AC52012

Research Methods Part II

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http://www.computing.dundee.ac.uk/internal/fullguide.asp?AC52012

Ethics and Science

Ethics and Science

``The practice of science will depend on guiding ethical visions. The strength of these visions will depend in turn, not solely on acceptance or affirmation but reflective thinking, cogent argument and informed judgement."

Ethics and Science: An Introduction. Briggle and Mitcham. CUP (2012) p. *xv*

Ethics and Science

Responsibility to:

Ethics and Science

Responsibility to:

1. Institution

Ethics and Science

Responsibility to:

1. Institution
2. Public

Ethics and Science

Responsibility to:

1. Institution
2. Public
3. Experiment participants

Ethics and Science

Responsibility to:

1. Institution
2. Public
3. Experiment participants
4. Colleagues

Ethics and Science

Responsibility to:

1. Institution
2. Public
3. Experiment participants
4. Colleagues
5. Students

Ethics and Science

Responsibility to:

1. Institution
2. Public
3. Experiment participants
4. Colleagues
5. Students
6. Society

I. Institution

- Fabrication - *"making up data or results."*
- Falsification - *"manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record."*
- Plagiarism - *"the appropriation of another person's ideas, processes, results, or words without giving appropriate credit."*

Case study in Informatics

- Automated Mathematician - Lenat.
- Graeme D. Ritchie, F. K. Hanna: AM: *A Case Study in AI Methodology*. Artif. Intell. 23(3): 249-268 (1984)

2. Public

- The First Open Science Revolution

Public

What is the relevance of the following to science?

SMAISMRMILMEPOETALEUMIBUNENUGTTAURIAS

Public

ALTISSIMUM PLANETAM TERGEMINUM OBSERV
(I have observed the highest planet in triple shape).

I discovered another very strange wonder, which I should like to make known to their Highnesses . . . , keeping it secret, however, until the time when my work is published . . . . the star of Saturn is not a single star, but is a compsite of three, which almost touch each other, never change or move relative to each other, and are arranged in a row along the zodiac, the middle one being three times larger than the lateral ones, and they are situated in this form: oOo.

Public

- Neilsen: A Second Open Science Revolution?

``Imagine a world in which every single human being can freely share in the sum of all knowledge"

Public

- Neilsen: A Second Open Science Revolution?

``*Imagine a world in which every single human being can freely share in the sum of all knowledge*" Wikipedia vision statement

Public

- A shift in how scientists find meaning in knowledge.
- Galaxy Zoo - more than 200,000 volunteers to help astronomers to classify galaxy images. - making astounding discoveries - just discovered a new class of galaxies: the green pea galaxies, where stars are forming faster than almost anywhere else in the world. The work of Galaxy Zoo has resulted in 22 scientific papers - more in the works.

Data sharing/hoarding

GenBank - historic conference in Bermuda 1996, attended by many of the world's leading biologists, everyone agreed that if open sharing of genetic data became common practice then science as a whole would benefit enormously.

Attendees weren't willing to make the first move.

Joint agreement - the Bermuda Agreement - that all human genetic data should immediately be shared online. Convinced grant authorities to make data sharing a mandatory requirement of working on the human genome.

- Changed the game - Clinton and Blair issued joint statement praising these principles and urging scientists in every country to adopt similar practices. HapMap publicly available.
- Many attempts to extend the spirit to other genetic data, but unsuccessful.
- As of 2010 no worldwide agreement to share data about influenza virus.
- Example of a scientist who'd been sitting on a genome for an entire species for over a year.

3. Protecting participants in an experiment

Principles

- Voluntary participation
- Informed consent
- No risk of physical or psychological harm
- Confidentiality / anonymity (if possible)
- Right to a service (control group problem)

Milgram obedience experiments (1961)

Public Announcement

WE WILL PAY YOU $4.00 FOR ONE HOUR OF YOUR TIME

Persons Needed for a Study of Memory

*We will pay five hundred New Haven men to help us complete a scientific study of memory and learning. The study is being done at Yale University.

*Each person who participates will be paid $4.00 (plus 50c carfare) for approximately 1 hour's time. We need you for only one hour: there are no further obligations. You may choose the time you would like to come (evenings, weekdays, or weekends).

