Science and Social Responsibility

Ethics *of* and *in* Science

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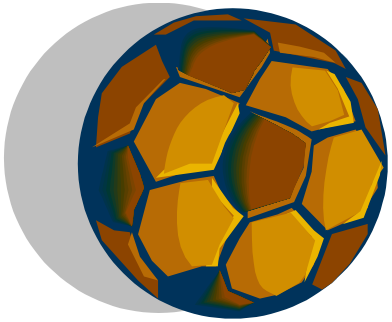

A football match several years ago

Was it a goal?

Did the ball cross the goal line?

Should Carroll have told the ref?

- FA Chief Executive Gordon Taylor:
  - "Sir Alex (Ferguson) would have been thrilled with him saying it was a goal, I'm sure," laughed Taylor. "He wouldn't have been best pleased as it was, but that would have made it even worse".
  - "That's starting to be naive because there are so many rubs of the green where you don't get what you feel you should get, and you hope it balances out".

Should Carroll have told the ref?

- Alex Stepney (ex-Man.U. goalkeeper):
  - "If you can get away with anything in football, especially for a goalkeeper, you need a bit of luck and you've got to go with it,"
  - "I would never have owned up and said `no, that was a goal'. I'd have done exactly the same as Roy. You play on until the referee makes the decision."

Perhaps we should use modern technology to decide?

Let’s move on to science…

Examples of ethical implications of scientific research?

- Cloning, stem cells, use of animals in experiments, synthetic biology…

These are medical related - where the implications are often (but not always) fairly obvious.

  - Note the existence of a whole ‘field’ of medical ethics.

Examples from the physical sciences?

- Manhattan Project (developed the atom bomb)
- H-bomb development in the 1950s
  - Russell-Einstein Manifesto 1955

Bertrand Russell at the Press Launch of the Manifesto

Examples from the physical sciences?

- Manhattan Project
- H-bomb development
  - Russell-Einstein Manifesto 1955
    - Led to the Pugwash movement of scientists concerned about the mis-use of science in world affairs which played a major role in the development of international arms control (www.pugwash.org)
- Use of napalm and agent orange in the Vietnam war
- Use of drones in surveillance and warfare
  - Development of autonomous weapons

These examples all:

- relate to the use to which the science is put
- concern the relationship between Science and Society

These might be called EXTERNAL ethical implications of science.

External Ethical Implications

- How you or I assess these implications will relate to your or my personal, internal ‘moral stance’.
- Others may have a different standpoint
- But I think we have a responsibility to think about these things, even though I and my colleagues working at Aldermaston may have to agree to disagree.

An example: JLF's research

- I study - largely by neutron scattering -
  - the structures of solutions of simple organic molecules (e.g. alcohols, amides, …)
  - the relationship of enzyme dynamics to function

What possible ethical implications might there be about this seemingly abstruse research?

Some aspects to consider

- Methods used
  - Experimental (neutron scattering) and computational
- Samples used
  - Toxic chemicals
  - Biological samples
- Motivation
  - Potential applications (‘external’ aspects)
  - Is *lack* of applications a potential problem?

These are *external* aspects

There are also *internal* ones

Internal Aspects: the integrity of the scientific process

- Governs the interactions *between* scientists
  - as against *external* aspects which relate to the interaction between science and society
- Sets out how science *works*
- It is crucial that, when doing our science, we all observe an agreed *code of practice* if the *integrity of the scientific process* is to be maintained.

Merton's Four Principles (1973)

- *Universalism:* claims to truth must be tested using pre-established impersonal criteria
- *Communality:* findings are made available publicly - they must not be hidden
- *Disinterestedness:* advancement of science is more important than personal interests
- *Organised scepticism:* all scientific 'truth' is provisional – it is subject to change

Consequent practical rules 1?

- Procedures must be reported accurately - enough information for others to replicate.
- Reported data must be *complete* & *correct*, and *error limits indicated*.
  - Data that don't agree with expectation must not be suppressed
    - It may be an experimental artifact, but….
    - it could mean something *very* interesting that has not been observed/suspected before!

Consequent practical rules 2?

- Data must be interpreted objectively
  - can be tempting to let prior expectation influence data analysis
  - politics or expectations of the funding agency should not influence the analysis
    - potential conflicts of interest should always be declared - and looked for in reported work
- Give credit where credit is due
  - to *all* who have contributed to the research

Final comments: internal aspects

- My scientific knowledge depends on the integrity of those who have gone before me
- In turn, those that follow me have the right to depend on my scientific integrity
  - notable past delusions: N-rays, polywater, cold fusion, ….

Otherwise, science has real problems

An interesting book

- R.A. Hinde: *Bending the Rules*.
  Oxford University Press 2007

You might also find interesting with respect to 'pathological science' the last chapter of:

J. L. Finney: Water: A Very Short Introduction

O.U.P. 2015 (only £7.99...)