Scientific Research in Information Systems: A Beginner's Guide (2nd edition)

Teaching Materials

Created by Professor Jan Recker

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Overview

Content
Part 1: Basic Principles of Research
Part 2: Conducting Research
Part 3: Publishing Research

Chapter 7:
Ethical Considerations

Scientific Ethics

- The role of ethics
- Fundamental principles of scientific ethics
- Ethics and scientific conduct
- Ethics and scientific writing

Charles Dawson

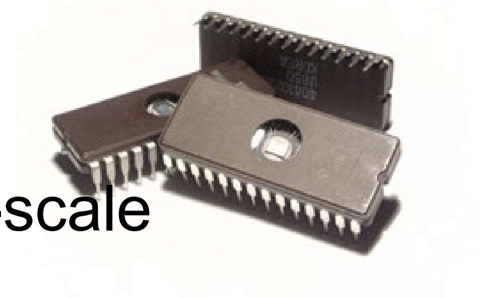
- a paleontologist who in the late 19th century ade a number of seemingly important fossil discoveries, which he named after himself (e.g., *Plagiaulax dawsoni*, *Iguanodon dawsoni*, and *Salaginella dawsoni*)

- He became considerably famous, was elected a fellow of the British Geological Society and appointed to the Society of Antiquaries of London.

- His most famous discovery (in 1912) was the “Piltdown Man“ – a fossil from a new species that represented the missing link between man and ape.

- In the 1950s researchers realized the piltdown man fossil did not represent the missing link, but rather an elaborate fraud in which the skull of a medieval human was combined with the jawbone of an orangutan and the teeth of a fossilized chimpanzee.
- The bones were chemically treated to make them look older, and the teeth had even been hand filed to make them fit with the skull.
- In the wake of this revelation, at least 38 of Dawson's finds have been found to be fakes, created in his pursuit of fame and recognition.

These things do not happen anymore or they don‘t happen where you live?



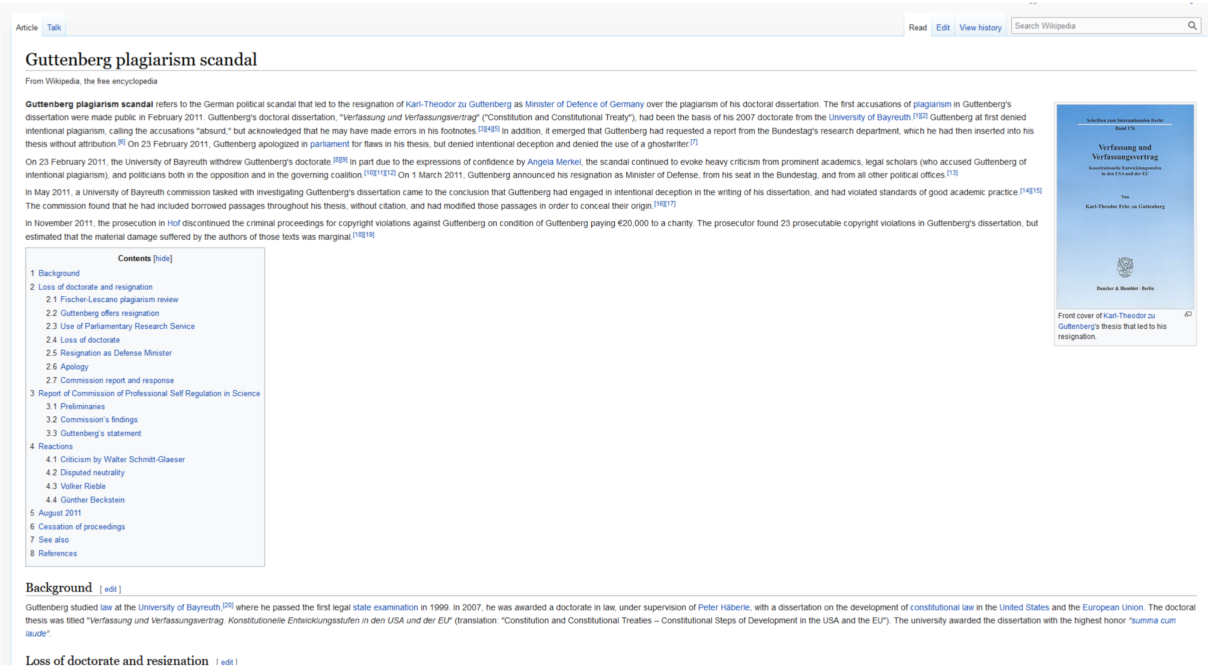
- In 2001, German physicist Jan Hendrik Schön appeared to produce a series of breakthrough discoveries in the area of electronics and nanotechnology.
- Schön and two co-authors claimed to have produced a molecular-scale alternative to transistors used commonly in consumer devices.
- Schön received a number of outstanding research awards.
- The work was deemed one of the "breakthroughs of the year" by Science.

https://www.visionlearning.com/en/library/Process-of-Science/49/Scientific-Ethics/161

Schön‘s story continued

- Other scientists could not replicate the work by Schön.
- Others noticed that an identical graph of data appeared in several different papers of Schön.
- His employer (Bell Laboratories) started an investigation. Schön claimed not to have logs or notebooks and that he „had to erase all data“ from his computers.
- His papers were retracted, his doctoral degree from the Uni Konstanz was revoked, he was fired, and was banned from working in science für eight years.

