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Supporting Online Material for Social Values and the Governance of Science

George Gaskell,* Edna Einsiedel, William Hallman, Susanna Hornig Priest, Jonathan Jackson, Johannus Olsthoorn

*Author for correspondence. E-mail: g.gaskell@lse.ac.uk

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Social values and the governance of science: A transatlantic comparison of public opinion

George Gaskell, Edna Einsiedel, William Hallman, Susanna Hornig Priest, Jonathan Jackson, Johannes Olsthoorn

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1. Details of the Surveys

The Canadian Biotechnology Strategy Secretariat's "International Public Opinion Research on Emerging Technologies" (Wave 13, March 2005) telephone survey was conducted during January-February 2005 in Canada and in the United States of America. Using computerized random digit dialling software, the total sample within Canada was 2,000 respondents, giving 95% confidence limits of +/- 2.2% for a 50/50% split, and within the USA 1,200 respondents, giving 95% confidence limits of +/- 2.7% for a 50/50% split. Respondents were aged 18 years or above.

The Eurobarometers "Europeans, Science and Technology (63.1: no 224) and "Social Values, Science and Technology" (63.1: number 225) were conducted during November 2004. The survey conducted in each European Union (EU) country used a multi-stage random sampling procedure and provided a statistically representative sample of national residents aged 15 and over. The total sample within the EU was 25,000 respondents, giving 95% confidence limits of +/- 0.6%. In the paper all data referring to Europe are weighted by the population sizes of the Member States.

2. The questions about the governance of science and technology

(i) Decisions about technology should be based mainly on the views and advice of experts OR Decisions about technology should be based mainly on the views of average [Canadians/Americans/people from the relevant European country]. Which of those two positions is closest to your own?

- Decisions should be based on expert advice
- Decision should be based on views of average citizens
- [DK/NR]

(ii) Decisions about technology should be based mainly on the moral and ethical issues involved OR Decisions about technology should be based mainly on the scientific evidence of risk and benefit. Which of those two positions is closest to your own?

- Decisions should be based on moral and ethical issues
- Decision should be based on scientific evidence of risk and benefit
- [DK/NR]

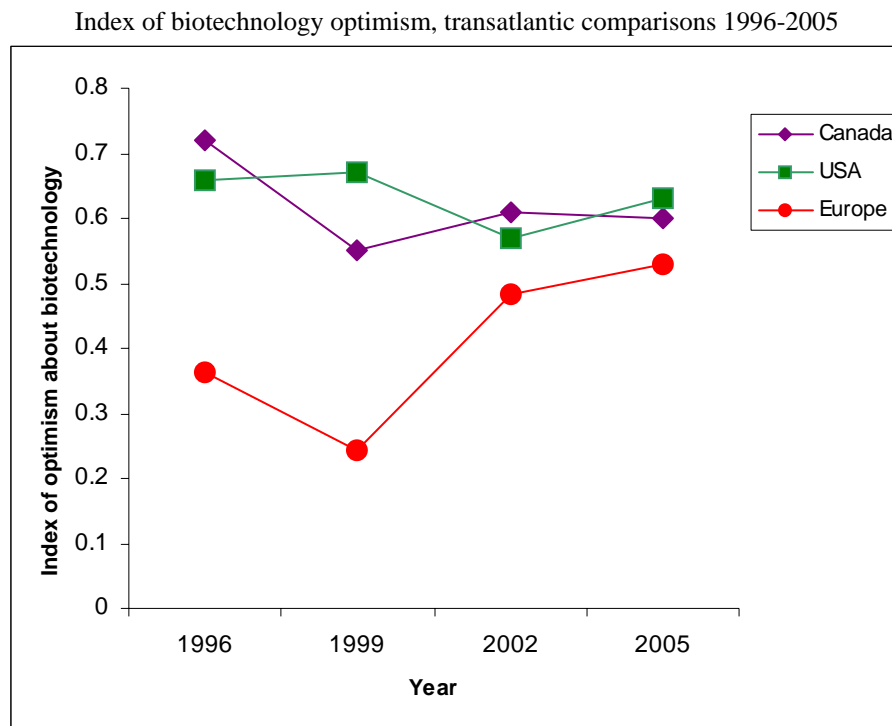
In the Canadian and American surveys a split ballot was used, where half the sample was asked the questions in the context of biotechnology and the other half asked about nanotechnology. For the purposes of the analysis we collapsed this split ballot, ignoring whether the target was nanotechnology or biotechnology, to make our comparisons between the North American and the European surveys

