field has developed its own sense of pacing and significance, and their differing approaches to truth deserve respect.

A SURVEY COURSE ON AMERICAN LITERATURE from 1865 to 1945 is rarely called a "History of Literature," and a history class "covering" science from ancient Greece to 1660 is seldom known as a "Survey of Science." In the English language, "literary studies" and "the history of science" sound like vastly different fields, since their names mask their close affinity. The German terms "*Literaturwissenschaft*" ("literary scholarship" or "literary science") and "*Wissenschaftsgeschichte*" ("the history of scholarship" or "the history of science") suggest a common core that transcends the subjects studied. They share this core of *Wissenschaft* (the production of knowledge through rigorous research) with the *Naturwissenschaften* (natural sciences), to which both fields are akin. Although their goals and methods can differ sharply, both literary studies and the history of science seek the meanings of creative works by placing them in context. Both require a deep understanding of narrative and metaphor, since they rely on language to make sense of the past. In their attitudes toward the past, however—reflected in the course titles proffered above—the fields can differ sharply. In considering how the techniques of

* Department of English, Emory University, Atlanta, Georgia 30322.

I would like to thank the Max Planck Institute for the History of Science for generously hosting me in 2009 while I wrote this article.

Isis, 2010, 101:570–577

0020-9903/2010/1013-0006$10.00

each field might benefit the other, one must weigh their contrasting attitudes toward evidence, fiction, and time.

DIFFERING TRUTHS

Apart from the goal of understanding texts by reading them in context, historians of science and literary scholars seem to have different aims. Science's history can be pursued in many ways, but most are driven by pragmatic curiosity. Most historians of science I know want to find out what happened and why, though few would express their goals in these naive terms. They would like to know what instruments their scientists used, who made them, and where they bought them. They want to know where their scientists worked, what light sources they had available, and what their labs smelled like. And they'd like to know who funded their experiments, who competed with them, and who inspired them. With its focus on instruments, institutional structures, and archival research, the history of science urges its scholars to pursue questions that can be answered with the evidence available. Above all, historians must document claims about emerging ideas, and the most respected studies often reveal previously unknown sources.

In my experience, literary scholars share this interest in origins, wanting to know how the works they love came to be. Their quest for roots often involves archival research, and no news could have been more welcome than Sally Wolff King's recent discovery of the ledgers out of which William Faulkner's *Go Down, Moses* grew. In many cases, though, the issue of emergence, even of context, is eclipsed by the question of how texts make meaning. Expressed simply, the goal might be to learn how stories or poems work—how they use language to inspire intelligent responses. Recently, my undergraduate student Nick Surbey noticed how many references there are to cannibalism in Charles Dickens's *Great Expectations*—a trend that probably lacks biographical roots but that suggests Dickens's state of mind when writing the novel and links psychological and socioeconomic readings based on "consuming." While this kind of analysis involves quests for patterns, the focus is more on differences than similarities between works, since literary value often arises when patterns break down.

In 2010, scholars who talk about truth are not taken too seriously, but a longing for truth haunts many fields. I would count literary studies and the history of science among them, although their notions of truth may differ. In the history of science, the commitment to truth has an ethical basis: a desire to recount events as accurately as possible out of respect for the people involved. One sees this dedication in the debates about Jim Watson, Rosalind Franklin, and the double helix. Certainly there are multiple versions of their story, but the scientists' notebooks, publications, and letters will show that some represent their interactions more faithfully than others.

Like historians of science, literary scholars can be outraged by distortion; but when aroused they speak of "violence to the text." In a field where truth is often viewed as a narrative creation, the greatest crime is misrepresentation—a simpleminded or biased reading of a complex narrative. In *The Dehumanization of Art*, José Ortega y Gasset writes that looking at a work of art is like gazing out a window at a garden.[1] If one focuses on the garden, one fails to see the art, which means examining the frame, the glass, and the kind of view the window affords. The person who sees only what Juan and María are

[1] José Ortega y Gasset, *La deshumanización del arte* (Madrid: Revista de Occidente/Alianza, 1984), p. 17.

