EUROPEAN COMMISSION

CANDIDATE COUNTRIES EUROBAROMETER

PUBLIC OPINION IN THE COUNTRIES APPLYING FOR EUROPEAN UNION MEMBERSHIP

CC-EB 2002.3

ON

SCIENCE & TECHNOLOGY

BY THE GALLUP ORGANISATION, HUNGARY

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Introducing the Candidate Countries Eurobarometer

The European Commission launched a new series of surveys modelled on the Standard Eurobarometer in the countries applying for European Union membership. This new tool's function is to gather information in a way that is fully comparable with the Standard Eurobarometer from the societies that are to become members of the European Union. Using this tool, the Commission is able to provide decision makers and the European public with opinion data that help them understand similarities and differences between the EU and the Candidate Countries. The Candidate Countries Eurobarometer (CC-EB) continuously tracks support for EU membership, and the change of attitudes related to European issues, in the Candidate Countries.

The present report covers the results of the survey conducted in November 2002 in the 13 Candidate Countries: Bulgaria, Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia, and Turkey. This opinion poll has been carried out at the joint request of the Directorate General for Research and Directorate General Agriculture.

An identical set of questions was asked of representative samples of the population aged fifteen years and over in each Candidate Country. The regular sample in Candidate Countries Eurobarometer surveys is 1000 people per country, except for Cyprus and Malta (500). The achieved sample sizes of the 2002.3 wave are:

Bulgaria	1,000	Latvia	1,005	Slovakia	1,099
Cyprus	500	Lithuania	1,020	Slovenia	1,001
Czech Rep.	1,066	Malta	500	Turkey	1,000
Estonia	1,006	Poland	1,000		
Hungary	1,015	Romania	1,035	Total	12,247

In each of the 13 Candidate Countries, the survey is carried out by national institutes associated with and coordinated by The Gallup Organization, Hungary. This network of institutes was selected by tender. All institutes are members of the "European Society for Opinion and Marketing Research" (ESOMAR), and comply with its standards.

The figures shown in this report for each of the Candidate Countries are weighted by sex, age, region, size of locality, education level, and marital status. The figures given for the Candidate Region as a whole (CC-13) are weighted on the basis of the adult population in each country.

Due to the rounding of figures in certain cases, the total percentage in a table does not always add up to 100%, but a number very close to it (e.g. 99 or 101). When questions allow for several responses, percentages often add up to more than 100%. Percentages shown in the graphics may display a difference of 1% compared to the tables because of the way previously rounded percentages are added.

Types of surveys in the Eurobarometer series

The European Commission (Directorate-General Press and Communication) organizes general public opinion, specific target group, as well as qualitative (group discussion, in-depth interview) surveys in all Member States and, occasionally, in third countries. There are four different types of polls available:

- Traditional standard Eurobarometer surveys with reports published twice a year.
- Telephone Flash EB, also used for special target group surveys (e.g. Top Decision Makers).
- Qualitative research ("focus groups"; in-depth interviews).
- Candidate Countries Eurobarometer (replacing the Central and Eastern EB).

The standard face-to-face general public Eurobarometer surveys, the EB Candidate Countries surveys, the telephone Flash EB polls, and qualitative research serve primarily to carry out surveys for the different Directorates General and comparable special services of the Commission on their behalf and on their account.

The Eurobarometer website address is:

http://europa.eu.int/comm/public_opinion/

Key findings

This Candidate Countries Eurobarometer report presents an analysis of public opinion towards the European Union in the 13 Candidate Countries during the autumn of the year 2002. The key findings are:

Information, interest, knowledge

- People in the Candidate Countries do not only feel they are not well informed about science, but indeed, there is a surprising lack of fundamental scientific knowledge in both parts of Europe. Europeans often consider themselves poorly informed about science and technology (so state two-thirds of them), although 45.3% declare that they are interested in this subject.
- In the Candidate Region, television plays an even more important role than it does in the current Member States in informing the public about developments in science and technology. Citizens in the Candidate Countries prefer the other "passive" information dissemination method — unlike current EU citizens, they prefer radio over newspapers when they are looking for news and information related to science and technology.
- Biology, physics, mathematics, and astronomy are accepted by most people as sciences, while about three in 10 people in the Candidate Region do not consider social sciences and psychology "fairly scientific". Ironically, even astrology is rated higher on the CC-13 level than history, economics, or sociology.

Values, science, and technology

- Most people agree that science is good and useful. Many even think it's omnipotent. Statistical analyses, however, do not support the theory of a naïve belief in scientific salvation; there is a very strong positive correlation between the level to which people understand the most pressing science- or technology-related problems of contemporary society and optimism related to scientific progress. It is also true that the more people know scientific fundamentals, the more likely they are to generally believe that science will help to improve our world.
- Combating diseases, improving daily life, and interest at work are still broadly attributed to — and expected from — scientific progress. On the other hand, there is great reservation regarding science and technology as a panacea for all problems, many of which need, in fact, to be addressed by public social or environmental policies. Still, the overall image of science (that it has more positive than negative effects) finds favour in the Candidate Countries.

The morality of science

- Most people throughout Europe (a bit more in the EU than in the Candidate Countries) believe that science is value neutral in the sense that there are no evil inventions — only the application of a certain scientific finding can be good or bad.
- Still, scientists are held responsible for the misuse of their discoveries by

almost half of the respondents in the Candidate Region. Consequently, the overwhelming majority in both parts of Europe agrees that scientists should be regulated by ethical standards that can be enforced by the authorities.

- While people in the current Member States are completely divided over the question of whether or not to allow scientists to conduct experiments "on animals like dogs and monkeys" (45% agree with this proposition and 41% disapprove of the idea); the overwhelming majority in the Candidate Region supports (63% vs. 22%) these experiments if they target human health problems.

BSE epidemic

- The food industry and scientists are most frequently cited as having a major responsibility for the mad cow disease problem in the Candidate Countries.
- We queried the respondents as to what they think should be done to avoid problems such as BSE in the future. It appears that many believe that scientists should be encouraged to warn the public about potential dangers. According to 89%, scientists should keep the public better informed of the potential hazards of new technologies and, more generally, "scientists should communicate their scientific knowledge better".

Food based on GMOs

- Attitudes are similar in the two parts of Europe; people first of all want to retain the right to choose between natural produce and foodstuff based on GMOs, which in other words means that the European public expects clear indication of GMO-basis on the packaging of food in supermarkets or in the menus of restaurants.
- This is an indication of the general attitude of the public that can be best described as “cautious”. Eighty percent of all teenagers and adults in the Candidate Countries await more information before consuming genetically modified food, and about the same proportion feel that such food should only be introduced if it is scientifically proven not to be a health hazard.

The scientific profession

- Both in the current Member States and the Candidate Countries, people have the highest regard for those professions that have technological or scientific relevance. Medical doctors have the highest prestige rating in both regions, with more than seven in 10 people naming this profession as one for which they have the highest regard. Scientists come in at second place, followed by engineers.
- Being a medical doctor or an engineer is much more attractive to less educated people, while people who went through lengthy studies are more likely to value scientists’ work

The scientific vocational situation

- People in the Candidate Region are not sure if there is a scientific vocational crisis in their countries or not.
- But if there is one, certainly one of the most important reasons for a declining interest in scientific careers is attributed to the labour market in the Candidate Region. Most people think that mediocre career prospects and low salaries turn people away from pursuing scientific studies and careers.
- About two-thirds of Europeans support the idea of active public policies to encourage scientific careers: 60% on the EU-15 level and 67% in the Candidate Countries would like "the authorities to resolve this situation".

European scientific research

- Candidate Countries' citizens are quite satisfied with the level of activity the European Union displays in the area of scientific research; their expectations and perception are relatively close to each other in this respect.
- Certainly, people in the EU and Candidate Countries believe that research conducted at the European Union level will be more and more important (62% of the citizens in the Candidate Region agree) at the expense of national research. People in the Candidate Countries are not convinced that this shift would be in the interest of their nation, or in the interest of "everybody" (53% and 52% respectively) — they are most likely to think that this process is in industry's interest (61%).
- Clearly, people in both parts of Europe feel an important remedy for the scientific inferiority of Europe is the closer cooperation between European scientists (more in the Candidate Countries) and European countries (more in the EU). Besides enhanced European-level cooperation, there is a wide agreement that a closer co-operation between industry and academia could lead to better products of scientific research.
- On average, six in 10 citizens in the Candidate Region (59%) believe that the enlargement will bring mutual benefits for all: at the end of the process, both the current Member States and the accessing countries will possess an enhanced scientific potential.

REPORT

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Introduction

This third report of the Candidate Countries Eurobarometer (CC-EB) presents results from the 13 Candidate Countries on several issues related to scientific research. This report looks at citizens' experience and general perception of science and technology. The survey was fielded in all 13 Candidate Countries during October-November 2002. In many instances, the reader will note that the results are compared to those from the 15 Member States of the European Union, to provide comparisons between the EU and the Candidate Countries. All EU data presented here are from Eurobarometer 55.2, May-June 2001.

The report begins with an overview of how the general public in the Candidate Countries perceive science and technology; the levels of information and interest in science compared to other areas of interest, how the media's role in disseminating scientific information is perceived, and finally this chapter reports on people's knowledge level of fundamental scientific information as well as of current issues with scientific relevance.

Chapter 2 concentrates on the connection between values and science; we will take a look the benefits people expect from science, and the role of fundamental research in that respect. We will analyse religions' role in evaluating science-related questions, and we will also look at the extent of superstition among people in the Candidate Region.

Chapter 3 focuses on the morality of science — covering issues like experiments on animals, and the responsibility and accountability of scientists.

Chapter 4 briefly summarizes what consequences people in the Candidate Region think the BSE epidemic — the mad cow disease — will have in the future, and we will also see who among the key players is seen to have major responsibility for the problem.

Chapter 5 will introduce people's opinions on genetically modified food; we will investigate the extent to which people think such food is dangerous, and the levels of willingness to consume such food in the Candidate Region.

Chapter 6 outlines the prestige ranking of scientists and other technology-dependent professionals compared to all professions, and later in that chapter we will discuss the extent to which scientists are seen as impartial sources of information in times of disaster.

Chapter 7 will take a look at the scientific vocational situation in the Candidate Countries; we will find out if citizens in the Candidate Countries think that scientific education is in crisis or not, and the possible consequences of the general decline in interest towards scientific studies and careers.

Finally, the last chapter will report on people's opinion about the European Union's role in promoting and supporting scientific research, the general situation of research in Europe in a global perspective, and possible effects of enlargement of the new and old members' scientific potential.

The Gallup Organization wishes to thank all respondents and interviewers in the Candidate Countries who have taken part in the survey. Without their participation, this report could not have been written.

1. Information, interest, knowledge

In this chapter, we will take a closer look at the extent to which citizens in the Candidate Countries are informed about science in comparison with other areas of interest. Further, we will compare the levels of interest towards scientific issues, and towards the results of different disciplines, in general. Later on, we will also examine the levels of factual knowledge in some scientific areas of the citizens in the Candidate Region.

1.1 Levels of information and interest towards science and technology

Candidate Countries Eurobarometer found that slightly more than one quarter, 27%, of the citizens in the Candidate Countries think they are well informed about scientific subjects, making it fifth among the five areas we listed in the survey; *sports* are the subject on which people are the most likely to claim they are well informed. This is not very different from what Eurobarometer found in the Member States a year ago (with a slightly different question that implies a bit more positive answers—see footnote on Figure 1.1a), science ranks low according to the level of people's information about the subject. (*FIGURE 1.1a*)

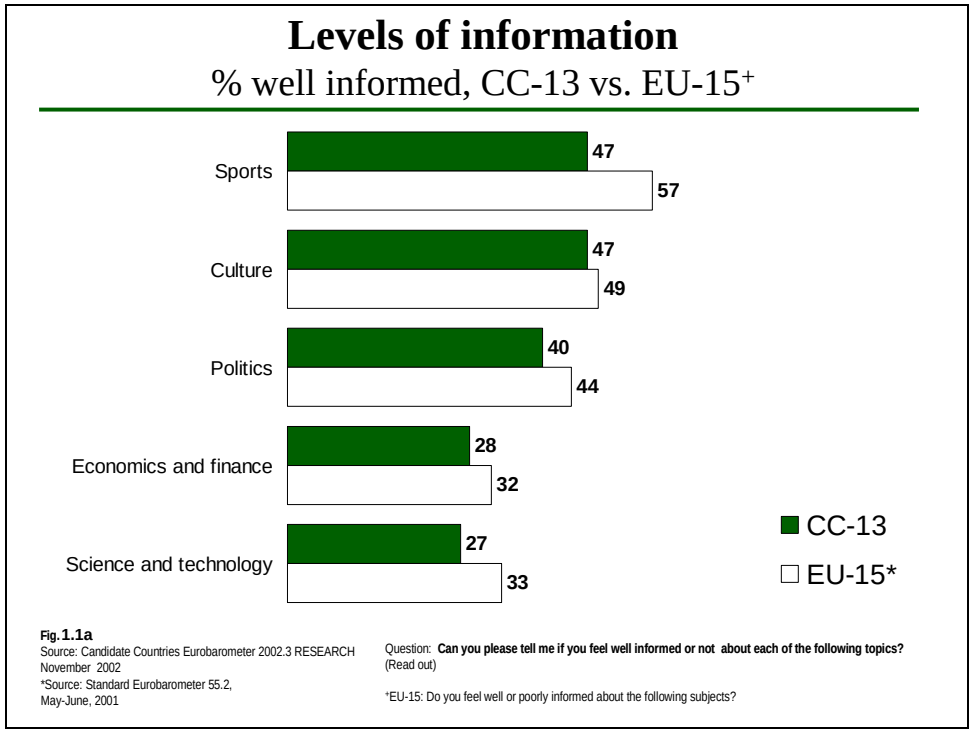


Fig.1.1a
Source: Candidate Countries Eurobarometer 2002.3 RESEARCH November 2002
*Source: Standard Eurobarometer 55.2, May-June, 2001

Question: **Can you please tell me if you feel well informed or not about each of the following topics?** (Read out)

*EU-15: Do you feel well or poorly informed about the following subjects?

Looking at *FIGURE 1.1b,* it is evident that there are significant differences in the extent to which people claim they are informed about science and technology. The proportion of those who claim to be well informed range from 39% in Malta, to 20% in Turkey and Estonia. Still, in Malta as well as in Estonia and Turkey, science ranks last among the five areas of interest. This is the case in all Candidate Countries but Poland and Romania, where economics ranks fifth, slightly behind science. (See also *ANNEX TABLE 1.1*)

Without doubt, much like the population of the current European Union, people do not feel particularly well informed about scientific issues — women even less so (22%) than men (32%). Among the four age groups (those aged 15 to 24, 25 to 39, 40 to 54, and 55 and over)

we find that the proportion of well-informed people is significantly higher for the youngest segment of the population (40%) than it is for the other age groups. Large variations are found among the various occupational groups in the population, with levels of being well informed about science and technology ranging from 8% among house persons to 49% among managers. People who stayed in school until the age of 20 or older (44%) are significantly more likely to claim to be well informed in the subject than are people who left school when they were aged 15 or younger (12%), or aged 16 to 19 (30%)[1]. (*ANNEX TABLE 1.2*)

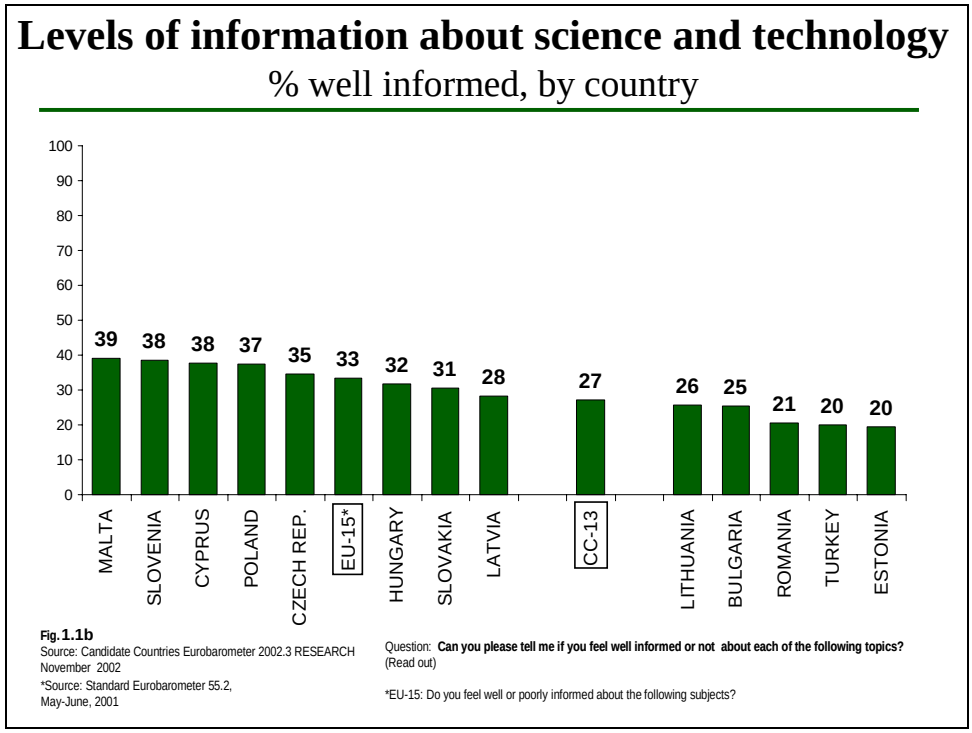


Fig.1.1b
Source: Candidate Countries Eurobarometer 2002.3 RESEARCH November 2002
*Source: Standard Eurobarometer 55.2, May-June, 2001

Question: **Can you please tell me if you feel well informed or not about each of the following topics?** (Read out)

*EU-15: Do you feel well or poorly informed about the following subjects?

Levels of interest in scientific topics are rather low across the Candidate Region. In the current Member States, science and technology receive higher levels of interest than do politics or finance, but this is not the case in the Candidate Countries. As *FIGURE 1.1c* shows, on the CC-13 level, science is the least likely to gain the interest of the people among the five investigated areas. Culture and sports inspire a strong degree of interest (55% and 53%). Four in 10 people in the Candidate Countries are interested in politics, while a bit more than a third expresses interest in finance and science.

Levels of interest in scientific topics range from 22% in Turkey, 34% in Bulgaria, and 35% in Romania, to 58% in Cyprus, 53% in Hungary, and 50% in Malta. (*ANNEX TABLE 1.3*)

Demographic analyses show that women are less interested in scientific topics (29%) than are men (41%). Again we find that the youngest age group has the highest level of interest in science and technology (44%), and the proportion of interested people gradually decreases to 26% in the oldest age group. As always, large variations are present among the various occupational groups of the CC-13 population. Levels of interest in science and technology range from 13% among house persons to as high as 62% among managers. Obviously, people who were still studying at the age of 20 are significantly more likely (59%) to claim interest in the subject than are people who left school as early as 15 years of age (15%), or those aged 16 to 19 (41%). (*ANNEX TABLE 1.4*)

[1] Appendix C.4 provides more details about demographic variables.

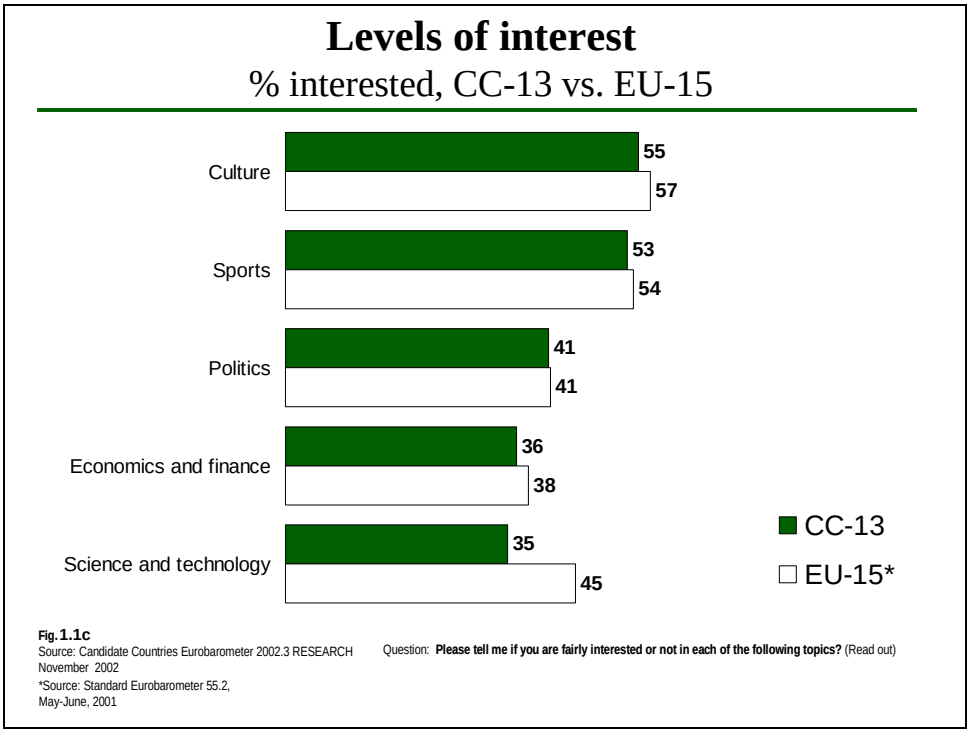


Fig.1.1c
Source: Candidate Countries Eurobarometer 2002.3 RESEARCH November 2002
*Source: Standard Eurobarometer 55.2, May-June, 2001

Question: **Please tell me if you are fairly interested or not in each of the following topics?** (Read out)

In order to better grasp the attitudes to scientific information of the people in the Candidate Region it is interesting to combine the two questions raised, firstly in terms of degree of information and the secondly in terms of interest (Table 1.1a).

