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Hubert Zapf

Literature and Science: Introduction

Hubert Zapf, University of Augsburg
E-Mail: hubert.zapf@phil.uni-augsburg.de

The relationship between science and literature, between conceptual-empirical knowledge and imaginative story-telling, has been a theme and testing-ground of literary and cultural theory from the very beginnings of critical thought. Ever since Plato discarded any claims of ascribing reliable truth or knowledge to fictional texts, literature has had to struggle for recognition as a field of intellectually serious and respectable cultural practice. All the same, the implicit or explicit truth-claims of imaginative texts could never be completely eliminated from the discourse of literary criticism and theory. The exploration of possible worlds in fictional literature within the principles of verisimilitude and plausibility was already described by Aristotle as an alternative form of generative, anticipatory knowledge extrapolated from the individual particularity of actual historical fact. In Sir Philip Sidney's Renaissance manifesto *An Apology for Poetry*, the Platonic dictum that poets lie was countered by the proposition of an "as if" logic of the imagination, a logic of "pseudostatements", as I.A. Richards would later call it (Richards 1926), that operates beyond the verifiable binaries of true or false, so that the poet "nothing affirms, and therefore never lieth" (Sidney 1595: 168). In this virtual space of suspended referentiality, imaginative literature is able to combine the general truth-claims of philosophical knowledge with the particular concreteness of historical narrative, without falling into the complementary traps of worldless abstraction or uninspired factuality. In romanticism, this emancipation of literary knowledge from the prevailing authorities of theology, philosophy, and science became still more pronounced, even as the romantics tried to find ways in their poetic production to fuse different forms of knowledge into one, as put forward in Friedrich Schlegel's influential concept of *progressive Universalpoesie* ["progressive, universal poetry"] (Schlegel *Athenäum Fragment* 116). In Percy Bysshe Shelley's *Defence of Poetry*, poetry is an intensely communicational form of revisionary world-making whose truth-claims require no external authorization, since it produces a special, performative form of self-recursive truth that unfolds its imaginary worlds as its own authentic evidence. Poetry explores infinite interrelations between mind and matter and is thus a holistic form of knowledge which merges and encompasses all other forms of

cultural knowledge, including the sciences. "It is at once the centre and circumference of knowledge; it is that which comprehends all science, and that to which all science must be referred. It is at the same time the root and blossom of all other systems of thought" (Shelley 1821: 511). From a defensive position towards science and rational philosophy, imaginative literature comes to represent the highest form of cultural knowledge in the period of romanticism, even though science remains an implicit or explicit reference point for all definitions of literary function and significance.

Obviously, this reversal of epistemological priorities has changed significantly in its own turn since the era of the romantics. But the evolution of the relationship between literature and science has by no means followed an unlinear path. Rather, it was characterized by shifting polarities and oscillating preferences in which the two poles were alternately seen as opposites, as competing alternatives, or as parts of an interrelated field of cultural knowledge. Thus while to Keats and other late romantics the natural sciences were a source of reductionism, prosaic disenchantment and positivist impoverishment of the mind, they represented an important source of inspiration to American Renaissance writers like Poe, Melville, Dickinson, and the Transcendentalists. The pendulum swung even more in this direction in the era of realism and naturalism, in which the reliance on science became a central criterion for the truthfulness of literary narratives, while in modernism art tried to incorporate the advances of science into its own experimental processes, without letting itself be subsumed by prevailing scientific epistemologies. In postmodernism, opposition to any authoritative truth-claims of science was radicalized within the framework of a constructivist epistemology in which the difference between fact and fiction was abolished and the conventional hierarchies of truth were subverted: "The truth of fiction is that fact is fantasy", is John Barth's version of this postmodern constructivism (Barth 1972: 246). At the same time, again in an intrinsic countermovement, postmodern writers assimilated knowledge from the postclassical natural sciences such as chaos theory, quantum physics, evolutionary biology, mathematics, and complexity theory into their texts. Representatives of this development include Thomas Pynchon, Raymond Federman, Don DeLillo and Neal Stephenson, not to speak of the various genres of postmodern science fiction literature anticipating future technoscientific developments that have gained increasing relevance in the context of recent climate fiction and of environmental utopian or dystopian narratives.

