

# Ethics in Research

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November 23, 2020

## Ethics

Ethics are rules that we all **voluntarily** follow because it **makes the world a better place** for all of us

Ethical principles arise naturally and are usually seen as a sign of:

- Intelligence (in some cases being sub-optimal on our incentives is globally optimal, Tragedy of the Commons)
- Civilization (e.g. Human Rights)

## Law:

- Must be as precise as possible
  - Difficult to adapt to changing environments (e.g. technology: copyrights, cryptocurrency,...)
- Must be followed (it is enforced)

## Ethics:

- Fuzzy world (e.g. lying is unethical?)
- Social pressure and self-esteem is what may enforce Ethics

## Ethics then Law

Laws are usually inspired by Ethics (Natural Law)

- Ethics should follow **universal** principles
  - e.g.: killing
- ...but they are strongly based on context (culture, history)
  - e.g.: sexism (harassment, adultery), slavery,...

## Quizz

Say something that is acceptable now and you believe that it will not in, say, 100 years

- Ethics should follow **universal** principles
  - e.g.: killing
- ...but they are strongly based on context (culture, history)
  - e.g.: sexism (harassment, adultery), slavery,,...

## Quizz

Say something that is acceptable now and you believe that it will not in, say, 100 years

My guess: Meat factories

# Why should care about Ethics?



## Groucho Marx

Those are my principles, and if you don't like them... well, I have others

- Many studies on Psychology and Behavioural Economics show that we align our values to our incentives
- So it seems a good idea to anchor our values as much as possible before we have an ethical conflict
- A study showed that religious people have stronger ethics

## Ethical Dilemma

Situation in which a difficult **choice** has to be made between two courses of action, either of which entails transgressing a moral principle.

## Trolley Problem, P. Foot 1965

A trolley runs down a track; ahead are five people awaiting certain death. You observe the scenario from nearby and see a lever next to you. If you pull the lever you can divert the trolley to a different set of tracks. Yet, on that other track is a single person. The train cannot be stopped.

## Solution to the Trolley Problem

The Trolley Problem is not designed to have a solution. It is, rather, intended to provoke thought, and create an intellectual discourse in which the difficulty of resolving moral dilemmas is appreciated, and our limitations as moral agents are recognized.

## Value theory approach

Choose the alternative that offers the greater good and the lesser evil



# Are Ethical Dilemmas Thought Experiments?

## Self-driving Car Problem

You are a Software Engineering programming a self-driving car ....

## Mortgage Recommender Problem

You are a Software Engineer programming a Mortgage Recommender for a bank ...

# Ethical Conflicts and Dilemmas

In order to solve ethical conflicts and dilemmas,

- Social Institutions should develop strict ethical *standards* for their members.
- Institution must demonstrate its *concerns* regarding the ethical norms within the organization.
- Institutions should provide ethical *training* for their members.

See

<https://corporatefinanceinstitute.com/resources/knowledge/other/ethical-dilemma/>

This course is about **Research** and **Innovation** in **Computer Science** so we will cover:

- Ethics in Research
- Ethics in Computer Science

# The Scientist's Dilemma

## Scientific attitude

- Critical (willing to be fair and objective)
- Open (willing to accept critics)
- Transparent (willing to socialized your ideas)

## Publish or Perish

Scientists have a strong pressure for getting good results

- promotion
  - funding
  - reputation
- 
- Scientists are tempted to do scientific malpractic
  - Is this an ethical dilemma? No. It is about ethical standards.

# Is Scientific Malpractice Really a problem?

## Fanelli D. (2009)

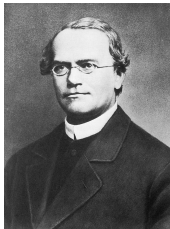
- 2% of scientists admitted to fabricating / falsifying / modifying data
- 34% admitted to other questionable research practices.

## Retractions (Steen 2011)

In the 2004-2009 time span:

- Fraud retractions:  $\times 7$  increment
- Mistake retractions:  $\times 2$  increment

# Mendel (1822-1884): A controversial case



- Undisputedly recognized as the father of genetics.
- No one doubts the validity of Mendel's final conclusions
- But...the numbers he reported seem a little too correct
- Statisticians have argued that he may have falsified and exaggerated his data to match his theory more perfectly

## **Malpractice:**

- Fraud
- Plagiarism
- Conflict of Interest/ Undue Influence of personal values

## **Questionable Research Practice:**

- Harking
- p-hacking
- Cherry picking
- Selective Omission
- Data Snooping

## fraud

Fraud is the publication of knowledge based on **false evidence** (e.g. data fabrication or alteration)

### Effects:

- Contamination of literature.
  - It may mislead other researchers
  - wasted resources (mislead funding agencies)
- Social loss of trust in the community

### Solution: Make it harder

- Transparency (e.g. research pre-registration, data open access)
  - See *Guidelines for Making Empirical AI Research Reproducible*
- Funding for **replication studies**



## Plagiarism

Plagiarism is the appropriation of other's work **without due credit**

- Text
- Ideas (very difficult to identify and proof (it could be accidental))
- Data

### Effects:

- Theft of Intellectual rights and Intellectual credit

### Solution:

- Transparency (e.g. open access)
- Automatic tools
- Reputable journals and conferences

## Self-Plagiarism

Self-plagiarism is the reuse of one's ideas **beyond what is reasonable** and **without due credit**

- Same paper in different conferences
- Rephrasing the same paper (change of notation,...)