When combining these results, we can see that a little less than one-fourth of the citizens in the Candidate Countries (23%) state that they are both well informed and interested in science and technology. At the other end of the scale, 56% say they are neither informed nor interested. Fifteen percent in the Member States and 10% on the CC-13 level report having a deficit in scientific information (i.e. they claim to be interested but not well informed), which is similar to the figure we found for the other subjects as well. The proportion of people who seek information in the Candidate Region ranges from 23-24% in Estonia, Cyprus, and Hungary, to only 4% in Turkey, 8% in the Czech Republic, and 10% in Bulgaria.

Table 1.1a Interaction between information and interest in the different areas
in %, CC-13 level

	Sports	Politics	Economics & finance	Culture	**Science & tech**	***Science & tech** EU-15**
interested and well informed	43	33	24	43	**23**	*29*
interested but not well informed	10	7	11	10	**10**	*15*
neither informed nor interested	40	49	55	38	**56**	*46*
other	8	11	10	8	**10**	*10*

* Standard Eurobarometer 55.2, May - June 2001

1.2 Levels of interest in developments of different scientific disciplines

Obviously, Candidate Countries' citizens are most interested in developments in medicine over and above all other disciplines (*FIGURE 1.2a*). The same is true in the current Member States as well — people are most interested in scientific developments that might affect their medication and health. In every single Candidate Country, developments in medicine gain the most attention. Environmental issues, as another important part of the public health domain, also raise a significant interest in both regions, somewhat more in the EU-15 countries than in the Candidate Region. Environmental science's second place position is almost unanimous; only in Lithuania does it rank third (behind the Internet), and in Turkey economics and social sciences come second. (*ANNEX TABLE 1.5*)

Unlike in the Member States where Internet comes third, chosen by 32% of respondents, economics and social sciences take third place in the Candidate Countries. There are four countries, where — similarly to the Member States — the third place goes to the Internet: Malta, Poland, the Czech Republic, and Estonia. The Internet ranks fourth on CC-13 level.

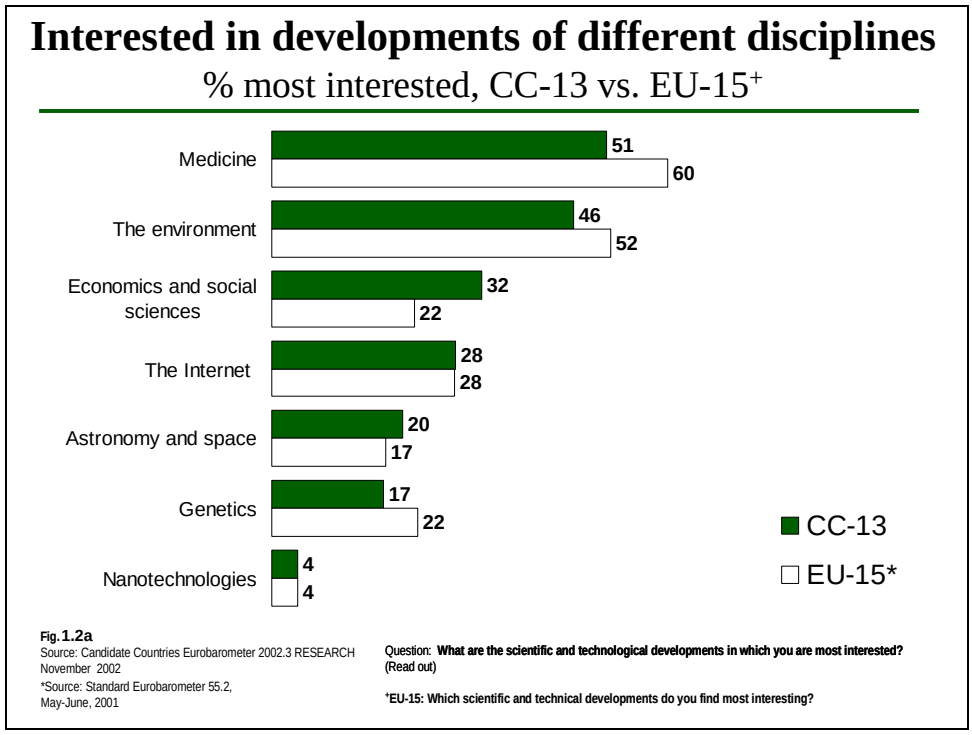


Fig.1.2a
Source: Candidate Countries Eurobarometer 2002.3 RESEARCH November 2002
*Source: Standard Eurobarometer 55.2, May-June, 2001

Question: **What are the scientific and technological developments in which you are most interested? (Read out)**

*EU-15: Which scientific and technical developments do you find most interesting?

Genetics and astronomy achieve comparable ratings (17% and 20% respectively), while nanotechnologies are very rarely mentioned as a scientific subject of great interest — in fact they are barely recognized as a scientific area by the citizens of the Candidate Region (or on the EU-15 level).

More educated people are more interested in each of these scientific subjects, without exception. Age has a more controversial effect on levels of interest. Medicine scores higher the older the age group (15-24 years: 43%; 55+ years: 55%), and we find an extremely strong opposite tendency in the case of the Internet (15-24 years: 52%; 55+ years: 9%). The environment concerns all age groups roughly equally, with the youngest group being the least interested (41%).

Females are more interested than males in developments in medicine (56% vs. 46%), in genetics (19% vs. 15%), and in the environment (47% vs. 44%). In all other areas men claim to be more interested than women.

1.3 Scientific information media

To assess the use of the various media (TV, radio, written press, scientific journals, the Internet, school or university) to convey scientific information, the public in the Candidate Countries were asked to classify them, giving each a rank of 1 (for the medium judged the most important) to 6 (for the least important).

Adding together the marks indicating primary (1) or secondary (2) sources of scientific information results in the following ranking of the different media's relevance in spreading scientific news and information among the Candidate Countries' public (the EU-15 figures from 2001[2] are in parentheses):

TV	71% (60%)
Radio	41% (27%)
Press	27% (37%)
School or university	19% (22%)
Scientific journals	18% (20%)
Internet	14% (17%)

As these numbers suggest, television plays an even more important role than it does in the current Member States in informing the public about developments in science and technology. The citizens in the Candidate Countries prefer the other "passive" information dissemination method -- unlike current EU citizens, they prefer radio over the newspapers when they are looking for news and information related to science and technology.

These preferences barely vary from one country to another, though we observe a preference for the printed press over the radio in Slovakia and the Czech Republic.

On the other hand, there are some differences in media use according to the age and level of education of respondents. While TV appears relatively universal (although well-educated groups are less likely to consider it as their primary or second most important source of information), the best educated more often choose the general press (34%), scientific journals (30%), and the Internet (21%). The youngest and those who are still studying prefer using the Internet more than do other groups (27% and 34% respectively). Logically, students and younger people also favour the school or university system (33% among 15-24 year olds and 44% among those still studying) as a source of information.

The following results also confirm the primacy of television in disseminating information about science and technology: two-thirds (63%) of Candidate Countries' citizens "prefer to watch television programmes on science and technology rather than read articles on this subject". About the same proportion (60%) admits that they "rarely read articles on science and technology". (*SEE ANNEX TABLE 1.6*)

Table 1.3a Role of television in %, CC-13 level

	SCIENTIFIC KNOWLEDGE SCALE[3]		
	— (0-4 correct)	**+/-** (5-9 correct)	**+** (10-13 correct)
Prefers watching TV programmes about science and technology to reading articles about it	47	67	70
Rarely reads articles related to science and technology	51	65	54

[2] EB 55.2, May-June 2001
[3] For definitions refer to Chapter 1.4

One might think that the more important the role television has in attaining scientific information, the lower is the level or the quality of the received information. Our data does not support the inferiority of television-canalized information dissemination about science and technology; those who have a good basic grasp of scientific information are as likely as those with very poor scientific knowledge to prefer TV to reading articles, as Table 1.3 on the previous page illustrates. Also, those who claim to be well informed about science are equally likely as those who admit they are not informed in science and technology (59%) to say that they prefer getting scientific information from television rather than from print media (60%).

Attitudes to media's scientific coverage

Overall, three in 10 people (29%) in the Candidate Region think that "scientific and technical developments are presented too negatively" by the media. Thirty-eight percent disagree, and a significant percentage has no clear opinion in this issue (33%).

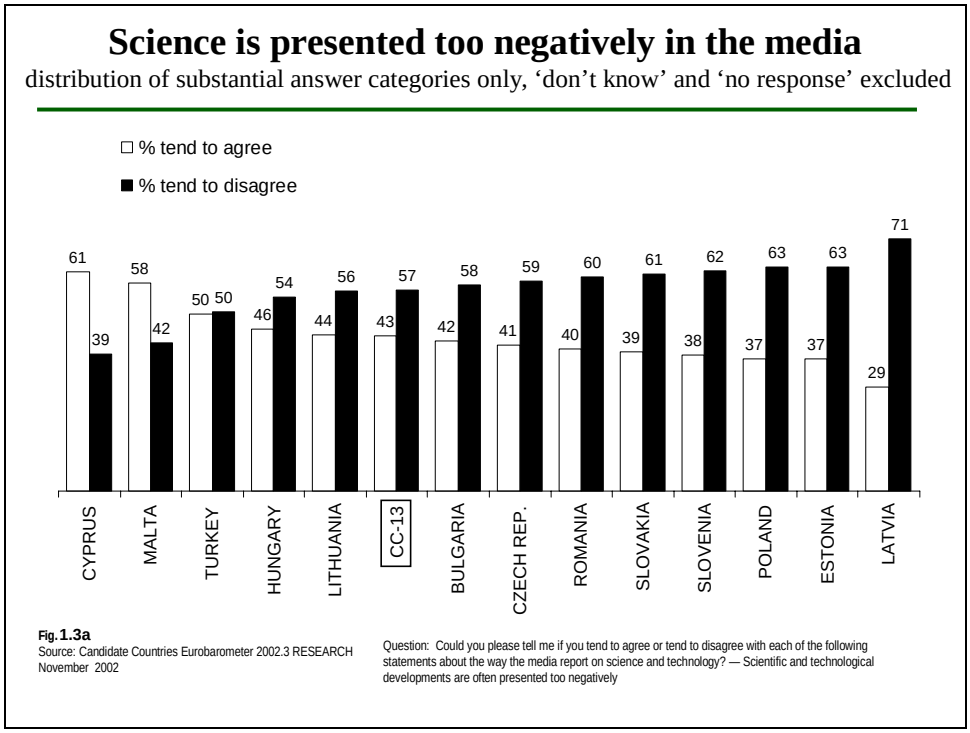


Fig.1.3a
Source: Candidate Countries Eurobarometer 2002.3 RESEARCH November 2002

Question: Could you please tell me if you tend to agree or tend to disagree with each of the following statements about the way the media report on science and technology? — Scientific and technological developments are often presented too negatively

If we exclude the responses of those people who do not have a clear opinion in this issue (which varies across countries to a significant degree from 23% in Slovenia to 56% in Bulgaria — see *ANNEX TABLE 1.6*), we find that in most countries a majority of citizens do not believe that science is presented too negatively in the media. In Cyprus and Malta, however, most respondents share this opinion, and the Turkish public is evenly divided.

People who say they are well informed about science and technology are slightly more likely than are those who are not well informed (28%) to agree that science is presented too negatively in the media (34%) However, they are even more likely to *disagree* with this statement (49% vs. 34%). (Obviously, people with lower levels of scientific information are much more likely not to have an opinion in this question.)

Almost half, 46% of the public in the Candidate Countries believe that journalists covering scientific subjects do not possess the necessary knowledge or training to do so. Only 20% disagrees, and another 34% can't decide in this question. The latter figure ranges from 24%

in Latvia to 49% in Bulgaria. For raw, country-by-country numbers, refer to *ANNEX TABLE 1.6*.

Journalists have no sufficient background to report on science

distribution of substantial answer categories only, 'don't know' and 'no response' excluded

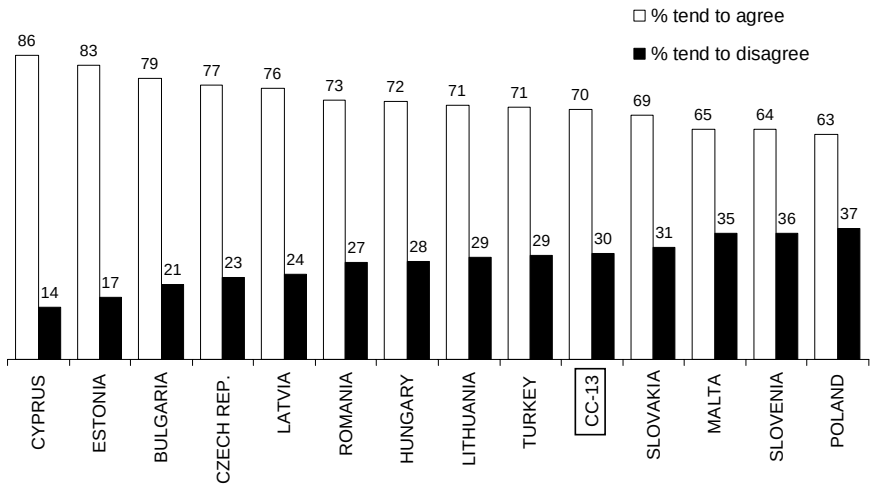


Fig.1.3b
Source: Candidate Countries Eurobarometer 2002.3 RESEARCH November 2002

Question: Could you please tell me if you tend to agree or tend to disagree with each of the following statements about the way the media report on science and technology? — Most journalists dealing with scientific topics do not have the appropriate background or training to do so

If we, again, exclude those responses that are neither affirmative nor negative, we find that in all Candidate Countries the large majority of those citizens who have an opinion agree that science and technology related news is covered by people who are not qualified to do so. This is especially the case in Cyprus, Estonia, and Bulgaria, and relatively the least so in Poland, Slovenia, and Malta.

Contrary to the previous question, people who are well informed about scientific subjects firmly believe that journalists report on scientific developments without proper background (57% agree, 21% disagree). People with lower levels of scientific information are not as confident — many of them avoid judgment in this question — but the clear majority of those who can decide say that the scientific knowledge of journalists reporting on science and technology related news is not sufficient.

The two attitudes we described above somewhat overlap each other; people who think one of them is true are more likely to believe that the other one is true as well[4], however, this association is not particularly strong.

There is a stronger association between the opinion that science is often reported too negatively on one hand, and that "there are too many programmes and articles dealing with science and technology" on the other[5]. In the Candidate Region, those who consider the coverage of science and technology as too negative are significantly more likely to think that there is an unnecessary abundance of such reports — they are either afraid or tired of hearing all the bad news, or simply think that science-related sensationalism should disappear from whatever media they use.

[4] Pearson correlation: 0.168, significant at the 0.01 level (2-tailed)
[5] Pearson correlation: 0.262, significant at the 0.01 level (2-tailed)

Visits to science and technology museums

Another way to assess the extent to which people are affected by all kinds of science and technology information is to look at how frequently they visit science and technology museums. Generally, people in the Candidate Countries are less likely to visit each of the cultural establishments or institutions than are their fellows in the current Member States, and consequently, a somewhat higher ratio reported that they haven't visited any of the places we mentioned in the question. (*FIGURE 1.3c*)

Science and technology museums are almost equally avoided by both current and future citizens of the EU — 8% in the Candidate Countries and 11% in the Member States indicate they have visited such a museum in the past 12 months. Public libraries are the most likely destinations if people visit cultural venues, followed by zoos and art museums. (*ANNEX TABLE 1.7*)

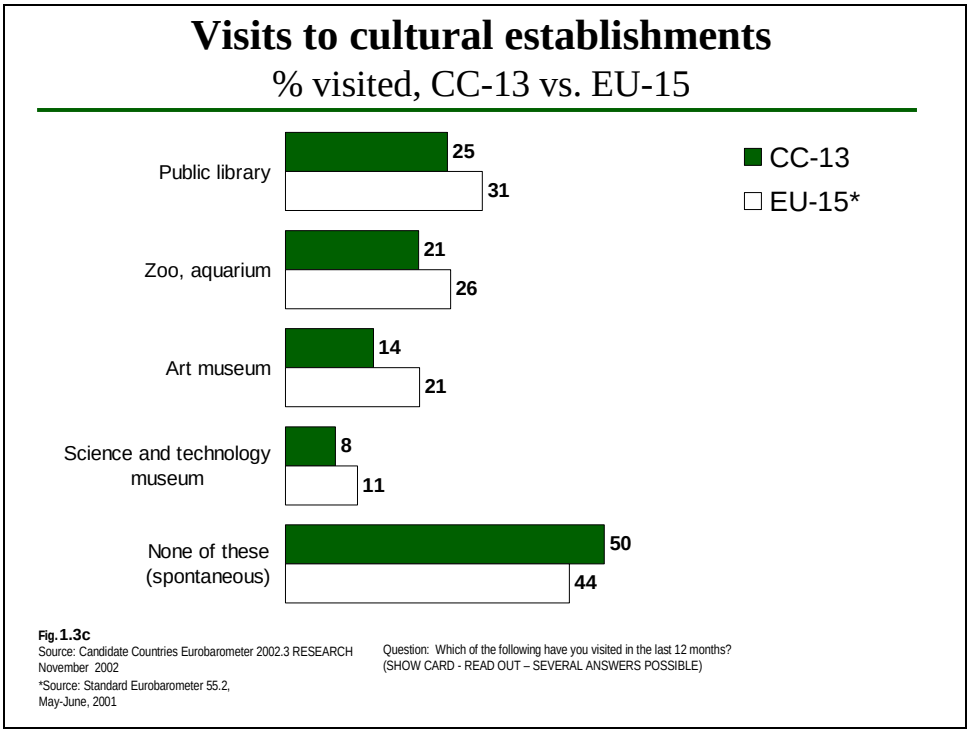


Fig.1.3c
Source: Candidate Countries Eurobarometer 2002.3 RESEARCH November 2002
*Source: Standard Eurobarometer 55.2, May-June, 2001

Question: Which of the following have you visited in the last 12 months? (SHOW CARD - READ OUT – SEVERAL ANSWERS POSSIBLE)

We asked people who had not visited a science and technology museum why they had not . Similarly to the EU-15 results, one-third (32%) of people living in the Candidate Countries and haven't visited such a museum admit that they are not interested in going to such museums. A significantly higher proportion in the Candidate Countries (37%) than in the current Member States (29%) claim they have no time for visiting such museums. Further reasons people in the Candidate Countries cited for not visiting a science and technology museum were that people did not know where they could find such a museum (24%), or these museums are "too far away" (27%). Sixteen percent indicated that high entrance fees prevent them from visiting science and technology museums, while 8% cited other reasons. (*ANNEX TABLE 1.8*)

Looking at the key percentage country by country, we find that only a sheer 1% in Turkey, 5% of Lithuanians and 6% of Latvians have visited a science and technology museum in the past one year. On the other hand, 21% of Slovenians, 17% of Hungarians and Czechs, and 16% of the Maltese have visited such a museum over the course of the past 12 months.

Demographic analyses show little variation between genders (Table 1.3b); however women are slightly more likely to visit all of the establishments under investigation. Consequently, fewer women admit that they have not visited any of the four cultural establishments recently

(48% vs. 52% among men). In other groups, we find more significant differences. The younger a respondent is, the more likely he or she is to have used the services of at least one of the institutions the survey listed, particularly public libraries.

In terms of education, the association is even more staggering. The most educated people are six times more likely to have visited a public library as compared to those who left school early, and seven to eight times more likely to have visited a science and technology museum.

Not surprisingly, villagers are more separated from these establishments, and consequently they are much more likely to report not having visited any of the venues (60%) than are those who live in more urbanized settings (44% in mid-sized towns, and 40% in large cities).

Finally, the variation is enormous between occupational groups as well. At higher levels in the employment hierarchy, people display much more cultural consumption and are less likely to avoid all the venues our survey listed. In fact, among all groups in the table below, managers are the most likely to have visited a science and technology museum in the past one year.