In the 21st century, the epistemic framing of the relationship between literature and science has again noticeably shifted as a result of the turn to new forms of realism as well as to ecological and ethical paradigms, whose agendas require some degree of referentiality and intersubjective plausibility of texts. The deep distrust and fundamental critique of science as an expression of Western Enlight-

enment ideology, which had characterized the radical phase of postmodernism, has been superseded by a new recognition of the inevitability and tentative validity – however relative and socially constructed – of scientific insights and observations as part of contemporary knowledge landscapes with which literature and literary studies are dealing today. Meanwhile, the much-debated "two cultures", whose lack of communication C.P. Snow already deplored in the 1950s, have diversified into ever more different disciplines and subcultures of knowledge, and the urge for their interdisciplinary or transdisciplinary reintegration is as strong as the ever-increasing centrifugal tendency of progressive (over-)specialization. Calls for an all-encompassing "unity" of knowledge as a form of cross-disciplinary "consilience" (E.O. Wilson) are countered by opposite claims of a vital diversity of functionally different and epistemologically complementary cultures of knowledge. In this situation, the problem of literature's relation to science, which has always been an ambivalent one between competition and attraction, has become ever more relevant, but also more contested. On the one hand, cultural and literary theory have moved from the fundamentalist critique of science towards including the sciences in a more comprehensive, transdisciplinary epistemology of the humanities, as manifest in the growing influence of theorists such as Gregory Bateson, Gilles Deleuze, Bruno Latour, Donna Haraway, Katherine Hayles, or Karen Barad. On the other hand, contemporary literary texts themselves are shaped, more than ever before, by the incorporation of scientific frameworks into their thematic and formal composition, as in the works of Don DeLillo, Mark Z. Danielewski, Richard Powers, T.C. Boyle, or Siri Hustvedt.

This situation is the historical, epistemological and aesthetic frame of reference for the present thematic issue of *Anglia*. It responds to transformations within contemporary "knowledge landscapes"[1] that are reflected in new directions and to research agendas which have emerged as some of the most promising developments of literary and cultural studies in the early 21st century. An underlying assumption of the contributions is that literature is, more than ever, significantly influenced, informed, and shaped by issues and developments of modern science, but that at the same time literature represents not just a derivative but an independent, specifically complex and multilayered form of cultural knowledge in its own right. The essays deal with various aspects of this relationship that have become especially relevant and urgent in the recent debates about "one", "two", and "more cultures", as Sabine Sielke puts it (Sielke 9). Major directions in which this dialogue is currently evolving are reflected in the contributions. They address the

1 For the current debate on these issues see also the 2015 annual conference of the German Association of American Studies in Bonn on *Knowledge Landscapes North America*.

role and place of literature in relation to science studies, environmental humanities, life sciences, biosemiotics, material sciences, physics, mathematics, psychology, linguistics, biomedicine, and cultural ecology.

In her opening essay, Sabine Sielke gives a brief historic-systematic survey of *science studies* as a kind of general frame for this new, intensified interactivity between various disciplines of the natural sciences and the humanities, arguing that literary texts, especially contemporary novels adapting scientific models, such as those of Richard Powers, produce their own form of cultural knowledge that partially converges with critical science studies but also differs from it in "putting literary and scientific practice on par" (Sielke 9). Ursula Heise describes the dialogue between literature and the *ecological sciences* in the field of what has come to be called the Environmental Humanities, in which this interdisciplinary cooperation proves to be both necessary and highly ambiguous. Not least as a response to the aggressive assault on science by climate sceptics, the critique of science prevalent in earlier ecocritical thought has given way to a new recognition of science and technology in dealing with global environmental challenges. This is reflected not only in the reorientation of academic research toward an intensified cooperation with the natural sciences, but also in the increasing integration of science fiction elements and the blending of neorealism and fantasy in new forms of speculative environmental fiction. Alfred Hornung examines the enormous potential of a transdisciplinary collaboration between literary studies and the *life sciences* in a spectrum between biology, medicine, neuroscience, social sciences and literary life-writing. Wendy Wheeler points out in her essay how *biosemiotics* has gained growing visibility as another promising field of interdisciplinary research at the interface of biology, linguistics, and semiotics, extending the cultural semiotics of Charles Sanders Peirce into a more comprehensive theory of signs across the boundaries of culture and nature, of human and nonhuman forms of life and communication. The rise of a *new materialism* in the dialogue of literary and cultural studies with the material sciences is discussed in Serenella Iovino's essay, which proposes the "intra-activity" (Barad 2007) between matter and text as an empowering condition of new forms of narrative agency and textual interpretation. In a similar vein, Serpil Oppermann takes the convergences between concepts from *quantum physics* and postmodern literature as a starting point for her analysis of the ways in which humanities scholars can make productive, cross-disciplinary use of models of the natural sciences. Hanjo Berressem examines the relations between *mathematics* and literature by tracing affinities in the uses of the notion of "integration" in the conflictual field between its scientific, philosophical, political, and poetic meanings, arguing that a crucial link between literature and mathematics was identified in Leibniz' "conceptual parallelism between mathematical and perceptual integration" (Berressem 115), and demonstrating how mathematical