## Conflict of Interests

When the researcher has other (external) interests that may clash with the claims made in the research. Therefore, the scientific objectivity may be questioned

- Research funded by private companies
- Research conducted at Think Tanks

### Effects:

- Contamination of literature.

### Solution:

- Transparency: Acknowledgements

# Undue Influence of Personal Values

## Undue Influence of Personal Values

When the researcher is **biased** towards proving certain claims

- Ideological bias

## Data Massage

Data massage is the selective report of results

- Sometimes it is legitimate (e.g. remove unreliable items)

**Example:** Suppose that we are studying teacher's *quality* at UPC and our hypothesis is that CS teachers are better than Math teachers.

We use the student surveys as a source of information.

Should we remove data from students that did not attend a minimum number of lectures if it favors our hypothesis?

**Golden Rule:**

- report the manipulation
- if possible, pre-decide (and pre-register) the manipulation rules

## Harking:

Hypothesize after results are known

- **legitimate**: run experiments to observe (induction phase)
- **illegitimate**: present the data as if obtained in the deduction phase

**Example:** Imagine I have access to Math exams scores at UPC in the last 10 years and I observe that women score significantly better than men. I write the following paper: i) My hypothesis is that women are better than man at math because blah blah blah, ii) let's check my hypothesis on UPC exams of last 10 years, iii) my hypothesis is supported by the data, so the hypothesis seems to be correct

## p-hacking:

Manipulate results to reach the right confidence level of the statistical test

- modify granularity of measurements
- select instances

**Example:** Decide that a patient has fever at a given threshold.

**Cherry picking:** Reporting only favorable results

Ex: Chose instances out of standard benchmarks

Solution: Tell the truth (*experiments demonstrate that idea may work well on some relevant instances*)

**Data Snooping:** Stop the data collection when results are favorable

Ex: Time cutout with anytime algorithms

Solution: Tell the truth (*with longer cutouts the advantage of the algorithm does not show so clearly*)



# A Researcher's Dilemma: Experiments with living beings

- **Harm a few, to benefit the whole society** (a.k.a. the goal justifies the means)
- **Research and Drug testing with animals:**
  - 11.5 million animals were used in experiments across Europe in 2011 (mostly for basic research)
  - Legislated in 1986
  - Principle of the three Rs: Replace (exp. with animals), Reduce (number of indiv. per experiment), Refine (to minimize pain)
  - What about frivolous research? (e.g. cosmetics)
  - What about bad-quality research?

# Experiments with humans: Drug Testing

- Tuskegee syphilis experiment (1932-1972)



- Protocols for ethical drug testing are now very well established

# Experiments with humans: Computer Science

- Done in many domains:
  - Robotics (assistance to elderly, virtual surgery, ...)
  - Diagnosis (Image processing,...)
  - Behaviour Psychology (Data Science, machine learning, ...)
- Some recent scandals have raised social alert
  - *Facebook fiasco: was Cornell's study of emotional contagion an ethics breach?* (quoting The Guardian)
  - *Google dreams up future of manipulating everyone* (quoting The Times)
- What private companies do is more difficult to control
- May be we need a *Tuskegee* scandal to raise social pressure

## Informed Consent

if any research is conducted on a **human** subject, then this human subject must be **informed** about the experiment, must **consent** to the experiment voluntarily, without any coercion, and must have the right to **withdraw** consent at any time.

# Informed Consent Dilemmas

- Sometimes complete information is not possible (e.g. psychology).
  - minimum violation of the consent must be done
- Informed consent is required if it is research, but it is not required if it is the ordinary conduct of business (e.g. develop a new web interface).
- Ethical issues about asking for consent:
  - when it is asked? early request, before medical treatment
  - how it is asked? fine print
  - what is the data going to be used for? clarity about the research

## Ethical Committees

Have an independent board approving and supervising the study

- **USA:** Independent Review Boards (IRBs)
- **Europe:** <http://www.eurecnet.org/index.html>

Neuroscience, Vol 397, 1/15/2019, Pages 31-40

## Bilateral Prefrontal Cortex Anodal tDCS Effects on Self-reported Aggressiveness in Imprisoned Violent Offenders

- **tDCS:** placing electrodes on inmates foreheads and sending a current into their brains.
- The electricity will target the **prefrontal cortex**, a brain region that plays a role in **decision-making** and **social behavior**.
- The idea is that stimulating more activity in that region may make the prisoners **less aggressive**

# Study Case: In favor

- Procedure is painless
- Inmates give informed consent
- Incarceration is immoral and counterproductive
- Prison life carries out a lot of suffering
- If study succeeds: massive inmate release
- The study may have many potential future benefits



# Study Case: against

- Consent is given in a coercive situation (they may get benefits if they show good behaviour)
- If the incarceration system is immoral, change the system, not the brain of the system victims
- the treatment could erode our free will