Such examples exist everywhere and all the time



Article Talk Read Edit View history Search Wikipedia

Guttenberg plagiarism scandal

From Wikipedia, the free encyclopedia

Guttenberg plagiarism scandal refers to the German political scandal that led to the resignation of Karl-Theodor zu Guttenberg as Minister of Defence of Germany over the plagiarism of his doctoral dissertation. The first accusations of plagiarism in Guttenberg's dissertation were made public in February 2011. Guttenberg's doctoral dissertation, "*Verfassung und Verfassungsvertrag*" ("Constitution and Constitutional Treaty"), had been the basis of his 2007 doctorate from the University of Bayreuth.[1][2] Guttenberg at first denied intentional plagiarism, calling the accusations "absurd," but acknowledged that he may have made errors in his footnotes.[3][4][5] In addition, it emerged that Guttenberg had requested a report from the Bundestag's research department, which he had then inserted into his thesis without attribution.[6] On 23 February 2011, Guttenberg apologized in parliament for flaws in his thesis, but denied intentional deception and denied the use of a ghostwriter.[7]

On 23 February 2011, the University of Bayreuth withdrew Guttenberg's doctorate.[8][9] In part due to the expressions of confidence by Angela Merkel, the scandal continued to evoke heavy criticism from prominent academics, legal scholars (who accused Guttenberg of intentional plagiarism), and politicians both in the opposition and in the governing coalition.[10][11][12] On 1 March 2011, Guttenberg announced his resignation as Minister of Defense, from his seat in the Bundestag, and from all other political offices.[13]

In May 2011, a University of Bayreuth commission tasked with investigating Guttenberg's dissertation came to the conclusion that Guttenberg had engaged in intentional deception in the writing of his dissertation, and had violated standards of good academic practice.[14][15] The commission found that he had included borrowed passages throughout his thesis, without citation, and had modified those passages in order to conceal their origin.[16][17]

In November 2011, the prosecution in Hof discontinued the criminal proceedings for copyright violations against Guttenberg on condition of Guttenberg paying €20,000 to a charity. The prosecutor found 23 prosecutable copyright violations in Guttenberg's dissertation, but estimated that the material damage suffered by the authors of those texts was marginal.[18][19]

Front cover of Karl-Theodor zu Guttenberg's thesis that led to his resignation.

Contents [hide]

Background [edit]

Guttenberg studied law at the University of Bayreuth,[20] where he passed the first legal state examination in 1999. In 2007, he was awarded a doctorate in law, under supervision of Peter Häberle, with a dissertation on the development of constitutional law in the United States and the European Union. The doctoral thesis was titled "*Verfassung und Verfassungsvertrag. Konstitutionelle Entwicklungsstufen in den USA und der EU*" (translation: "Constitution and Constitutional Treaties – Constitutional Steps of Development in the USA and the EU"). The university awarded the dissertation with the highest honor *"summa cum laude"*.

Loss of doctorate and resignation [edit]

https://en.wikipedia.org/wiki/Guttenberg_plagiarism_scandal

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Freitag, 13. September 2013

Vorwürfe unredlicher wissenschaftlicher Praxis gegen Professor Dr. Ulrich Lichtenthaler: Senat der WHU beschließt Aberkennung der Lehrbefähigung

Vallendar, 13. September 2013. In seiner Sitzung am 11. September 2013 hat der Senat der WHU – Otto Beisheim School of Management einstimmig beschlossen, Professor Dr. Ulrich Lichtenthaler die an der WHU erlangte Lehrbefähigung abzuerkennen. Der Aberkennung ging eine intensive Untersuchung der Vorwürfe wissenschaftlichen Fehlverhaltens voraus, die eine lückenlose Aufklärung zum Ziel hatte.

Nach eingehender Prüfung und Beratung ist der Senat der WHU zum Schluss gekommen, dass eine wesentliche Voraussetzung für die Zuerkennung der Lehrbefähigung nicht gegeben war. Prof. Dr. Lichtenthaler kann gegen die Aberkennung Widerspruch einlegen.

Gang des Verfahrens

Nachdem der Rektor der WHU im Sommer 2012 über statistische Mängel und andere wissenschaftliche Unzulänglichkeiten in den Arbeiten von Prof. Dr. Lichtenthaler erfahren hatte, wurden diese genauer untersucht. Die an der WHU bestehende Kommission zur Sicherung guter wissenschaftlicher Praxis legte am 13. Juni 2013 nach eingehender Prüfung der wissenschaftlichen Arbeiten von Professor Dr. Lichtenthaler ihren abschließenden Bericht dem Rektor der WHU vor. Der Bericht war Grundlage der Prüfung durch den Senat, die am 20. Juni begonnen hatte und am 11. September zu dem Beschluss über die Aberkennung der Lehrbefähigung führte. Basis der Entscheidungen sind die Grundsätze und Verfahrensregeln der WHU für den Umgang mit wissenschaftlichem Fehlverhalten und die Habilitationsordnung.

Dateien:
PM_Aberkennung_Lehrbefaehigung.pdf 38 K

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Ethics

- A branch of philosophy that addresses questions about morality, that is, concepts like good and bad, right and wrong, justice and injustice, and virtue and evil.

- Ethics are defined as **a set of moral obligations that define the principles of right and wrong conduct** in a community or profession, and which can be used by individuals to guide their choices and behaviours.

- Many professions and communities have formalized ethical codes to guide professionals in their field
  - The Hippocratic Oath: doctors should „do no harm“ to their patients.
  - Professional engineers code of ethics: „hold paramount the safety, health, and welfare of the public.”
  - First law of robotics: “A robot may not injure a human being.”

- Ideally, ethical principles become ingrained in everyday professional practices – part of the way a profession is practiced.

- A breach of ethics is considered a very serious offence – punishable within the profession and sometimes also by law.

Key concepts in ethics

- Ethical behavior describes a set of actions that abide by certain rules of :
  - **Responsibility** means accepting the potential costs, duties, and obligations of one’s decisions.
  - **Accountability** means being answerable to others for decisions made and actions taken.
  - **Liability** means accepting responsibility and accountability so individuals can recover damages done to them through breaches of responsibility.
  - **Due diligence** means investigating or exercising care to ensure individuals can examine or appeal how responsibility, accountability, and liability are applied.

Key goal in scientific ethics

- Maintaining “honesty and integrity” in all stages of scientific conduct.

  - includes all aspects of scientific activity, such as experimentation, testing, education, data collection, data analysis, data storage, data sharing, peer review, etc.

  - Also other activities that have a direct bearing on science, such as government funding or staffing of research teams.

Six Fundamental Ethical Principles for Scientific Research

Scientific honesty

Scientists should not commit scientific fraud by, for example, fabricating, "fudging," trimming, "cooking," destroying, or misrepresenting data.

Example Implementation Scientific honesty

- https://retractionwatch.com/
  - a blog that reports on retractions of scientific papers and on related topics.

Retraction Watch

Tracking retractions as a window into the scientific process

Authors unhappy as “battlefield acupuncture” paper earns an expression of concern

via Joint Base Andrews

A journal has slapped an expression of concern on a 2021 paper reporting on the utility of self-administered “battlefield” acupuncture in soldiers, citing readers who said the FDA has not approved the devices for that use – a point the authors, who object to the move, dismissed as irrelevant and misleading.

