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On the Influence of Literature on Science

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Scholars of Literature and Science studies have always maintained that literature influences science as much as science influences literature. In *Literature and Science*, his 1963 contribution to the two cultures debate, Aldous Huxley asserts that “it goes without saying, between the Two Cultures the traffic of learning and understanding must flow in both directions—from science to literature, as well as from literature to science.”¹ In 1988, George Levine identifies at the heart of Literature and Science studies a “determination to see the impurity of scientific and literary ideas and the recognition that there is two-way traffic between them.”² In his survey of the field in 1978, G. S. Rousseau acknowledges that “there is no reason to disbelieve on logical or epistemological grounds that literature and science affect each other reciprocally. That is, that each influences the other in just about the same degree, although conceivably in different ways.”³ But Rousseau notes that, despite these claims, it is only the influence of science on literature that has actually been investigated in any detail. He continues,

It is also probably valid to assume, although it would be practically impossible to prove, that science shapes literature to the same degree that imaginative

1. Aldous Huxley, *Literature and Science* (1963; repr., Woodbridge: Ox Bow Press, 1991), p. 72.
2. George Levine, *Darwin and the Novelists: Patterns of Science in Victorian Fiction*, new ed. (Chicago: The University of Chicago Press, 1992), p. 5.
3. G. S. Rousseau, “Literature and Science: The State of the Field,” *ISIS* 69:4 (1978): 583–591, at p. 587.

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literature shapes science. Obviously the whole problem is largely one of semantics, yet semantics put aside, only the former has been studied in any depth. Literary scholars are understandably far more concerned about literature than about science, and most applied scientists as well as historians of science have not seriously considered the possibility that literature has shaped or can shape scientific developments. The latter is an unexplored territory, probably the one in greatest need of cultivation right now and also the one requiring learning so vast that it is hard to imagine it in a single scholar.⁴

Since Rousseau's assessment of the field in 1978, the most influential body of work in UK Literature and Science studies has focused on the nineteenth century, with Gillian Beer's *Darwin's Plots* (1983) maintaining its place as the paradigmatic example of such scholarship. Beer's work is regularly celebrated for its uniqueness in precisely having addressed the bidirectionality of literature-science influence. In his foreword to the third edition, Levine's emphasis on *Darwin's Plots'* continued originality—even in 2009, he argues, its distinctiveness “has not been adequately assimilated into literary study”⁵—highlights that, at the opening of the twenty-first century, there remains a paucity of work in Literature and Science studies that addresses the influence of literature on science.

Levine's work is also committed to a belief in the influence of literature on science and to investigating what science can learn from nonscientific discourse. In the preface to *One Culture*, he insists that “the idea of ‘influence’ of one upon the other must work both ways—it is not only science that influences literature, but literature that influences science.”⁶ Like Beer's and Levine's, the majority of other work focusing on this direction of influence also takes as its period of study the nineteenth century, which was, of course, before the formalization of disciplines and a time when scientists drew unabashedly from literature for inspiration and information.⁷ But such work

4. Ibid.

5. George Levine, foreword to *Darwin's Plots: Evolutionary Narrative in Darwin, George Eliot and Nineteenth-Century Fiction*, 3rd ed., by Gillian Beer (Cambridge: Cambridge University Press, 2009), pp. ix–xiv, at p. xii.

6. George Levine, *One Culture: Essays in Science and Literature* (Madison: University of Wisconsin Press, 1988), p. vii.

7. See, for example, David Amigoni, *Colonies, Cults and Evolution: Literature, Science and Culture in Nineteenth-Century Writing* (Cambridge: Cambridge University Press, 2007); Gowan Dawson, *Darwin, Literature and Victorian Respectability* (Cambridge: Cambridge University Press, 2007); John Holmes, “‘The Poet of Science’: How Scientists Read Their Tennyson,” *Victorian Studies* 54:4 (2012): 655–678; and Sally Shuttleworth, *The Mind of the Child: Child Development in Literature, Science, and Medicine, 1840–1900* (Oxford: Oxford University Press, 2010).