Table 1.3b Visits to different cultural venues
CC-13 level, in %, by demographics

	Zoo, aquarium	Science and technology museum	Public library	Art museum	None of these		Zoo, aquarium	Science and technology museum	Public library	Art museum	None of these
Male	20	8	24	13	52	Self-employed	16	5	14	10	66
Female	22	7	26	15	48	Managers	38	19	51	34	26
AGE: 15-24 years	26	10	46	18	37	Other white collars	27	10	33	18	36
AGE: 25-39 years	27	8	25	15	49	Manual workers	26	9	24	12	46
AGE: 40-54 years	20	7	19	13	53	House persons	19	2	11	7	68
AGE: 55+ years	10	6	13	10	59	Unemployed	20	5	22	11	53
EDU: up to 15 years	11	2	7	5	72	Retired	11	6	15	10	53
EDU: 16-19 years	27	9	28	15	40	Rural area or village	14	5	19	7	60
EDU: 20+ years	31	15	43	28	30	Small or middle sized town	22	9	30	16	44
EDU: still studying	27	17	68	27	19	Large town	28	10	28	20	42

1.4 The public and science

This sub-chapter will first report on people's views about different scientific disciplines, and continue with the level of scientific knowledge present in each of the Candidate Countries' societies. We will show the extent to which people are familiar with basic scientific testing methods, and how they assess probabilities. And finally, we will investigate the public's perceptions and factual knowledge related to topical scientific issues, such as holes in the ozone layer, or the greenhouse effect.

Boundaries of science

We asked our respondents to tell us if they find certain disciplines "fairly scientific" or not. The results are as surprising as those Eurobarometer have found in the European Union. The overall indication is that the scientific character of social sciences have a very low rating, while only medicine has an undisputed scientific image in the public.

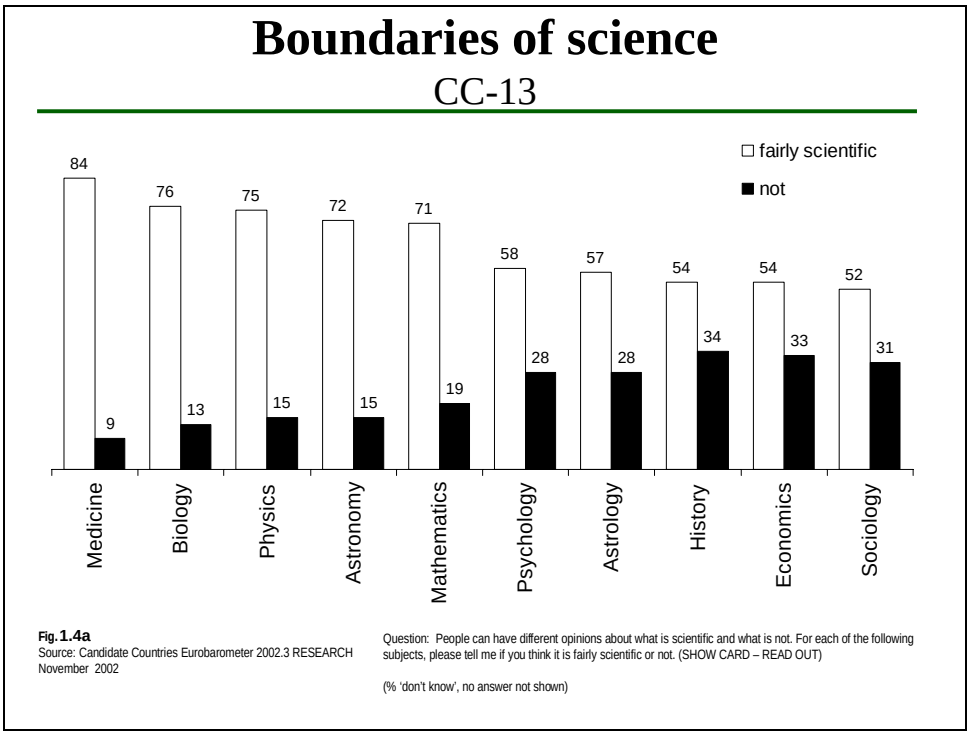


Fig.1.4a
Source: Candidate Countries Eurobarometer 2002.3 RESEARCH November 2002

Question: People can have different opinions about what is scientific and what is not. For each of the following subjects, please tell me if you think it is fairly scientific or not. (SHOW CARD – READ OUT)

(% 'don't know', no answer not shown)

Biology, physics, mathematics, and astronomy are accepted by most people as sciences, while about three in 10 people in the Candidate Region do not consider social sciences and psychology "fairly scientific". Ironically, even astrology is rated higher on the CC-13 level than history, economics, or sociology.

In the Candidate Countries, traditional sciences like medicine, biology, and physics are less well regarded than they are in the European Union (medicine "fairly scientific": EU-15: 93%, CC-13: 84%; physics: EU-15: 90%, CC-13: 75%; biology: EU-15: 88%, CC-13: 75%). Psychology is also less well regarded in the Candidate Countries (EU-15: 65%, CC-13: 58%). Other social sciences have a better — or at least more scientific — image in the Candidate Countries than in the current Member States; most markedly in the case of history (EU-15: 33%, CC-13: 54%). Sociology was not asked in the EU, but the low rating given for history and economics (EU-15: 42%, CC-13: 54%) predicts that newborn, and in fact sometimes vaguely established, scientific disciplines have a better image in the transiting countries than in the established Western European societies.

Country differences in defining boundaries of science

% 'fairly scientific'

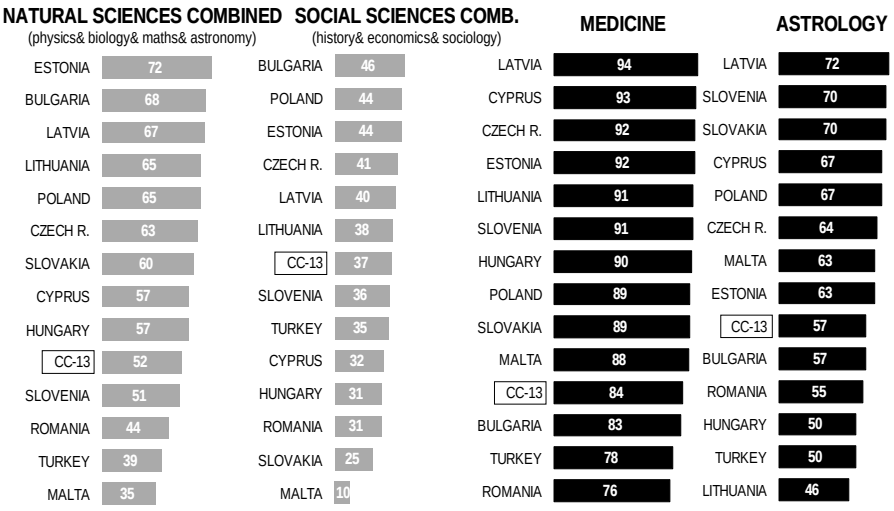


Fig.1.4b
Source: Candidate Countries Eurobarometer 2002.3 RESEARCH November 2002

Question: People can have different opinions about what is scientific and what is not. For each of the following subjects, please tell me if you think it is fairly scientific or not. (SHOW CARD – READ OUT)

(% 'not', 'don't know', no answer not shown)

The differences are even higher if we compare individual countries in the Candidate Region. *Figure 1.4b* has ratings for all four natural sciences combined, social sciences combined, medicine, and astrology. Social sciences are universally seen as less scientific than are hard or natural sciences. In fact, the two rankings are quite similar — although the exact rank order of the countries differ —the same countries comprise the first half of both lists. (*ANNEX TABLE 1.9* has the country-by-country numbers for each discipline)

The Maltese are the most sceptical; only 35% found each of the four traditional natural science disciplines "fairly scientific", and only one in 10 people did so with the three social disciplines. Slovakia has the biggest contrast between hard and social sciences' image; while 60% believe that mathematics, physics, biology, and astronomy all are scientific, only one in four people think that all three social disciplines are in fact science.

As far as medicine is concerned, we have to emphasize that the evaluation of this discipline is more a function of satisfaction with health services (and the actual success rate of those who practice it) than a reflection of an overall perception of the nature of medical science in general. This made this discipline an undisputed first in the EU countries and in the Candidate Countries, where people are satisfied with health services. Bulgaria provides a good example. The Bulgarian rating of natural sciences is the second highest of all countries in the region, but the public is relatively unlikely to find medicine particularly scientific. As a previous Candidate Countries Eurobarometer revealed, people are very unsatisfied with health services in Bulgaria[6].

And finally, the embarrassing results about astrology. Fifty-seven percent of people in the Candidate Countries, and 53% in the European Union, believe that astrology is scientific. This result varies a great deal across countries, ranging from 45% in Lithuania, and 50% in both Hungary and Turkey, to as high as 72% in Latvia and 70% in Slovenia and Slovakia.

[6] Candidate Countries Eurobarometer 2002.1, March-April 2001, at the request of DG Employment

Demographic analyses are enlightening in many respects. While there is no substantial difference between males and females in defining boundaries of science (although men a bit more confidently believe that natural sciences are in fact scientific), the image of natural sciences is not particularly good in the oldest age group. Oddly enough, the youngest people are the most likely to believe that astrology is scientific (62%), while the elderly have a lower regard towards forecasting based on stellar constellations (49%).

Astrology has a prestige even among the most educated group. Sixty-three percent of those who left school at the age of 20 or later believe that astrology has a scientific basis (while those who did not remain at school beyond 15 years of age are less likely to trust the scientific nature of astrology). Otherwise, schooling has a positive effect on people's regard, especially towards natural and, to a smaller degree towards social, sciences.

Six in 10 managers in the Candidate Countries think that stellar constellations have something to do with their fate, and they think it can be scientifically proven. Other white collar workers, such as manual workers, are also firm believers in astrology. Self-employed people are probably more individualistic and are less likely to believe in deterministic fate (as most of them live in Turkey and are Moslems as well, see below). The place one occupies in the labour market food chain, however, has a positive effect on the extent to which people think sciences are objective. As many as 71% of managers believe that all four natural sciences are "fairly scientific", and four in 10 believe that history, economics, and sociology are disciplines that comply with scientific criteria.

Finally, those who visit church or mosque at least once a week are much less likely than those who don't attend religious services (61%) to believe that natural sciences are in fact objective and true (49%). We can't find such an interaction in the case of social sciences — apparently social sciences do not conflict more with the religious world view than they do with the non-religious mindsets. Astrology has higher regard among non-believers.

Table 1.4a Evaluation of sciences, and astrology
CC-13 level, % 'fairly scientific', by demographics

	Natural sciences, combined	Social sciences, combined	Astrology		Natural sciences, combined	Social sciences, combined	Astrology
Male	54	37	58	Self-employed	43	32	53
Female	51	37	56	Managers	71	49	61
AGE: 15-24 years	54	38	62	Other white collars	60	41	62
AGE: 25-39 years	54	38	58	Manual workers	57	37	63
AGE: 40-54 years	53	38	58	House persons	36	32	45
AGE: 55+ years	47	34	49	Unemployed	55	41	61
EDU: up to 15 years	38	32	46	Retired	52	37	53
EDU: 16-19 years	60	38	65	Practicing believer (++)	49	35	56
EDU: 20+ years	70	47	63	Believer (+)	53	39	57
EDU: still studying	63	39	68	Non-believer (-)	61	36	60

To be more accurate on the last point, the scientific nature of astrology has a low regard among practicing Moslems (47%), but on average there is no difference among practicing or non-practicing Christians in this respect. Moreover, the lower regard of frequent churchgoers towards hard and social sciences is also extent among Moslems. Practicing Christians

consider natural sciences somewhat less scientific (58%) than do non-believers living in countries with a Christian tradition (60%), and the same tendency is very strong among Moslems, who generally are less confident that science is in fact scientific.

Table 1.4b reveals that this problem is even more complex; different religions apparently play different roles in confirming or refuting the scientific approach to explaining how the world works. One thing is sure — one's religion has a great effect on the extent to which one believes in scientific explanations of natural or social phenomena.

Catholic frequent churchgoers — should they be Roman or Greek Catholics — are more likely to think that natural and social sciences are in fact scientific and objective than do those Catholics who do not go to church at all, or as frequently. We find the opposite among Protestants, Moslems, and people belonging to the Orthodox Church.

The same pattern can be observed with astrology as well. While practicing Catholics are the most likely to accept that this discipline is scientific, this likelihood decreases with the intensity of religious participation among Moslems, Protestants (dramatically), and Orthodox believers.

Table 1.4b Religious affiliation, level of participation, and image of science
CC-13, % "fairly scientific"

	ROMAN CATHOLIC			
participation:	**++** (at least once a week)	**+** (at least yearly)	**—** (never)	***all***
Hard sciences, combined	62	64	57	63
Social sciences, combined	42	40	31	40
Astrology	64	63	59	63
	PROTESTANT			
participation:	**++** (at least once a week)	**+** (at least yearly)	**—** (never)	***all***
Hard sciences, combined	53	59	69	60
Social sciences, combined	38	33	46	37
Astrology	43	54	70	55
	ORTHODOX			
participation:	**++** (at least once a week)	**+** (at least yearly)	**—** (never)	***all***
Hard sciences, combined	38	53	54	50
Social sciences, combined	30	36	39	35
Astrology	47	58	59	56
	MOSLEM			
participation:	**++** (at least once a week)	**+** (at least yearly)	**—** (never) [7]	***all***
Hard sciences, combined	31	43	..	39
Social sciences, combined	27	38	..	34
Astrology	47	52	..	50

These findings might indicate that people who believe in the accuracy or objectivity of certain sciences believe astrology also has valid claims to accuracy or objectivity. People seem either to generally accept that the different disciplines, including even astrology, are able to conceive the world in a scientific way, or not — with the important limitation that social sciences still seem to be more anecdotal than scientific in the eyes of many devoted science-believers as well.

[7] we do not include data due to small sample size (N<50)

The coming results about popular knowledge of scientific fundamentals support this "science-faith" theory rather than a generally affirmative attitude towards science that is based on some kind of subject matter knowledge, or on some other 'hard' evidence. This should not be forgotten if we analyze attitudes towards science in general or even certain science-related problems or issues in particular.

Knowledge of fundamental scientific facts

In the form of a quiz, we asked our respondents about 13 basic scientific facts, most of them paradigmatic in the sense that they constitute the bases of current scientific world-view, and as such, are the basics of school curricula as well. We started the section on the boundaries of science by saying that the results will be 'surprising', here we admit that the numbers we report are even staggering. (*ANNEX TABLE 1.10*)

Subject matter knowledge in certain scientific questions

CC-13 vs. EU-15; % of correct responses; (T): true, (F): false statement

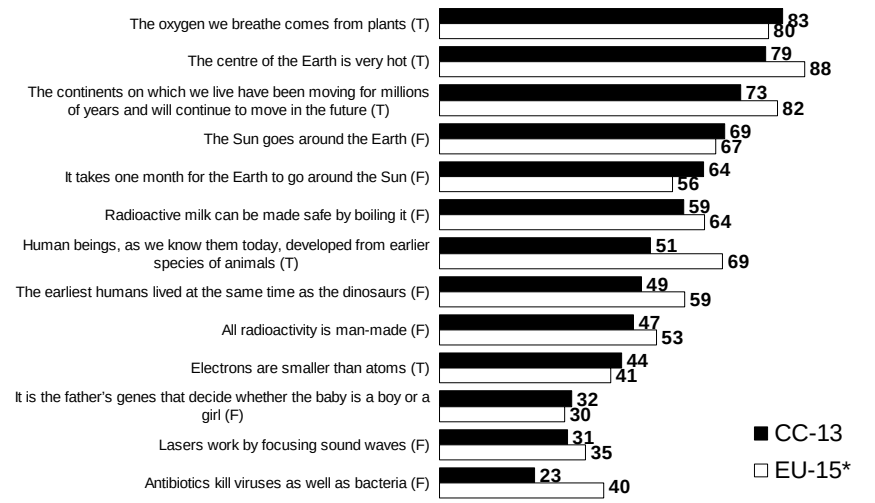


Fig.1.4c
Source: Candidate Countries Eurobarometer 2002.3 RESEARCH November 2002
*Source: Standard Eurobarometer 55.2, May-June, 2001

Question: Here is a little quiz. For each of the following statements, please tell me if you think it is true or false. If you don't know, say so, and we will go on to the next one. (SHOW CARD)

% correct responses shown, (T) and (F) indicate if the statement is true or false

As *FIGURE 1.4c* illustrates, both current and future citizens of the European Union possess a very limited knowledge about fundamental scientific information. Current EU citizens seem to be a bit more knowledgeable overall, specifically in geology and medicine. People in the Candidate Countries are a bit more familiar with the heliocentric world-view, but these differences are not decisive. *FIGURE 1.4d* on the next page shows that the average knowledge level in most Candidate Countries is similar to that of the EU-15 region. In the Candidate Region, the Turkish (5.2 accurate answers for the 13 quiz items), the Romanians (5.9), and the Maltese (6.0) are the least, while Slovenes, the Czech (8.1 both), and Hungarians (8.0) are the most informed in basic scientific questions.

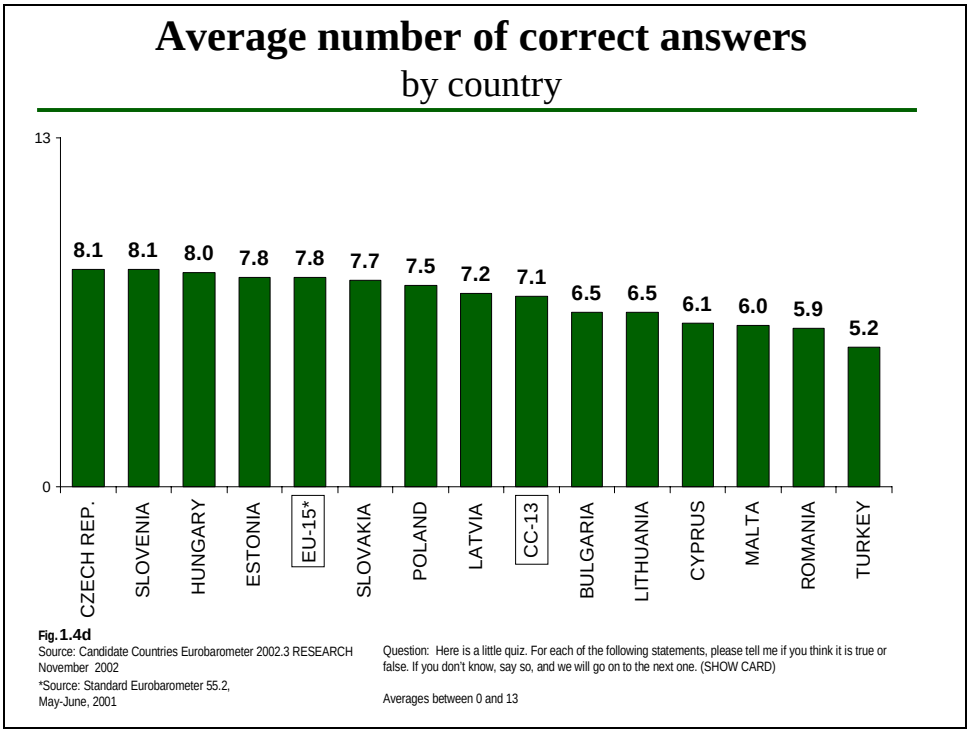


Fig.1.4d
Source: Candidate Countries Eurobarometer 2002.3 RESEARCH November 2002
*Source: Standard Eurobarometer 55.2, May-June, 2001

Question: Here is a little quiz. For each of the following statements, please tell me if you think it is true or false. If you don't know, say so, and we will go on to the next one. (SHOW CARD)

Averages between 0 and 13

Demographic analyses show a marked difference between males and females according to their scientific knowledge level, men being more informed (7.5) than women (6.7). Level of information decreases with age (in fact, some of the listed items are based on relatively recent discoveries — such as the one about the radioactive milk — which had not yet made the curricula when the current elderly went to school). Obviously, level of education has a great effect on the knowledge level of the people. However, even those people who stayed in school past the age of 20 are only able to give 8.3 correct responses to these 13 fundamental scientific questions.

Table 1.4c Scientific knowledge, CC-13 level, by demographics

	Average number of correct responses (between 0-13)		Average number of correct responses (between 0-13)
Male	7.5	Self-employed	7.1
Female	6.7	Managers	8.8
AGE: 15-24 years	7.7	Other white collars	7.9
AGE: 25-39 years	7.5	Manual workers	7.2
AGE: 40-54 years	7.2	House persons	5.2
AGE: 55+ years	6.2	Unemployed	6.7
EDU: up to 15 years	4.9	Retired	6.3
EDU: 16-19 years	7.2	Practicing believer (++)	6.3
EDU: 20+ years	8.3	Believer (+)	7.1
EDU: still studying	8.1	Non-believer (-)	7.9

Managers (8.8) and white-collar workers (7.9) are the most informed in scientific fundamentals, while at the other end of the spectrum house persons (in fact, housewives) are the least knowledgeable in basic scientific subject matter. Knowledge level decreases with more intense religious participation, and this time the rule is universal and applies to all religions equally.