The study, which appeared in *Medical Acupuncture*, looked at the experiences of a dozen veterans at an Ohio VA hospital who’d purportedly self-administered acupuncture to treat chronic pain. According to this 2010 article from the U.S. military:

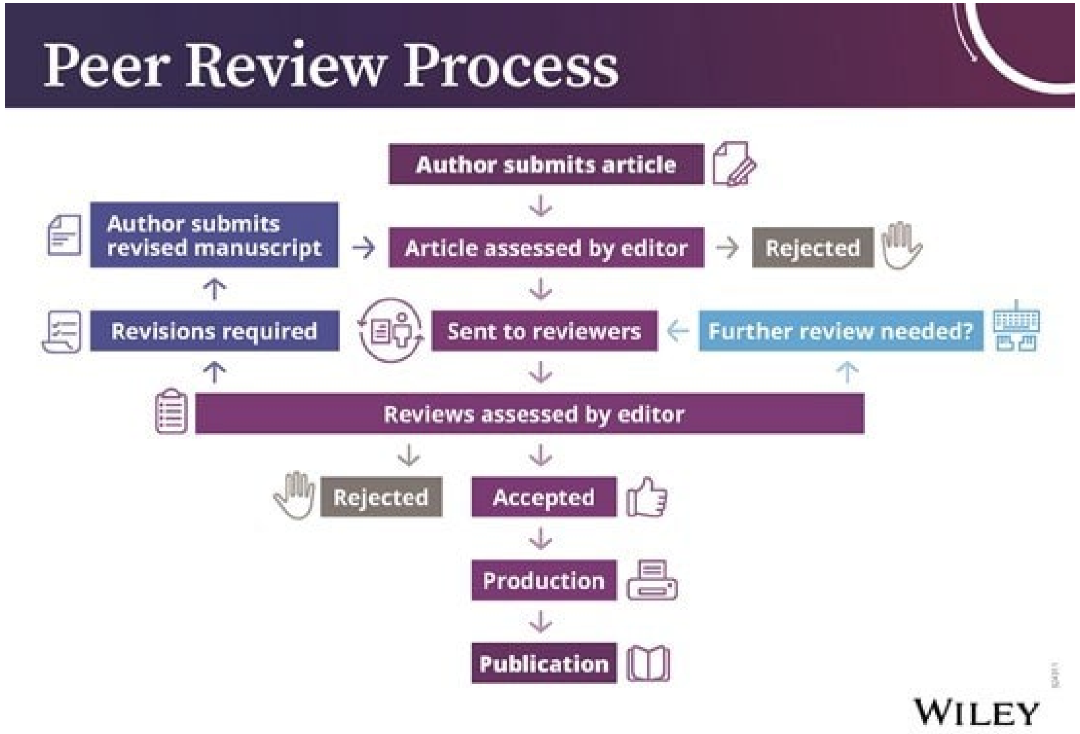
Six Fundamental Ethical Principles for Scientific Research

Carefulness

Scientists should avoid careless errors and sloppiness in all aspects of scientific work.

Example Implementation Carefulness

- Academic peer review processes



Six Fundamental Ethical Principles for Scientific Research

Intellectual freedom

Scientists should be free to pursue new ideas and criticize old ones and conduct research on anything they find interesting.

Example Implementation Intellectual Freedom

Tenure / “Verbeamtung”

- an indefinite appointment that can be terminated only for cause or under extraordinary circumstances that provides sufficient protection for scientists to pursue their ideas
  - e.g., in Germany: salary, health cover, pension, rooms, assistants, budget, etc.

- Objective: to safeguard academic freedom for all who teach and conduct research in higher education.
- Provides conditions for scientitss to pursue research and innovation and draw evidence-based conclusions free from corporate or political pressure.
- Should faculty members possibly lose their positions because of their speech, publications, or research findings, they cannot properly fulfill their core responsibilities to advance and transmit knowledge.

- Not without controversy, e.g., the lectures of Prof Dr Bernd Lucke at the University of Hamburg in 2019
  - https://www.uni-hamburg.de/en/newsroom/im-fokus/2019/1022-fragen-antworten-lucke.html
  - https://www.tagesspiegel.de/wissen/massive-stoerung-bei-vorlesung-von-afd-gruender-uni-hamburg-sagt-bernd-lucke-schutz-zu/25125924.html

Six Fundamental Ethical Principles for Scientific Research

Openness

Whenever possible, scientists should share data, results, methods, theories, equipment, and so on; allow people to see their work; and be open to criticism.

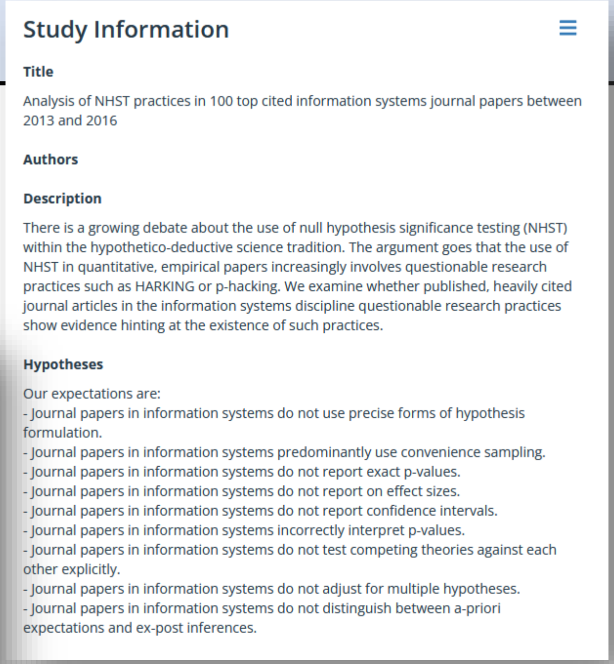
Example Implementation Openness

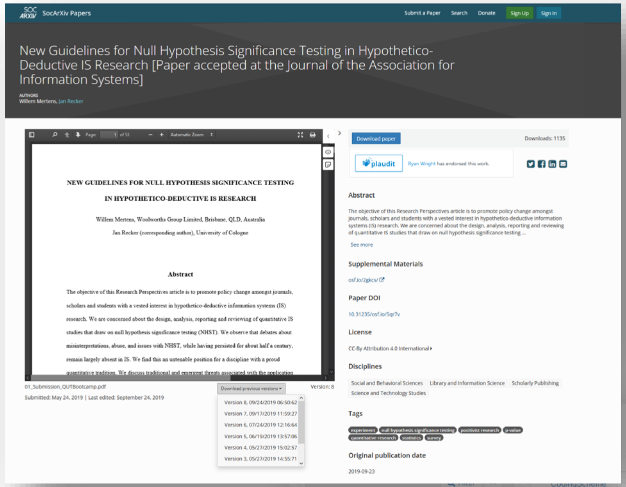
Open Science (e.g., https://www.cos.io/)