often moves swiftly from an insistence on bidirectional influence and the need to pay attention to both directions, to a conception and analysis of literature and science as functioning as one culture, with both drawing on and influencing the intellectual and wider climate of the times. This slippage has led to a rejection of the idea of influence entirely in favor of models of commonality or interaction, especially in work on more contemporary material. For instance, N. Katherine Hayles is committed to analyzing "the inadequacy of the 'influence' model" in order to provide different theories about "the confluence of discourses," creating a critical approach that addresses the "conceptual isomorphism between different fields."⁸

Following the genealogy of this move away from influence leads to Michel Serres and other poststructuralist theories about the equally relative values of science and literature as cultural discourses. At stake here are questions of priority and authority. Since the influence model in reality produced predominantly studies of the influence of science on literature, it is implicated in positioning science as the dominant discourse. Models of commonality, in contrast, are thought to level the playing field. As Levine argued in 1988, "Implicitly denying the priority of science over other cultural expressions . . . opens (or encourages) the way toward a richer and more complex reading of interchanges between discourses."⁹ In reality, however, it did not. In terms of opening up dialogue between the two cultures, it had the opposite effect: it put scientists not just on their guard but on the attack, as the "Science Wars" of the 1990s so clearly demonstrate.

Affinity or commonality models have a clear and laudable purpose: to bridge the gulf between the two cultures in order to draw scientists and humanists together so that we might tackle today's problems and those of the future as one. But there is an unacknowledged utopianism driving such thinking. This is found, for example, in Huxley's rallying cry at the end of *Literature and Science*: "let us advance together, men of letters and men of science, further and further into the ever-expanding regions of the unknown."¹⁰ In English, we ordinarily understand the imperative form to be an order, but it may also be a request, an invitation, a wish, or even a plea.

8. N. Katherine Hayles, "Information or Noise?: Economy of Explanation in Barthes's *S/Z* and Shannon's Information Theory," in *One Culture: Essays in Science and Literature*, ed. George Levine (Madison: University of Wisconsin Press, 1988), pp. 119–142, at pp. 120 and 122.

9. Levine, *One Culture* (above, n. 6), p. 17.

10. Huxley, *Literature and Science* (above, n. 1), p. 118.

Huxley's final flourish in *Literature and Science*, while ostensibly a rallying cry for future unity, is actually a bravely disguised but poorly supported plea—the essay in fact focuses only on how literature responds to science. Huxley provides no argument as to why literature is important to science and therefore why scientists might wish to join the forward march hand in hand. Jay A. Labinger's essay in the first installment of this double special issue, "Where are the Scientists in Literature and Science?," shows clearly that the directions the field has taken have not yet succeeded in practical terms in drawing literature and science together, nor in convincing scientists of the importance and relevance of what we do.¹¹

Theories of commonality and affinity, or theories that displace the influence of literature on science, or vice versa, into a study of their mutual influence on "culture" (whatever that might be), elide what I perceive to be the crucial *differences* between science and literature. In doing so they fail to mine the most productive site for thinking about the different strengths and value of literature and science, and fail to address the pressing contemporary need to advocate for the importance of literature and literary scholarship in particular, and the ways of knowing offered by the arts and humanities in general. Our field should be at the forefront of such advocacy. If one abandons the commonality approach and reinstates the separateness of the two cultures, one is back full circle to the beginning of Literature and Science scholarship, and we stand badly in need of new theories and studies of the influence of literature on science. What role, for instance, does imaginative literature play in the life and work of contemporary scientists? What role can literary critics, with our unique skills, play in addressing the most pressing concerns of our times? And how do we analyze influence in relation to twentieth- and twenty-first-century literature and science, an entirely different proposition than doing so in relation to the nineteenth century?

We have not yet come far enough in answering such questions and others like them. This is clear in the opening of Sally Shuttleworth's essay in the first installment of this double special issue. Shuttleworth observes,

It has become an accepted orthodoxy in Literature and Science studies that relations between the two domains are a "two way street," and that literature and culture do not meekly reflect the new findings of their dominant partner,

11. Jay A. Labinger, "Where Are the Scientists in Literature and Science?," in "State of the Unions," ed. Melissa M. Littlefield and Martin Willis, special issue, *Journal of Literature and Science* 10:1 (2017): 65–69.

science, but are actively engaged in a dynamic, reciprocal set of relations with scientific practice and the development of scientific ideas.¹²

Shuttleworth notes that this is “an attractive position (and one to which I have always subscribed),” but she acknowledges that “such reciprocity is decidedly easier to track in historical context, before the consolidation of structures of institutional and professional science, than in the current period.”¹³ Shuttleworth’s comments uncannily repeat Rousseau’s of forty years earlier.