Of course this again raises a question about whether religious belief holds people back from knowing about science, or if they simply do not believe scientific truths that conflict with religious truths. To test that, we selected three subject matter questions that, to some degree, contradict what people can read about in Genesis, the letter of the Koran, or the Bible.

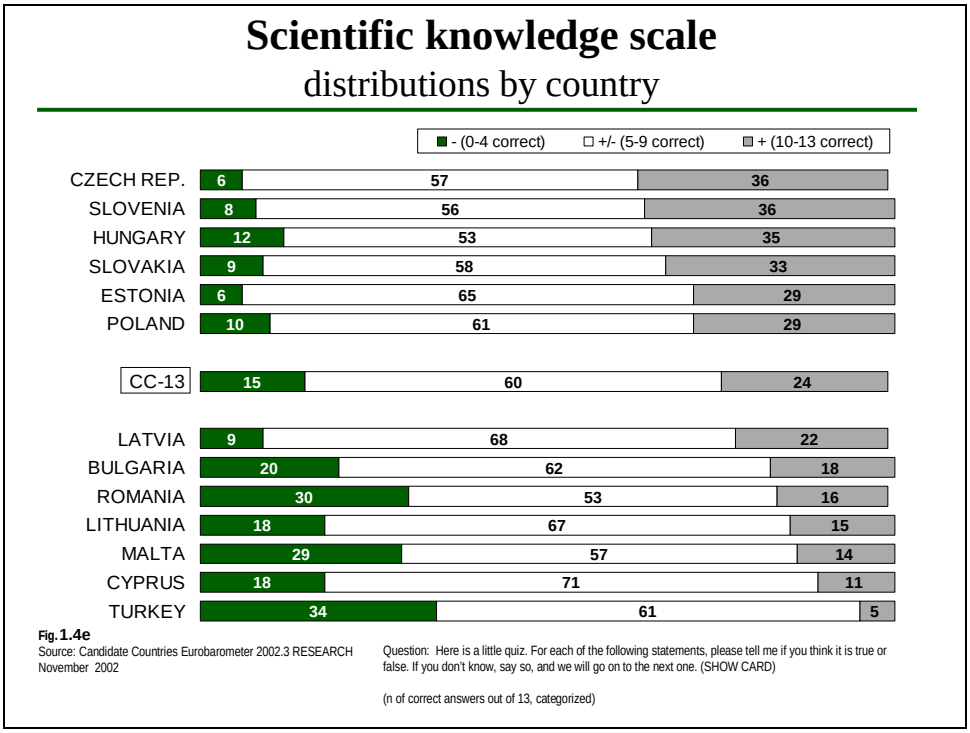
Just a few points before we get too involved with religion's role in our subject: the theory of evolution is definitely the one that people with strong ties to their churches are the least likely to believe, no matter which religion they practice (especially true for Protestants as Table 1.4d shows). At the same time, most religions seem to play a role in spreading the word about the heliocentric world (Roman Catholics, and even Protestants), except for the Orthodox Church. All in all, scientific subject matter knowledge among believers does not necessarily reflect their actual knowledge, rather the nature and probably the strength of their religious conviction.

Table 1.4d Religious affiliation, level of participation, and scientific facts that conflict with religious theories
CC-13, % "fairly scientific"

	ROMAN CATHOLIC			
participation (goes to church…):	**++** (at least once a week)	**+** (at least yearly)	**—** (never)	***all***
The continents on which we live have been moving for millions of years	70	76	75	73
Human beings developed from earlier species of animals	47	56	58	52
The sun goes around the Earth	70	74	68	72
	PROTESTANT			
participation:	**++** (at least once a week)	**+** (at least yearly)	**—** (never)	***all***
The continents on which we live have been moving for millions of years	71	76	77	76
Human beings developed from earlier species of animals	24	53	70	52
The sun goes around the Earth	71	75	70	74
	ORTHODOX			
participation:	**++** (at least once a week)	**+** (at least yearly)	**—** (never)	***all***
The continents on which we live have been moving for millions of years	67	72	70	71
Human beings developed from earlier species of animals	45	54	51	52
The sun goes around the Earth	54	69	71	66
	MOSLEM			
participation:	**++** (at least once a week)	**+** (at least yearly)	**—** (never) [8]	***all***
The continents on which we live have been moving for millions of years	61	62	..	61
Human beings developed from earlier species of animals	22	34	..	30
The sun goes around the Earth	48	43	..	45

[8] we do not include data due to small sample size (N<50)

Finally, we would like to introduce a categorization based on this quiz that we will use throughout the report for breakdowns that reflect the respondents' scientific knowledge in different analyses, as we have already done in Table 1.3a in the previous subchapter. We will call it the 'Scientific knowledge scale', and the three categories break down the respondents according to how many of their quiz question responses were correct. *FIGURE 1.4e* below has the country-by-country distribution of this variable.



Familiarity with scientific testing methods, and perception of probability

Beyond the question of fundamental knowledge itself, one might also wonder to what extent the public more or less clearly perceives certain rules of the scientific method. To assess this kind of actionable rather than factual knowledge, two questions were asked:

Try to imagine that a scientist wants to know if a certain drug is effective against a disease for which there is no means of prevention or treatment. Which do you think is the scientifically correct approach for testing the drug's effectiveness?

1 - Administer the drug to 1000 people suffering from the disease and see how many show signs of recovery.

2 - Administer the drug to 500 people suffering from the disease, tell another 500 to continue without drug treatment to see in which of the two groups there are more people showing signs of recovery.

3 - Administer the drug to 500 people suffering from the disease and treat another 500 with a totally harmless, identical-looking substance to see in which of the two groups there are more people showing signs of recovery.

and:

Suppose doctors tell a couple that their genetic make-up means that they've got a one in four chance of having a child with an inherited illness. Does this mean that…?

1 - If they have only three children, none of them will have the illness.

2 - If their first child has the illness, the next three children will not.

3 - Each of their children has the same risk of having the illness.

4 - If their first three children do not have the illness, the fourth will.

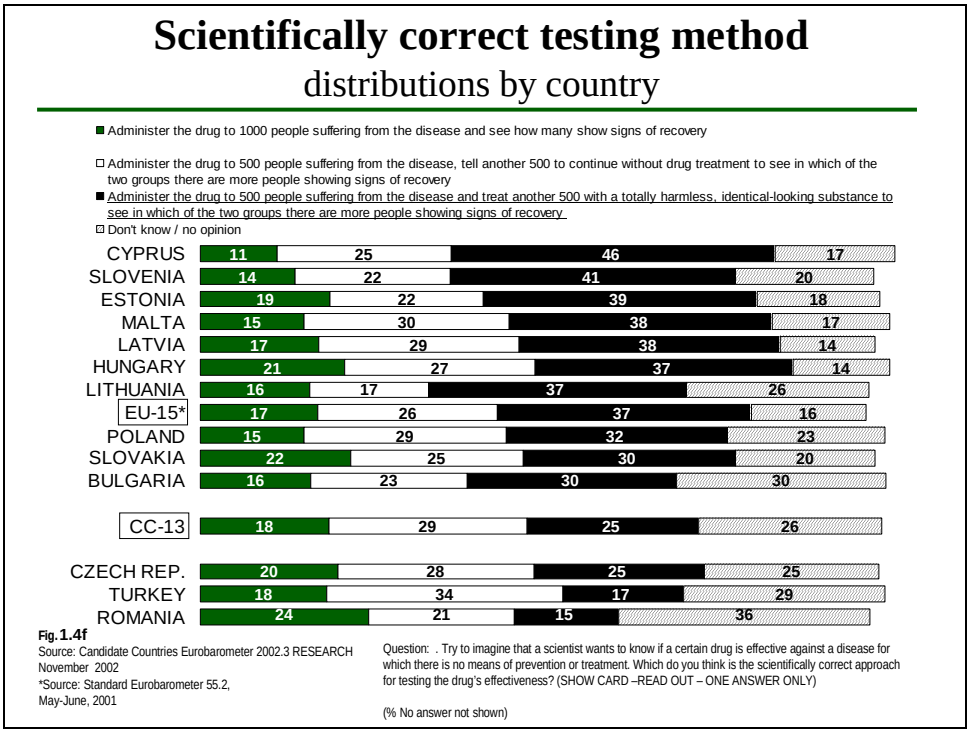


Fig.1.4f
Source: Candidate Countries Eurobarometer 2002.3 RESEARCH November 2002
*Source: Standard Eurobarometer 55.2, May-June, 2001

Question: . Try to imagine that a scientist wants to know if a certain drug is effective against a disease for which there is no means of prevention or treatment. Which do you think is the scientifically correct approach for testing the drug's effectiveness? (SHOW CARD –READ OUT – ONE ANSWER ONLY)

(% No answer not shown)

For the first of these two questions (*FIGURE 1.4f*), only one in four (25%) of Candidate Country citizens identified the correct answer (the administration of the medicine to one group and a placebo to the other). To the second question, on the other hand (perhaps because it is more linked to real life problems people might face), 49% of respondents answered correctly, and in most of the Candidate Countries six to seven in 10 respondents identified the accurate answer.

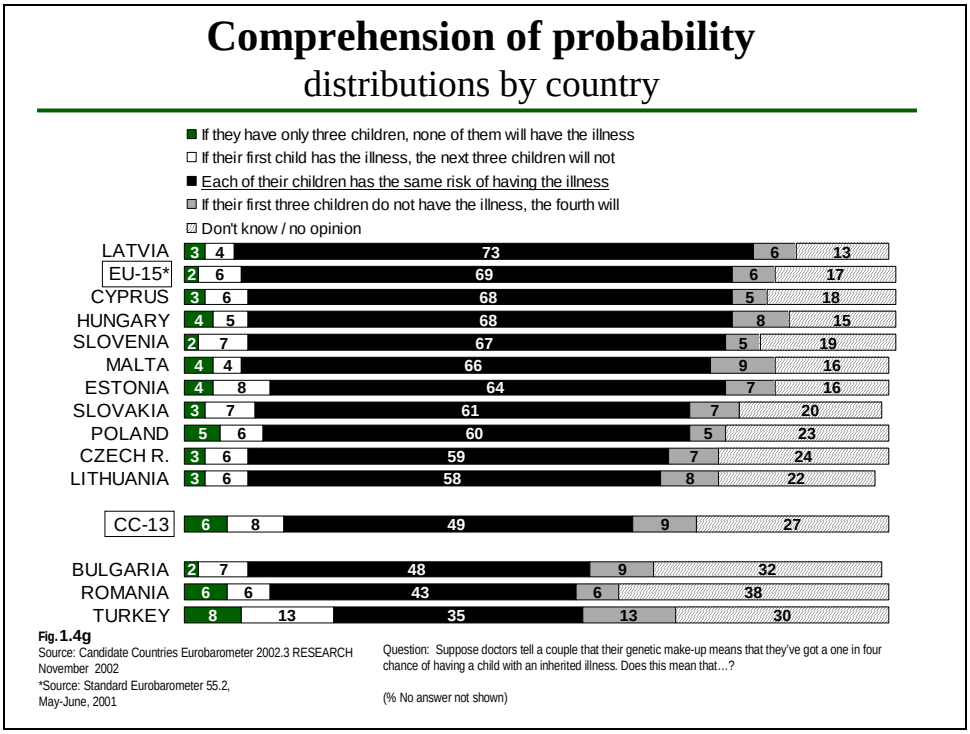


Fig.1.4g
Source: Candidate Countries Eurobarometer 2002.3 RESEARCH November 2002
*Source: Standard Eurobarometer 55.2, May-June, 2001

Question: Suppose doctors tell a couple that their genetic make-up means that they've got a one in four chance of having a child with an inherited illness. Does this mean that…?

(% No answer not shown)

The answers to these two questions once again reinforce the recurring impression that the level of scientific knowledge is quite low in Turkey, Romania, and Bulgaria, while Latvia often

scores the highest on these scales. *ANNEX TABLE 1.11b* and *1.12b* profile demographic and socio-economic groups in this respect. The overall indication is that there is no difference between genders, the elderly are somewhat less informed than are the younger cohorts, and education level has a very positive effect on one's grasp of the investigated elements of the scientific method. Among the different occupational groups, managers have the best understanding and house persons are by far the least likely to give correct answers.

Finally, there is a very clear correlation between the level of knowledge revealed by the scientific knowledge index devised above (based on the answers to the quiz) and correct answers to these two questions. For example, among those giving 10 to 13 correct answers to the series of questions on knowledge, 38% (as opposed to 25% on average) also give a correct answer to the first question concerning scientific method (the administration of a medicine) and 79% (average 49%) to the second (the example of a hereditary disease).

Perception and knowledge of topical scientific subjects

A list of topical scientific subjects and issues was also shown to respondents, who were asked to say if they felt they understand each of the concepts or not. Generally, as shown on *FIGURE 1.4h*, current citizens of the Union are more likely to feel they understand the concepts we investigated than do people living in the Candidate Countries.

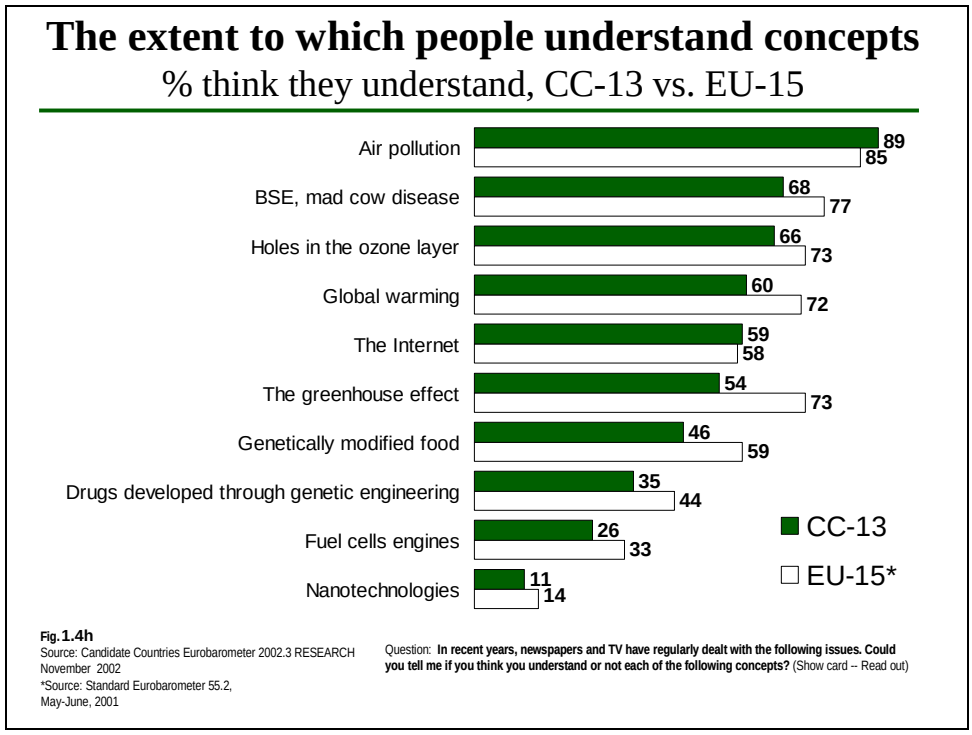


Fig.1.4h
Source: Candidate Countries Eurobarometer 2002.3 RESEARCH November 2002
*Source: Standard Eurobarometer 55.2, May-June, 2001

Question: **In recent years, newspapers and TV have regularly dealt with the following issues. Could you tell me if you think you understand or not each of the following concepts?** (Show card -- Read out)

Air pollution is the problem most people throughout Europe feel they understand, with almost nine in 10 people in the Candidate Region confident they can answer this question positively. About six to seven in 10 people think they understand BSE, holes in the ozone layer, global warming, and the Internet. Nanotechnologies once again prove not to be well known by the public, understanding of fuel cell engines has a very limited spread in old and new Europe equally, and finally, about four in 10 citizens in the Candidate Countries understand the concept of GMOs and genetic engineering.

As evident from the chart above, the Candidate Region as a whole lags behind current Member States in its understanding of current issues of scientific and social relevance. *FIGURE 1.4i* indicates that understanding of these topical concepts is at about the same level in most of

the Candidate Countries as it was in the EU-15 a year ago. But the very low level of knowledge we found in Turkey especially, but also in Romania and Bulgaria, moves the regional average down significantly. Latvians, on average, aver they understand seven out of the 10 concepts we presented to them, and Poles claim they have a grasp of 6.9 subjects. In most countries, we find that people understand about six of the 10 topics, which is the case on the EU-15 level as well. (*ANNEX TABLE 1.13*)

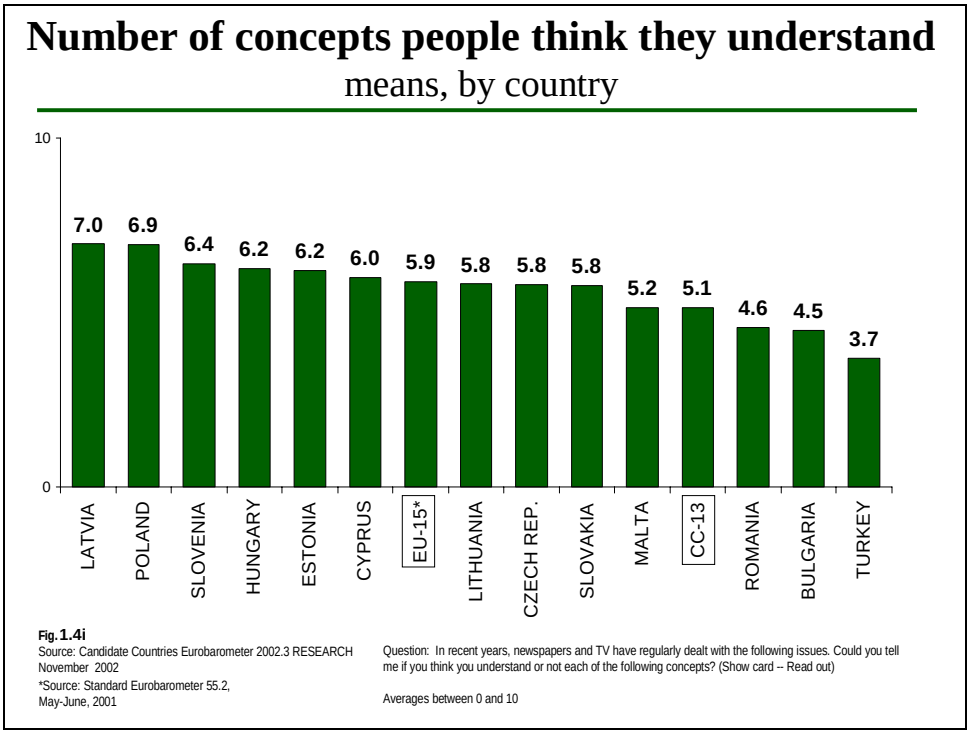
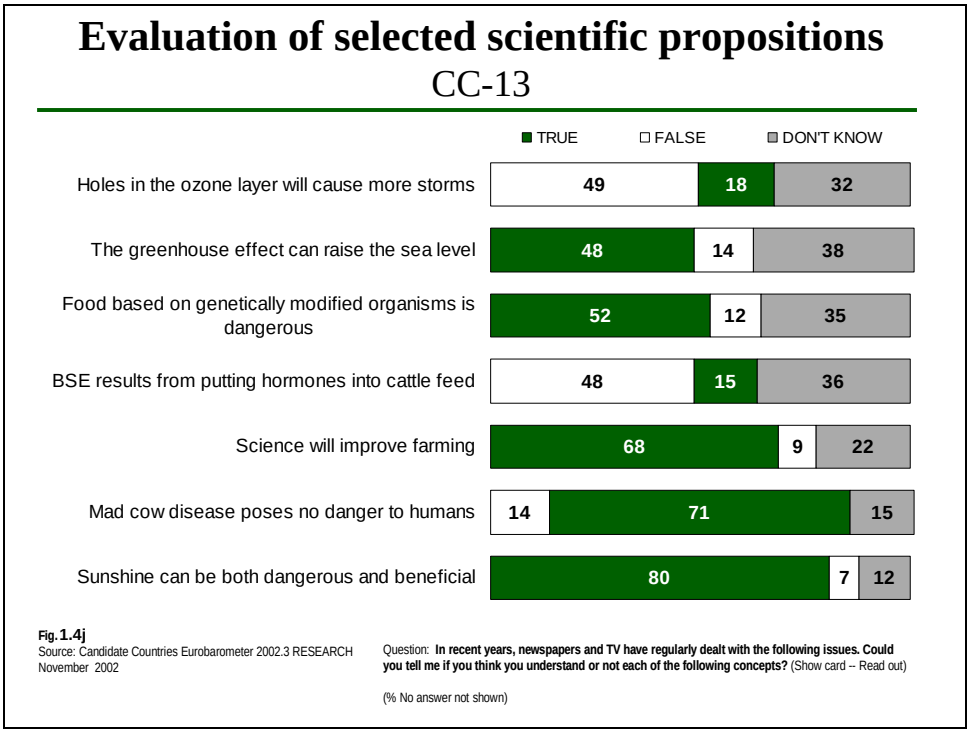


Fig.1.4i
Source: Candidate Countries Eurobarometer 2002.3 RESEARCH November 2002
*Source: Standard Eurobarometer 55.2, May-June, 2001

Question: In recent years, newspapers and TV have regularly dealt with the following issues. Could you tell me if you think you understand or not each of the following concepts? (Show card -- Read out)

Averages between 0 and 10

This question of self-perceived comprehension of topical scientific issues was followed by a series of “true/false” propositions detailing some of these issues. Some of the statements are controversial even in scientific circles (if, and to what extent is, genetically modified food dangerous, will science improve farming), while others are clearly subject matter questions (most notably those related to BSE).



