

New sciences in a ‘new country’ – the Irish paradox

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In the first invention of Ireland as a country, in the late 19th and early 20th centuries, literature, performing arts, national language, mythic Celtic culture had defining roles. Only as natural history, and then peripherally, did science form part of the emerging public culture.

It has been argued that Ireland re-invented itself over the past quarter-century as the Celtic Tiger, with its open economy, modernising society, young population, flexible education, partnership politics, strident consumerism, and global cultural reach. In that re-invention, first technology, then increasingly, ‘research’, ‘science’ and ‘knowledge’ have been important themes. Where the public presentation of Ireland as a place to do business earlier stressed the youth of the population and can-do attitudes, it now places knowledge – mainly the useful knowledge of science and technology – at the heart of affairs.

This is more than mere rhetoric. Public spending commitments to science have been at unprecedented levels over the past decade. The public funding of R&D has increased over four-fold in a decade, and from 0.35% of GNP to 0.63%. This puts Ireland just below EU and just above OECD averages for percentage of GNP spent on public funding of R&D. The rate of growth in R&D spending since 2003 has been surpassed, among comparator countries, only by Luxembourg. The scale of that investment has been maintained despite the significant drop in public spending overall in recent months.

In his Budget speech of October, the Minister for Finance Brian Lenihan underlined that “the very significant investment in promoting the knowledge economy” was being maintained: the €179 million for SFI represented a 5 per cent increase, and the €127 million for Enterprise Science Technology Innovation represented a 2.5 per cent increase. This month, the long-delayed fifth cycle of the PRILI programme, worth €300 million over 4 years, was announced, signalling yet again, in the words of the Minister for Education and Science, Batt O’Keeffe, “the government’s determination to prioritise investment in Ireland’s development as a knowledge-intensive economy”.

The preferred areas of science for this investment are what we might call ‘new sciences’, that is, sub-disciplines that have emerged in the last 20th century related to biotechnology and information and communication technologies. But it might also be argued that all scientific activity in the forms currently manifested is ‘new’. With the possible exceptions of agricultural and medical sciences, science in Ireland up to 30 years ago was artisan in scale and nature and had very limited social resonance.

When Ernest Walton returned to TCD in the 1930s from the Rutherford Laboratory in Cambridge where he had done the work on nuclear fission that was to win him the Nobel Prize for Physics in 1951, he returned to a department with one technician, whose

salary accounted for one half of the £460 annual budget for equipment and running expenses. There was not much difference between the scientific infrastructure in the mid-20th century of that department, with its distinguished history, and the facilities enjoyed and often provided by the gentlemen scientists of Ireland's supposed 'golden age' of science in the 19th century. Walton devoted himself to science teaching over research largely by vocation, but he was also a persistent advocate of the need for greater funding of scientific research.

In the mid 20th century normal / academic science was barely at critical mass in Ireland. In a series of steps from the 1970s and accelerating through the 1980s and 1990s, science in Ireland has grown with the characteristics of 'post-normal' (Ravetz), 'mode 2' (Nowotny et al) or 'post-academic' (Ziman) science. The country now has a dozen major research centres that are industrial in scale and in organisational form, as well as many more, smaller units with ambitions to grow to such scale. The science being done in these centres is strongly socially contextualised through industry links and through its connection to strategic priorities, and it is highly collaborative across disciplines and institutions.

The priority given to biotechnology and related areas is common to many countries but it is representative of this trend. Fuller takes biotechnology as a paradigmatic case of 'new science' that is technoscience (Latour), where the technological and commercial applications are internalised into knowledge production. The Technology Foresight exercise of 1999 identified biotechnology as one of two research areas for preferential support, being one of the underlying technologies that enable development across several fields. The TF report advocated a national biotechnology research programme with 200 groups in biomedical science (100), agri-food biotechnology (60), bioinformatics and genomics (20), environmental remediation (10), and instrumentation and drug delivery (10), where 'leading edge' research would be done.

The TF report also advocated a National Conversation on Biotechnology, picking up a theme from the 1996 White Paper on the need for public confidence ('comfort', in the words of the White Paper) in scientific and technological developments. The common assumption of the broader science communication movement of the time is reflected here, that higher levels of scientific activity require higher levels of public engagement, or, conversely, that the ambition to attain higher levels of scientific activity could be threatened by inadequate levels of public engagement.

So, if Ireland is in some sense a 'new country' that has turned to 'new science' and 'new sciences', is there a concomitant or consequent new public culture of science? There are many possible elements to a 'scientific culture' but, for the present, we are asking, what awareness, attention, interest and support for science does the Irish public show? Even allowing that the knowledge to be acquired from national attitude surveys is uncertain, we can derive some indicators and patterns from the repetition of these surveys over time and across countries.

From the mid-1990s, the state has promoted activities aimed at increasing awareness of, and support for, science and technology. The number and range of such activities and of participants in them have increased steadily. Raising young people's interest in science, and particularly in pursuing science studies and science-based careers, has been stated as an imperative for public policy.

