Science, Culture and Public Affairs

BRIAN TRENCH

Several cultures and several understandings of culture come into play when we consider the place of science in culture. At least some of those cultures and understandings make the reflection, never mind the negotiation, of possible new relations difficult. One received view of science sees it as universally valid and located outside the messiness of national, linguistic and popular cultures. One received view of culture sees it as co-terminous with creative arts and the associated intellectual and critical disciplines.

These mutually reinforcing and restrictive views of science and culture underlie a long-standing discussion about 'two cultures'—a phrase most often associated with the lectures and writings of the scientist-novelist C. P. Snow over forty years ago. Snow commented that 'the number two is a very dangerous number',[1] but, in the political culture, in the culture of the universities, in the cultures of science and of the humanities, the production and reproduction of knowledge continue to be represented—and experienced—as taking place in two worlds, two paradigms, or two cultures. The institutions, lifeworlds and discourses of the professionals involved all contribute to these representations of polarity.

Even a cursory comparison with neighbouring countries indicates that Ireland has an especially bad case of the cultural splits. In many of the languages of Europe, the disciplines that are here encompassed under arts or humanities carry names containing 'science', as in *sciences humaines*, or *Literaturwissenschaft*. In France, many scientists are public intellectuals, alongside philosophers, authors and social theorists. In Britain, playwright Michael Frayn and novelists Ian McEwan and A. S. Byatt have explored, in their different ways, the ideas emerging from natural sciences.

In Ireland, the gaps between natural sciences and other aspects of intellectual culture and between sciences and popular culture are large and may be growing, even as the public policy commitment to scientific research increases. As I shall explore, the weak connections may have benefited scientists in the short term, but in the bigger picture the gaps

are to the detriment of the sciences as much as of the general culture.

Historical narratives on the status of science in Ireland have critically influenced how we see the contemporary cultural reception of science. The scientific heritage movement argues that the misconception that Ireland has not generated significant science in the past contributes to young people's lack of attention to contemporary science. This underlies their efforts to mark symbolically the birthplaces, residences and workplaces in Ireland of leading historical scientists and engineers.

One version of the story about science's changing status draws attention to a 'golden age' of science in Ireland from the late eighteenth century to the late nineteenth century in order to highlight the claimed rapid decline of science after that period. Trinity College geographer Gordon Herries Davies noted that 'Ireland's scientists were in the past overwhelmingly drawn from the protestant, Anglo-Irish ascendancy stock, and within the Republic of Ireland it has been customary to play down, and even to dismiss as non-Irish, the notable achievements of that particular ethnic group'.[2]

This view is echoed in a post-colonial analysis from physicist Roy Johnston, who also has an affiliation with Trinity College. Johnston writes, 'The "indigenous stream" [of science] got going only somewhat late in the [nineteenth] century, thanks largely to Cardinal Paul Cullen blocking access for catholics to the Queen's Colleges in Cork and Galway … Science remained in colonial hands; it had a protestant image; the people who staffed the civil services in the 1920s and 1930s had little time for it'.[3]

Another analysis goes to the character of the religious belief systems in Ireland. Cultural historian John Wilson Foster asserts that 'the catholic church in Ireland has not on the whole encouraged science or explicitly entertained scientific explanations of cosmic mechanisms and the evolution of life on earth. That church has been a counter-enlightenment force and has generally obstructed the introduction and development of enlightenment values in Ireland long after they became part of the common intellectual currency of protestant Europe and America'.[4] However, Foster acknowledges the scientific tradition of the catholic seminary at Maynooth and the need for further study of the relations between science and catholicism in Ireland.

Writing from the perspective of the history of science, Nicholas Whyte points to the long-standing exclusion of catholics from higher education and the 'gatekeeping' role of the Anglo-Irish ascendancy in scientific institutions as the most significant explanations of the low standing of science among Ireland's majority population.[5] He states that there is no

evidence for any intervention by the catholic church in Ireland to deter scientific investigation. Rev. Nicholas Callan, professor of mathematics and natural philosophy at Maynooth for nearly forty years, won international recognition for his work on electro-magnetics. But, Callan was never invited to present his work at the ascendancy-dominated Royal Irish Academy. Nor was he much appreciated by his seminary colleagues; there was no monument at his grave for forty years after his death in 1865.

