Advisory Council of Science and Technology Policy

Faith in science no longer self-evident

By: Dorette Corbey and Anne Janssen
With the cooperation of Pieter Adriaans, Eduard Klasen and Marike van Lier Lels

Scientists are the ones who tell us that the climate is changing and that Omega-3 fatty acids are good for our cardiovascular systems. Scientific statements constitute a major basis for day-to-day decisions, and certainly for policy as well. So it is important that people's faith in science is great and widely shared. Confidence in science was recently the subject of discussion on several occasions, especially with respect to the climate problem, H1N1 flu, cervical cancer vaccinations and CO2 storage. During these discussions, it was frequently assumed that confidence in science is declining: the vaccination campaigns did indeed encounter a great deal of resistance. But is this a sign of diminishing faith in "science"? And what impact will decreasing confidence in science have? Could it be that science is ceasing to be an objective standard for policy? As a result of these questions, the AWT decided to analyse public confidence in science (see appendix). How much faith do the public have in science, what is the reason for this, and what effect will it have?

First of all, it has emerged from data published by the Netherlands Institute for Social Research (SCP) and the Eurobarometer that the Dutch public have considerable faith in science as an institution (see also "state of public confidence" on the information chart). Most people believe that science ensures progress and finds solutions to problems. However, public confidence can be a great deal lower with respect to specific issues. Scientists' statements or scientific substantiation of policy are being disputed. This depends on the issue to a large extent: for example, people often trust health researchers more than climate researchers. Public confidence in science also depends on the kind of people asked for their opinions: those with a low level of education have less faith in science than highly-qualified people. And finally, financing also plays a role: there is less confidence in research financed by the industry. The information chart gives an overview of the possible causes and effects of the high level of confidence in "science as an institution", as well as diminishing faith relating to specific policy discussions. Four players are essential in the analysis of causes and effects: the public, the media, science and politicians. We will be examining which trends influence public confidence in science, or which might influence it, in the paragraphs below.

The public: we'll be the judge of that!

The first major trend is individualisation. People are increasingly better educated, which results in more confidence in their own opinions. "We'll be the judge of whether something is true or not, and we don't need scientists to tell us anything," they say. Internet provides easy access to knowledge, and the fact that not all the opinions that can be found on the Internet comply with scientific quality standards has hardly any significance. Scientists' and scientific institutes' websites are by no means invariably the first source of information for the public.

A second trend is that the elite and the people have come into conflict with one another. The socio-economic position of people with a low level of education has become uncertain in today's knowledge-based society (with an increasing significance of science!). The response to this is distrust of the elite and of science. This is one explanation of the difference in the level of confidence between highly-qualified and unskilled people[1]. Conspiracy theories are also popular in this respect ("they put nano chips in vaccines!").

However, these trends are compensated by one constant: public faith in technological progress is still high. Although this is a good thing, there is still one drawback involved: the high level of confidence in science does not motivate people to resolve problems themselves. After all, science will do this for them. Climate change? Maybe, but science will come up with solutions.
Although expecting too much of science is not good for motivating people to resolve problems, a lack of confidence is not good either. This is because there is no longer any objective standard for establishing problems, let alone for formulating solutions to these problems. It is therefore important that people have a realistic idea of science, which brings us to the role of the media.

The media: hearing both sides of the argument

Scientists and science are often in the limelight. In addition to newspaper supplements and TV programmes on science, scientists are often called upon to give their interpretation of news items. This serves to illustrate public confidence in science as an independent source of information, and journalists and the media work on the principle of hearing both sides of the argument. Each opinion should be challenged, and supporters and opponents alike can air their views. A different opinion is put forward against the statement made by a scientist, and it makes no difference whether this opinion is based on a widely-shared consensus among scientists. This means that scientists are more and more frequently portrayed as proclaimers of opinions.
Viewers, listeners and readers of newspapers have a tendency to seek confirmation of their own opinions. In the debate on climate change, for instance, people opposed to government intervention or environmental measures seek out climate sceptics who can confirm their views. There is no problem with the climate, so no government intervention is necessary. Relatively speaking, climate sceptics are given a great deal of attention due to the media's principle of hearing both sides of the argument which dissidents do not place within the context of a widely-supported scientific opinion[2]. This is substantiated in the SCP's 2010 Citizens' Outlook Barometer survey and in recent research.

One additional complicating factor is that the contesting of statements is an essential part of science. However, this has the effect of confusing the general public in cases where the discussion is held in the public domain. So how does science actually function?

