

Introduction: Science and Literature Special Issue

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The most extraordinary fact about the need for a discussion of the relationship of Science and Literature, is that it needs discussing. The strangeness of the idea can be more fully elaborated if we consider it next to two other great conjunctions, Science and History and Science and Philosophy. The former, Science and History, was in existence even before Science and History acquired their present disciplinary panoplies. There is a well-documented story of how history was used in understanding the work of early modern natural philosophers, for example, or how History of Science itself emerged as a coherent modern discipline within the Twentieth century (Kragh 1989, pp. 1–19). The latter conjunction, Science and Philosophy, had its origins in the birth of systematized thinking. From there, it has only grown stronger. In these cases, there seems to be no need to establish the necessity of the rapprochement or argue for its inevitability.

What is then the differentiating factor for Science and Literature? What is the reason that two such broad and archetypal fields of study are only cautiously approached together? Or to be more provocative, why aren't there Departments of Science and Literature alongside the venerable History and Philosophy of Science Departments and Programs? These are of course rather rhetorical questions. But in the next few pages, we will try to take them at face value, in order to show how this special issue of *Science & Education* tackles the subject of Science and Literature.

A first attempt to examine the apparent incompatibility of Science and Literature is to consider their relationship historically. It could be the case that what we today call Science did not intersect with Literature, in their evolution towards modern disciplinary status. But recent scholarship has done much to dispel such notions. Even in the case of exemplary figures of early modern sciences, such as Galileo Galilei or Nikolaus Copernicus, it has

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been shown that they had leveraged the rhetoric of their era in a very successful manner, in order to promote their theories and views (Biagioli 1994; Westfall 1991). In the same period, the emerging Renaissance humanism proved a valuable pool of resources for proponents of new systems, such as Regiomontanus, in their debate against established disciplinary and scientific boundaries (Dear 2009, pp. 33–34).

Early Modern Science is not the only period where the close proximity of Science and Literature is apparent. Another case in point is provided by the emergence of the modern research university. Research seminars devoted to the physical sciences appeared in the German lands in the early nineteenth century. Dedicated teaching and research laboratories followed soon after. However, the concept itself did not originate from the physical sciences. The first research seminars appeared in Gottingen, and were devoted to philology (Olesko 1991). The German scientists quickly appropriated the idea and later on, research seminars were incorporated into the model of the German University (Clark 2007). This in turn became the exemplar for research Universities everywhere from Greece to the USA. Thus, historically speaking, Literature and Science were quite close indeed during the years of their modern academic coalescence.

Of course, historical arguments are well and good, but they only prove that at some point, these fields of knowledge were not that separated. What they do not prove is that Science and Literature indeed have, or should have, any affinities today. Genealogies aside, it could be argued, their methods in their present time are different, their objects of inquiry clearly distinguished and their cultures as disciplines incompatible (dare we say incommensurable?). And here, a host of horror stories can be summoned to give credence to the argument, from C. P. Snow's famous *Two Cultures* lectures, to Richard Feynman's casual disdain of humanities, to the recent and unfortunate Science Wars.¹ And yet, even in these iconic cases, the division between Literature and Science is not as clear cut. Even if we brushed aside the heavy criticism that C. P. Snow's model has received, both in its time and in earlier years, even, that is, if we grant the absolute division of these famous *Two Cultures*, distinctness does not mean segregation. Fifty years of work in Sociology and Anthropology, not to mention History of Science itself, have taught us a lot on how cultures interact, interrelate and reciprocally affect each other (Raj 2010; Schaffer et al. 2009). Rather than being treated as isolated islands, cultures are now more and more seen as roughly defined spaces with porous boundaries. There are no walls between cultures. There are borderlands and spaces of transition.