doing in the garden misses the craft that has gone into their representation. In this vein, a good reading of *The Double Helix* or one of the many new fictional works about Watson and Franklin will consider history and culture, but probably it will focus on what the text *does*. Its consistencies, its inconsistencies, its originality, and its relationship to other texts will likely get more attention than its relationship to the facts as we know them.[2]

Like literary scholars, historians of science compare perspectives and value multiple accounts, weighing discrepancies and noting differences. In my recent book, *Müller's Lab*, I compared the search for truth in the history of science to determining the path of an unknown function by superimposing many other curves, all of which are known to intersect it at several points.[3] The more curves you have, the more likely you'll be to get an image of the elusive function, although your picture will never be good. The aim of a field can't be judged by a metaphor like this one, but to some degree it suggests history's driving force. In my experience, historians of science analyze conflicting narratives to sort out differences and visualize common elements, though they acknowledge that the truth may never be learned. Literary analyses of multiple narratives tend to celebrate differences rather than resolve them, focusing more on the writing than the reality that inspired it. For literary scholars, reading is rarely a means to an end. It may produce wisdom and philosophical insights, but it is driven more by a love of language and storytelling than a desire to learn about the past.

In their focus on textual analysis, historians and literary scholars share a common task, as they do in their desire to build worthwhile knowledge. At the same time, they maintain a troubled relationship with the natural sciences, whose empirical approach to knowledge making is so highly respected. With its emphasis on archival research and carefully defined problems, history approaches the laboratory sciences in its demand for rigorous evidence. Only the most cynical scholars would call historical knowledge an oxymoron, but literary knowledge is another story.

While in German studies of nature and literature are both considered *Wissenschaft*, the English language excludes history and literary studies from science and science from the "humanities." A neuroscientific colleague of mine at Emory told me how insulting he finds it that he isn't considered a humanist after decades of studying the human brain. Undergraduate course requirements at American universities show that familiarity with respected literature is still valued, especially when combined with writing instruction. Still, one can't build knowledge about *Slaughterhouse Five* the way one builds knowledge about NMDA receptors. Both scientific and literary studies involve input from the observer, and both require interpretation. But literature departments celebrate interpretation, and as long as readings respect texts there is little urge to resolve the differences between them. Valuing textual evidence but seeing the differences between their interpretations and a biochemist's, historians and literary scholars share a concern with methods.

TELLING A GOOD STORY

In their focus on narratives—both creative and analytic—literary studies and the history of science are blood relatives. To succeed in either field, one must be able to tell a good

[2] Of course, in a field as complex as literary studies, generalizations can do as much harm as unreflective readings. A feminist or Marxist critic reading *The Double Helix* would care as deeply as any historian about the social realities of 1953.

[3] Laura Otis, *Müller's Lab* (New York: Oxford Univ. Press, 2007), p. xiv.

story as well as recognize a flawed one. Sorting through documents, a scholar must at some point decide what to include. What are the key conflicts, relationships, and events in a story? In this respect, both fields are closely related to fiction writing—more so than they might want to admit.

Like literary studies, history involves the analysis of fictions, stories that are actively made.[4] Rather than destabilizing the history of science, acknowledging this fact can help to ground the field, reinforcing its connections to disciplines that face the same challenges. Admitting that knowledge about the past can be accessed only through fictions does not exclude the possibility that truth exists or that valuable knowledge can be secured. Skepticism, like creativity, has long been an essential quality of a scholar in either field.

If one believes that historical and literary knowledge can progress, as I do, they often develop by debunking official stories. Although Thomas Kuhn's account of scientific revolutions and the overthrow of paradigms has faced some serious challenges—and is now itself an aging official story of how science works—many scholars hear a ring of truth in his notion of repressed evidence against a master narrative. In both history and literary studies, careers can be built on new interpretations, as long as they're supported by sufficient evidence. The fields differ, though, in their understandings of discovery. In the history of science, this usually means the rediscovery of a forgotten instrument or an unknown document, something material and real. In literary studies, a new reading can be a discovery, especially if it involves a previously unnoticed connection between texts.