*No special training, education, or experience is needed. We want:

Factory workers	Businessmen	Construction workers
City employees	Clerks	Salespeople
Laborers	Professional people	White-collar workers
Barbers	Telephone workers	Others

All persons must be between the ages of 20 and 50. High school and college students cannot be used.

*If you meet these qualifications, fill out the coupon below and mail it now to Professor Stanley Milgram, Department of Psychology, Yale University, New Haven. You will be notified later of the specific time and place of the study. We reserve the right to decline any application.

*You will be paid $4.00 (plus 50c carfare) as soon as you arrive at the laboratory.

TO:
PROF. STANLEY MILGRAM, DEPARTMENT OF PSYCHOLOGY, YALE UNIVERSITY, NEW HAVEN, CONN. I want to take part in this study of memory and learning. I am between the ages of 20 and 50. I will be paid $4.00 (plus 50c carfare) if I participate.

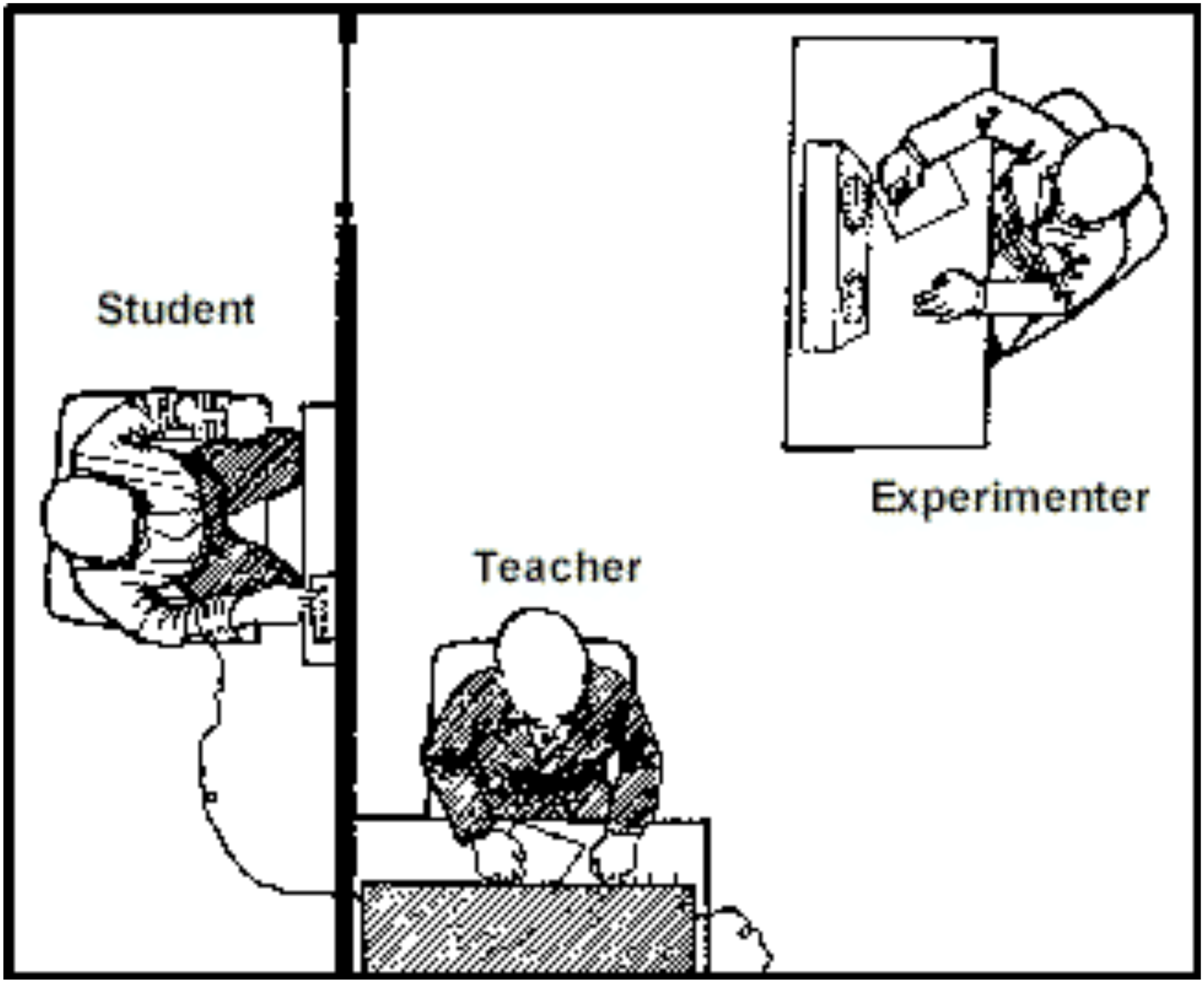
NAME (Please Print). . . . . .