Those who influenced educational and cultural policy in the young Irish Free State may not have been outwardly hostile to science, but nor did they help it take root. Timothy Corcoran, the Jesuit professor of education at University College Dublin, was a major influence, advocating a conservative view of teaching and learning in which learning by rote was central. '[Developing] manipulative skills is not the aim, or even necessary adjunct, of general education through science … Training in the use of a textbook is the basis of all progressive education in science'.[6]

In the mid-1930s, the small element of primary education devoted to developing manipulative skills in physical sciences was displaced to make way for the teaching of *Gaeilge*. This substitution has been frequently recalled in recent public discussion of the place of science in Ireland, often with an implicit or explicit commentary that something useful gave way to something useless in the project of developing a national culture.

Eamon de Valera, an emblematic figure in republicanism, is perhaps most centrally associated with this project. More than that, the values with which he is most commonly associated, expressed in shorthand by reference to Gaelic Ireland or 'comely maidens', are often regarded as antithetical to rationalist thought and scientific endeavour. But, de Valera combined with his commitment to the Irish language and the agrarian community a passionate interest in mathematics and science. This dimension of his work and personality is systematically omitted or downplayed in accounts of his life.

De Valera was a lecturer in mathematics when he became involved in the volunteers. As president of the executive council in the war years, he was able to give concrete expression to his enthusiasm for the work of the nineteenth-century mathematician William Rowan Hamilton by rescuing from neglect the Dunsink Observatory, of which Hamilton was once director. If commemorative postage stamps can be taken as one index of how a country sees itself, then Irish stamps appear to indicate that high-level mathematics was especially appreciated in this country.

William Rowan Hamilton is the only person to have twice been the subject of commemorative stamps. This anomaly undoubtedly reflects Eamon de Valera's particular interest.

As the Nazis' power grew in central Europe, threatening independent scholarship, de Valera personally invited the distinguished Austrian physicist Erwin Schrödinger to come to Dublin to establish the School of Theoretical Physics within the new Dublin Institute for Advanced Studies. Thanks largely to Schrödinger's presence, Dublin became an important centre for physics in the 1940s and 1950s. The leading international physicists of the day attended the summer seminars at the Institute, as, indeed, did Eamon de Valera. De Valera's confidant for forty years on the board of the Institute was fellow Hamilton enthusiast Albert McConnell, a northern protestant of unionist background and sometime provost of Trinity College.

Just as this dimension of de Valera's life and work is occluded in biographies or in histories of the new Irish state, so works of cultural history and analysis are also largely silent on science. Declan Kiberd's magisterial work defines the project of 'inventing Ireland' largely in terms of literature and language.[7] When he comes to discussion of Brian O'Nolan (Flann O'Brien), Kiberd focuses on the author's tussle with Irish-language culture in *An Béal Bocht* and omits any reference to his encounter with contemporary physics in *The Dalkey Archive*. The massive *Field Day Anthology of Irish Writing* found no place for scientific texts or writings about science.[8]

A few works of cultural recovery have sought to take account of scientific investigation and thought as part of Irish intellectual traditions. The 1985 collection of papers *The Irish Mind*, edited by Richard Kearney, gave space to consideration of scientific thought.[9] Expanding on this endeavour in his recent *History of Irish Thought*, Thomas Duddy includes consideration of Robert Boyle, often regarded as a founding figure in modern science.[10] Boyle was an aristocrat with an 'orientation … towards English life and culture', but, for material and historical reasons, Duddy argues, he is 'indisputably an Irish thinker'. Duddy explores the fascinating case of John Tyndall, educated in County Carlow, an internationally acclaimed physical scientist, a proponent of Darwinism, and an 'adversarial' protagonist in the science versus religion debates of the late nineteenth century. He also surveys the writings of some of those who defended religion against scientific incursions and rejected Darwin, but proposed another version of evolution.

A recent collection of papers, *Reinventing Ireland—culture, society and the global economy*, is presented as an update on Kiberd and a

riposte to those who claim that Ireland has been significantly reinvented in recent years.[11] The editors and authors explore the culture of the Celtic Tiger in terms of religion, cinema, television and newspapers, and of the commonly used definitions of who we are and what we are about. It is remarkable that none of the contributors refers to the central position accorded to science and technology in the dominant policy discourses of the Celtic Tiger. At that level, there is significant evidence of an attempted 'reinvention' of Ireland as a 'knowledge economy' in which science and technology play a key role.

Reinventing Ireland misses a story that properly belongs in a treatment of Irish culture in a global context. From the 1980s on, a technology imperative was argued with increasing force, requiring policy-makers, educators and citizens to apply themselves to the collective task of making this country fit for high-technology companies. Latterly—and largely due to the success, in its own terms, of this strategy—the technology imperative has given way to the knowledge, or research, imperative.

