SCIENTIFIC HONESTY

- In Silico: Markram's scandal, claimed that the Human Brain Project could simulate an entire human brain within 10 years: awarded money, but recognised to be mismanaged and its claimed overblown
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Replicability crisis and open science

- Types of ethical responsibility in research
  - about individuals involved in the research
    - position of control towards the participants: no right to harm physically, emotionally, psychologically
    - power doesn't mean abuse
  - public dissemination and reports of research
    - communication of science
    - we need to ensure that it's accurate and honest: the goal of the scientific method is to ensure that we're trying to obtain answers to the problems
      - the confidence of society towards scientists could be menaced by ethical issues
- Research misconduct/fraud
  - fabrication, falsification or plagiarism in proposing, performing, reviewing, reporting research
  - plagiarism=representation of someone else's ideas, processes, results, words as one's own, without giving proper credit
    - self-plagiarism=a student summits a project work twice
  - fabrication=making up data or results from scratch and recording or reporting them
  - falsification=we collect real data, but we manipulate research equipment, materials, processes, data, or we change or omit (cherry picking) data or results→ the research is not accurately represented in the research record
    - we pick the results and data that go towards our hypothesis
  - reviewing fraud=fake peer review
    - ex Tumour Biology=retracted 100+ papers, some of the suggested reviewers had actually false email account=authors themselves made up other accounts of fake reviewers
  - NB: do not include honest error or divergence in opinions→ from "german error" to misconduct to intentional fraud
- Procedure for assessing scientific fraud
  - research fraud=significant departure from accepted practices of the relevant research community, at the time in which it has occurred→ contextualised in the time

        - committed intentionally, knowingly, recklessly
        - allegation to be proven by “preponderance of evidence”
- Exponential increase in the number of researchers, together with decrease in funding for academic research→ why has scientific fraud recently increased?
    - career depending on publications
        - incentives for “publish or perish” strategy
        - often, requirement to publish in international journals to obtain career advancements and promotions (and bonuses) for publishing in good journals
    - non appropriate statistical analysis of results→ fraud, error, sloppiness?
    - increase in the number of open access journals
- From open access to predatory journals
    - before: articles that had been reviewed and inserted in a journal
    - now: open access journals with free articles that are not reviewed
        - predatory journals=publish articles irrespective of scientific merit, without rigorous peer review screening, provided that the authors accept to pay publications
            - sloppy missing quality checks for issues such as plagiarism or ethical approval
        - John Bohannon’s sting operation=fake scientific article was accepted in a lot of journals, proving how some of them are not serious
            - fake name, non-existing biologists, non-existing institute
            - fake database, obvious mistakes
            - should have been rejected
        - “Get me off your fucking mailing list”: article full of this sentence, flowchart, accepted by incredible journals, rated as “excellent”
- Safeguards against fraud
    - scientific community
        - replication-open science
        - pre-publication and post-publication peer review
        - registered reports
    - editorial office
        - use CRedIT=description of role of each author in the work
        - softwares to uncover frauds
    - institutions/governments/funding bodies
        - change evaluation criteria to allocate funding, promotions, recruitments awards away from exclusively quantitative bibliometric and impact factor logic (DORA) → independently of the quality
            - DORA=
        - new types of incentives and punishments
            - incentives for individual success are focused on getting it published instead of getting it right
                - need to change policies in place
            - example of China (prison) or Italy (numbers of citations→ cheating)
                - to be PHD, you must have published some papers (mere quantitative criterion, > number of published articles per researcher)

Norms	Counter-norms
Communality=openly sharing findings with colleagues	Secrecy=protecting their newest findings to ensure priority in publishing, patenting, application
Universalism=scientists evaluate research only on its merit (according to accepted standards of the field)	Particularism=assessing new knowledge and its application based on the reputation and past productivity of the individual or research group
Disinterestedness=scientists are motivated by the desire for knowledge and discovery, not by the possibility of personal gain	Self-interestedness=competing with others in the same field for funding and recognition of their achievements
Organised scepticism=considering all new evidence, hypothesis, theories, innovation (even if they challenge or contradict their own work)	Organised dogmatism=investing careers in promoting their own most important findings, theories or innovations
Governance=scientists are responsible for the direction and control of science through governance, self-regulation, peer review	Administration=relying on administrators to direct the scientific enterprise through management decisions. Usually, lacking the right training. Bureaucracy.
Quality=judging each others' contributions to science primarily on the basis of quality	Quantity=assessing each others' work primarily on the basis of numbers of publications and grants

