

The 2010 Eurobarometer on the life sciences

To the Editor:

Since 1991, the triennial Eurobarometer survey has assessed public attitudes about biotech and the life sciences in Europe. The latest 2010 Eurobarometer survey on the Life Sciences and Biotechnology (http://ec.europa.eu/research/science-society/document_library/pdf_06/europeans-biotechnology-in-2010_en.pdf), based on representative samples from 32 European countries, hints at a new era in the relations between science and society. We see less criticism of technology based on distrust in government and industry; more enthusiasm for novel technologies; and a more sophisticated appraisal of what technologies offer in terms of benefits, safety and sustainability. Europeans want regulation in the public interest and want a voice in such regulation when social values are at stake; we highlight an emerging European landscape of social value differences that shape people's views of technologies.

That sustainability is framing perceptions of technology is illustrated in Europeans' overwhelming support for

the second-generation biofuels, as well as their optimism about the contribution of different technologies to improving our way of life. Respondents were asked about a number of technologies. From their answers, we have created an index of technological optimism: the more positive the score, the higher the ratio of optimists to pessimists. **Figure 1** shows the impact of rising concerns about climate change and sustainability. Wind and solar energy, the sustainable options, are in the same league as the ubiquitous computers and information technology. These green energies have also drawn increasing support over the past five years. Nuclear power shows a similar increase, albeit still attracting an equal number of pessimists as optimists. By contrast, all the non-energy-related technologies show declines in optimism; it is possible that this is due to their lack of relevance to the sustainability agenda rather than to a change in attitudes. Of note is that support for biotech has returned to the level seen in 1993 (before the controversies over agrifood biotechnologies of the mid to late 1990s).

A rebuilding of public trust in regulators and industry from the nadir of the 1990s is in evidence. On an index capturing trust surplus (the percentage trusting minus the percentage not trusting), we find national governments at 46% (up 13% since 2005), the European Union (EU; Brussels) at 56% (up 14%) and industry at 50% (up 9%). On this index, university scientists maintain a trust surplus of around 80%.

But along with feeling increasing trust, Europeans expect to see appropriate regulation and are unwilling to accept a reliance on market forces. Science-based regulation is widely accepted; however, when ethics and social values are at stake—in the cases of synthetic biology and animal cloning, for example—many want to see public involvement in decision-making.

Detailed questions about emerging technologies (such as nanotechnology and synthetic biology) illustrate the focus upon benefits and safety. Nanotechnology, described in the context of common consumer products, attracts support from three out of five, with safety as the most important consideration, followed by benefits. Although 83% of Europeans have not heard about synthetic biology, their responses show what people expect from a novel technology. When they are asked which three of seven issues they would most like to learn about, "possible risks," "claimed benefits" and "who will benefit and who will bear the risks" are the prevalent choices. Under what conditions would respondents support the development of synthetic biology? Europeans are evenly split between those opting for strict regulation and those who either reject synthetic biology altogether or would only approve it under very special circumstances. It is clearly a sensitive and potentially controversial issue—it may be prudent for its promoters to take note of the evolving public perceptions.

Although the regulation of embryonic stem cell research is back in focus in the United States, 63% of Europeans approve of human embryonic stem cell research.

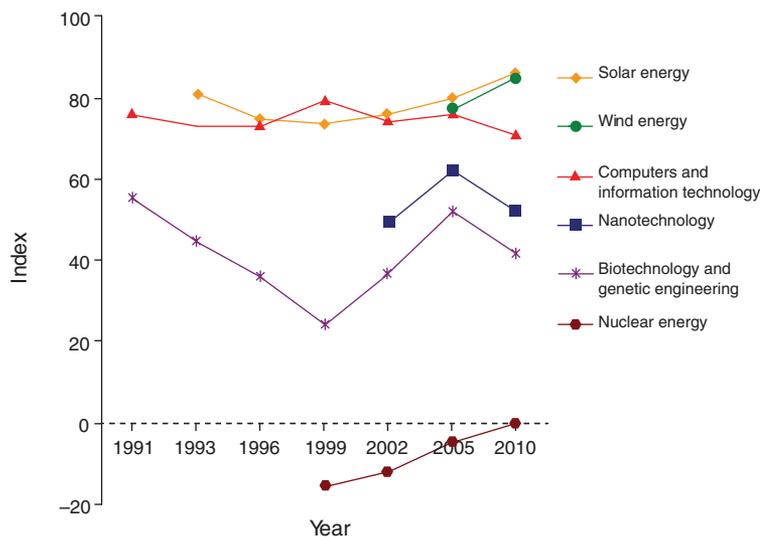


Figure 1 Index of optimism about six technologies. The more positive the score, the higher the ratio of optimists to pessimists. The countries included in each score for "Europe" (weighted according to their relative population sizes) reflect the expanding membership of the EU; thus, 1991 and 1993 scores are for the original 12 member states, 1996–2002 for EU15, 2005 for EU25 and 2010 for EU27.