Before 1987, science and technology had sporadic recognition in government administration and policy. When significant amounts of EU money became available for research and development, Irish institutions quickly became adept at securing these funds. The strong emphasis of government programmes was on applied science and technology, which led to the establishment in the early 1990s of scientist lobbies in support of threatened basic science. The Irish Research Scientists' Association, established in 1993, played a leading part in persuading government to review scientific activities and to produce the first-ever extended statement of formal science policy in the history of the state.

On the basis of that 1996 white paper, a new policy advisory body, the Irish Council for Science, Technology and Innovation (ICSTI), was established in 1997. Just over two years later, ICSTI produced the 'Technology Foresight' report that led directly to the allocation by government of €711 million over five years to research in biotechnology and information and communication technology. In 2000, a new institution, Science Foundation Ireland (SFI), was established to oversee disbursement of these funds.

By any standards, this is remarkably rapid policy formation and implementation, and it marked a historic departure. In the name of a commitment to developing a knowledge economy, the long-standing assumption that Ireland could not reasonably expect to be a home for advanced research has been reversed. In 1995, a leading biomedical researcher could claim that 'the philosophical, religious and cultural

climate in Ireland is so hostile to the scientific method that research can never thrive here without a complete reorientation'.[12] Now, nearly €2.54 billion is due to be spent on supporting research and development over the lifetime of the National Development Plan. That this was achieved with minimum public participation, and almost no formal political debate, is further testimony to the separation of science and (political) culture in Ireland.

The 'knowledge economy', in whose name this effort is being undertaken, is a much-abused term, but it does represent some significant part of a present or emerging reality. Mental work in general and intellectual work in particular have an increasing weight in economic production; increasingly-specialised knowledge and skills are required to maintain economic processes. The production of knowledge itself assumes greater prominence and takes on new, more inclusive forms.

In the Irish government version of this thesis, the connections are made in a particular way. Announcing €71.1 million worth of SFI awards to ten principal investigators in biotechnology and information and communications technologies in July 2001, Mary Harney, Minister for Enterprise, Trade and Employment, said:

> The underpinning of economic development by a commitment to research has been a fundamental part of industrial development strategy, and has become even more important as we enter the knowledge age. It underlines the government's commitment to achieve sustainable economic development through innovation and the creation of international competitiveness in the enterprise sector in Ireland.

Here, the production of knowledge is encapsulated in formal scientific research and its translation into technical innovation. The prevailing form of knowledge economy policy statement identifies a set of necessary and causal connections and, in the name of national competitiveness, exhorts the country to make these connections deliver the anticipated benefits.

The knowledge at issue is neither the intuitive knowledge that the arts bring nor the critical knowledge of history, philosophy, and social sciences. Rather, the knowledge economy privileges scientific knowledge. In so doing, it takes a restricted view of the possible contributions of science. In concentrating on wealth generation and national competitiveness, it downplays the possible contribution of science to improving the quality of life. Similarly, in insisting on public support for science as a means to an economic end, it ignores the contribution a greater awareness of science can make to a more active citizenship. The knowledge economy model also takes an instrumentalist

view of education, of social participation in science and technology, and of scientists' engagement with the public. Finally, the knowledge economy thesis plays down the intellectual and aesthetic stimulation of scientific activity; astronomers, oceanographers and entomologists are at least as likely to speak of the beauty of what they study as of its economic use value.

The Higher Education Authority (HEA), in a recent submission to a commission on science policy established by the ICSTI, attempted to strike a more harmonious set of notes.[13] It chose to define the national aim as an 'innovation society', relating innovation to the 'economic domain', 'social gain', and the 'personal domain'. The HEA stressed, on the one hand, the need to 'build competitive advantage based on the skills and knowledge of our people', but, on the other hand, 'the importance of investment in the creation of a vibrant research community in the humanities and social sciences, in helping us to understand and interpret our changing society'. The HEA insisted on the co-existence of utilitarian and cultural objectives for education and research.

Recent developments illustrate how far we are from such synthesis. The report of the Technology Foresight panel, which considered opportunities and needs in the biological sciences, recognised the public dimension of scientists' work in this field and called for a 'national conversation' on the applications and implications of biotechnology. By common consensus, some very difficult ethical challenges are presented by developments in human genetics. Almost equally widely shared is the view that researchers in the field are not well prepared to address those challenges. But, this awareness of the significant social aspects of developments in biotechnology has not been reflected in the SFI research programme. Similarly, the case to propel forward research on information and communication technologies is often based on the claimed social benefits of more advanced communication technologies, but research on the social adoption of these technologies is inadequate and the SFI programme makes no formal provision for it.