3. Optimism about biotechnology in Europe, Canada and the United States 1996-2005

Respondents were asked: *'I am going to read a list of areas in which new technologies are currently developing. For each of these areas, do you think it will improve our way of life in the next twenty years, it will have no effect, or it will make things worse? How about...biotechnology [along with computers and information technology, nuclear energy, nanotechnology, mobile phones and new energy sources to power cars]?'*

This question concerning optimism and pessimism about biotechnology has featured in the series of transatlantic surveys since 1996. To provide a basis for time series comparison we used an index: the percentage of pessimists is subtracted from the percentage of optimists and the result divided by the combined percentage of optimists, pessimists and those who say the technology will have no effect. In excluding the "Don't know" responses, this index is based on only those respondents who expressed an opinion. A positive score reflects a majority of optimists over pessimists, a negative score a majority of pessimists over optimists and a score around zero more or less equal percentages of the two. As the percentage of 'no effect' respondents increases so the index shrinks towards zero.

The time series plot (Figure 1) shows very similar profiles for Canada and the US for the period 2002-2005. It also indicates a striking rise in optimism in Europe since 1999, such that by 2005 European opinion appears to be converging towards that of Canada and the US.



4. The questions about GM foods and Stem Cell Research

In the North American survey Stem Cell Research and Genetically Modified Foods were described as follows:

“Biotechnology encompasses a number of different areas of research and applications. The next part of this survey focuses on one of these areas, stem cell research. Stem cell research involves the use of special human cells to study diseases and their cures. Stem cells have the unique ability to grow into any type of cell in the human body. Stem cell research has led to breakthroughs in our understanding of diabetes, MS, and Parkinson’s disease that offer the potential for new treatments and cures. However, to conduct this research, scientists have to get stem cells. They have been getting them from human embryos that are less than 2 weeks old and have been frozen and stored in fertility clinics. However, these embryos will only be used for research if they are not going to be used for fertility treatments. A recently discovered way of getting them is to extract stem cells from the blood contained in umbilical cords that people could donate to research after giving birth. The umbilical cords would in most cases be frozen and stored for future scientific use”.

“The next part of this survey focuses on another aspect of biotechnology, genetically modified food. Genetically modified foods, also called "biotechnology-derived foods", have had one or more genetic characteristics changed by altering the genetic makeup of the food or ingredients in the food. This is done to add, remove, or modify a characteristic of the food. For example, a plant might have its genetic makeup modified to make it resistant to a particular plant virus, to grow larger, or to help it grow in cold climates”.

Following the description of stem cell research and GM foods respondents were asked: “which of the following best captures your views about stem cell cloning (GM foods)?”

- I approve the use of stem cell research, as long as the usual levels of government regulation and control are in place
- I approve of stem cell research if it is more tightly controlled and regulated
- I do not approve of stem cell research except under very special circumstances
- I do not approve of stem cell research under any circumstances

In the Eurobarometer survey, respondents were asked:

“Now we are turning to the issue of what science and technology may be developing in the future. I am going to read out a list of possible future applications of science and technology for the next 20 years. For each new technology, please tell me if you approve the use of this technology?”

The two target technologies were described as follows

- “Cloning human stem cells from embryos to make cells and organs that can be transplanted into people with diseases”

- “Developing genetically modified crops for farming to increase the variety of regionally grown foods”

The response alternatives were: (I approve)

- In all circumstances;
- Only if it is highly regulated and controlled;
- Only in exceptional circumstances; and,
- Never.