The same can be said about the anecdotal rejection of literature by famous scientists. Feynman himself used literary metaphors and examples in his famous semi-autobiographical books. And for every misrepresented Feynman, there is a Stephen J. Gould arguing for a closer integration, and a Niels Bohr, giving lectures in psychology and talking about poetry (Gould 2011; Rotella 1987). Clearly, the physical sciences are not as tightly secluded from the humanitarian neighbors as one might think.

Finally, much is made of the disciplinary and methodological differences between Literature and Science. But again, the real issue here is why is this an issue at all. Rapprochement neither requires nor entails monism. To go back to our earlier example, History and the Sciences have managed to interrelate in more ways than one, without any

¹ C. P. Snow's lectures can be found in Snow (1963). A critical appraisal of the debates that followed is Furedi et al. (2009). Feynman's notorious quotes about poetry and the humanities in general are usually drawn from his semi-autobiographical books Feynman (1997, 2001). Finally, the Science Wars provoked a rich and rather biased literature from many authors. A critical and highly readable analysis is Jardine and Frasca-Spada (1997).

requirements for a unified methodology. *Mutatis mutandis*, why should Science and Literature be any different? And even when such disciplinary incursions were successfully attempted, the main result has been the enrichment of both disciplines. Interdisciplinarity, though elusive, is fertile almost by definition.

However, it could be the case that, even though there are no historical or a priori reasons for being so, Literature and Science have nothing to say to each other. It could be the case that the common disciplinary borderlands whose existence we have been trying to delineate are just not there, after all. But even a cursory glance over recent—and not so recent—scholarship reveals that, theoretical objections aside, researchers have been engaging relevant questions in a multitude of ways (Beer 1996; Gossin 2002).

A variety of studies coming from a plethora of disciplines attest to the many ways Science and Literature studied together can enrich our understanding of both. Martin Rudwick's classic *The Great Devonian Controversy* showed how social literary and rhetoric interaction played a key role in the practice of Victorian geology (Rudwick 1988). Even earlier, Marjorie Nicolson's work documented the various ways scientific developments found their way in eighteenth century poetry (Nicolson 1976, 1966). More recently, Peter Galison, influenced by the works of Serres and Foucault, borrowed the concept of pidgin language to describe what happens when scientific cultures interact in his *Image and Logic* (Galison 1997). The examination of the rhetoric of science has almost become a field in itself, analyzing the discourses of both exemplary figures of science, such as Darwin, as well as contemporary literary production of scientists (Dear 1991; Harris 1997; Pera and Shea 1991). The list goes on and on, with anthologies and literary companions to science, examination of scientific themes in literature, the use of science fiction in science education and many more.

What is then the contribution that this issue of *Science & Education* intends to make in such a broad and burgeoning field? As is to be expected, this is not an attempt to cover all possible themes and areas of research associated with Science and Literature. That would be a task that would require a multi-volume encyclopedia. Our aim was rather to introduce lines of inquiry that have not yet received the attention they warrant. Science education is prominent among them. Education is where Science and Literature are more often brought in contact. The various "Physics for Poets" and "Poetry for Scientists" courses, which abound in colleges and universities, are the most distinct indicators of the fact. They also nicely highlight the standard response to the problem: Take the disciplinary fence for granted and then strive to create a door. Is it thus a surprise that interdisciplinarity, while emerging in the social sciences in the first decades of the Twentieth century, received early on such a vigorous use in science education (Klein 2001, pp. 19–40)? And indeed, up to today, there is a surprising amount of work being done which historians and literature scholars often miss, because it is published in science education journals and books. It is our hope that this issue could help bring these different audiences to each other's notice. In this volume, special attention is given to the often neglected educational component of studying Science and Literature in tandem. But there are also contributions that span the field in many ways.

Aimee Slaughter tackles the question of science in the public imagination, by looking how radiation appeared in science fiction pulp journals. She untangles the web of pedagogical intensions, mystifying and glorifying beliefs, and actual practical depictions that went into the incorporation of radiation in early American science fiction during the 1920s and 1930s. She also analyzes the connection between actual scientific beliefs and the plot and imagery used by the authors, to show how radiation became entrenched within the general optimistic culture of science, in these years of innocence before the atomic bomb.