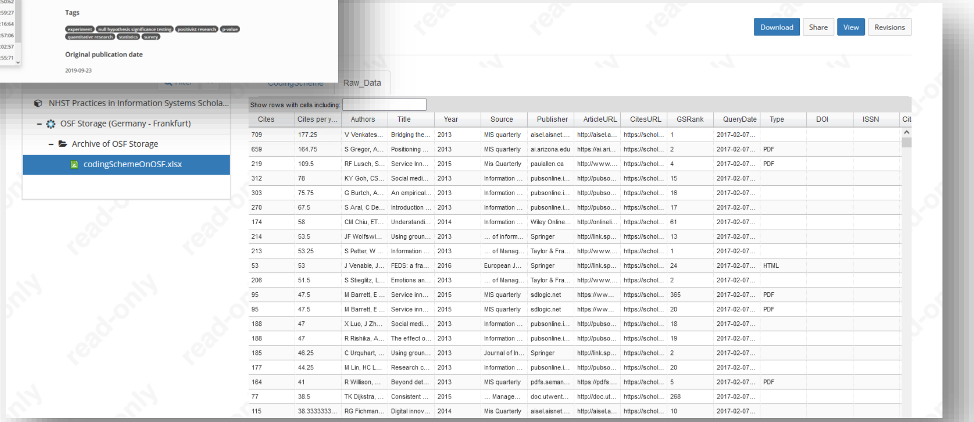
https://www.youtube.com/watch?v=9YuNGB3vNOw

Example open science registration

- Open registration of study, data, measurement, hypotheses, paper drafts
  - https://osf.io/ecwsj
- includes
  - Hypotheses
  - Coding Scheme plus raw data
    - https://researchdatafinder.qut.edu.au/display/n8485
    - https://osf.io/zg46t/
  - Paper versions
    - https://osf.io/preprints/socarxiv/5qr7v/







Six Fundamental Ethical Principles for Scientific Research

Attribution of credit

Scientists should not plagiarise the work of other scientists. They should give credit where credit is due but not where it is not due.

Example Implementations Attribution of Credit

- Grammarly Plagiarism checker
  - https://www.grammarly.com/plagiarism-checker

- https://de.wikipedia.org/wiki/Liste_deutscher_Dissertationen_mit_Plagiaten
  - Franziska Giffey, Karl-Theodor zu Guttenberg, Annette Schavan, etc.

Six Fundamental Ethical Principles for Scientific Research

Public responsibility

Scientists should report research in the public media when the research has an important and direct bearing on human happiness and when the research has been sufficiently validated by scientific peers.

Example Public responsibility

- https://www.nature.com/articles/s41591-020-01207-3

Q&A | Published: 13 January 2021

What do journalists say about covering science during the COVID-19 pandemic?

Anita Makri

Nature Medicine **27**, 17–20 (2021) | Cite this article

An Author Correction to this article was published on 04 May 2021

This article has been updated

Download PDF

Sections

The pandemic has thrust many mainstream journalists into unfamiliar grounds, including coverage of expert opinion that is not backed up by peer-reviewed content, reporting on preprints, and assessing high-complexity instant-response science. How did they manage? We asked five journalists from mainstream media about their experience.

Apoorva Mandavilli is a reporter on science and global health for The New York Times, USA. **Chloé Hecketsweiler** covers health, pharmacy and biotechnology for Le Monde, France. **Rema Nagarajan** is a journalist writing about public health for the Times of India, India. **Sabine Righetti** writes about science and innovation for Folha de S. Paulo, Brazil. **Tamar Kahn** is a science and health journalist with Business Day, South Africa.

Ethical considerations for scientific conduct

- All behaviors involved in the research process, such as developing a theory, collecting data, and testing hypotheses, are subject to ethical considerations, codified and uncodified**, particularly ethics related to empirical data collection and human subjects**.

Ethical considerations for scientific conduct

- Research involving human subjects in institutions that receive federal research funding must receive **ethical clearance** by an **independent review board**.
- IRB must approve any research with human subjects *before* it is initiated.

Ethical clearance considerations

- An IRB evaluates
  1. the extent to which participation in a study
     - is voluntary,
     - does not exert physical or psychological stress, and
     - not cause other kinds of damage to participants
  2. whether participants must give consent regarding
     - how their data will be used
     - how their data will be reported
     - how the data will be protected in terms of anonymity or confidentiality
  3. whether participants have the right to withdraw from participation at any time.
  4. how data is stored and analysed
     - Involves ownership, storage and backup, privacy, confidentiality, access, and reuse.

IRB at University of Hamburg

- https://www.bwl.uni-hamburg.de/en/forschung/spiegel-researchdraft2020service.html

- https://www.inf.uni-hamburg.de/en/home/ethics.html

UHH → MIN → Department of Informatics → About → **Ethics Commission**

ETHICS COMMISSION

The local Ethics Commission of the Department of Informatics (Faculty of Mathematics, Informatics and Natural Sciences of Universität Hamburg) comments on request on the ethical tenability of research projects involving humans as well as research projects including personal data.

Every student and member of the Department of Informatics within the Faculty of Mathematics, Informatics and Natural Sciences of Universität Hamburg can apply for an ethics vote. Submitting an application is particularly recommended for experiments which involve potential risks for the participants, or for studies in which participants are not entirely informed about the purpose and procedure of the study. Applications may be submitted at any time. However, please note the deadlines by which applications must be received in order to be dealt with at the upcoming meetings!

Please complete this basic questionnaire.