- Registered reports=write an article, but doing that before collecting the actual empirical data
    - remedy against misconduct in science
    - steps
        - develop idea
        - design study
        - stage 1 peer review=reviewers assess theory, rationale, rigour, robustness of method
        - collect and analyse data
        - write report
        - stage 2 peer review=reviewers assess compliance with study protocol and whether conclusions are based on the evidence
        - publish report
    - early impacts are promising
        - more likely to disconfirm hypothesis
        - higher computational reproducibility
        - rated higher in quality than regular articles
    - but there are some limits

        - stage 1 review time
        - needing to commit to a journal before results are known
        - not well suited to programmatic research where one stage 1 protocol could lead to multiple stage 2 outputs
        - inconsistent editorial standards and levels of training/experience
        - inconsistent transparency of accepted stage 1 protocols
        - inconsistent policies on open peer review and on open access
- Registered reports 2.0
    - introducing the peer community in registered reports: chain-review
- Questionable research practices=methodological and research practices that undermine the credibility and reproducibility of research findings and bias
    - data exclusion or manipulation
    - 50% of published results are biased by questionable research practices
- Paradox in the literature: published results are mostly statistically significant, but many published results come from underpowered studies=less likely to produce statistically significant results (ex due to low sample size)
    - explanations
        - file drawer problem=publication bias
            - experiments that succeed by producing positive results are published, the ones that fail to produce positive results are sent to a file drawer
        - Nelson disagrees with this explanation: most failed studies are not missing, they're published in our journals masquerading as success
            - scientists are reluctant to abandon their research after they've seen that the initial analysis yields negative results ("sunk costs")
            - "researchers file-drawer a study not when the study fails, but when p-hacking does; file drawers overflow with failed analyses of studies we DID publish, not with failed studies we did not publish"
                - consequences of selectively reporting data and analyses (p-hacking)
- Researcher's degrees of freedom in planning, running, analysing reporting studies
    - researcher's exploratory behaviour to find the right statistical and methodological combination to get significant results
        - ambiguity on how to make research decision
        - desire to find statistically significant results
- How to turn negative results into positive ones (with questionable research practices)
    - cherry picking=fallacy of incomplete evidence=selecting individual data that confirm a particular hypothesis, while omitting a portion of related and similar data that contradict that hypothesis
        - not reporting all measures or results
    - P-hacking/data dredging=misusing data analysis to demonstrate that data are statistically significant, when they are not
        - deciding to collect more data after checking for statistical significance (and finding out that it is nor reached)
        - finishing collecting data earlier than planned if significant results are obtained

        - performing multiple tests on data and only focusing on the tests that return results that are significant (vs multiverse analysis)
        - choosing to exclude individual data after checking if they affect statistical significant
        - using any other strategy to obtain a p value < .05
    - HARKing=hypothesising after the results are known
        - “presenting a post hoc hypothesis in the introduction of a research report as if it were an a priori hypothesis”
        - underestimate because
            - scientists might not be willing to disclose questionable research practices
            - passive HARKing=scientists don’t feel responsible if HARKing is required by editors and reviewers
            - might not be recognised due to confirmation biases
        - → very frequent in psychology
- Open science framework (Nosek)=collaborative replication efforts, with multiple independent labs trying to replicate previously published research
    - OSF=allows researchers to more transparently record, share, report their work
- Fair guiding principles for scientific data management and stewardship (FAIR)
    - findable=when you post your data, you should be complete in describing them to guide researchers to find the data
    - accessible=once the users find the required data, they need to know how they can be accessed, possibly including authentication and authorisation
    - interoperable=the data need to be integrated with other data and to interoperate with applications, workflows, etc
    - reusable=metadata should be well-described to be replicated or combined in different settings

Credibility revolution

- Organised distrust produces trustworthy reports (Campbell), but how?
    - transparency
        - pre-registration=specifying research plan in advance
        - open data, code, materials
        - open access/preprint
        - open review
        - declaring conflicts of interest
        - contributorship (CRediT)
        - no barriers to entry
    - need for accuracy
    - critical evaluation=organised scepticism
        - strong theory
        - error detection tools=registered reports
        - diversity
        - reproducibility
        - replicability
        - negative results

- post publication peer review