

Scientists for Global Responsibility - the importance of statistics

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First, thanks to Radical Statistics for inviting Scientist for Global Responsibility (SGR) to contribute an article.

I think that there is a particularly close relationship between the issues which SGR is seeking to address and statistics. SGR's prime concern is the responsible use of science, engineering and technology. Particular areas we have identified include the military uses of technology, genetic engineering, energy technology, animal experimentation and low levels of electromagnetic radiation. More generally, SGR's concerns include the social and environmental effects of existing and new developments in engineering, science and technology.

Information, a crucial issue

In many of these areas, I suspect all, accurate information and the access to and the control of information are crucial issues. To take energy as an example: One of the main reasons why vital renewable sources of energy have not been and are not being developed as quickly as they should be, was what appears to have been the deliberate misrepresentation of data about the costs of wave power, where the costs of transmitting electricity through undersea cables from off shore wave energy platforms were overestimated by factors of 10 to 100. The result was that comparisons between conventional and wave energy "showed" that wave power generated off shore would be relatively uneconomical. In reality this is not and never was the case, as has been shown by the deployment of the UK-developed technology in Norway. This is a clear example of a powerful vested interest - the electricity generating companies - producing statistics supporting their preferred technology.

Right now there is controversy over the potential health effects of low levels of electromagnetic radiation. This is a highly important debate because we are literally surrounded with human generated electromagnetic vibrations of varying frequencies. The sources range from the relatively mundane: electricity meters, electric blankets and alarm clocks, to hand held phones and overhead, cables to secret radar and communications installations. One of our members is an expert in this area and gave extensive assistance to the producers of the recent Panorama programme on the subject. His interviews and views were not acknowledged or broadcast because Panorama preferred

to use the words of those more centrally identified with the establishment. A short pamphlet is available from SGR for details see below.

However, the nub of the controversy is the potential link between some kinds of relatively rare illnesses particularly in children and the effects of electromagnetic waves. The National Radiation Protection Board have set a "safety" level based upon the heating effect of such waves and do not take into account the possible biological activity of certain frequencies which resonate with known biological frequencies of certain body cavities. Part of the ensuing debate will involve the analysis of data for certain childhood (and possibly other illnesses) against field strength measurements. This is the "statistical" element; the other side of the debate will concern the way in which field strength calculations are used in a general but unrealistic way to estimate levels of fields some distance from cables or installations. This is wrong because the fluctuating voltages and currents in real power cables do not behave in a convenient theoretical way. Life is messier than oversimplistic assumptions (for those with a technical bent the current and voltage change their phase relationship with each other).

Future statistical issues for SGR

Historically, SGR through its origins in Scientists Against Nuclear Arms (SANA) and Electronics and Computing for Peace (ECP) was very closely associated with the use of statistics. Back in the Cold War days SANA and ECP engaged in various arguments and debates with the authorities about the effects of nuclear weapons and the possibility of nuclear war. SANA showed that the Government calculations made for public consumption grossly underestimated the likely casualties from nuclear attack (although the military figures not for general public knowledge were fairly realistic), whilst the probability of accidental nuclear conflict or the possibility of accidental launch of, say, a cruise missile were also discounted as highly unlikely.

In all these examples much of the debate centred around data closely connected with scientific hypotheses of various kinds. The importance of the statistics, in my experience, is in coming up with concrete numbers or predictions out of the arguments put forward which enable the general public to understand the arguments better. The ever-present danger is, of course, that if one sticks purely to the statistical debate without making value judgements that one can be seen as an aloof expert to be put up against another expert with a differing view. If, on the other hand one makes value judgements, then one can be presented as biased. What this means is that anything important is political, something which will be no astonishing insight to members of Radical Statistics. Another factor is that the media strive to maintain so-called "media balance" and the avoidance of excessively

biased views.

Looking towards the future, based upon my past experience, and working forwards from our present concerns, I think it is possible to make some predictions about the types of issues which will be of importance.

There is no doubt in my mind that the level of access to data or information will remain a key issue. There is an increasing tendency for institutions, government departments, quangos, to release "processed" data, not original source material (if they release it at all). There are also some very worrying trends in the possible use of new communications technology to monitor individuals (say via the new System X telephone system or by complex coding algorithms to which the security services have a master "key") or to censor computer communications networks such as Internet.