ADDRESS . . . . . .

TELEPHONE NO. . . . . Best time to call you . . . . . .

AGE . . . . . OCCUPATION . . . . . SEX . . . . . .
CAN YOU COME:

WEEKDAYS . . . . . EVENINGS . . . . . WEEKENDS . . . . . .


Student
Experimenter
Teacher

Please *continue*.
The experiment requires that you *continue*.
It is absolutely essential that you *continue*.
You have no other choice, you *must* go on.

Milgram obedience experiments

- Investigate the role of authority
- 65% prepared to administer what they believed to be lethal shocks
- Any normal person can become a killer if he finds himself in a place where killing is called for

Fifty years on....

You can never really debrief a subject after an experiment like that

Hands still hurt with what I did

The experiment changed my life

Opening Skinner's Box: Great Psychological Experiments of the Twentieth Century - Slater, Bloomsbury Publishing PLC (2005)

Ethical consequences

- Diana Baumrind (1964) concluded that Milgram:
  - deceived subjects
  - failed to get informed consent
  - caused trauma
- Milgram lost the prestige of the Ivy League tenure, denied Yale, Harvard and many others

Research Ethics Committees

- Role is to protect the participants from harm, and also the researcher and the organisation from legal actions.
- The need to balance harm and benefit.

Computing
Ethical Approval Forms

- Information for students plus sample forms can be found on the Computing website – link from the Internal Resources page for staff and students

http://www.computing.dundee.ac.uk/internal/ethics.asp

Data Protection

- http://www.dundee.ac.uk/recordsmanagement/dataprotection/
- http://www.legislation.gov.uk/ukpga/1998/29/contents

4. Colleagues

- Peer review of papers and grant proposals - should it be blind?
- Appropriate credit given (author list, plagiarism)

5. Students

- Supervision, lectures etc.

6. Society

- What about when the results conflict with cultural beliefs?
- What about when results might be used for harm?

- Pythagoras - irrational numbers; Cantor - infinity; Copernicus - heliocentric model, Darwin - evolution,....

  "Who will venture to place the authority of Copernicus above that of the Holy Spirit?"

The Manhatten Project:

- On Aug 2nd, 1939, Einstein signed a letter to Roosevelt informing him of recent developments in nuclear physics.
- Roosevelt responded with $6,000 initial funding - project eventually employed 160,000 people- most expensive research and development project up to that point.

The Manhatten Project:

- The first nuclear bomb exploded on July 16th, 1945 over desert sands in New Mexico.
- Three weeks later - Aug 6th 1945, the US *Enola Gay* bomber dropped ``little boy'' on Hiroshima.
- Three days later another dropped ``fat man'' on Nagasaki.
- Both cities had been kept as virgin targets in order to test the devastating effects of the new weapons.

The Manhatten Project:

- The bombs levelled each city, burned thousands of people, radiation effects continue today.
- J Robert Oppenheimer, scientific director of the Manhatten project:

> ``*I am become death, destroyer of worlds*".

The Manhatten Project:

Einstein:

``*The unleashed power of the atom has changed everything. We require a new type of thinking. We scientists who released this power have an overwhelming responsibility in this world life and death struggle to harness the atom for the benefit of mankind and not for humanity's destruction. "*

The Manhatten Project:

President Dwight Eisenhower:

``Science seems ready to confer on us, as its final gift, the power to erase human life from this planet"

Further reading (Optional)

- *Ethics and Science: An Introduction*. Briggle, Mitcham. CUP (2012)
- *On Being a Scientist:*

  http://www.nap.edu/catalog/12192.html
- *Opening Skinner's Box: Great Psychological Experiments of the Twentieth Century* - Slater, Bloomsbury Publishing PLC (2005)

Discussion Questions

1. Was Milgram's experiment ethical?
2. What should we do with knowledge which has been unethically obtained?
3. What is the ethical relationship between pure science and its application?