Unlike the quiz discussed above, these questions are less basic. Therefore, people's knowledge, even if it exists, can be challenged easily with trick questions, which was the case with the questions about holes in the ozone layer or BSE caused by hormones in cattle feed. (More people claimed to understand the concept of ozone holes than the greenhouse effect, for example, but barely any of them identified the related factual statement correctly as false).

There was one statement, though, in which people did not fall to the trick question: seven in 10 people in the Candidate Region knew that BSE can be dangerous to humans. The other statement to which the vast majority of the interviewees answered correctly regarded the beneficial and harmful effects of sunshine — the other one that has a direct effect on their health and behaviour. (*ANNEX TABLE 1.14*)

In the first four questions, three to four in 10 respondents admitted they have no idea, and the rest could have been easily intimidated with false statements.

The high agreement with the statement that "science will improve farming" (68%) leads us to Chapter 2, where we discuss general optimism related to science and technological development.

2. Values, science, and technology

In this chapter, we will investigate the extent to which people in the Candidate Region believe science will be able to solve a series of problems. Then we will take a look at attitudes about industrial use of scientific discoveries, and finally we will briefly investigate the roles of faith, superstition, and science in people's everyday lives. All questions covered in this chapter were asked in the form of statements with which people could either agree or disagree.

2.1 Optimism regarding science and technology

Most people agree that science is good and useful. Many even think it's omnipotent (*FIGURE 2.1a*). Eurobarometer investigated people's optimism regarding science and technology with a list of statements to which respondents agreed or disagreed. About eight in 10 people in the Candidate Region believe that science and technology "are making our lives healthier, easier, and more comfortable" (81%), and that scientific and technological progress will help to cure nowadays often terminal illnesses such as cancer or AIDS (77%). Three-quarters of the respondents agree that scientific progress will bring more opportunities for future generations (76%).

Six in 10 people believe that the science and technology of tomorrow will always be able to repair the damage they cause today, and that the benefits of science outweigh its harmful effects (59% agree with both statements).

Slightly more people (52%) believe in the almighty nature of science and technology (that it can "sort out any problem") than do not (48%). Many people do not know, but the remaining 80% is sharply divided in their belief about whether science will be able to help eradicate hunger and poverty; 41% support the optimistic, and 39% support the pessimistic stance.

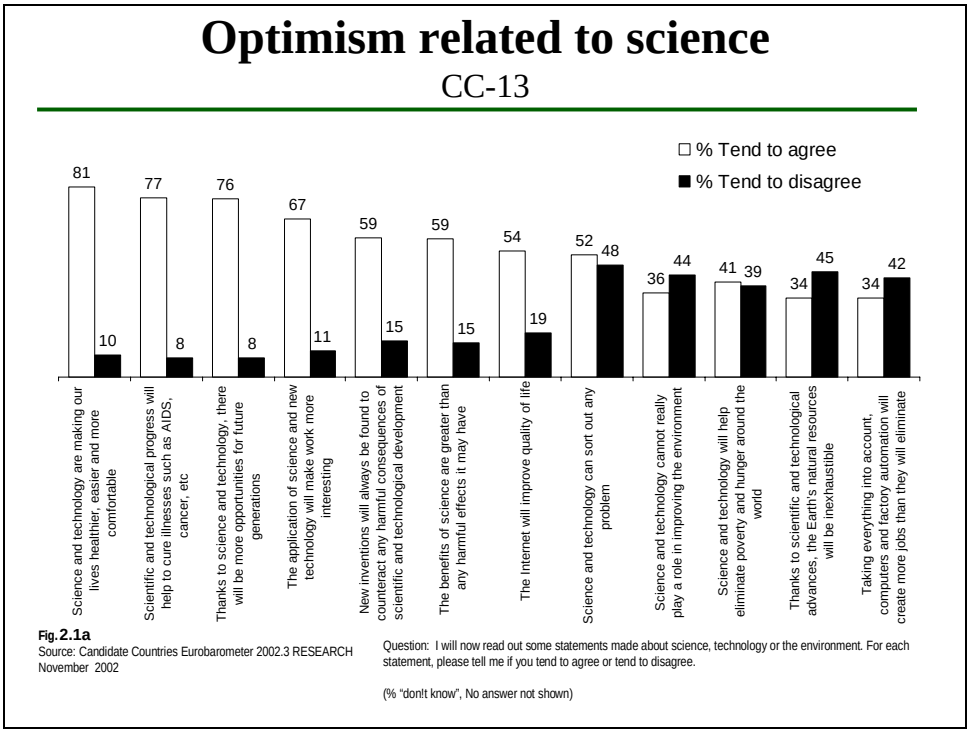


Fig.2.1a
Source: Candidate Countries Eurobarometer 2002.3 RESEARCH November 2002

Question: I will now read out some statements made about science, technology or the environment. For each statement, please tell me if you tend to agree or tend to disagree.

(% "don!t know", No answer not shown)

People in the Candidate Region tend not to believe that the ever-increasing problems related to the scarcity of natural resources will ever be resolved with the help of science and technology (45% do not agree and a further 21% can't decide), and many are pessimistic about whether technology and science will be able to improve the condition of the environment (36% agree it won't). Finally, most people do not believe that computers and factory automation would, on balance, create more jobs than they eliminate (42% disagree, 32% agree).

Obviously, there are enormous differences between countries in the extent to which people are optimistic about the potential of science and technology. A notable example comes from responses to our question asking people if they agree or disagree that "science can sort out any problem". As opposed to 42% of the Poles and 69% of the Turkish, only 14% of Slovenes and 18% of Latvians and Slovaks believe in the unlimited potential of science. Country-by-country responses for each of the statements are to be found in *ANNEX TABLE 2.1* and *2.4*. We constructed an index for simple comparison of countries' science-related optimism. The figure below shows each Candidate Country's average "agreement" to the listed twelve items.

Level of optimism related to science and technology

means, by country

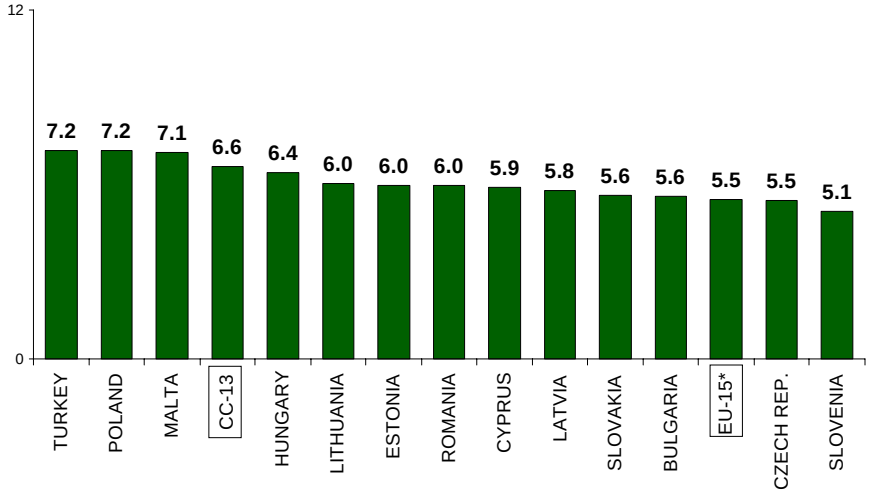


Fig.2.1b
Source: Candidate Countries Eurobarometer 2002.3 RESEARCH November 2002
*Source: Standard Eurobarometer 55.2, May-June, 2001

Question: I will now read out some statements made about science, technology or the environment. For each statement, please tell me if you tend to agree or tend to disagree.
(Show card -- Read out)

Average number of optimistic statements (see Fig. 2.1a) chosen as agreed with; between 0 and 12

Certainly, one can sense a reverse association between the general level of optimism in a country and the extent to which people are informed about scientific subjects (Turkey, for example, tops the ranking above, but comes last in all rankings related to level of knowledge).

Statistical analyses, however, do not support the theory of the naïve belief in scientific salvation; there is a very strong positive correlation between the level to which people understand the most pressing science- or technology-related problems of contemporary society (*Figure 1.4h* in the previous chapter), and the optimism related to scientific progress[9]. It is also true that the more people know scientific fundamentals, the more likely they are to generally believe that science will help to improve our world[10].

[9] Pearson correlation of .31, after filtering out the effect of length of education
[10] Pearson correlation of .23, after filtering out the effect of length of education

Combating diseases, improving daily life, and interest at work are still broadly attributed to — and expected from — scientific progress. On the other hand, there is great reservation regarding science and technology as a panacea for all problems, many of which need, in fact, to be addressed by public social or environmental policies. (see also *ANNEX TABLE 2.2*) Still, the overall image of science (that it has more positive than negative effects) finds favour in the Candidate Countries.

But there is another very strong feeling associated with scientific development, namely that scientific progress and new technologies — even if they bring more good than evil — have too many overwhelming effects that make people's way of life change too fast. Two-thirds of citizens in the Candidate Region (67%) agree that science changes their lifestyle too rapidly, but there is great variation between the individual countries. About eight in 10 Cypriots, Slovaks, and Slovenes confirm this proposition, whereas only 47% of Lithuanians, 55% of Estonians, and 56% of Romanians agree. This belief is less widespread in the current Member States than in the Candidate Region.

Science makes our way of life change too fast

%, by country

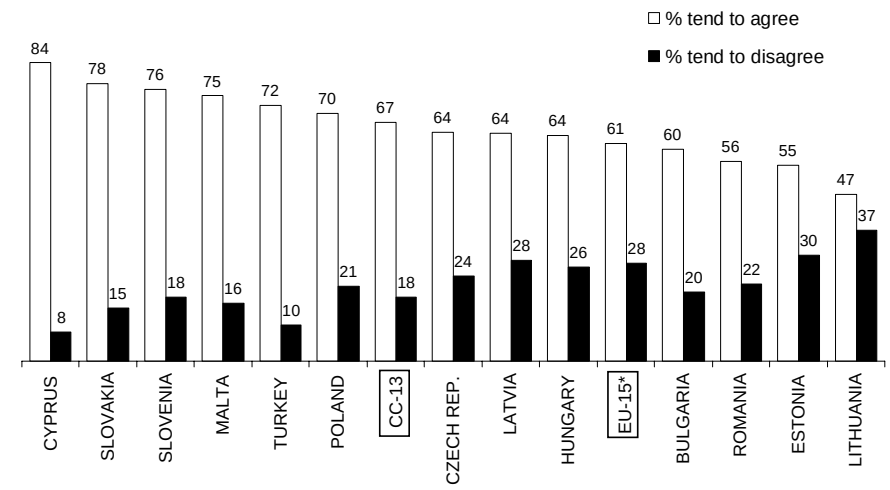


Fig.2.1c
Source: Candidate Countries Eurobarometer 2002.3 RESEARCH November 2002
*Source: Standard Eurobarometer 55.2, May-June, 2001

Question: I will now read out some statements made about science, technology or the environment. For each statement, please tell me if you tend to agree or tend to disagree. (Show card -- Read out) — Science makes our way of life change too fast

(% "don't know", No answer not shown)

ANNEX TABLE 2.3 profiles this question according to demographics. Men sense more change resulting from science and technology than do women (70% vs. 64%). It is enlightening that the elderly are the least likely to believe that science changes the way of life too much. "Only" 62% of those aged 55 and over agree that life changes too fast, whereas 71% of young adults between 25 and 39 years of age believe the same thing.

This may be the question in which type of occupation and level of education matters the least — we don't see here the usual huge gaps between those with higher (70%) and lower levels of education (64%). People who score low on the scientific knowledge index are much less likely to believe that science makes our lives change too fast (55%), compared to those who possess a mediocre (72%) or high (69%) score. Finally, there is an eight percentage-point difference in the evaluation of this question between practicing believers (69%) and those who never go to church (61%).

2.2 Fundamental research, applied research, and industrial applications

Another series of statements investigated attitudes concerning fundamental research and its industrial applications. (*FIGURE 2.2a*)

Fundamental and applied research, industrial application
CC-13

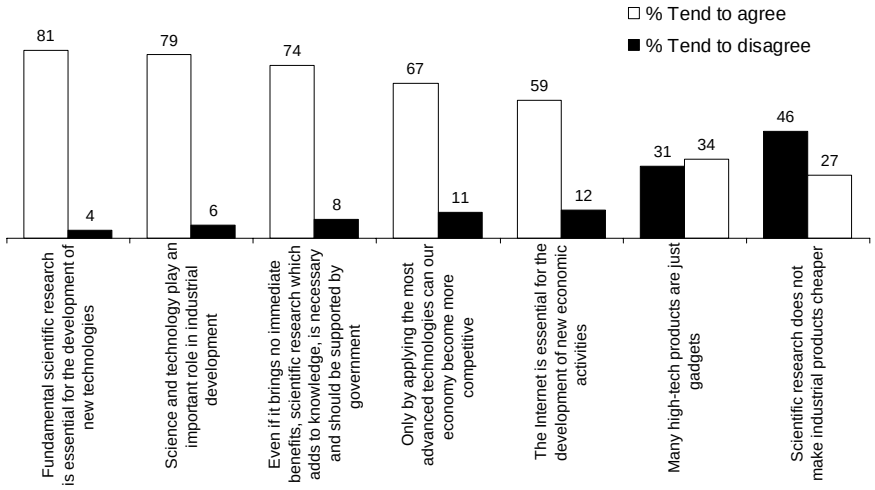


Fig.2.2a
Source: Candidate Countries Eurobarometer 2002.3 RESEARCH
November 2002

Question: I will now read out some statements made about science, technology or the environment. For each statement, please tell me if you tend to agree or tend to disagree.

(% "don!t know", No answer not shown)

Two questions focused primarily on appreciation of basic or fundamental research. The results show that a very large majority of Candidate Countries' citizens appreciate basic research for the development of "new technologies" (81%) and, though to a lesser extent, because it "adds to knowledge" (74%).

More generally, there is very widespread agreement with the opinion that science and technology "play an important role in industrial development" (79%).Two-thirds of the citizens (67%) agree that it is necessary "to use the most advanced technologies to make the economy more competitive" (but in this instance the rate of "don't knows" is quite high: 22%).

Among the new technologies that might have positive consequences, the Internet, or more precisely its effects on new economic activities, inspired relatively widespread optimism in the entirety of the Candidate Region (59%). (Fifty-four percent even agreed that the Internet could have a positive impact on the quality of life, see Figure 2.1a.)

The last two questions in the list are different in the sense that they were worded negatively: "scientific research does not make industrial products cheaper" and "many high-tech products are only gadgets". Most people disagree with the first of these, meaning that the public believes scientific research plays a role in inventing more economic solutions for industrial production — although a very significant 27% did not know what to think. On the other hand, most people agree that the products of high tech industry are not particularly useful; that most of them are only "gadgets". (*ANNEX TABLE 2.4*)

2.3 Superstition, ignorance towards science, and pre-modern nostalgia

In Chapter 1 we discussed the relationship between religion and scientific knowledge. It seemed that a sizeable proportion of people are reluctant to accept a scientific interpretation of the world simply because they have different beliefs. But in some cases, a peaceful coexistence between scientific and religious approaches can be observed, and even the practical magic of astrology can go hand in hand with relatively high levels of fundamental scientific knowledge.

Another finding that supports the idea of the symbolic rather than cognitive appreciation of science regards the correlation of **superstition** and scientific knowledge.

Statistical analyses reveal that people — at least in the Candidate Countries — who have better fundamental scientific knowledge[11], or claim to understand more of the major scientific issues of our times[12], are more likely to believe that "some numbers are especially lucky for some people". The correlations are not high, but their directionality is totally counterintuitive; one might expect that people with more scientific knowledge are less likely to be superstitious.

Some numbers are especially lucky for some people

%, by country

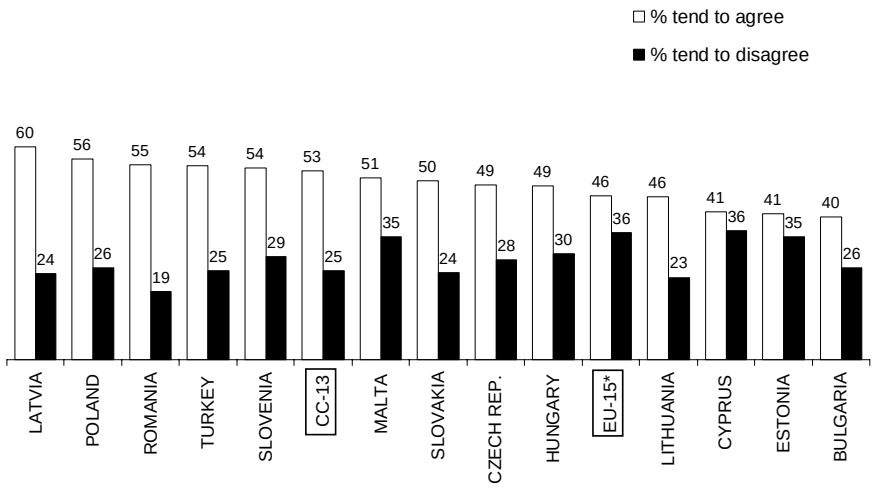


Fig.2.3a
Source: Candidate Countries Eurobarometer 2002.3 RESEARCH November 2002
*Source: Standard Eurobarometer 55.2, May-June, 2001

Question: I will now read out some statements made about science, technology or the environment. For each statement, please tell me if you tend to agree or tend to disagree. (Show card -- Read out) — Some numbers are especially lucky for some people

(% "don't know", No answer not shown)

There is surprisingly low variation across Europe in the extent to which people believe that certain numbers can be lucky for some people; about half tend to agree with this idea. (*FIGURE 2.3a*) The general level of superstition in the Candidate Region is higher (53%) compared to the current Member States (46%).

Demographic analyses show that females (57%) are more superstitious than males (47%). People younger than 55 are equally likely to believe in lucky numbers (55% in all three young cohorts), but the elderly are more sceptical (47% agree, and 31% have no opinion). The well educated are a bit less likely to agree with this statement (47%) than are those who left

[11] Pearson correlation of .15, significant at the 0.01 level
[12] Pearson correlation of .11, significant at the 0.01 level

school before they reached 20 years of age (55%). With 45% believing in lucky numbers, managers are the least, while house persons (60%) are the most, superstitious among the occupational groups. Religious people (55%) are more likely to be superstitious than people who do not go to church, or mosque (45%). (*ANNEX TABLE 2.5*)

There is, however, another attitude also prevalent in societies that might be described simply as **ignorance**; Eurobarometer also investigated the extent of this in the Candidate Countries. Overall, 52% disagree and 37% agree that "in my daily life, it is not important to know about science". The majority of the Czech (54%), Bulgarians (53%), and Estonians (49%) agree that scientific knowledge is irrelevant in their everyday life. At the other end of the scale, Slovenes disagree the most with the proposition (66%), followed by 60% of Cypriots, and 58% of Maltese — people belonging to these nations are the most likely to believe that one needs to have some scientific information in everyday life.