María del Pilar Blanco's work takes us away from archetypically hegemonic spaces and instead focuses in *Fin de Siècle Mexico*. Science fiction becomes the starting point through which she launches an investigation of how science and literature intermingled with the notion of scientific development in Mexico and Latin America. She focuses on the work of the eccentric polymath Pedro Castera, one of the first science fiction writers in the Americas. Her paper discusses how modernity, as a political and cultural program, intersects with the establishment of science and literature as distinct disciplines, and how, by looking at the *oeuvre* of writers such as Castera, a number of historiographical assumptions are called into question.

Pietro Daniel Omodeo, in his contribution, directly engages the question of the historical relations between science and literature. He examines Renaissance literary and scientific discourse for the interpretations and transformations of the myth of Phaethon. By close textual analysis, he shows how the myth of Phaethon was galvanized in post-Copernican texts, thus displaying the close affinity between the literary and scientific production of the natural philosophers and astronomers of the era.

Tom Furniss reverses the usual epistemic priority of scientific texts by proposing to read scientific writing as literature. He explores James Hutton's unpublished accounts of his 1785–1788 tour in Scotland as a text rife with literary strategies, aimed at provoking powerful emotions to its readers. Problematising the contention that Hutton was such a bad writer that his geological acceptance suffered for it, Tom Furniss sheds new light in the coevolution of Romantic aesthetics and geology, by studying the structure, technique and prose in Hutton's text. In the end, Hutton comes across as a figure whose place within both history of science and history of literature must be reevaluated.

In an interesting counterpoint, Axel Gelfert invites us to consider Edgar Allan Poe not solely as an outstanding literary figure, but also as an intellectual who drew from, and participated to, the scientific debates of his time. Poe's poem *Eureka* is described as a proposal and contribution to the methodological debates of the era. Poe is shown to put forward a new mode of inference as a model for science, while arguing for the necessity of intuition and imagination in its *modus operandi*. Thus, new light is shed in what the author calls "Poe's historical moment", especially in the way that artistic and scientific discourses co-existed in Poe's era.

Maria Terdimou continues this line of investigation by analyzing the poetry of Odysseas Elytis for mathematical concepts. Odysseas Elytis, whose real name was Odysseas Alepoudelis, won the Nobel Prize in Poetry in 1979, one of the two Greek poets so far to receive the prestigious award. His poems are shown to be rife with mathematical and geometrical concepts, which Elytis uses to great emotional and symbolic effect.

The use of poeticity in teaching physics is the subject of the paper by Panagiotis Pantidos, Konstantinos Ravanis, Kostas Valakas and Evangelos Vitoratos. It aims to examine how poetical forms can be harnessed for the creation of a more effective science education narrative. Taking as their starting point the importance of making a strong impact in students' mode of thinking, the authors describe several strategies for making science education texts more poetic, so as to shape understanding more efficiently. Thus, poetry and science are taken together as educational resources, in a way that goes beyond cross-disciplinarity into applied interdisciplinarity.

Finally, Andreia Guerra and Marco Braga propose a specific way that science and literature can be integrated in education, via the use of the history of science. By using Umberto Eco's novel *The Name of the Rose* as a pivot, they discuss how Nature of Science can be taught by placing an emphasis in the historical period called "The Birth of Modern

Science”. In their schema, the dialogue between the various academic disciplines is not only a desideratum, but also a necessity.

As a final note, we, as the guest editors of this volume, are well aware of the many areas left unexplored in this special issue. We did not intend for these essays to be representative of the field, nor for the themes appearing here to span the possible research areas. Rather, we aimed for originality, suggestiveness and fruitfulness. Our hope is that educators, historians, scientists and literature scholars will all find something interesting in the essays included here. We certainly did, and it is our main regret that the many other interesting proposals we received could not be published.

We wait for the chance to make amends.

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