The next key issue is how data is presented. A topical example is the level of Council Tax in Labour and Conservative Authorities. Labour uses the average cost per head figure, the Tories the cost in a given band. The media present both sorts of statistic as though both are equally useful or valid. Quite apart from the fact that the whole debate is not addressing the issue of value for money, the two sorts of numbers are not the same at all. If you spend a few minutes with two distributions of revenue in tax bands and two distributions of house prices (typically lower in Labour controlled authorities) you quickly realise that a comparison between bands is very misleading. On paper you can create two authorities one of which is cheaper in every band but which is actually spending more simply because most of the houses are in a higher price band. Presumably the media do not understand this and thus they do not point this out on our behalf. The next, rather tricky question is this. "If the average cost per head in Labour authorities is lower why is this somehow better?". Surely if typically social needs are higher shouldn't spending be higher? Or turn it around: why is more spending going to richer areas?

My next prediction for growth areas in statistics are in the statistics of very small risks, relatively small effects masked by other factors (such as epidemiology) or risks which have small effects over a long period of time (radiation?). Other important areas of risk include very complex systems; an important example is the risk of accident in a complex industrial or nuclear plant. This type of analysis is always more than purely statistical and also relies upon thinking of all the possible things that could possibly happen in various nasty combinations. (No-one, of course, predicted the crazy sequence of events at Chernobyl).

This is a very important area because of the speed of the development of new technology and because of increasing public fears and suspicions combined

with a growing awareness of the importance of the environment. At the Hinkley Point C Public Inquiry I gave evidence with an SGR (then SANA) colleague on the complete unpredictability of certain mathematically well defined systems typical of a nuclear power plant control system in possible configurations and suggested that some of their accident calculations could be wrong by factors of 10,000 or more. The breakdown of predictability is a relatively new "discovery" connected with chaos theory. It has nothing to do with quantum mechanics and atomic particles but everything to do with why a bumble bee can fly despite its singular lack of conventional aerodynamics.

The next area I identify is information connected with long time scales or very long extrapolations into the future. For example the possibility of radioactive escape from underground storage leaching into water supplies in underground storage in 1,000 - 2,000 years. Other examples include a host of possible environmental impacts - long term effects of high contaminant and hormone levels in the sea, assessing observed climatic variations - natural or not?

Next, is the area of new sorts of statistics. There is a whole new way of measuring performance being developed at present by means of "sustainability indicators". These are intended to be a means of assessing "progress" in environmental, social and economic terms and will include some alternative economic indicators. This is a truly radical idea because it is attempting to set a new agenda. It is not proving simple and doubtless there will be numerous attempts to massage sets of data or to develop various kinds of sustainability index to set one against another.

Scientists for Global Responsibility

SGR's strengths lie in the area of appreciating the scientific background to some of the new developments and in having sufficient numeracy to start to develop an alternative view free from economic vested interest. Of course we all have our own individual biases and perceptions. The crucial issue for organisations such as SGR and I would imagine Radical Statistics, is finding the right focus or "angle" and most important of all getting the message across. We are still feeling our way in SGR as a relatively new organisation.

What we want to do first is to properly review issues which already concern working scientists and engineers and to publish the reasons why and to facilitate a debate about the issues. We want to see mechanisms in institutions such as universities to consider ethics. Here I mean discussing the likely consequences for society of developments, asking the question "why?" more often. Seeking to set the agenda as well as working within somebody else's. We think that it is important that students become more

informed about the impact of their chosen career and that the public in general can access an alternative voice about technical issues with important human and global consequences for good or ill and which are usually poorly debated and understood.

Our organisation is open to scientists of all sorts and as in the old Soviet definition of the word includes, for example, teachers, engineers, students, mathematicians, biologists. We are actively seeking new members and are very interested to work with new members. If you are interested, please contact SGR.

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General Household Survey 1992

*From an
advertiser
Better late than
never I suppose...*

The GHS is a continuous, sample survey and has been running since 1971. It is based each year on a sample of the general population resident in private households in Great Britain. Interviews for the 1990 survey were carried out from April 1992 to March 1993.

The 1992 report contains information on:

- the age and marital status of the population;
- house and families;
- employment and social class;
- economic group.

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