In daily life, it is not important to know about science
%, by country

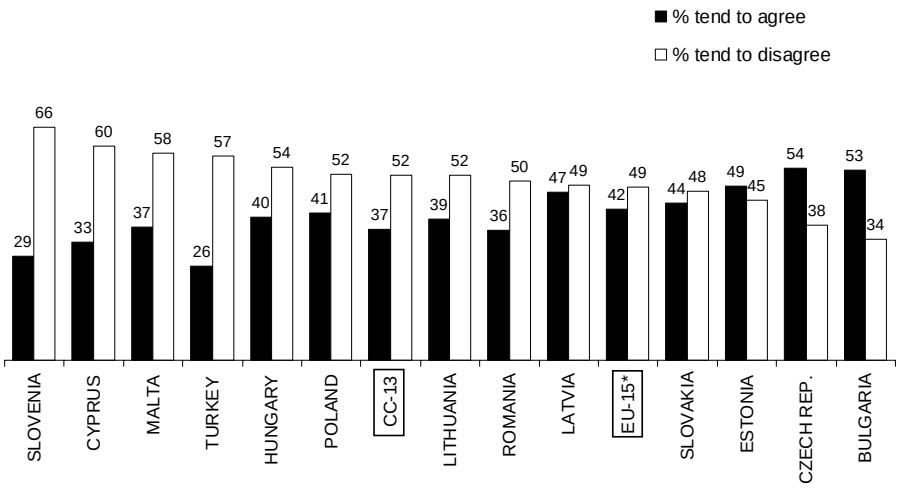


Fig.2.3b
Source: Candidate Countries Eurobarometer 2002.3 RESEARCH November 2002
*Source: Standard Eurobarometer 55.2, May-June, 2001

Question: I will now read out some statements made about science, technology or the environment. For each statement, please tell me if you tend to agree or tend to disagree. (Show card -- Read out) — In my daily life, it is not important to know about science

(% "don't know", No answer not shown)

Finally, the majority of the citizens of the Candidate Countries (52%) believe that "we base our lives too much on science and not enough on faith". With a slightly different question wording[13], the proportion was lower in the current Member States (45%) of the EU, but both numbers indicate a high level of **nostalgia** for an era when transcendence was essential and life was much less overwhelmed by technology.

We base our lives too much on science and not enough on faith

%, by country

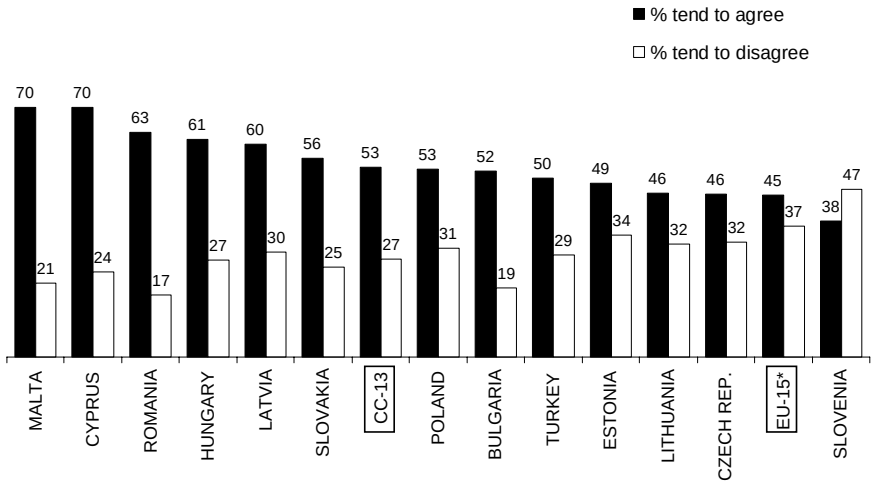


Fig.2.3c
Source: Candidate Countries Eurobarometer 2002.3 RESEARCH November 2002

Question: I will now read out some statements made about science, technology or the environment. For each statement, please tell me if you tend to agree or tend to disagree. (Show card -- Read out) — We base our lives too much on science and not enough on faith (EU-15: We depend too much on science and not enough on faith)

(% "don't know", No answer not shown)

The opinion that faith lost too much of its significance is most widely shared in the two islands of the Mediterranean Sea: Malta and Cyprus (by 70% of the people). Slovenes, on the other hand, do not find science has gained too much control over people's lives at the expense of faith or religion; more people disagree (47%) than agree (38%) with the sentence.

Demographic analyses show no differences between the two genders in this respect. The youngest age group is the least likely to feel the loss of faith's importance to be too excessive (49%) compared to older age groups, where about 55% of the respondents agree that we base our lives too much on science and not enough on faith. There is almost no difference in judgment on this proposition between those with lower and those with higher levels of education. Practicing believers, however, are much more likely to agree with this statement (57%) than those who never visit any church (45%). (*ANNEX TABLE 2.6*)

[13] "We depend too much on science and not enough on faith"

3. The morality of science

Are scientists responsible for the potentially negative consequences of their discoveries? Can deadly or cruel experiments on animals be justified if they help us understand problems that are relevant for human medicine? To what extent is the myth of the "mad scientist" widespread in the Candidate Region? This chapter will answer these questions.

Responsibility and accountability of scientists

Most people throughout Europe (a bit more in the EU than outside) believe that science is *value neutral* in the sense that there are no evil inventions — only the application of a certain scientific finding can be good or bad. This perception is almost universal across demographic groups, although agreement is dramatically lower in the low-educated group (64% compared to the CC-13 average of 75%). They, who score very low on the scientific knowledge scale, are much less likely to accept that scientific discoveries have no value relevance (55%). Frequent visitors of churches and mosques are also more sceptical about the value-neutral nature of science (72%) compared to those who avoid such places (82%).

Twenty-five percent of those who think scientific discoveries cannot be interpreted in value terms do not agree with a subsequent proposition, that scientists are as responsible for the misuse of their discoveries as anybody else, indicating that people are less likely to trust scientists than science itself in this respect. Still, overall, six in 10 citizens in the Candidate Region, and 69% in the European Union, believe that responsibility for abusing a scientific discovery for evil purposes is universal, and does not lie on scientists.

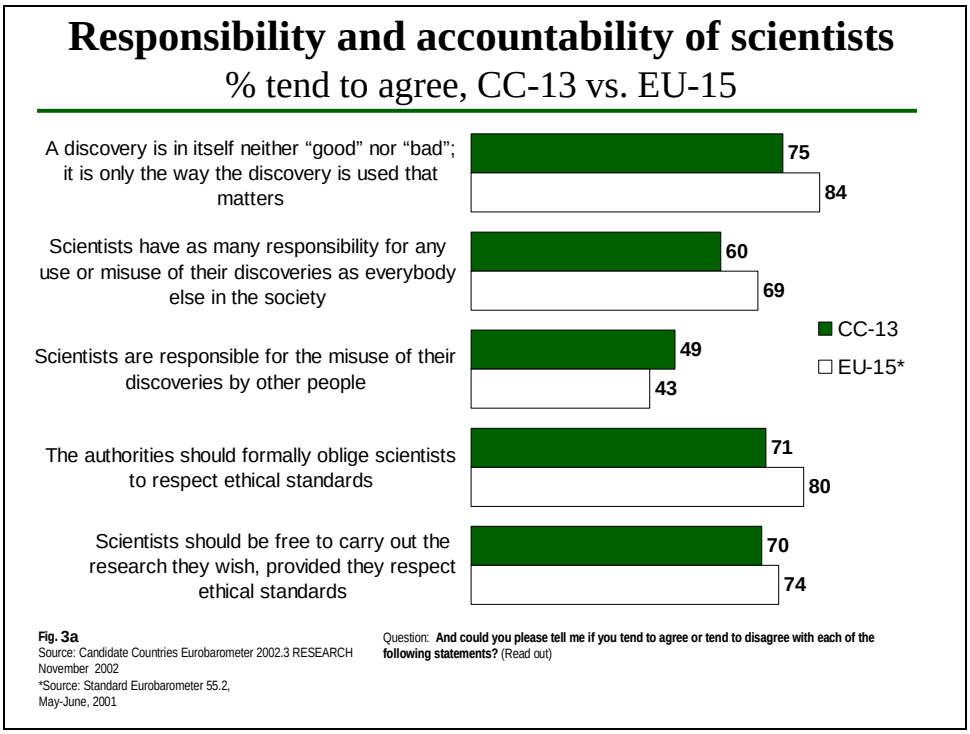


Fig. 3a
Source: Candidate Countries Eurobarometer 2002.3 RESEARCH November 2002
*Source: Standard Eurobarometer 55.2, May-June, 2001

Question: **And could you please tell me if you tend to agree or tend to disagree with each of the following statements?** (Read out)

Still, scientists are held responsible for the misuse of their discoveries by almost half of the respondents in the Candidate Region, and a slim majority of current EU citizens share this view as well. Consequently, the overwhelming majority in both parts of Europe agrees that scientists should be regulated by ethical standards that can be enforced by the authorities

(CC-13: 71%, EU-15: 80%). Once this criterion is fulfilled, people would let scientists determine the nature and direction of their research, even if — as will be shown in subsequent chapters — a sizable proportion of people think that the priorities of European research reflect more the hobbies of scientists than society's needs. (*ANNEX TABLE 3.1*)

The myth of Dr. Frankenstein

In the paragraphs above, we have seen a certain level of reservation towards scientists (that they are personally responsible for the misuse of their discoveries even if it is done by others). Surprisingly high proportions of respondents interiorized the romantic perception of the almighty and / but dangerous scientist, which is so often reinforced by popular fiction literature and movies: 53% agree that "because of their knowledge, scientists have a power that makes them dangerous", only 25% disagree, and a further 22% don't know what to think. This belief is even higher among current European Union citizens (63%).

This perception is universal in all groups of society; the proportion of those who reject this idea is stable, only the ratio of those who can't decide varies across societal groups.

There is more variation when we compare the individual Candidate Countries as the figure below shows. While in Malta the opinion of scientists as dangerous is very widespread (shared by three-quarters of the citizens), Lithuanians and Estonians are the most likely to disagree (34% and 36% disagree, respectively).

Because of their knowledge, scientists have a power that makes them dangerous %, by country

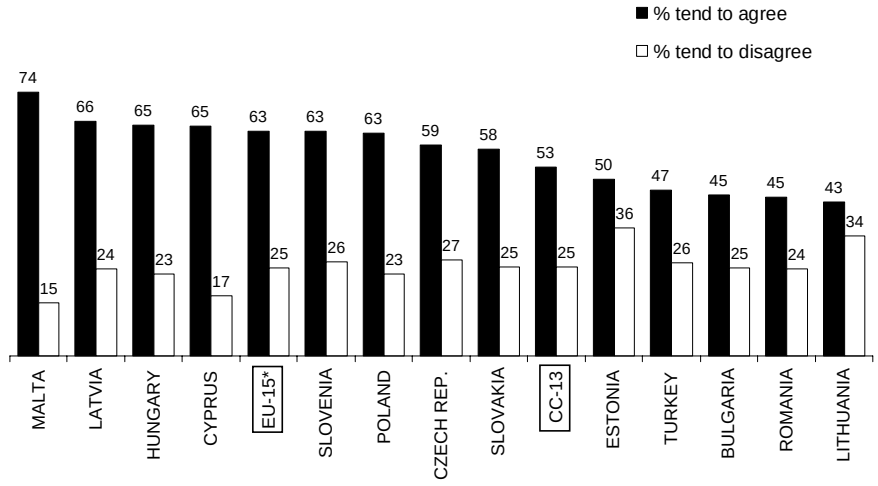


Fig. 3b
Source: Candidate Countries Eurobarometer 2002.3 RESEARCH November 2002
*Source: Standard Eurobarometer 55.2, May-June, 2001

Question: **And could you please tell me if you tend to agree or tend to disagree with each of the following statements?** (Show card -- Read out) — Because of their knowledge, scientists have a power that makes them dangerous

(% "don't know", No answer not shown)

Experiments on animals

The responses to most questions showed differences between current and future EU members that were not decisive in the sense that they did not represent different patterns, even if the actual numbers showed larger differences. This is not the case when we investigate opinions concerning experiments on animals.

While people in the current Member States are completely divided over the question of whether or not to allow scientists to conduct experiments "on animals like dogs and monkeys" (45% agree with this proposition and 41% disapprove the idea); the overwhelming majority of the Candidate Region supports (63% vs. 22%) these experiments if they target human health problems.

The proportion of opponents of animal experiments in Malta and Slovenia is comparable to the European Union average, but Candidate Countries Eurobarometer found no country where the majority — either driven by religious conviction, or belief in animals' rights — would oppose experiments on animals. The proportion of opponents is the lowest in Bulgaria with 8%. The attitude that reaching justifiable human goals has priority over the protection of animals is also very widespread in Cyprus (73%) and Hungary (71%).

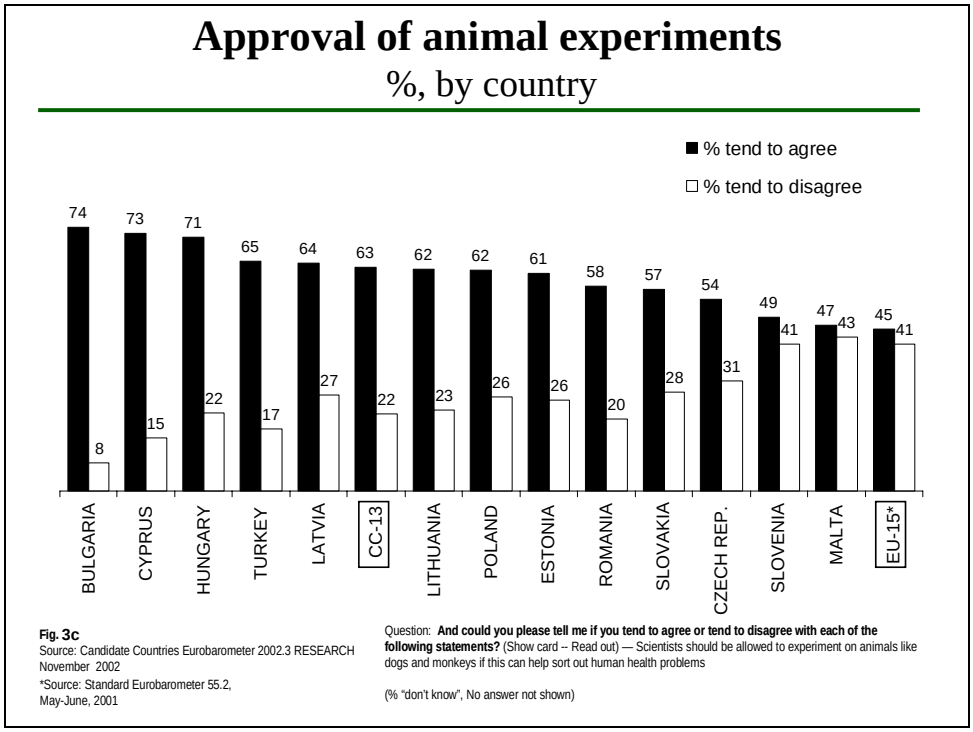


Fig. 3c
Source: Candidate Countries Eurobarometer 2002.3 RESEARCH November 2002
*Source: Standard Eurobarometer 55.2, May-June, 2001

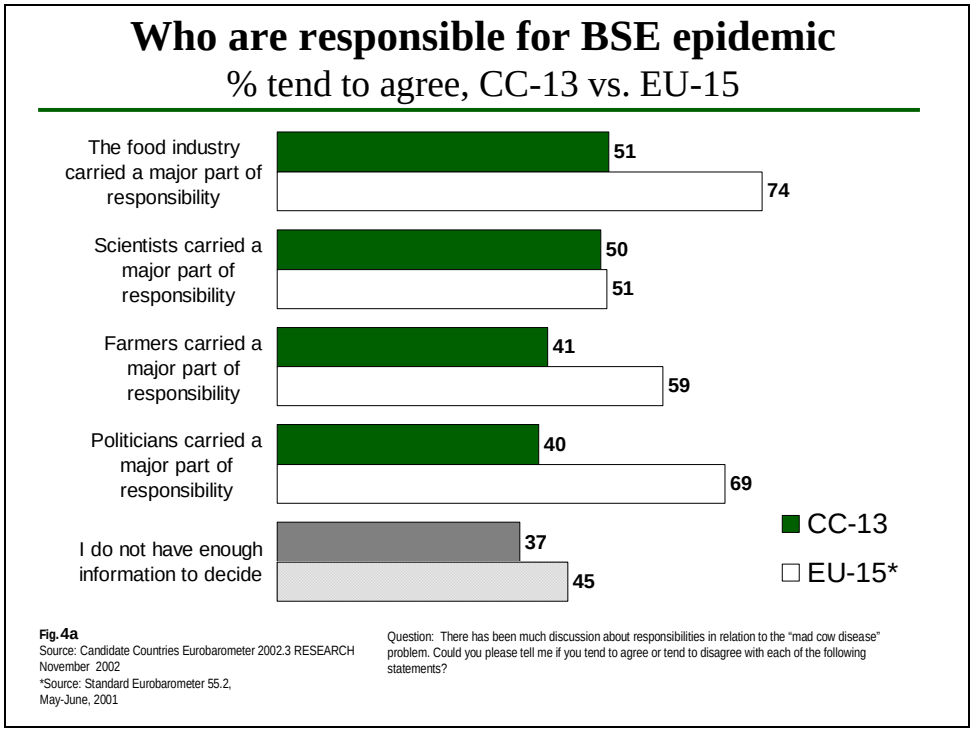
Question: **And could you please tell me if you tend to agree or tend to disagree with each of the following statements?** (Show card -- Read out) — Scientists should be allowed to experiment on animals like dogs and monkeys if this can help sort out human health problems

(% "don't know", No answer not shown)

The analysis shows that this attitude is correlated to the degree of scientific knowledge possessed: people scoring high on the scientific knowledge scale are much more likely to find animal experiments justifiable if they are aimed at resolving human health problems (68%), while those who don't know much about science are much less likely to agree (52%). Men are also more likely to accept experiments on animals (68% agree with the question vs. 58% among women).

4. Lessons learned from BSE epidemic

In terms of media coverage, BSE (bovine spongiform encephalopathy, or “mad cow disease”) was certainly one of the most important issues of a scientific nature in Europe in the second half of the 1990s. As respondents correctly remembered (see Chapter 1.4), BSE was connected to a so-called “new-variant” of Creutzfeldt-Jakob disease, which is fatal to humans. Tens of thousands of potentially infected animals were killed throughout Europe; whole areas were quarantined, but the epidemic seemed to be unstoppable. The human death toll was not particularly high (remaining below 100 known cases over the five most intense years of the epidemic), but the public panicked, and many throughout Europe stopped eating beef. Sporadic occurrences of BSE and other transmittable forms of spongiform encephalopathy are still observed around the globe, but the issue does not make the headlines anymore.



Memories are now fading, but still many people have an opinion about who is responsible for the epidemic (although about one-fifth of the respondents are not able to decide, and 37% admit they have not enough information to decide who is responsible for BSE).

The food industry is most frequently cited as having a major responsibility for the mad cow disease problem both in the EU-15 region (74%), and — to a much lesser extent — in the Candidate Countries as well (51%). Interestingly, in the Candidate Countries, scientists were named as a group equally responsible for the epidemic.

The responsibility of farmers and politicians are not that clear for people living in the Candidate Region — opinion is strongly divided. About four in 10 people think politicians and farmers were responsible for the problem, almost as many think the opposite. Among current EU citizens, there is little doubt whether these groups were responsible for the problem; at the same time they are much less convinced about scientists’ negative role in the scandal. (*ANNEX TABLE 4.1*)

We queried the respondents as to what they think should be done to avoid problems such as BSE in the future. Respondents from all parts of Europe agreed with all the suggestions they were presented with — regardless of the extent to which they find scientists responsible — although the problem should be much more complex than that.

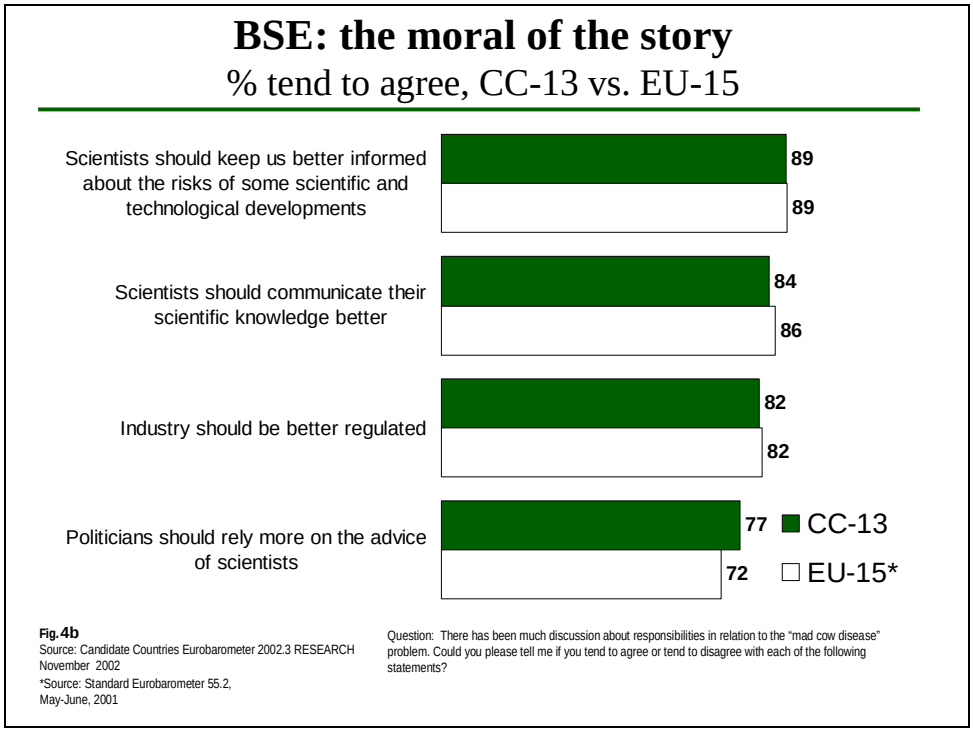


Fig. 4b
Source: Candidate Countries Eurobarometer 2002.3 RESEARCH November 2002
*Source: Standard Eurobarometer 55.2, May-June, 2001

Question: There has been much discussion about responsibilities in relation to the "mad cow disease" problem. Could you please tell me if you tend to agree or tend to disagree with each of the following statements?