- If you can answer all boxes with "no", you do not need to consult the Ethics Commission. Please store the completed questionnaire with your project documentation.
- In case you tick one or more boxes with "yes", please send the completed basic questionnaire and additional information on your study to the Ethics Commission by e-mail: ethikkommission@informatik.uni-hamburg.de
- In case your funding agency requires an official ethics assessment, you may send the completed form and additional information about the project proposal to the Ethics Commission by e-mail: ethikkommission@informatik.uni-hamburg.de
- The work of the Ethics Commission underlies the legal requirements of data protection of Universität Hamburg as well as the WMA Declaration of Helsinki, the ethical guidelines of the German Informatics Society and the ethischen Richtlinien der Deutschen Gesellschaft für Psychologie e.V., each in their current version.

Members

- **Prof. Dr. Judith Simon** (chair)
- Prof. Dr. Frank Steinicke (deputy)
- Prof. Dr. Hannes Federrath
- Prof. Dr. Stefan Wermter
- Christian Kurtz / Dr. Sven Magg
- Natalia Mannov / Laura Fichtner
- Anna Pasdzior / Jakob Ambsdorf
- Korbinian Koch / Benjamin Zimmer

Universität Hamburg
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FAKULTÄT
FÜR BETRIEBSWIRTSCHAFT

Declaration of compliance with Terms of Use and Ethical Standards

Title of Project:

Name, address and institution of principal investigator/investigators:

I/we hereby declare to have made all statements truthfully and that I am/we are especially aware of my/our obligation to comply with all ethical and scientific guidelines stated below.

Place, date, seal, signature

I/We hereby declare that the proposed research project is in compliance with the following scientific and ethical standards:

- Guidelines for Safeguarding Good Scientific Practice and Avoiding Scientific Misconduct at Universität Hamburg, as released by the Academic Senate of the Universität Hamburg in the respective current terms. See website for good scientific practice.
- The RESPECT Code of Practice, as released by the RESPECT Project (professional and ethical codes for socio-economic research in the information society) by order of the European Commission.

I/We confirm to have read and accepted these standards. I/we particularly declare to conduct my/our research project within the WISO Laboratory in steady compliance with the three core criteria of the **RESPECT Code of Practice**; I/we confirm, that I/we

1. uphold scientific standards,
2. comply with the law and
3. avoid social and personal harm.

Example ethics consent form

Add project details and a unique reference to the ethical clearance provided by an independent ethics review board

Here you typically insert specifics about what participation actually means (e.g., being interviewed or completing a survey)

Here you specify who will be able to access the research data

Here you can list choices a participant has about his data will be used

Consent to participate in research

Project title: ______________

Lead investigator: ______________

Ethical clearance: ______________

- I, ……………………………………………, voluntarily agree to participate in this research study.
- I understand that even if I agree to participate now, I can withdraw at any time or refuse to answer any question without any consequences of any kind.
- I understand that I can withdraw permission to use data from my participation within two weeks after the participation, in which case the material will be deleted.
- I have had the purpose and nature of the study explained to me and I have had the opportunity to ask questions about the study.
- I understand that participation involves at least **one semi-structured in-depth interview (follow-up interviews and observations are optional)**.
- …ent directly from participating in this research.
- I agree to my interview being audio-recorded, transcribed and analysed.
- I understand that the access to the interview transcript will be limited to **Prof Dr Jan Recker**.
- I understand that all information I provide f… this study will be treated confidentially and that I have been informed about being able to sign a non-disclosure agreement in additio…
- I underst… in the report on the results of this research my identity will remain anonymous. This will be done by changing my name and …sing any details of my interview that may reveal my identity or the identity of people I speak about.
- I understand that disguised extracts from my interview may be quoted (directly and indirectly) in reports about this research. With regards to being quoted, please make an 'x' next to any of the statements that you agree with:
  - ❑ I wish to review the notes, transcripts, or other data collected during the research pertaining to my participation.
  - ❑ I agree to be quoted directly if my name is not published and a made-up name (pseudonym) is used.
  - ❑ I wish to review any report/paper pertaining to my participation prior to submission.
- I understand that if I inform the researcher that myself or someone else is at risk of harm they may have to report this to the relevant authorities - they will discuss this with me first but may be required to report with or without my permission.
- I understand that signed consent forms and original audio recordings will be retained by the research team for a period of time in accordance with research data management regulations.
- I understand that under freedom of information legalisation I am entitled to access the information I have provided at any time while it is in storage as specified above.
- I understand that I am free to contact any of the people involved in the research or **the independent ethics committee at ...** to seek further clarification and information.

Signature of research participant

-- --

Signature of participant *City, Date*

Signature of researcher

I believe the participant is giving informed consent to participate in this study.

-- --

Signature of researcher *City, Date*

Here you specify an independent third party that could be involved in the matter

Example: Facebook secret moods experiment and emotional contagion

- https://www.theguardian.com/technology/2014/jun/29/facebook-users-emotions-news-feeds
- https://www.theguardian.com/technology/2014/jun/30/facebook-emotion-study-breached-ethical-guidelines-researchers-say

Ethical considerations for scientific writing

- A subset of ethical issues in scientific conduct that relates only to the reporting of research
- Very important part of scientific ethics because it is typically only through reported research that an ethical issue is revealed
  - we typically cannot learn about data fabrication or amendment until those data are disclosed.
  - We cannot identify a lack of attribution of credit until an unnamed contributor sees it in writing

1. Plagiarism

- the wrongful appropriation, close imitation, or purloining and publication of another author’s language, thoughts, ideas, or expressions and their representation as one’s own work.
- the act of passing off someone else's work as your own, whether intentionally or unintentionally.
- The most common form of scientific misconduct.

Plagiarism Examples

tagesschau   Sendung verpasst?