There is a similar level of support for gene therapy. Xenotransplantation, an application long subject to moratoria in various countries, now finds approval with 58% of respondents. And the solid support for medical biotechnologies is also seen in nontherapeutic applications. Moving from repair to improvement, we find that 56% of the European public approves of research that aims to enhance human performance. But support for regenerative medicine is not unconditional; approval is contingent upon perceptions of adequate oversight and control. The contrast between the public's reception of medical biotechnologies and the traditional agrifood biotechnologies is, however, greater than ever.

The 2010 Eurobarometer survey was conducted one month before BASF's Amflora potato was approved by the European Commission (Brussels). But the survey shows that some controversies never die: genetically modified (GM) food is still the black sheep of biotech. The findings show declining support across many of the EU member states—on average, opponents outnumber supporters by 3 to 1, and in no country is there a majority of supporters. Why are there no winds of change for GM? The findings show that public concerns about safety are paramount, followed by the absence of benefits and a worry that it is unnatural. Cloning of animals for food products evokes similar concerns in almost all EU countries and attracts even less support than GM food. Food and biotech is thus an explosive cocktail—a point that nanotechnologists should not ignore as nanoparticles in food packaging and as food ingredients near the plate.

Yet there are indications that all is not lost for GM agriculture. Cisgenics, GM crops produced by adding only genes from the same species or from plants that are crossable by conventional breeding, evoke a different reaction than the those with genes from more distant species. In all EU countries, our example of the cisgenic production of apples receives higher support (55%) than transgenic apples (33%), with the former attracting majority support in 24 countries. Cisgenics might be seen as an example of the so-called 'second generation' of GM crops. Here, the benefits of GM apple breeding are achieved with a technolite process, a consumer benefit is offered (reduced pesticide use and pesticide residues), and as such the process achieves better ratings

in terms of benefits, safety, environment and 'naturalness', and double the support, compared to GM food. Indeed, the possibility of more acceptable solutions may harden opposition to traditional GM products.

To what extent are beliefs, socialization and values associated with support for science and technology? Overall, the nonreligious show more technological optimism and are more likely to support human embryonic stem cell research. Yet when faced with a conflict between scientific and ethical views on regenerative medicine, they are almost evenly split on which 'pillar of the truth' should prevail. This pattern is seen even among the adherents of Europe's major religions. Unsurprisingly, religious commitment is associated with greater concerns about ethical issues in stem cell research and with a belief that ethics should prevail over scientific evidence. But here again, there are many highly religious people who say that science should prevail in such a conflict of opinion.

What of education? The findings show that having been socialized in a scientific family or having a university education in science is associated with greater technological optimism, more confidence in regulation based on scientific delegation and more willingness to encourage the development of both nanotechnology and GM food. Even so, the findings also show that scientific socialization either in the family or at university is not a magic bullet. For example, a majority of those coming from a scientific family background or having a degree in science are not willing to support the development of GM food.

Finally, looking at the way values relate to support for technologies across the European countries, we have suggestive evidence of five clusters of countries differentiated by two fundamental contrasts. The first contrast is between those countries in which, relatively speaking, the public prioritizes science over ethics and those that prioritize ethics over science. The second contrast is between those countries that are concerned about distributional fairness and those that are less so. Crucially, a country's collective viewpoint on these two contrasting approaches is associated with technological optimism and support for regenerative medicines.

In countries where ethics takes priority over science, concerns about distributional

fairness lead to a profile of lower support (Germany and Austria); but with lower sensitivities about distributional fairness, the profile of support is relatively higher (Denmark and the Netherlands). When science taking priority over ethics is combined with concerns about distributional fairness, we find only moderate support (Finland and Poland); but once more the absence of sensitivities about distributional fairness reveals a profile of high support (UK and France).

Looking across religious beliefs, socialization and values, we see a complex and hierarchical pattern of influences. So, what are the conditions for socially robust technological innovation in Europe? The 2010 Eurobarometer points to some of the general criteria—sustainability, benefits, appropriate regulation, safety and a fair distribution of benefits and risks. Harnessing the winds of change into the design of particular emerging technologies will necessitate listening and accommodating to the public's voice(s).

ACKNOWLEDGMENTS

The authors designed, analyzed and interpreted the results of the Eurobarometer 73.1 survey on the Life Sciences and Biotechnology as part of the research project Sensitive Technologies and European Public Ethics (STEPE), funded by the Science in Society Programme of the EC's Seventh Framework Programme for Research and Technological Development (FP7).

COMPETING FINANCIAL INTERESTS

The authors declare no competing financial interests.

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