To move forward, we need to expand our understanding of what constitutes the Literature and Science studies field; we need to embrace interdisciplinary working and the benefits of diverse methodological approaches; we need to speak with and to scientists; and we need to create institutional structures that facilitate such conversations. In the first installment of this double special issue, Kanta Dihal argues for the expansion of the field to include the study of science fiction. In particular, she argues that the neglect of science fiction may in fact, at least in part, account for the lack of research into “the influence of fiction on scientific practice.”¹⁴ Dihal’s forthcoming work on the influence of Isaac Asimov’s fiction, especially his laws of robotics, on the history and present of ethical thinking about AI demonstrates that much is to be gained by expanding our conception of the legitimate terrain of the field. Rousseau notes that analysis of the influence of literature on science requires learning beyond that of one scholar, and is likely to fall within the range of interest of social scientists, rather than literary scholars or scientists. Such work, it is clear, requires interdisciplinary teams. I have had the good fortune to be involved in two such teams, both as part of the What Scientists Read project in Scotland (2012–2013), and now as part of the AI Narratives team at the Leverhulme Centre for the Future of Intelligence at the University of Cambridge. Both teams have brought literary scholars together with social scientists and scientists. The result is an expansion of the methodological possibilities of enquiry into the influence of literature on contemporary science.

What Scientists Read yielded significant results, the publication

12. Sally Shuttleworth, “Life in the Zooniverse: Working with Citizen Science,” in “State of the Unions,” ed. Melissa M. Littlefield and Martin Willis, special issue, *Journal of Literature and Science* 10:1 (2017): 46–51, at p. 46.

13. Ibid.

14. Kanta Dihal, “On Science Fiction as a Separate Field,” in “State of the Unions,” ed. Melissa M. Littlefield and Martin Willis, special issue, *Journal of Literature and Science* 10:1 (2017): 32–36, at p. 34.

of which is forthcoming. We conducted in-depth interviews with twenty working scientists across the central belt of Scotland, asking them about their reading habits from childhood onward. From these interviews we have derived new theories of the way in which the leisure reading of contemporary scientists can influence their scientific thought and practice. Word count requires me to only summarize some of them here, without supporting evidence, but to give some examples: reading imaginative literature increases a scientist's receptivity to diverse methodological approaches; imaginative literature helps scientists to understand their place in the wider culture and develops their social skills at a local level; the genre of science fiction is particularly significant in its influence on scientists and requires further thorough investigation; reading imaginative literature plays a key role in enabling scientists to escape from their work, and to relax, often rendering them more intellectually adept on returning to their research.

In particular, the AI Narratives project has achieved in practice what Huxley only conjured in rhetoric—our research is in partnership with the Royal Society, and many practicing scientists and AI researchers are engaging with us, including Fellows of the Royal Society. AI Narratives also has a clear advocacy goal, aiming to work with scientists and policy makers to raise their awareness of the importance of including literature and literary criticism in addressing the social, ethical, and political consequences of emergent technologies, such as AI. It is a sign of the times, perhaps, that we have met with little resistance and, in fact, almost overwhelming eagerness and enthusiasm to learn about what we can bring to the table. Perhaps the shocking political events of 2016, in the United Kingdom and the United States, have revealed to everyone what literary scholars have always insisted upon—the influence of stories, over and above facts and figures. Stories are affective, persuasive, and powerful in non-quantifiable ways. And they are not clearly definable as true or false. As a result, the recent historical tendency has been to be suspicious or dismissive of them. But lately we have seen the very real political dangers of such an attitude. Stories are not going away, and now, more than ever, literary scholars need to use our skills to educate and inform the public, policy makers, and scientists about how to deal with their power, how to analyze how narrative functions and achieves its effects. I believe that Literature and Science scholars in particular, situated as we already are at the intersection of fields, can and ought to lead the way. Then, indeed, we may truly begin to advance *together* into the ever-expanding regions of the unknown.