In my experience, most historians of science and literary scholars are epistemologically self-aware, actively questioning the kind of knowledge they're building. In their concern with evidence, they are closely aligned, but they can clash about what constitutes proof. Both fields involve comparisons of conflicting narratives and choices about what to believe. Historians of science don't need to be told by literary scholars that storytellers have an agenda (usually presenting themselves in the best possible light) and that there are no unbiased sources. The decision about which version of an event to believe, however, involves more factors than corroborating evidence. As the neuroscientist Antonio Damasio and the psychologist Gerd Gigerenzer have shown, choices believed to be rational are often driven by emotions or intuitions, "gut feelings" about which alternative is right.[5] Even in fields with the most rigorous demands for evidence, there is a tendency to believe the person who tells the best story: one with interesting characters, engaging conflicts, interpretive challenges, and big surprises. Well aware of this tendency, scholars try to deal with it in different ways: historians by indicating documents or interviews that favor one account over another (as in Dan Kevles's study of the Baltimore case); and literary scholars by examining language, looking for consistencies and discrepancies.[6]

[4] James Bono has called fiction writing "positive making" and, following Alfred North Whitehead, has identified it as an essential step in building knowledge. Bono points out that "fact" and "fiction" should not be seen as opposites, since facts themselves are created. See James J. Bono, "Perception, Living Matter, Cognitive Systems, Immune Networks: A Whiteheadian Future for Science Studies," *Configurations*, 2005, *13*:135–181, esp. pp. 169–170.

[5] In *Gut Feelings*, Gigerenzer demonstrates how often people make decisions intuitively rather than rationally and how frequently such decisions turn out to be right. In *Descartes' Error*, Damasio debunks the myth that moral reasoning must exclude the emotions, showing that human emotions play an essential role in most social behavior and moral choices. See Gerd Gigerenzer, *Gut Feelings: The Intelligence of the Unconscious* (New York: Viking, 2007); and Antonio Damasio, *Descartes' Error: Emotion, Reason, and the Human Brain* (New York: Putnam, 1994).

[6] See Daniel J. Kevles, *The Baltimore Case: A Trial of Politics, Science, and Character* (New York: Norton, 1998).

In their close attention to language and their respect for archival evidence, science history and literary studies blend into one another. In my own English department at Emory, many of the faculty and students are examining poets' papers with the same excitement as historians studying letters about microscopes. In both fields, archival evidence can settle debates and liberate scholars from endless cycling among contradictory sources. Similarly, literary scholars' strategies for close readings have a lot to offer historians. As someone who works with fiction, I can see a wealth of literary techniques that might help build historical knowledge. Of course, many are being employed already, but they can be used much more than they are.

One approach that I have found valuable in both literary studies and the history of science is the search for patterns of metaphor running through a writer's work, often arising both in scientific essays and in fiction. The Spanish neurobiologist Santiago Ramón y Cajal, for instance, compared structures in the nervous system to trees and plants but avoided comparisons to telegraph networks. In the previous generation, when national networks were being constructed, physiologists such as Herman von Helmholtz and Emil du Bois-Reymond had found telegraph metaphors valuable for expressing what nerves did. By the 1890s, however, Cajal rejected them, since he viewed mechanical communications systems as fixed structures but believed that nervous systems grew and changed throughout organisms' lives in response to ongoing activity.[7] In *Metaphors We Live By*, George Lakoff and Mark Johnson have argued that metaphors are not decorative or rhetorical; they reflect the way their users think and perceive the world. According to James Bono, they are more than cognitive tools, permitting a "cultural poetics of science" without which science would be impossible.[8] As can be seen in the cases of Helmholtz and Cajal, metaphors can go through phases, initially helping scientists to understand a problem, then becoming widespread, and finally, when past their peak, being quoted ironically to show the errors of an earlier view.[9]

Closely related to quests for metaphorical patterns are studies of narrative structure, attempts to understand why storytellers adopt particular forms. In his letters to Eduard von Hallmann, for example, the ambitious medical student Emil du Bois-Reymond described his progress with Johannes Müller (the senior scientist with whom he hoped to work) as an eighteenth-century libertine might recount his progress in a seduction:

> 27 May 1840. Relationship to Müller: I only go to him when I need him, then impress him as much as possible with my firmness, if not to say crudeness, and also with sparkling, brand-new scientific items . . .
>
> 27 July 1840. Relationship to Müller: Has only gotten better. Concessions much more on his side than on mine.