Inland ▸ Innenpolitik ▸ Plagiate in Abschlussarbeit: FU Berlin entzieht Giffey Doktorgrad

Plagiate in Abschlussarbeit

FU Berlin entzieht Giffey Doktorgrad

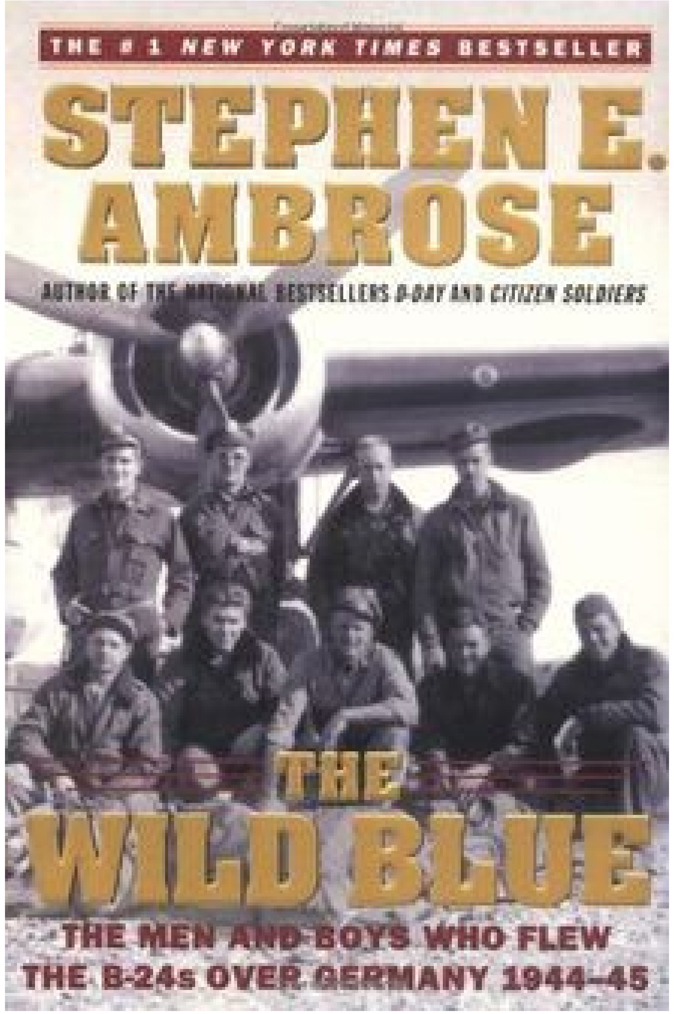
Stand: 10.06.2021 15:16 Uhr

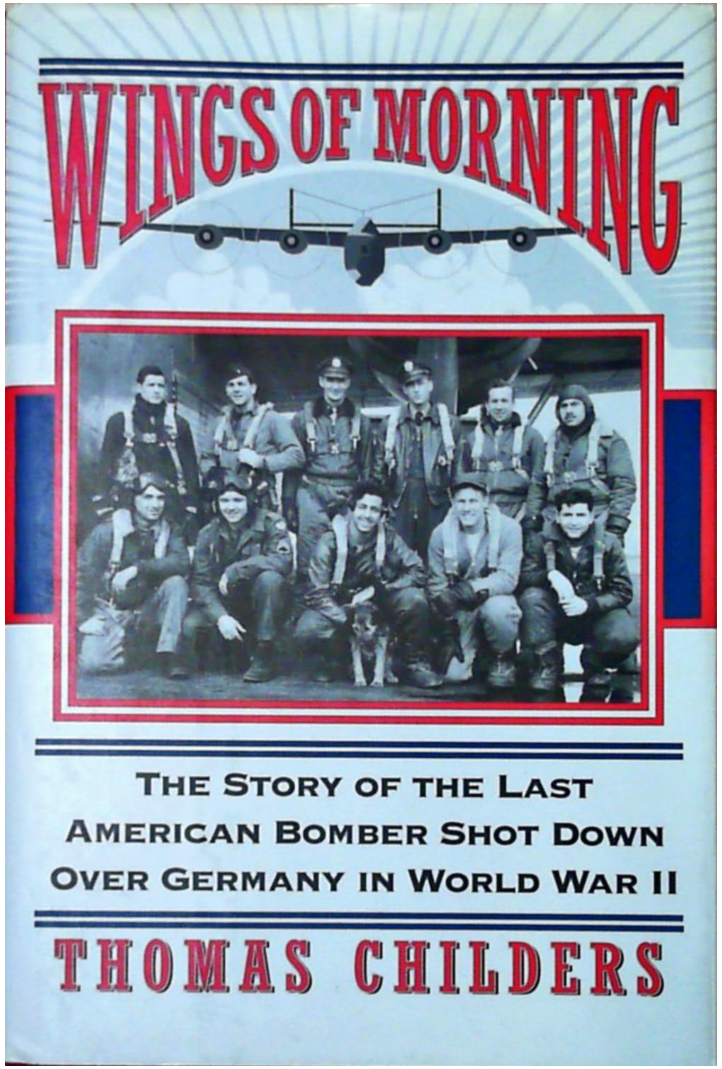
Ex-Familienministerin Giffey verliert ihren Doktorgrad. Die Politikerin habe diesen durch "Täuschung über die Eigenständigkeit ihrer wissenschaftlichen Leistung" erworben, teilte die Freie Universität Berlin mit. Giffey akzeptierte den Beschluss.

Wegen Plagiaten in ihrer Dissertationsschrift verliert die frühere Bundesfamilienministerin Franziska Giffey ihren Doktorgrad. Wie die Freie Universität Berlin mitteilte, fasste das Hochschulpräsidium den Beschluss "nach umfassender Beratung einstimmig".

https://www.tagesschau.de/inland/innenpolitik/fu-berlin-giffey-doktorgrad-verlust-101.html

Plagiarism Examples





Plagiarism Examples

https://en.wikipedia.org/wiki/Sometimes_(Britney_Spears_song)

Forms of plagiarism

- Intentional plagiarism
  - a writer knowingly lifts text directly from other authors' work without giving appropriate credit.
- Duplicate publication
  - an author submits for publication a previously published work as if it were original.
- Self-plagiarism
  - a writer copies large parts of an earlier manuscript word for word into a new manuscript.
  - can occur when individuals pursue large programs of research over many years on the same topic, so they are constantly building on their own work and in their own language.

Protecting against plagiarism

1. Always acknowledge the sources of and contributions to your ideas.
2. Enclose in quotation marks any passage of text that is directly taken from another author's work and acknowledge that author in an in-text citation.
3. Acknowledge every source you use in writing, whether you paraphrase it, summarise it, or quote it directly.
4. When paraphrasing or summarising other authors' work, reproduce the meaning of the original author's ideas or facts as closely as possible using your own words and sentence composition.
5. Do not copy sections of your previously published work into a new manuscript without citing the publication and using quotation marks.