To make a comparison between the three cases the first two response alternatives in each survey were combined, thus including all those who say they approve of the technology, with at most high regulation and control. This excludes those who do not approve at all or approve only in very special circumstances.

5. Parameter estimates of the multi-nominal logistic regression

		B	Std. Error	Sig.	Exp(B)	B	Std. Error	Sig.	Exp(B)	B	Std. Error	Sig.	Exp(B)
		Canada				Europe				US			
Public engagement in science	Intercept	-0.11	0.86	0.90		-0.82	0.18	0.00		4.02	0.66	0.00	
	income	-0.11	0.05	0.05	0.90	-0.18	0.04	0.00	0.84	-0.10	0.04	0.02	0.90
	education	0.28	0.12	0.02	1.32	0.00	0.02	0.96	1.00	-0.32	0.09	0.00	0.72
	religiosity	0.23	0.08	0.00	1.26	0.13	0.02	0.00	1.14	0.39	0.05	0.00	1.48
	age	0.18	0.11	0.09	1.20	-0.15	0.04	0.00	0.86	-0.12	0.07	0.11	0.89
	trust	-0.31	0.16	0.06	0.74	0.03	0.07	0.69	1.03	-0.61	0.12	0.00	0.54
	gender (female referent)	-0.35	0.29	0.22	0.70	-1.05	0.12	0.00		-0.24	0.21	0.26	0.79
Moral elitism	Intercept	-1.35	1.29	0.29		0.10	0.03	0.00	1.10	-0.29	0.94	0.76	
	income	-0.15	0.08	0.07	0.86	-0.04	0.01	0.00	0.96	-0.15	0.07	0.02	0.86
	education	0.14	0.18	0.44	1.15	0.11	0.02	0.00	1.11	-0.19	0.13	0.14	0.83
	religiosity	-0.02	0.12	0.85	0.98	0.05	0.03	0.08	1.05	-0.01	0.08	0.85	0.99
	age	0.02	0.16	0.88	1.02	0.27	0.05	0.00	1.31	0.08	0.11	0.43	1.09
	trust	-0.24	0.23	0.30	0.78	-0.50	0.14	0.00		-0.34	0.17	0.05	0.71
	gender (female referent)	0.13	0.42	0.76	1.14	-0.21	0.03	0.00	0.81	-0.13	0.31	0.67	0.88
Moral populism	Intercept	0.09	1.20	0.94		-0.06	0.01	0.00	0.94	4.46	0.89	0.00	
	income	-0.05	0.08	0.47	0.95	0.04	0.02	0.03	1.04	-0.10	0.06	0.11	0.90
	education	0.15	0.17	0.37	1.17	-0.17	0.03	0.00	0.84	-0.45	0.13	0.00	0.64
	religiosity	0.17	0.11	0.12	1.19	-0.14	0.06	0.01	0.87	0.53	0.08	0.00	1.70
	age	-0.16	0.15	0.30	0.85	-0.82	0.18	0.00		-0.27	0.10	0.01	0.76
	trust	-0.50	0.24	0.03	0.61	-0.18	0.04	0.00	0.84	-0.95	0.17	0.00	0.39
	gender (female referent)	-0.16	0.42	0.70	0.85	0.00	0.02	0.96	1.00	0.05	0.29	0.86	1.05

- Income: high score equals higher income
- Education: high score equals higher education
- Religiosity: high score equals higher religiosity
- Age: high score equals older aged
- Trust: high score equals higher trust
- Gender: male equals 1, female equals 0

By way of illustration consider the column for Canada. The first section shows how the *scientific democrats* differ from the reference category, the *scientific elitists* on the six characteristics or predictor variables. The *scientific democrats* are significantly lower in income and trust, higher in education and religiosity, but not significantly different in terms of age or gender.