[7] For a comparison of Cajal's, Helmholtz's, and du Bois-Reymond's use of telegraph metaphors see Laura Otis, *Networking: Communicating with Bodies and Machines in the Nineteenth Century* (Ann Arbor: Univ. Michigan Press, 2001).

[8] See George Lakoff and Mark Johnson, *Metaphors We Live By* (Chicago: Univ. Chicago Press, 1980); and Bono, "Perception, Living Matter, Cognitive Systems, Immune Networks" (cit. n. 4), p. 178. Bono criticizes Lakoff and Johnson's tendency to universalize, treating all human bodies as approximately the same. In examining the role of metaphor in science, he argues, one must see metaphor as a cultural as well as a body-driven factor. See James J. Bono, "Why Metaphor? Toward a Metaphorics of Scientific Practice," in *Science Studies: Probing the Dynamics of Scientific Knowledge*, ed. Sabine Maasen and Matthias Winterhager (Bielefeld: Transcript, 2001), pp. 215–234, esp. pp. 219–220.

[9] See Sabine Maasen and Peter Weingart, *Metaphors and the Dynamics of Knowledge* (London/New York: Routledge, 2000), p. 137.

Of what use is this kind of observation? Is it relevant to the pathbreaking electrophysiological studies that du Bois-Reymond would conduct over the next decade—or not? While it reveals nothing about how he performed his experiments, it suggests something about his motivation and style. Raised in a cultured Huguenot family, du Bois-Reymond was a superb, ironic writer, willing to laugh at himself as well as at his future mentor.[10] A native speaker of French, he valued style and wit and may well have known Choderlos de LaClos's fictional seducer, Valmont. Eager to learn how nerves worked, he grew impatient with Müller's comparative anatomy, and his nineteen-year relationship with his mentor affected his science. Committed to the technology and culture of Berlin, du Bois-Reymond chose to stay close to Müller, while peers such as Helmholtz, who left Berlin for Königsberg, advanced more rapidly in their careers. By themselves, observations about du Bois-Reymond's epistolary style say nothing about his science; but read in the context of his scientific writing, his letters hint at his desires. They suggest what life was like in a hierarchical system where young scientists could advance only by pleasing more experienced scholars.

Studies focused on language and narrative can thus complement archival research both in literary studies and in the history of science. They can be particularly valuable for two issues that are equally interesting to historians and literary scholars: those of origins and influences. The creative aspect of science is often underestimated, and historians' passionate interest in the moments in which ideas arise—whether in conversations, dreams, or laboratory accidents—suggests their close kinship with scholars fascinated by the origins of literary works. Since ideas rarely emerge from isolated minds, the question of influence, central to both fields, is inseparable from this desire to learn how sudden insights arose. Like radioactive tracers, patterns of words can indicate how ideas moved, suggesting the transmission of thoughts from person to person. If "all influence is immoral—immoral from the scientific point of view," as Lord Henry quips in Oscar Wilde's *Picture of Dorian Gray*, then the movement of metaphors can show seduction at work.[11] In the quest for origins and influences, close reading plays an essential role in both fields: the ability to detect patterns and to resist tempting stories.

AN UNEASY TIME

Narratives, dull or riveting, unfold in time, and they vary in the ways they show time passing. In their attitudes toward time, history and literary studies vary considerably, creating different representations of the past. Interestingly, each field has a troubled relationship with the people practicing or creating its objects of study: history of science departments, with scientists; and English departments, with creative writers. Although many creative writing programs are housed in English departments, there is often tension between those who analyze and those who create, with a tendency for each to look down on the other. Literary critics suspect that, unlike the Joycean novels they study, their

[10] Emil du Bois-Reymond, *Jugendbriefe von Emil du Bois-Reymond an Eduard Hallmann*, ed. Estelle du Bois-Reymond (Berlin: Reimer, 1918), pp. 56–57 (letter of 27 May 1840), 63 (letter of 27 July 1840) (my translations). Gabriel Finkelstein has also noticed this pattern, writing that du Bois-Reymond "courted" Müller during this time. See Gabriel Ward Finkelstein, "Emil du Bois-Reymond: The Making of a Liberal German Scientist (1818–1851)" (Ph.D. diss., Princeton Univ., 1996), pp. 176–178. For a more detailed study of du Bois-Reymond's cultural and family background and the development of his career see *ibid.*, pp. 3–40, on which I loosely rely in this paragraph.