Public attitude surveys undertaken in association with those efforts show little, or contradictory, evidence of their impact, one way or another. On the one hand, there are marginal increases in the self-reported informedness about S&T, but, on the other hand, marginal decreases in the support for and interest in S&T. Among the key target group of 15/16-year-old students, however, the levels of informedness, interest and support have all declined, some rather more than marginally. Among adults in general, and mid-teen students, there is an increase in the percentage of those answering ‘neither’ or ‘don’t know’ to questions on informedness and interest.

As a member state of the EU since 1973, Ireland has featured in all of the many EU-level surveys of knowledge of and attitudes to science. The general Eurobarometer surveys on science and technology, the more focused surveys on the new science of biotechnology, and the one-off surveys on individual topics in science offer a view of the Irish public’s engagement with science in the context of 12, then 15, then 25, and now 27 member states over 30 years.

The picture that emerges points to a paradox – that the Irish ‘turn to science’ and the rising level of commitment to science have happened more in spite of than because of the levels of public attention and support. The surveys situate the population of Ireland as generally less aware of and less attentive to developments in science than the average for the EU, including the enlarged EU.

This was the clear evidence of the 1977 survey, Science and European Public Opinion (EC=12): Irish respondents’ interest in and attention to science were below-EC-average levels and sometimes close to, or at, the lowest levels. Interestingly, although Irish respondents saw their lives as changing, and changing for the better, they did not attribute a large role to science in this change. One possible interpretation of this is that ‘science’ was not yet available or at least not very salient in public perceptions.

I have grouped findings from later surveys under the headings of *awareness*, *attention*, *informedness*, *interest* and *disposition*, and I have selected findings from these surveys to illustrate the trends and patterns. I have not included the often-cited findings about literacy or knowledge as I consider these surveys present much greater difficulties in interpretation. I also discount the possibility of combining survey findings on literacy and other dimensions into a unitary index of a country’s scientific culture. However, some patterns can be seen in a review of surveys, and I offer a selection of illustrations of such patterns from 12 of these.

Awareness: two surveys show Irish respondents as less aware than the EU average of ‘new-science’ fields in the biosciences, most notably of nanotechnology (2005), and less aware than the EU average of the presence [in Ireland] of EU-funded research in such fields. One response to the latter finding might be to say that more publicity work needs to be done. Yet, the effect of the very significant publicity around GM foods appears to have evaporated quickly – nearly one third of the adult population says it is not aware of GM foods despite the public controversies played out in the media some years earlier. In 2005, public controversy was more focused on stem cell research, and this may be reflected in the EU-average levels of reported familiarity in Ireland with stem cell research.

Informedness: international and national surveys have asked people how informed they feel about certain topics: the responses may be evidence of how people feel about those

they consider responsible for providing information as much as how they feel about themselves. EU surveys on particular science-based topics show Ireland at or about EU average in relation to climate change and radioactive waste (though with declining informedness in the latter case), and significantly below average in relation to biodiversity loss, where there is a very high level of 'not at all informed' responses.

Interest: Eurobarometer surveys have included similar questions over the series that seek respondents' self-reported levels of interest in scientific and technological developments. The findings from 1989 and 2005 surveys are similar: the Irish population has below-EU-average interest in scientific, medical and technological discoveries and inventions. Between the two dates the composition of the EU had changed significantly and the states showing the highest and the lowest levels of interest were both new members.

A special survey on science in the media (2007) offers further evidence of interest in new developments. Here, Ireland shows below-average responses for 'very interested' and 'fairly interested' and the joint highest response for 'not at all interested'. Another special survey with young people (2008) confirms this picture: Irish young people report low / lowest levels of interest in news about science and technology and in technological inventions.

Attention: I have grouped under this heading questions that address respondents' behaviour, as distinct from questions about (self-reported) interest. I acknowledge that respondents may be likely to overstate, for example, media consumption habits. But they may perhaps do so to a lower degree than in response to questions about interest in general. Irish responses to the questions (1989) about visits to science exhibits reflect the (non-)availability of relevant institutions, but these responses tend to confirm the bigger picture emerging from the findings reported above. Responses on biotechnology (2005) report not only present behaviour but also interest in other possible behaviours. Responses on media consumption (2005, 2007) further confirm the position of Ireland as having low/lowest levels of attention to science.

Disposition: Eurobarometer surveys on S&T have repeated questions where respondents are asked to rate their level of agreement with supplied propositions. The responses from 1989 and 2005 show Ireland close to EU averages but having become more approving (or less disapproving) of science's impacts in general, at the same time as less convinced of its impact on individuals' daily lives. When it comes to questions of support for, or recognition of the importance of, particular areas of science, Ireland is again an average member-state. Perhaps surprisingly, however, it is more approving (in 1989) of nuclear energy research than any other member state.

The disposition of the Irish towards new sciences is sometimes more friendly than the average for the EU. This was true in the early 1990s, for example, for biotechnology – perhaps surprisingly so, given the scepticism or outright antagonism of the Catholic church to various applications of biotechnology. But this case represents another paradox: optimism about this area of science fell to its lowest level in Ireland in 1999, in the wake of the public controversies about GM foods. That was the year the Technology Foresight report was completed. This low optimism was the context for the proposal for the National Conversation on Biotechnology that was recommended in 1999, but that never got started.