This fragmentation of intellectual effort is to everybody's long-term cost, although it is not unique. Carl Boggs has observed that 'the technocratic, yet fragmented world of academic life militates against development of a common public discourse within which intellectuals could address the larger philosophical and social concerns which have preoccupied human beings throughout history'.[14]

However, not all scientists and, presumably, not all academics in humanities and social sciences wish to be so constrained. The 1999 World Conference on Science, meeting under the auspices of UNESCO,

agreed a declaration on science in the twenty-first century that called for 'a vigorous and informed democratic debate on the production and use of scientific knowledge' and for 'greater interdisciplinary efforts, involving both natural and social sciences'. These were, according to the declaration, 'a prerequisite for dealing with ethical, social, cultural, environmental, gender, economic and health issues'.[15]

Internationally, scientists today show increasing interest in relationships between natural sciences and the humanities, arts and public culture. The evidence is found in papers, essays and correspondence in scientific journals and magazines, dealing with ethical, sociological, political, creative and other aspects of science. Plant scientist Nick Battey wrote that scientists should 'remember … that what we know and consider valid knowledge is dependent on language, culture, our time in history, and society'. He suggested that scientists have failed to communicate what many of them are clear about, namely that 'science is not able to answer questions about "first and last things" … [and is not] a method for being right'. Battey identified a 'hard science' position that 'overstates the claims of science and does real harm … The world revealed by science has a fissure in its soul that must be filled by the products of other human activities including literature, music, art and religion'.[16]

The late Stephen Jay Gould, a paleontologist, revived the art of the essay with his 300 contributions to the journal *Natural History*. He has described how he moved from exploiting 'humanistic components' in order to tell his science stories more effectively to a view of 'the indivisibility of these two accounts and the necessary embeddedness of "objective" knowledge within worldviews shaped by social norms and psychological hopes'.[17]

Viewed from the perspective of literature, plastic arts and humanities, the poles also seem to be converging. One of the striking literary phenomena of recent years is the emergence and great success of popular science, which has generated new genres and revived old ones. Science-and-arts initiatives find support from institutions based in the sciences, such as the Wellcome Trust or the Royal Society of Chemistry, and from those based in the arts, such as the Gulbenkian Foundation. Dramatist Michael Frayn has had international success with a play about theoretical physics; poet and essayist Hans Magnus Enzensberger achieved best-seller status for his mathematical adventure for children; and chemist Carl Djerassi, inventor of the female oral contraceptive, has written a play about oxygen. Human genome pioneer and 2002 Nobel Prize-winner John Sulston has had his portrait done in a representation of his

own DNA and has co-written a book about the ethics and politics of the human genome project.

Art historian Lisa Jardine, daughter of pioneering science populariser Jakob Bronowski, explores the similarities of artistic and scientific processes in *Ingenious Pursuits*, a study of the simultaneous flowering of arts and sciences in the Renaissance. This historical study prompts Jardine to comment that art and science are not 'two distinct practices; rather, they comprise a range of perennially familiar practices in two largely distinct, but occasionally overlapping spheres'.[18]

Even the institutions of higher education are responding. Stanford University in California has introduced a course on science in fiction; the University of Glamorgan, in Wales, has started a degree programme in science fiction, based in its department of earth sciences. These developments reflect, not least in their accumulation, a remarkable dialectical process. As awareness grows of the impact of science on all of our lives, so too awareness grows of the limits of science.

There are aspects of science in more and more of our everyday choices. An increasing number of important public issues have an explicit scientific component; blood contamination, nuclear waste transport and disposal, and 'mad cow' disease are just some of those. Scientific developments present major public issues in ethics, law and governance. The big ideas of science challenge many of our received views—and it is not for the first time that novelists and visual artists have been quicker than most to recognise this.

In these circumstances, educational institutions have a particular responsibility to address the relations between science and the national culture. To achieve some rapprochement, there needs to be recognition of the diversity of research models and of paths to research achievement. Science education should be enlarged to include the history, philosophy and communication of science. Students of all disciplines should have the opportunity to take courses in science, technology and society, with particular reference to ethical issues in science. Scientists and engineers should be more ready to accept the contribution of the humanities and social sciences to locating their disciplines in relevant contexts. 'Scientists are hardly interested in their subject's history', writes biologist Lewis Wolpert, evidently with some satisfaction.[19] But, physicist Jean-Marc Lévy-Leblond insists that 'we cannot go on behaving as if science were different from art, philosophy or literature; that is, as if it could be taught independently from history'.[20]

Artistic activities become cultural activities through critique—it is a defining characteristic of drama, music, visual arts and literature that

their public reception is part-mediated through the critic; it may be that science does not find its place in culture because it lacks that critical dimension. 'We cannot put science back in the heart of culture if we shun any critical perspective,' writes Lévy-Leblond.[21] The notion of science critic has been resisted within science, partly on the basis that scientific method and peer review contain their own critical functions and that non-scientists do not understand adequately the scientific process. However, a claim to scientific method is by no means the reserve of the natural sciences, peer review is repeatedly shown to be faulty, and physicists may understand as little or as much about biological research as do sociologists.