It appears that many believe that scientists should be encouraged to warn the public about potential dangers. According to 89% of Europeans, scientists should keep the public better informed of the potential hazards of new technologies and, more generally, "scientists should communicate their scientific knowledge better" (84% to 86%).

The need for better regulation of the industry also appears desirable to 82% of all Europeans. Finally, a slightly lower percentage expects politicians to rely more on the opinion of scientists when making decisions (CC-13: 77%, EU-15: 72%). (*ANNEX TABLE 4.2*)

5. Genetically modified food

As we discussed in Chapter 1.4, a bit more than half of the people living in the EU (54%) and in the Candidate Region (52%) think that food based on genetically modified organisms (GMOs) is dangerous.

Other attitudes are similar in the two parts of Europe as well; people first of all want to retain the right to choose between natural produce and foodstuff based on GMOs (CC-13: 85%, EU-15: 95%), which in other words means that the European public expects clear indication of GMO-basis on the packaging of food in supermarkets or in the menus of restaurants. (*ANNEX TABLE 5.1*)

This is an indication of the general attitude of the public that can be best described as "cautious". Eighty percent of all teenagers and adults in the Candidate Countries await more information before consuming genetically modified food, and about the same proportion feel that such food should only be introduced if it is scientifically proven not to be a health hazard (79%).

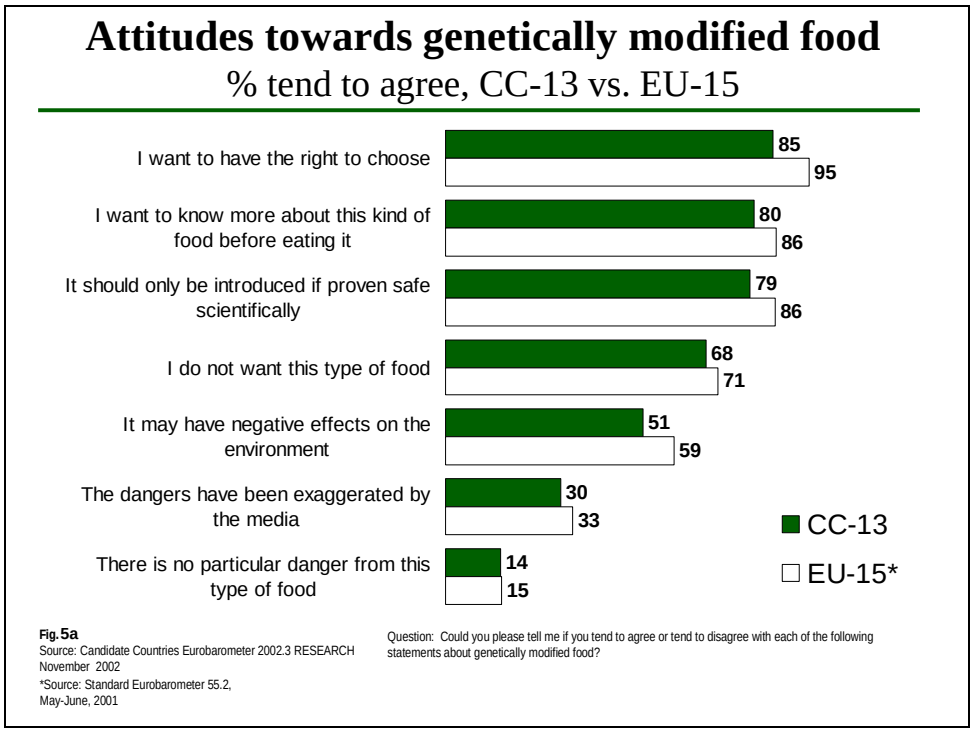


Fig. 5a
Source: Candidate Countries Eurobarometer 2002.3 RESEARCH November 2002
*Source: Standard Eurobarometer 55.2, May-June, 2001

Question: Could you please tell me if you tend to agree or tend to disagree with each of the following statements about genetically modified food?

Currently, seven in 10 Europeans (68% in CC-13 and 71% in EU-15 countries) do not prefer eating genetically modified food — or at least *would not* if they could identify it. The survey did not have questions that would help us understand whether this preference is based on principle, or is a practical "survival strategy" until the public learns whether or not genetically modified food is completely safe. Also, it remains uncertain whether people would actually be willing to pay more for food produced from natural organisms. A hint may be that people who claim to understand the concept of food based on GMOs — as discussed in Chapter 1.4[14] — are more likely (75%) to choose not to eat such food, as compared to those who say they do not understand the whole concept (64%).

[14] 46% on CC-13 level

The high level of resistance to food based on GMOs is universal across all segments of the societies. People with higher levels of scientific knowledge are somewhat less likely to accept GMO-based food (about seven in 10 agree that “I do not want that type of food”) than those who score very low on this knowledge scale (59%, 32% have no opinion). (*ANNEX TABLE 5.2*)

Half (51%) of people in the Candidate Countries affirm that GMOs could have negative effects on the environment, but as many as 35% have no opinion. The higher the level of knowledge, the lower the number of "don't know" responses and, at the same time, the more people believe there may be negative effects on the environment. Among those with a low level of scientific knowledge, 51% can’t decide, and 40% assume there could be harmful consequences. For those with a high level of knowledge, the proportion of those without opinion falls to 23%, and 58% think there could be environmental consequences. There is another, similar, relationship regarding knowledge and the environment. Sixty-two percent of those who think they understand what “genetically modified organism” means think that GMOs can be harmful for the environment, as do only 45% of those who said they do not fully understand what genetically modified food really means.

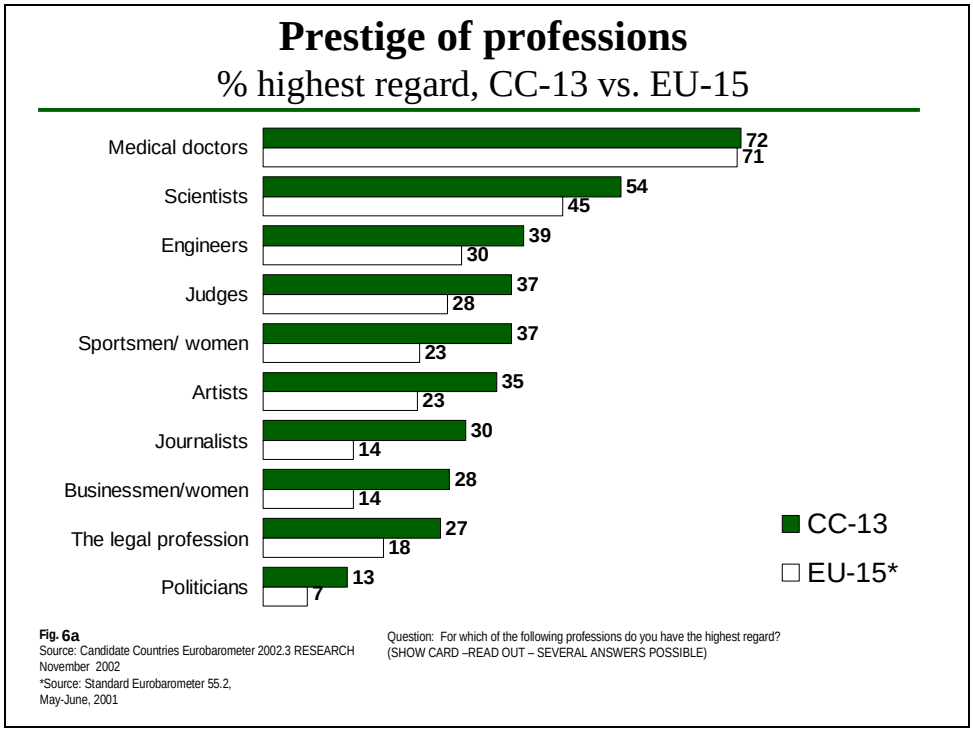
Four in 10 people in the Candidate Countries (39%) disagree that the dangers related to genetically modified food are exaggerated by the media, while 30% confirm this proposition. The belief that the media does not exaggerate the dangers associated with GMOs is shared by 47% of those who think they understand what genetically modified food means.

Finally, only a very small minority believes that there is “no particular danger from this type of food”. Only about one in seven of the current and future citizens of the European Union see no danger, while 52% on the CC-13 and 55% on the EU-15 level think the opposite.

6. The scientific profession: confidence and prestige

Both in the current Member States and the Candidate Countries, people have the highest regard for those professions that have technological or scientific relevance. Medical doctors have the highest prestige rating in both regions, with more than seven in 10 people (CC-13: 72%) naming this profession as one for which they have the highest regard. Scientists come in at second place, followed by engineers.

Generally, all professions but medical doctors gain more significantly high ratings in the Candidate Region than in the EU Member States, but the rank order is almost identical. The only exception is the legal profession, which is regarded relatively worse in the Candidate Countries than in the EU. (*ANNEX TABLE 6.1*)



Whereas medical doctors and engineers have better ratings among those who score low on the scientific knowledge scale, scientists gain the most regard from those with a good knowledge of fundamental scientific information. Education level has exactly the same effect, indicating that being a doctor or an engineer is much more attractive to less educated people, while people who went through lengthy studies are more likely to value scientists' work.

Country-by-country differences in evaluation of scientists' work are also apparent. (*FIGURE 6b*) With 83%, the prestige of scientific work is skyrocketing in Cyprus — where all professions are unusually highly regarded as well — and respect for this profession is also high in Turkey and Slovakia (62% both). But only about four in 10 Poles, Latvians, and Lithuanians have high regard for scientists.

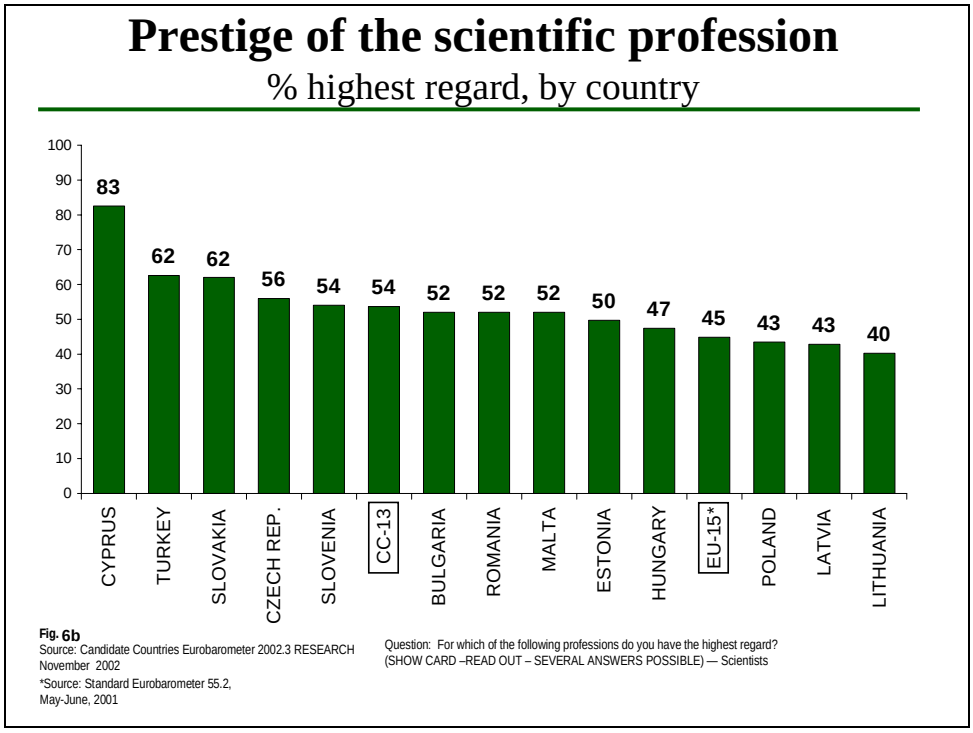


Fig. 6b
Source: Candidate Countries Eurobarometer 2002.3 RESEARCH November 2002
*Source: Standard Eurobarometer 55.2, May-June, 2001

Question: For which of the following professions do you have the highest regard? (SHOW CARD –READ OUT – SEVERAL ANSWERS POSSIBLE) — Scientists

For another angle, Eurobarometer investigated trust towards scientists compared to other professions, agencies, and organizations. We found that in the case of a catastrophe, 39% of the people who live in the Candidate Region would most trust scientists to explain the reasons for the disaster, and altogether almost two-thirds (64%) named scientists among the three most trusted groups in this respect. (Five percent said they would not trust anybody, and another 5% think it depends on the nature of the disaster — see *ANNEX TABLE 6.2*)

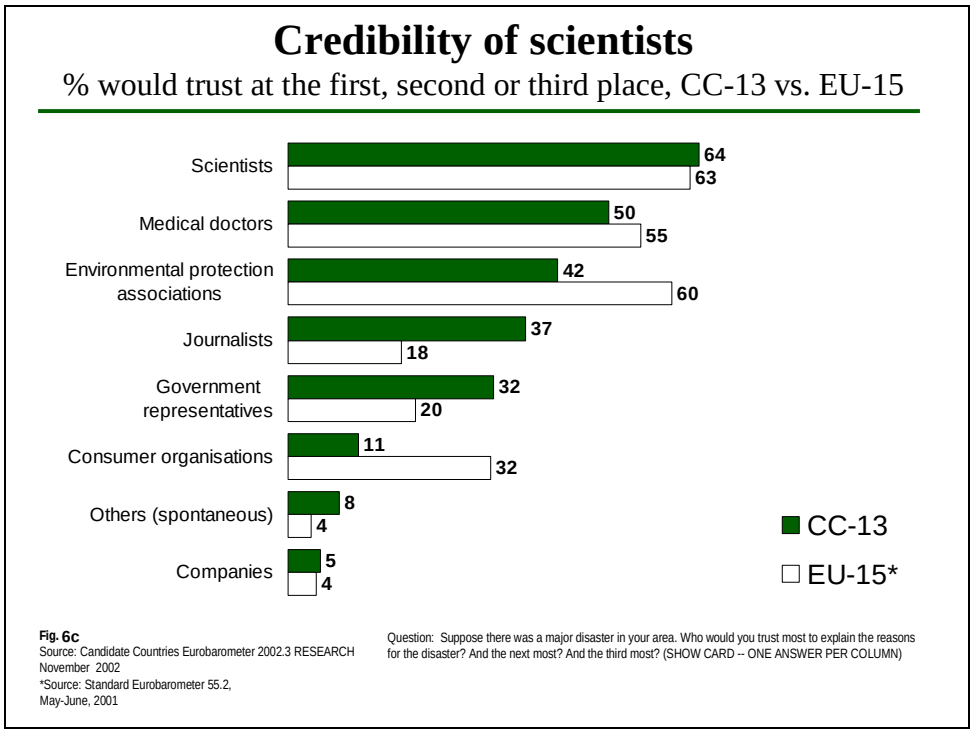


Fig. 6c
Source: Candidate Countries Eurobarometer 2002.3 RESEARCH November 2002
*Source: Standard Eurobarometer 55.2, May-June, 2001

Question: Suppose there was a major disaster in your area. Who would you trust most to explain the reasons for the disaster? And the next most? And the third most? (SHOW CARD -- ONE ANSWER PER COLUMN)

Scientists, maintaining an impartial image, are enormously credible across Europe, and medical doctors are also widely trusted when it comes to explaining the reasons for a disaster (50% in the Candidate Region trust doctors). Environmental and consumer organizations particularly are much less credible, and government agencies are more widely trusted in the Candidate Countries than in the European Union. Finally, companies are certainly not seen as impartial and honest sources of information from which people can have proper explanation of the nature of whatever disaster happens in their area.

7. Scientific vocational situation in the Candidate Region

In the European Union, especially in certain countries, there is a growing anxiety that kids and young people are less and less interested in scientific subjects. The concern is that the lack of interest leads not only to the extreme levels of scientific illiteracy that this report illustrates, but that it may endanger the industrial development of Europe as well. (Especially when European science education is compared to the more successful systems in the Far East.) The authors of this report are not aware of evidence that would confirm the presence of similar trends of concern in each of the Candidate Countries, and if they exist, how far-reaching their effects are. Instead, we have asked the respondents if they perceive such a tendency.

Perception of a decline of interest towards science

%, by country

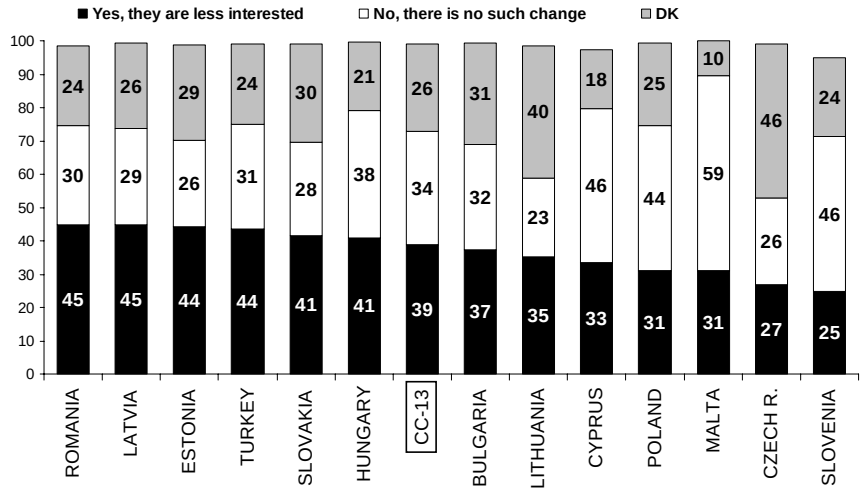


Fig. 7a
Source: Candidate Countries Eurobarometer 2002.3 RESEARCH November 2002

Question: Do you think that young people are today less interested in scientific studies and careers, or you do not see such change?

(% 'No answer' not shown)

The responses are not showing a clear trend. On average, people in the Candidate Region are a bit more likely to agree that there is a tendency as described in the following question: "*Do you think that young people are today less interested in scientific studies and careers, or you do not see such change?*". But — besides the 39% who agree — there are nearly as many people (34%) who do not see such a change, and a very significant 26% who simply have no idea.