It should be noted that Irish support specifically for GM foods remained relatively high, in Europe, during this period and was close to that of the most supportive country, Spain, by 2002. In the 2005 survey, Europeans and Biotechnology, Irish support for GM foods was higher than the EU average, but lower for three other selected biotechnology applications, including nanotechnology, where Irish respondents reported the lowest level of support and of awareness in the EU.

Support for embryonic stem cell research – which is reported as differing little, at EU level, from support for non-embryonic stem cell research – is also lower than the EU average in Ireland. There is majority support for embryonic stem cell research, with usual or tighter regulation, in 15 of the 25 member states. Ireland is grouped with Portugal and five newer member states in the level of its support, but also in having higher proportions of respondents in the ‘don’t know’ category than in any other.

At this stage, it is worth noting that differentiation by member state of their responses to these surveys has been made by various commentators in terms of levels of differences between north and south, traditional and modern. With the expansion of the EU over the decades from its historical core to the north, to the south and to the east, it becomes difficult to draw these lines but there do appear to be some geographic patterns. There may also be evidence for another trend that has not, to my knowledge, been previously observed, namely the effect of EU membership itself. Given the influence of the EU on national policy-making and the efforts by the EU to promote scientific research and ‘scientific culture’, it is to be expected that time spent as a member of the EU would have some normalising effect on a country’s attitudes to S&T.

It is a notable feature of the Irish responses to questions on biotechnology but also to surveys on science and technology more broadly that the ‘don’t know’ (DK) responses are among the highest in the EU. Morris and Adley (2000) reviewed four 1990s Eurobarometer surveys on biotechnology as they applied to Ireland. Of the 1991 survey commented, “One of the most noteworthy results was the high number of ‘don’t know’ responses that were obtained in the Irish survey. The highest numbers of ‘don’t know’ responses to questions about both biotechnology and genetic engineering were found in Ireland, Greece and Portugal.” These three countries also recorded the lowest scores on knowledge of biotechnology, suggesting a link between ‘ignorance’ of one kind (giving incorrect answers) and ‘ignorance’ of another (saying you don’t know).

Morris and Adley go on to note that Irish respondents were in the top three member states in terms of support for biotechnology and genetic engineering applications. Thus – and this is part of the Irish paradox – low levels of knowledge and high levels of uncertainty are matched with high levels of confidence. We shall see further evidence of this reversal of a key aspect of deficit model thinking that is sometimes rendered colloquially as ‘to know us is to love us’.

In relation to high levels of ‘don’t know’ responses, Pardo and Calvo (2002) in their critical analysis of Eurobarometer surveys refer to the considerable variation of DK responses between countries, as well as very wide differentials in DK responses according to level of education. They observe that the DK responses indicate that “not all the aspects of science that were presented to the interviewees had the same level of familiarity, salience, or power to elicit valuations”.

Bauer, alum and Miller (2007) advise care in interpreting these DK responses on Eurobarometer surveys, drawing attention to the possible effect of different fieldwork protocols that might arise from the 5-yearly change of Eurobarometer contractors and, with it, of fieldwork protocols.

In a discussion of DK responses in psychological inquiries, Beatty et al (1998) propose that one kind of DK response may represent avoidance, and another a truthful DK. They also identify the possible untruthful substantive response, where the respondent “may really not know the answer to a question, but feel that admitting ignorance is somehow undesirable”. One of their concluding comments may be relevant to the scientific knowledge parts of Eurobarometer and similar surveys: “If respondents believe that wild guesses are adequate, they may provide them as substantive responses. Researchers should seriously consider whether it is worthwhile to allow such responses or whether it would be preferable to explicitly encourage DKs rather than wild guessing”.

DK responses are capable of yet further interpretations; in at least some cases, a ‘don’t know’ response may be the most authentic, particularly in respect of things that are new, uncertain and maybe unknowable. Variations in DK responses may also reflect different attitudes to surveys. But, in their benchmarking study for the EC, Miller et al (2002) drew attention to the DK responses in the 1992 and 2001 Eurobarometer S&T surveys, commenting that “for Ireland, there is a danger that the “disinterest through ignorance” features noted in 1992 may be leading to a downward spiral into a “don’t-know, don’t care” situation as far as RTD culture and PUS is concerned”. Where some countries demonstrate an accommodating or acquiescent disposition to new sciences, and others show active apprehension, Ireland appears actively apathetic.

In a recent national survey on the knowledge economy commissioned by Science Foundation Ireland, 25 per cent said they felt very well or well informed about the term, ‘knowledge economy’, the remaining three-quarters being unsure of their responses or not feeling well informed. However, a clear majority, in the same survey, supported investment in scientific research. The paradox to which this survey and many others draw attention is that the Irish population is willing to make an act of faith in science without apparently knowing or caring much about what is being done in science, in their name. From the perspective of technocratic policy-making, these findings present no dilemma. From the perspective of reconciling democracy and knowledge, they clearly do.