The increasing public importance of science makes interpreters, mediators and analysts on behalf of the public necessary. Scientific research represents a significant slice of economic activity. Whether it is funded from public exchequer or from corporate sources, there is an obligation on those who manage such funds to account for their stewardship and to facilitate public scrutiny of and participation in the policies that determine the direction of funding. These obligations bring with them a need to find ways of talking about science in the public sphere that permit such scrutiny. Even if only on the grounds of democratic accountability, the yawning gaps in public culture need to be closed.

But, there is another, perhaps less tangible, reason for seeking to renegotiate the relations between the cultures. Biologist E. O. Wilson believes that 'the greatest enterprise of the mind has always been and always will be the attempted linkage of the sciences and humanities'.[22] An arts administrator who has actively promoted collaborations between science and the visual and performing arts has suggested that the fruits of these collaborations 'somehow make us feel more whole'.[23]

Notes

[1] C. P. Snow, *The Two Cultures* (Cambridge: Cambridge University Press 1993).

[2] G. H. Davies, 'Irish Thought in Science', in R. Kearney (ed.), *The Irish Mind—exploring intellectual traditions* (Dublin: Wolfhound Press 1985).

[3] R. Johnston, 'The government must recognise the potential of scientific research', *The Irish Times*, 13 December 1993.

[4] J. W. Foster, 'Natural History in Modern Irish Culture', in P. Bowler and N. Whyte (eds.), *Science and Society in Ireland—the social context of science and technology in Ireland, 1800–1950* (Belfast: The Institute of Irish Studies, QUB 1997).

[5] N. Whyte, *Science, Colonialism and Ireland* (Cork: Cork University Press 1999).

[6] Quoted in ibid., pp. 175–176.

[7] D. Kiberd, *Inventing Ireland* (London: Jonathan Cape 1995).

[8] S. Deane (ed.), *Field Day Anthology of Irish Writing*, vols. 1–3, (Derry: Field Day Publications 1991).

[9] R. Kearney (ed.), *The Irish Mind—exploring intellectual tradition* (Dublin: Wolfhound Press 1995).

[10] T. Duddy, *A History of Irish Thought* (London: Routledge 2002).

[11] P. Kirby, L. Gibbons and M. Cronin, *Reinventing Ireland—culture, society and the global economy* (London: Pluto Press 2002).

[12] B. Harvey, 'Making Knowledge Work for us—review of the STIAC report', *The Irish Scientist Year Book* 1995.

[13] Higher Education Authority, *Creating and Sustaining an Innovation Society* (Dublin: Higher Education Authority 2002).

[14] C. Boggs, 'Intellectuals', in G. Browning, A. Halcli, F. Webster (eds.), *Understanding Contemporary Society* (London: Sage 2000).

[15] Declaration on Science and the Use of Scientific Knowledge, adopted at World Conference on Science, 1 July 1999. 12 May 2003. <www.unesco.org/science/wcs/emg/declaration_e.htm>.

[16] N. Battey, 'Science with attitude', *Science & Public Affairs* (December 1999).

[17] S. J. Gould, *The Lying Stones of Marrakesh—penultimate reflections in natural history* (London: Jonathan Cape 2000).

[18] L. Jardine, *Ingenious Pursuits—building the scientific revolution* (London: Abacus 2000).

[19] L. Wolpert, 'Arts versus science: the critical difference', *The Independent*, 25 February 2000.

[20] J.-M. Levy-Leblond, 'Two cultures or none?', *Pantaneto Forum* 8 (October 2002). 12 May 2003. <www.pantaneto.co.uk/issue8/levyleblond.htm >.

[21] J.-M. Levy-Leblond, ibid. and 'Pour une critique de la science', in his *La Pierre de touche: la science à l'épreuve* (Paris: Gallimard 1996).

[22] E. O. Wilson, *Consilience—the unity of knowledge* (London: Abacus 1998).

[23] S. Ede, 'The Truth about Art-and-Science', *Science and Public Affairs* (October 2000).

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