2. Recognition of co-author contributions

- Concerns the **appropriate acknowledgement** (not too much or too little) of collaborators' substantial contributions to a piece of scholarly work.

- An ethical issue that appears frequently in scientific work because collaboration is the norm, not the exception.
  - Working alone means less productivity
  - Working alone means having to do every thing well
  - Collaboration means sharing workload, complementing skills, broadening the domain of interest

- Recognizing co-author contributions appropriately be difficult to deal with because the correct attribution of credit sounds easy but is hard to identify in practice.

- Making co-authorship decisions is important because on the one hand co-authorship confers credit to individuals for their contribution to academic tasks, which can have academic, social, and financial implications; but on the other hand, co-authorship also implies responsibility and accountability for published works.

Four ethical issues relating to co-authorship

- Coercion authorship
  - occurs when intimidation is used to gain authorship credit, such as when a senior person pressures a more junior person to include the senior person’s name on a paper to which he or she has not contributed enough to qualify for authorship.
- Gift authorship
  - Occurs when individuals are given recognition as co-authors without having made substantial contributions, often for reasons like acknowledging friendship, gaining favour, or giving the paper more legitimacy by adding well-known senior researchers to the list of authors.

Four ethical issues relating to co-authorship

- Mutual support authorship
  - occurs when two or more authors (or author groups) agree to place their names on each other’s papers to enhance their perceived productivity. The “authors” can count both publications towards their own list of papers, receive citations for both papers, and so forth.
- Ghost authorship
  - occurs when papers are written by people who are not included as authors or are not acknowledged. A typical form of ghost authorship involves using or hiring professional scientific writers, perhaps because the researchers feel they cannot write “well” or “scientifically.”

Managing coauthorship

- Golden rule of publishing: Good papers built on good research.
  - You can contribute in either or both areas.

- Most important involved in the research process warrant co-author recognition when done by someone else but not all of them!
  - Developing an original idea
  - Designing a study
  - Organizing data collection
  - Collecting data
  - Analyzing data
  - Writing and revising a paper

  - Sponsoring/funding the project
  - Managing the project

My decision rules

- A co-author has…
  1. made substantial contributions to the conception or design of the research or the acquisition, analysis, or interpretation of data for the research; and
  2. made substantial contributions to drafting the publication or revising it critically for important intellectual content; and
  3. given final approval of the version to be published; and
  4. agreed to be accountable for all aspects of the work, including being accountable for the parts of the work he or she has done, being able to identify which co-authors are responsible for other parts of the work, and having integrity about the contributions of other co-authors.

- Authorship of a research output should not be claimed when
  1. participation rests solely in the acquisition of funding or the collection of data.
  2. General supervision of the research group does not justify authorship.

- **These are my criteria; they may or may not be yours**. Rules change by country, institution, and sometimes persons.

- E.g., the DFG (“Deutsche Forschungsgemeinschaft”) demands “participation in” rather then “contribution to” the points above.

Exercise: Recognizing co-authorship

Professor Smith, the head of the lab, is publishing a paper on the structure of chitin.

Professor Smith's lab collaborated with a high profile lab group in Sweden that had already engineered and published the correct gene construct to express chitin in vitro, and who sent some of their materials to help Professor Smith's team.

Professor Smith's post-doc, Mary, did the majority of the lab work, staying late and working long hours to get the necessary data. A final year PhD student, Jiang, and a technician, Oliver, both helped Mary do some of the technical work.

Professor Smith did not write any of the paper, but reviewed and edited Mary's drafts that she sent to him. He is writing the cover letter and submitting the paper to Nature.

Mary wrote the bulk of the paper but for the Introduction she used paragraphs of text directly from Jiang's unsubmitted, draft thesis.

Who should be listed as a co-author?

Authorship credit: what should be the order of authors?

Author order seems alphabetical, but was actually determined by comparing hair length, thickness and volume. The exact algorithm is confidential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GUEST EDITORIAL

Check for updates

Building a complementary agenda for business process management and digital innovation

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ABSTRACT
The world is blazing with change and digital innovation is fuelling the fire. Process management can help channel the heat into useful work. Unfortunately, research on digital innovation and process management has been conducted by separate communities operating under orthogonal assumptions. We argue that a synthesis of assumptions is required to bring these streams of research together. We offer suggestions for how these assumptions can be updated to facilitate a convergent conversation between the two research streams. We also suggest ways that methodologies from each stream could benefit the other. Together with the three exemplar empirical studies included in the special issue on business process management and digital innovation, we develop a broader foundation for reinventing research on business process management in a world ablaze with digital innovation.

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KEYWORDS
Business process management; digital innovation; organisational routines; process-aware information systems; theory

1. Introduction

We live in a digital world. From toothbrushes, thermostats, and telephones to cars, buildings and airplanes, the objects we use at work and in everyday life are augmented with digital capabilities that infuse their substance and meaning (Baskerville et al., 2020). As Floridi (2012) put it, our physical world and the objects in it are being "enveloped" by a digital layer building on pervasive and accessible digital infrastructure of computers, broadband networks and mobile devices (Brynjolfsson & McAfee, 2014; Fichman et al., 2014). Digital platform businesses dominate our economy (Tiwana, 2015). Innovative digital devices feature in the experiences of more and more people (Yoo, 2010) through the proliferation of smart, connected products, online social networks, and wearable devices (e.g., Benbunan-Fich, 2019; Beverungen et al., 2019; Gerlach & Centefelli, 2020; Marchant & O'Donohoe, 2019). Digital devices now outnumber humans as information processors. At the present time, over 20 billion devices are connected feeding off over more than 50 billion sensors that track, monitor, or feed data to those objects (Zhang, 2016). Digital devices are everywhere and they seem to be changing everything.

What is often overlooked in this story is that digital innovation is not only about the objects (a.k.a., infrastructure, platforms, devices or other artefacts) – it is also about the processes they facilitate. Digital innovation may take the form of new technology but the key to its impact is that it unleashes generative capacity (Tilson et al., 2010): digital innovation yields ability to rejuvenate, to reconfigure, to reframe, and to challenge the way we see and understand the world and act within it (Avital & Te'Eni, 2009). In other words, digital innovation is the story about *how we change what we do* because of the digital technologies emerging around us.