[11] Oscar Wilde, *The Picture of Dorian Gray* (New York: Oxford Univ. Press, 1981), p. 17.

colleagues' works will not endure, and the writers suspect that their critical colleagues are wannabe novelists. It is challenging to build systematic knowledge about something in the process of becoming, especially if it is becoming in the office down the hall.

Just as working novelists make some critics nervous, scientists can drive some historians to distraction when they decide to write their own histories.[12] I have seen colleagues exasperated by amateur historians of science who publish papers or even teach courses without reading primary sources or undergoing methodological training. To a much greater degree than literary scholars, historians face the problem of when the history of science *begins*. Can one do a historical study of science that was conducted yesterday?[13] Supposedly, ongoing science is the stuff of science studies, a field that shares history's emphasis on social context but often employs ethnographic methods. Luis Campos's work on synthetic biology is raising powerful epistemological questions about how to write the history of an emerging field. In creating narratives of spanking new science, he and others must come to terms with what George Eliot calls "the make-believe of a beginning."[14] To historians of science, the question of when and how history begins constitutes a greater challenge than it does to literary scholars.

If one reconsiders the courses mentioned in the introduction, the "History of Literature" and the "Survey of Science," it becomes clearer why the titles can't be exchanged. No matter when literature was written, it exists in the present. Although cultural contexts have changed, *The Awakening* and "The Snows of Kilimanjaro" are alive and well, as valuable now as when they were written. They may be read differently, attributed new meanings, but they are still respected as inspirers of meaning. Historians of science, on the other hand, see past science as informative and thought inspiring, but they must deal with the popular view—maintained stubbornly by some scientists—that past science is yesterday's newspaper. A survey implies an introduction to diverse and equally appealing thoughts, thoughts that may have appeared at different points in time but have not lost value. A survey of science suggests—to me, anyway—an introduction to various kinds of science, all of which are happening at the present moment. To scientists, this course title would almost certainly suggest the word "lightweight." A history of science class, in contrast, promises a succession of ideas, each of which has influenced those that follow. It also promises an interpretive narrative—the real reason students want to take it. Many literary scholars, in contrast, would find it counterproductive to create a unified narrative about American literature from 1865 to 1945. One can make comparisons and draw connections, but any generalization would threaten the artistic uniqueness of the works studied. To literature scholars, "The History of Literature" has a presumptuous ring. Who would be qualified to write it? And what works would it include?

In these reflections on names, some of the fundamental differences between the history of science and literary studies emerge, differences that persist despite the fields' common focus on narrative. Although scholars in both realms try to build valuable knowledge, the

[12] See Howard Kushner's recent work on the importance of historical context for epidemiological problem solving and the need for some scientists to understand that history is a discipline with rigorous methods and training: H. I. Kushner, "History as a Medical Tool," *Lancet*, 2008, *371*:552–553.

[13] The historian Greg Dening would say that we can: "No sooner is the present gone in the blink of an eye than we make sense of it as past." According to Dening, we are constantly renarrating the past, and we need to focus our critical attention on this narrative process. See Greg Dening, *Performances* (Chicago: Univ. Chicago Press, 1996), p. 35.

[14] See Luis Campos, "That Was the Synthetic Biology That Was," in *Synthetic Biology: The Technoscience and Its Societal Consequences*, ed. M. Schmidt, A. Kelle, A. Ganguli-Mitra, and H. de Vriend (Berlin: Springer, 2010), pp. 5–21; and George Eliot, *Daniel Deronda* (New York: Penguin, 1984), p. 35.

history of science, as currently constructed, is more devoted to empirical research, systematic understandings, and the quest for unified truth. Having worked in both fields, I remain confident that scholars in each can offer one another valuable insights. A team-taught historical survey of literature and science might not be a bad idea, emphasizing science that has endured and literature that was wrong.