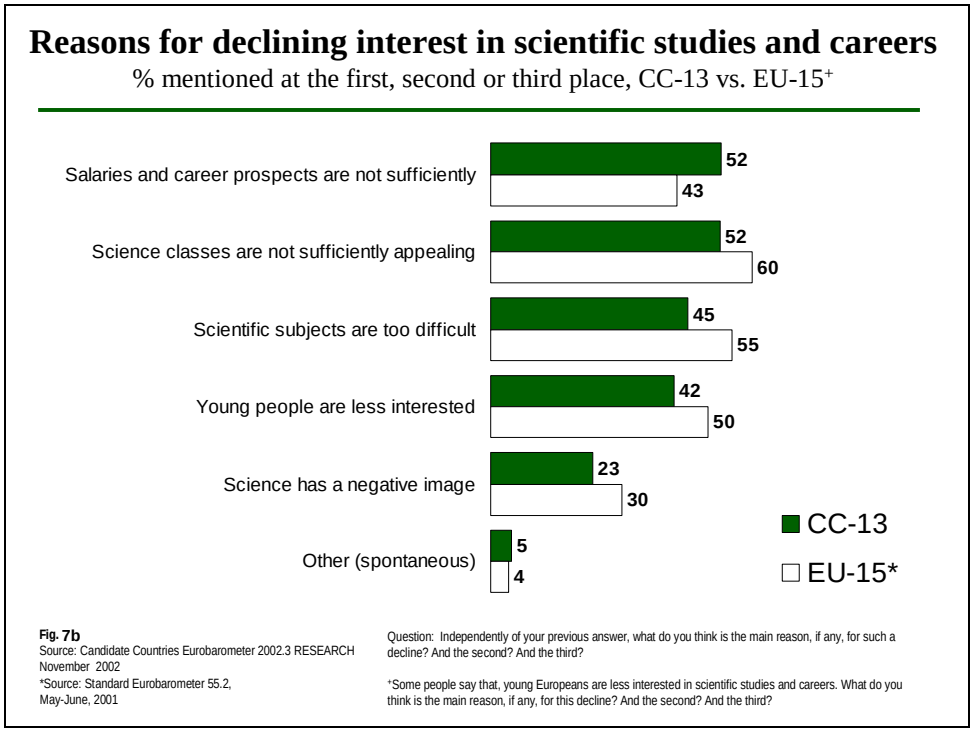
And the variation across countries is enormous. First of all, the proportion of those who do not have a clear opinion on the question range from 18% in Cyprus to as high as 40% in Lithuania and 46% in the Czech Republic (which, by the way, also indicates that the problem is certainly not at the centre of public debate in the latter two countries). There is a group of countries where people clearly tend to agree that there is a decline in interest among pupils and young people towards science: Romania (agree (A): 45%; disagree (D): 30%), Latvia (A: 45%; D: 29%), Estonia (A: 44%; D: 26%), and Slovakia (A: 41%; D: 28%). On the other hand, the ruling opinion is the opposite in Malta (A: 31%; D: 59%), Slovenia (A: 25%; D: 46%), Poland (A: 31%; D: 44%), and Cyprus (A: 33%; D: 46%). In the remaining countries, the public is undecided. (*ANNEX TABLE 7.1a*)

Demographic analyses (*ANNEX TABLE 7.1b*) reveal mostly differences in the extent to which people are unable to judge the situation. Some differences are apparent though: young people are much more likely to see a decline in scientific interest as compared to the elderly, who, by the way, are very unlikely to form an opinion on this question (38% "don't know"). Highly educated people confirm that there is such a decline (45% agree, 38% disagree), while those who are familiar with the basics of scientific knowledge, although by a very slim margin, think the opposite (41% agree, 42% disagree).

Without deciding the truth of this question, we better move on and investigate what would be the reasons for such a decline, if any.

Reasons for declining interest in scientific studies and careers

Certainly, one of the most important reasons for a declining interest in scientific careers can be attributed to the labour market in the Candidate Region. Most people think that mediocre career prospects and low salaries turn people away from pursuing scientific studies and careers. (*FIGURE 7b*)



In the current Member States, people are more likely to believe that the main reason for declining interest in scientific studies and careers lies in the way science is taught in schools. People in the Candidate Countries also tend to agree that science classes are not appealing enough (52%), but they do not consider the school factor as important as current citizens of the EU do. (*ANNEX TABLE 7.2*)

Relatively high proportions blame young people, saying they are simply less interested in scientific subjects; this is the opinion of 42% in the Candidate Countries and 50% in the EU.

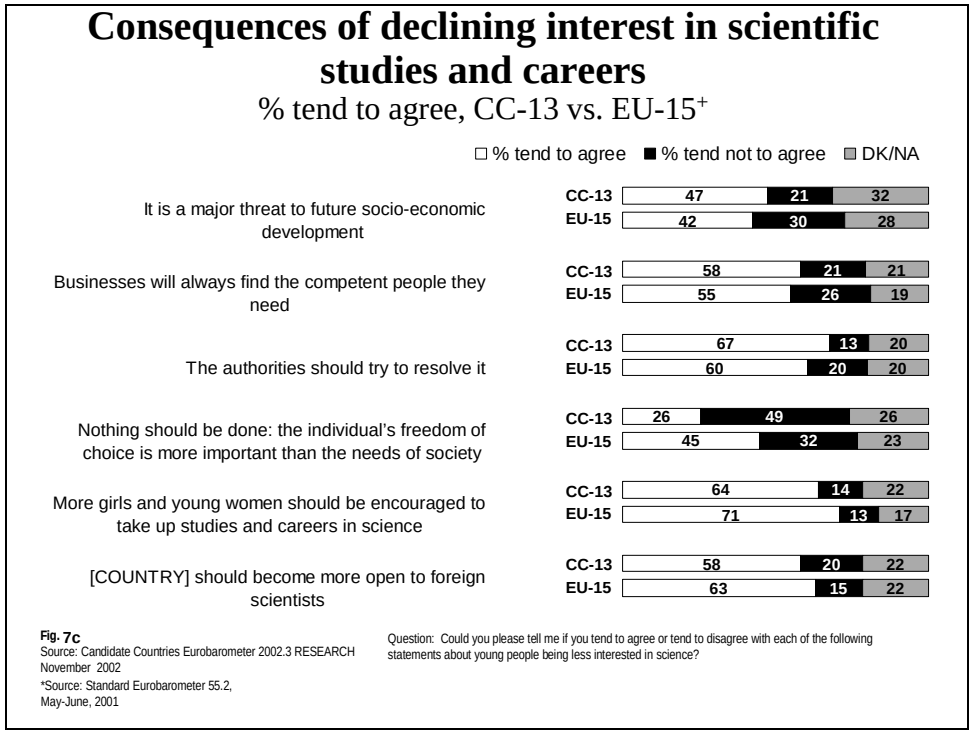
Finally, in both parts of Europe, few people agree that the declining interest in scientific careers would be a result of a general bad image of science (23% in the Candidate Countries agree).

The pattern we see on the CC-13 level repeats in all social groups.

Consequences of declining interest in scientific studies and careers

A series of questions were asked to explore people's opinion about declining interest towards scientific studies and careers. (*ANNEX TABLE 7.3*)

First, it appears that less than half of Europeans (CC-13, 47%) agree that this lack of scientific appeal would constitute "a threat for future socio-economic development", while many have no opinion in this respect.



As this threat is not perceived as urgent, most citizens throughout Europe also believe that companies will always find the people they need — only 21% in the Candidate Countries and 26% in the current EU countries think the opposite.

However, about two-thirds of Europeans support the idea of active public policies in this area: 60% on the EU-15 level and 67% in the Candidate Countries would like "the authorities to resolve this situation".

A marked difference: 45% of respondents in the current EU countries would advocate a laissez faire policy in this area, whereas only 26% of the citizens in the Candidate Regions agree that the individual's freedom of choice should be respected above all (although this is an artificial opposition, since the state can only intervene in a way that would encourage individuals to be more likely to "choose right" — behave the desired way — without being *obliged* to do so).

There is wide agreement with the proposition that more women should take up scientific careers in both parts of Europe, and current and future citizens of the European Union are about equally likely to support opening up their country or Europe[15] for foreign scientists.

[15] the question in the EU-15 countries was: Europe should become more open to foreign scientists

8. European scientific research

(An important note before going into detail about the issues we will analyse in this chapter — the respondents from the Candidate Countries had to answer questions that did not directly apply to them. At the beginning of the questionnaire, an introduction warned the respondents that some questions were taken from the within-EU survey, and they — as future members of the EU — should respond as if they were already EU citizens. Having said that, we should have some reservations whether and to what extent the respondents were able to imagine that situation.)

Is the Candidate Countries' public more educated or simply more optimistic? Citizens of the Candidate Countries are (usually much) more likely than are current EU citizens to believe that the European Union is active in several policy areas. The only exceptions are policies regarding agriculture, for which EU citizens are slightly more aware than are those in the Candidate Region. (*ANNEX TABLE 8.1*)

Science, research, and technology is in the middle of the ranking in both parts of Europe, considered by 51% (CC-13) and 38% (EU-15) as a policy area that the EU deals with.

Table 8a In which of the following policy areas do you think the European Union is active?
CC-13 vs. EU-15, % mentioned

	CC-13	EU-15
Foreign affairs	61	45
International trade	61	54
Environment	59	51
Agriculture	57	59
Defence	52	42
Science, research and technology	51	38
Regional development	49	22
Employment and social affairs	47	29
Consumer protection	46	29
Energy	46	33

Demographic analyses show that males are more likely to believe that the European Union is active in the area of science and R&D (men: 56%, women: 46%). The younger respondents are, the more likely they are to think that the EU is active in this area.

But, as we have seen so frequently throughout the report, the differences between the groups are indicative only of the extent to which people are unable to formulate an opinion: in the groups where positive awareness is higher, the proportion of those who explicitly say that the EU is not active in the given policy areas rises as well. (*ANNEX TABLE 8.2*)

Generally, people in the Candidate Countries (like their fellows already in the EU) would like the European Union to be more active in all policy areas. The greatest gap between the current perception (Table 8b, first column) and citizens' desires (second column, see also *ANNEX TABLE 8.3*),is to be found in the areas of consumer protection and employment and social affairs, as illustrated by the 32 and 29 percentage points net difference, respectively. With 16 percentage points net difference, science scores third from the bottom, indicating that Candidate Countries' citizens are satisfied with the level of activity the European Union displays in that area.

Table 8b Gaps between perception and preference in the policy areas CC-13, %

	CC-13 perception	CC-13 preference	net difference
Consumer protection	46	78	+32
Employment and social affairs	47	76	+29
Energy	46	74	+28
Defence	52	76	+25
International trade	61	80	+19
Regional development	49	68	+19
Foreign affairs	61	80	+19
Science, research and technology	51	67	+16
Environment	59	74	+15
Agriculture	57	70	+13

Demographic analyses reveal no differences beyond the one we already suspect: there is a relatively high variation of the don't know responses between demographic segments (those with more education or knowledge are less likely to have no opinion on the subject) but the opposition — that science and R&D should not be among the priorities of the EU — is only shared by 9% on CC-13 level, and this proportion is stable across all groups we investigate. (*ANNEX TABLE 8.4*)

Research at European Union level

Certainly, people in the EU and the Candidate Countries believe that research conducted at the European Union level will be more and more important (62% of the citizens in the Candidate Region agree) at the expense of national research. People in the Candidate Countries are not convinced that this shift would be in the interest of their nation, or in the interest of "everybody" (53% and 52% respectively) — they are most likely to think that this process is in industry's interest (61%). (*FIGURE 8a*, see also *ANNEX TABLE 8.5*)

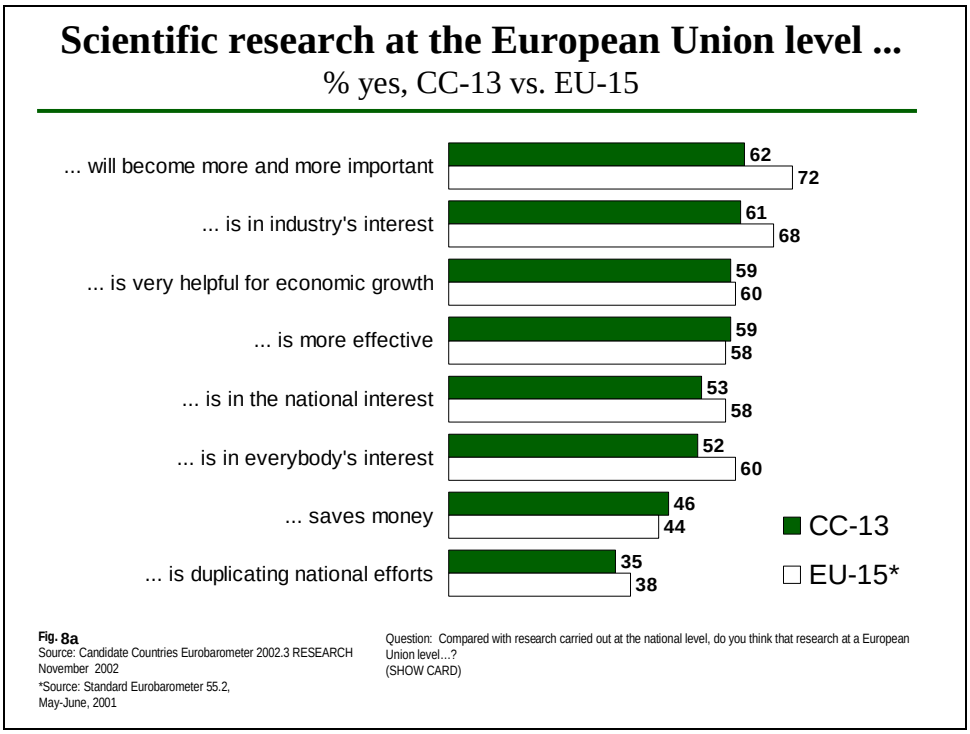


Fig. 8a
Source: Candidate Countries Eurobarometer 2002.3 RESEARCH November 2002
*Source: Standard Eurobarometer 55.2, May-June, 2001

Question: Compared with research carried out at the national level, do you think that research at a European Union level…?
(SHOW CARD)

Table 8c below draws attention to some differences in optimism regarding scientific research and development conducted at the European Union level. We have computed averages of the seven positive propositions (i.e. how many of them were chosen as characteristic by the respondents). Based on this comparison (which, again, reflects the level of confidence to answer such questions rather than the extent to which people favour EU-level research over national research), males are more optimistic than females. The older the respondents are the less optimism they express towards R&D done at the EU level. Education and position on the scientific knowledge scale have similar effects: people who are better educated or know more about the scientific fundamentals are much more likely to believe that research done at a supranational level is generally beneficial.

Among the occupational groups, managers and white collar workers are the most optimistic, while house persons and retired people are the least.

Table 8c Optimism regarding research at EU-level
CC-13 level, averages between 0-7, by demographics

	Average number of correct responses (between 0-7)		Average number of correct responses (between 0-7)
Male	4.2	Self-employed	4.0
Female	3.6	Managers	4.7
AGE: 15-24 years	4.2	Other white collars	4.7
AGE: 25-39 years	4.1	Manual workers	4.2
AGE: 40-54 years	4.0	House persons	3.4
AGE: 55+ years	3.5	Unemployed	3.7
EDU: up to 15 years	3.4	Retired	3.5
EDU: 16-19 years	4.2	Knowledge scale (–)	2.7
EDU: 20+ years	4.6	Knowledge scale (+/–)	4.2
EDU: still studying	4.4	Knowledge scale (+)	4.9

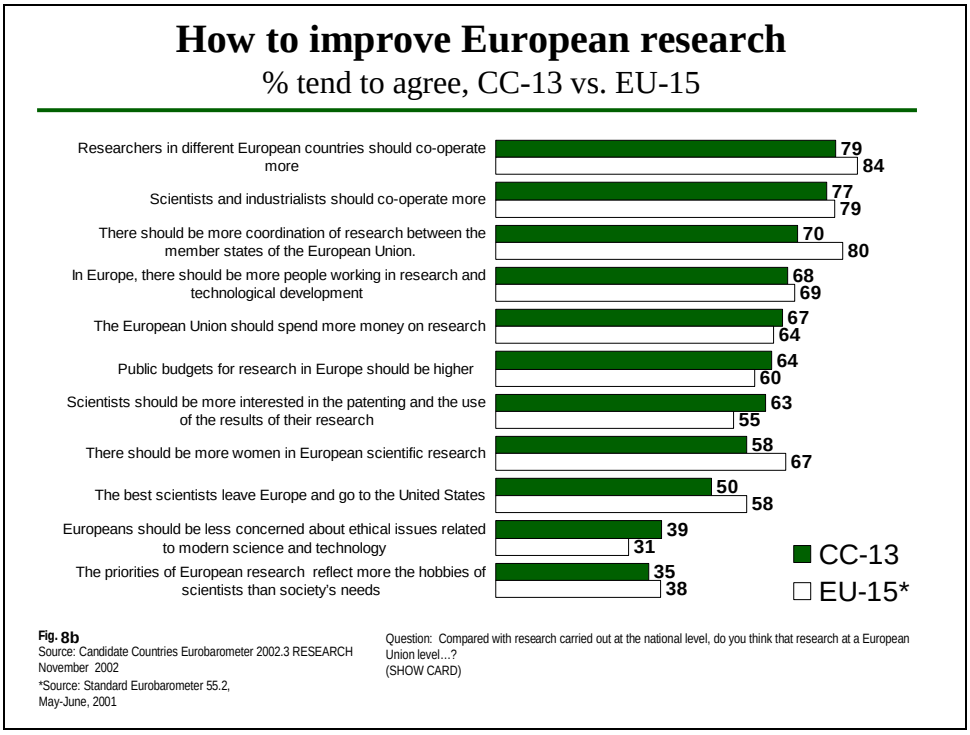
Improving the quality of research in Europe

We tried to explore people's opinion about why European research is not able to come up with inventions comparable to biotechnologies or the Internet, and why most scientific Nobel prizes go to researchers working overseas. Many people have no clue what to think in these questions — the proportions of don't know responses are about the 30% mark in most of the questions. (*ANNEX TABLE 8.6*)

FIGURE 8b shows what people think might be the prime causes (and possible remedies) of the scientific inferiority of Europe in a global comparison. Clearly, people in both parts of Europe feel an important remedy is the closer cooperation between scientists (more in the Candidate Countries) and countries (more in the EU) of Europe. Besides enhanced European-level cooperation, there is a wide agreement that a closer co-operation between industry and academia could lead to better products of scientific research.

Although the opinions are very similar, there are some minor differences in the opinions of the current and future Member States of the European Union. People in the Candidate Countries

are more likely to think that scientists are not active enough in patenting their results, and they are not interested in industrial application of their findings. European citizens, on the other hand, think that more women should be involved in scientific research. Current EU citizens are also more convinced that brain drain has a negative effect; that the best scientists leave for the United States where both academia and industry can offer higher salaries for high quality work.

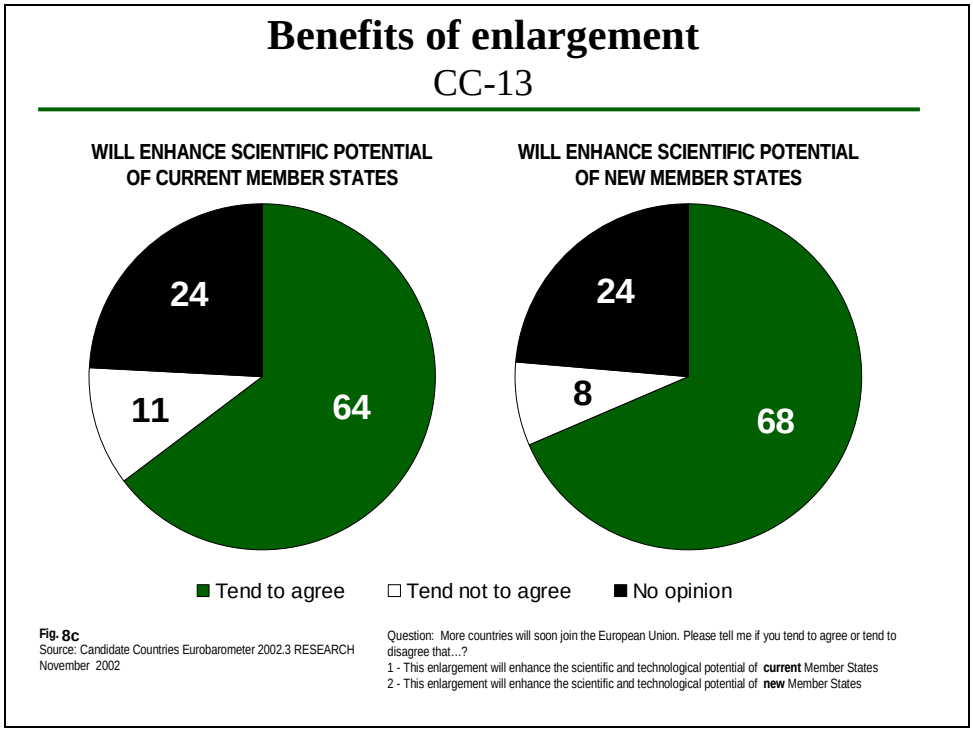


Candidate Countries' citizens are a bit more likely to agree that European scientists should be less concerned about ethical issues (which, after the human cloning attempts suspected to be done in the Netherlands and Italy, seems to be in fact the case).

Finally, the majority seem to believe in the liberty of research, and most people do not blame scientists for pursuing their own interests in the selection of research topics — rather than serving "society's needs".

Effect of enlargement on scientific potential

In terms of scientific potential, people in the Candidate Region expect great benefits for both their own countries and current Member States from the enlargement. A clear majority in each of the Candidate Countries believe that the enlargement will increase momentum for scientific research across Europe. In certain countries, people expect more benefits for the accessing countries than for the current Member States (these countries are Bulgaria, Cyprus, Estonia, Romania, Slovenia, and to a lesser extent, Slovakia and Lithuania) (*ANNEX TABLE 8.8*) In Hungary, the Czech Republic, Latvia, Malta, and Turkey, the opinions are balanced, but still slightly more people think that the Candidate Countries would have more advantages in this respect, while the Poles are confident enough to say that the current Member States will even benefit a bit more than the accessing countries.



On average, six in 10 citizens in the Candidate Region (59%) believe that the enlargement will bring mutual benefits for all: both the current Member States and the accessing countries will have an enhanced scientific potential at the end of the day.