problems as formulated by Leibniz and others are intricately interwoven with the fictional texture of postmodern novels. Laura Otis interrogates *psychology and cognitive metaphor theory* in her examination of how literature and other media have traditionally dealt with socially marginalized emotions such as self-pity, revealing both a deep-rooted biological basis and a high degree of cultural variability and, therefore, social constructedness, of human emotions. Bernadette Malinowski and Winfried Thielmann critically investigate the use of language in science from a *linguistic and comparativist* perspective, pointing out the ways in which the creative reception of scientific language in literature has served to question and relativize authoritative truth-claims of the sciences. And Julia Fendt applies an approach inspired by *cultural ecology* to analyze both literal and metaphorical meanings that a biological concept like the 'chromosome' can take on in its translation between different forms of discourse and knowledge, enriching both sides in this process of mutually transformative adaptation.

In their presentations of these various epistemological and theoretical approaches, the contributions always also refer to concrete literary examples that demonstrate the mutual influences and interactions as well as the tensions and conflicts which have characterized and continue to characterize the relationship between literature (or, for that matter, other artistic media) and science. The novels of Richard Powers, especially *The Time of Our Singing* and *The Echo Maker* (Sielke); speculative environmental fiction by Kim Stanley Robinson, Alan Weisman and Naomi Oreskes/Erik M. Conway's (Heise); various texts by David Zuzuki, E.O. Wilson, and Siri Hustvedt (Hornung); the documentary film *The Majestic Plastic Bag* (Iovino); novels by Don DeLillo, Jeanette Winterson and others (Oppermann); Thomas Pynchon's "The Secret Integration" and Neal Stephenson's *The Baroque Cycle* (Berressem); Dante, Dickens, Virginia Woolf and contemporary films (Otis); Charles Darwin and Gottfried Keller (Malinowski/Thielmann); and Amitav Gosh's *The Calcutta Chromosome* (Fendt) - all of these mark the broad spectrum of literary and medial references in which the topic of this special issue is addressed and explored in the essays. These multifunctional and multiperspectival analyses of texts and other forms of cultural creativity testify to the vibrant role of literature and literary studies as a rich resource and vital player in the cross-disciplinary dialogue about sustainable cultures of knowledge.

All of the contributors to this thematic issue have published substantially and are active representatives in their respective fields. Sabine Sielke has long worked in the field of literature and science studies, which she has established as an interdisciplinary focus of American Studies at the University of Bonn. Ursula Heise is one of the most widely published ecocritical scholars and expert on the interrelations between science, technology and environmental literature, and directs the Institute of Environment and Sustainability at UCLA. Alfred Hornung has

initiated a DFG-sponsored graduate research program at Mainz University that explores boundary experiences of human life from a multidisciplinary spectrum of approaches between the life sciences and literature. Wendy Wheeler is herself a leading representative of a biosemiotic approach in ecocritical literary studies, which has just recently been the topic of an EASLE conference at Tartu.[2] Serenella Iovino (Turin) and Serpil Oppermann (Ankara) are two important protagonists of the new materialism in literary and cultural studies, as is evidenced by their recent co-edited volume on *Material Ecocriticism*. Hanjo Berressem at the University of Cologne is a leading exponent of a creative integration of approaches from science, philosophy, mathematics, eco-logics, and complexity theory into literary studies on the basis of Deleuze and Latour. Laura Otis is a neuroscientist and literary scholar who has specialized in the relation between these disciplines in her research that she conducts at Emory University and as a fellow of the Max Planck Institute for the History of Science. Bernadette Malinowski has written her habilitation on historical and theoretical aspects of science in literature, and has established an interdisciplinary cooperation between comparative literature and linguistics with Michael Thielmann at the University of Chemnitz. Julia Fendt has just finished her doctoral dissertation on the relationship between science and imagination in contemporary literature, and is a member of the cultural ecology research group in American Studies at the University of Augsburg.

Together, the essays collected in this issue help to map out the epistemic space in which the relationship between literature and science can be positioned in ways that do justice both to the multidisciplinary developments in the contemporary sciences and humanities, and to the special place and potential of literature as a form of cultural knowledge that continues to be relevant and, indeed, indispensable for imagining adequately complex, intellectually informed, and ethically responsible forms of response of human societies to the manifold challenges of a globalized world.

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2 Wendy Wheeler, Keynote Lecture "The Carrying: Material Frames and Immaterial Meanings". 2014 EASLCE Conference *Framing Nature: Signs, Stories, and Ecologies of Meaning*. April 29–May 3, 2014.

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