Science: diminishing returns

Scientific methods consist of drawing up verifiable hypotheses, testing and subsequently rejecting these hypotheses, and finally drawing up better hypotheses. Progress starts with the refuting of existing ideas; science flourishes as a result of dissent. Although these scientific methods have indisputably resulted in considerable success in fields such as medicine, agriculture and technology, confidence in rapid progress is wavering among scientists themselves. During the past centuries, science has succeeded in making a great many discoveries, and the human body and psyche, society, the world and even the universe have revealed most of their greatest secrets. We can say that this was the "low-hanging fruit". But the issues currently confronting science - such as climate, DNA

[1] See also: Koobe de Keere, *Wantrouwen in de Wetenschap* (Distrust of Science).
[2] See also: *Continu Burger Onderzoek* (Citizens' Barometer Survey) 2010, Netherlands Institute for Social Research and Dan Kahan: Cultural Cognition as a Conception of the Cultural Theory of Risk, Harvard University.

structures and cell function - are a great deal more complex. That is why progress is made step by step instead of in leaps and bounds[3]. The law of diminishing returns has taken effect in full force, and an even larger number of studies, researchers and charters has resulted in relatively few new opinions. This is a problem, because the parties that commission research - including politicians, the government or the taxpayer - want to see results, and scientists still have to earn their pay. In addition, financing nowadays is increasingly "tied up": researchers have less "real disposable" budget. In such cases, it is helpful to come up with results which appeal to the public, or to hold out the prospect of potential future results. After all, scientists depend on financing from public or private flows of funds. But this also contains the seeds of disillusionment if the results turn out to be less spectacular.

Incidentally, the public has always had cause to doubt the independence of scientific statements. Thomas Kuhn wrote in the 1960s that scientists think in paradigms, and that the outcome of their research is determined by their own views on the matter[4]. Science is carried out by human beings, and humans are sociable creatures who are able to influence one another. Scientists can be very biased and can wear collective blinkers: the fact that these blinkers can also be extremely productive does not detract very much from this. Philosophers have been calling scientists' claims to veracity into question ever since the 1960s. Bruno Latour unravelled the knowledge progress procedure in the 1980s, and arrived at the conclusion that scientific facts are partly based on social interaction among scientists[5].
To sum up, science can sometimes result in biased knowledge, and is certainly not the only rational way of thinking. This line of reasoning has meanwhile become more widely accepted. As we have already said, the public themselves are the judge of what is true and what is false.

Politicians: selective shopping around

Scientists are human too, and they have to take care of the shop. If we look at the matter from the clients' point of view (the government, politicians, interest groups, society), we see that there is a great deal of knowledge and research available. This makes it easy to substantiate or undermine any political position whatsoever. Interest groups, politicians and the government can shop around and make their choice from the tremendous amount of knowledge available. Unwelcome communications are not included and remain behind in the scientist's shop. And this reinforces the image of science as something that can be deployed at one's own discretion. Kobben and Tromp have already described this in their book "*De Onwelkome Boodschap*" (The Unwelcome Message). They cite many examples of results, either unwelcome or otherwise, which have been effectively covered up by the government and/or politicians. This is done using a number of strategies ranging from keeping quiet about research results to disputing the credibility of the research. This selective shopping around means that irrefutable counterarguments put forward by scientists are left over which reach the public through the media and the Internet. All this serves to confuse the general public, who wonder why one message is included in policy while another one is left out. And this in turn further undermines public confidence.

What now?

Faith in science is naturally of importance, and objective knowledge of what is or what is not healthy, safe or clean is necessary in order to make decisions. Progress in scientific knowledge results in useful expertise. Although confidence in science is no longer self-evident, we can still build on the credit accrued by science for the time being.

---

[3] See also: John Horgan, The End of Science.
[4] Thomas Kuhn: The Structure of Scientific Revolutions.
[5] See also Marjolein Februari's column in *NRC Handelsblad*, 1 November.

Moreover, too high a level of confidence is not good either: the results of scientific research may not be imposed as a condition. A healthy distrust and a critical following of scientific research is therefore essential. What should we do?

First of all, more attention should be devoted to the communication and accessibility of knowledge. We must make knowledge and science more accessible. More science programmes should be broadcast on TV, and more websites should be set up which make knowledge accessible and give an overview of this knowledge to lay people. There are many good examples such as the "Cochrane Collaboration", a network of physicians and scientists which assesses and summarises the current availability of medical knowledge. However, websites that make science accessible must provide top-quality information and safeguard the scientific nature of such information. Research and studies must be accompanied by disclaimers stating what exactly has been studied, what basic assumptions have been used, and what conditions validate the results. Attention should be given to how science works at secondary schools as well.

Secondly, science itself must be aware of the changing environment in which the media and the public operate. Scientists must work towards maintaining the independent nature of science. Since the figures relating to confidence in research financed by the industrial sector are as plain as a pikestaff, it is important to restore faith in privately-financed research. The report published by the Royal Netherlands Academy of Arts and Sciences (KNAW), entitled "*Wetenschap op bestelling*" (Science to order) has already initiated this.

Thirdly, more attention should be devoted to independent science. Public financing is still important, and in this respect, it is essential to give more and better consideration to the diminishing returns of science and to the deployment of funds for research in order to manage expectations. In addition, politicians must be aware of the importance of public faith in science: selective shopping around and improper use of scientific reports should be taboo. Politicians must set an example in this respect.
To sum up, we call on politicians and the government to treat scientific research with respect, and on scientists to invest in public confidence.