To understand change, we need to understand process, and vice versa (Langley & Tsoukas, 2017). Offerings like Uber do not change the fact that we move from A to B; they change the *process* of finding, reserving, and paying for a ride. We still watch TV at home, but the *process* of choosing what show to watch and when to watch changes with digital platforms such as Netflix, Hulu and others. These processual changes continue to occur even in domains that are already digitised. For example, the *process* of transferring money is fundamentally different on a blockchain system than the process of transferring money on a conventional digital network, such as SWIFT.

These examples begin to suggest that the established terminology of digital innovation, such as generativity and recombination, is not only about digital technology per se (technological objects, devices and artefacts). Digital innovation is also the story of action for changing and facilitating new pathways of action (Arthur, 2009; Garud et al., 2010; Hargadon, 2006). Creating new process pathways can have dramatic side effects. For example, the emergence of social media made our ability to connect with family and friends faster, better and cheaper, but it has also fundamentally changed the political process. Heads of nations

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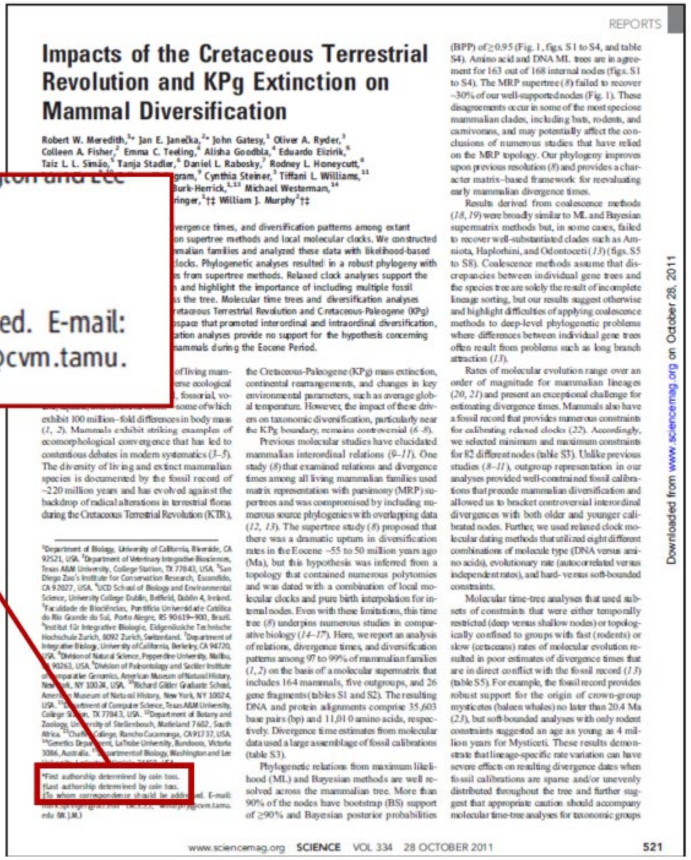

REPORTS

Impacts of the Cretaceous Terrestrial Revolution and KPg Extinction on Mammal Diversification

www.sciencemag.org SCIENCE VOL 334 28 OCTOBER 2011 521

Science **334**, 521 (2011)

Authorship credit: what is the order of authors?

- The order of authors is entirely up to the authors.
- Typical practices when it comes to putting the authors' names on the paper…
  - Most often, the first authors are the ones who did most of the work, with the authors listed in descending order of contributions
  - Some put principal investigators at the end of the list
  - Some groups do it alphabetically
  - In some scientific fields the most highly credited author is the one whose name appears [first/last].
  - Social scientists tend to place the authors' names in alphabetical order regardless of the amount of effort that was contributed.
  - Some journals allow annotations identifying one or two authors who did the majority of the work (this can be important for PhD thesis defenses or for job applications)

Examples

S.H.C. designed and performed experiments, analysed data and wrote the paper; N.C., M.T. and J.M.G. designed and performed experiments; D.R. and M.B.G. developed analytical tools; and C.I.B. designed experiments, analysed data and wrote the paper.

T.J. and U.H.v.A. designed the study; T.J., E.A.M., M.I., S.M. and P.A.L. performed experiments; T.J., E.A.M., M.I. and S.M. collected and analysed data; M.B., K.F., N.C.D.P., D.M.S., N.v.R. and S.P.W. provided reagents and mice; T.J., E.A.M., M.I. and U.H.v.A. wrote the manuscript; S.M., K.F., S.E.H., T.M. and S.P.W. gave technical support and conceptual advice.

All authors contributed extensively to the work presented in this paper.

Hint: Identify the driver

- Typically, research ownership is evident
- Typically, papers are driven by an individual
  - Major contribution to completing the first draft
  - Handling the revisions
- If not – discuss!
  - Research ownership
  - Data ownership?
  - Paper ownership

The New School Bus Driver

A formal way of handling co-auhtor recognition: CRediT

- CRediT (Contributor Roles Taxonomy)
- A system introduced with the intention of recognizing individual author contributions, reducing authorship disputes and facilitating collaboration.
- Defines a set of roles that individuals can occupy in a research process
- CRediT statements can be included in submissions or in final papers
- Example CRediT statement
  - Zhang San: Conceptualization, Methodology, Software Priya Singh.: Data curation, Writing- Original draft preparation. Wang Wu: Visualization, Investigation. Jan Jansen: Supervision.: Ajay Kumar: Software, Validation.: Sun Qi: Writing- Reviewing and Editing.

CRediT roles

Term	Definition
Conceptualization	Ideas; formulation or evolution of overarching research goals and aims
Methodology	Development or design of methodology; creation of models
Software	Programming, software development; designing computer programs; implementation of the computer code and supporting algorithms; testing of existing code
Validation	Verification, whether as a part of the activity or separate, of the overall replication/ reproducibility of results/experiments and other research outputs
Formal analysis	Application of statistical, mathematical, computational, or other formal techniques to analyze or synthesize study data
Investigation	Conducting a research and investigation process, specifically performing the experiments, or data/evidence collection
Resources	Provision of study materials, reagents, materials, patients, laboratory samples, animals, instrumentation, computing resources, or other analysis tools
Data Curation	Management activities to annotate (produce metadata), scrub data and maintain research data (including software code, where it is necessary for interpreting the data itself) for initial use and later reuse
Writing - Original Draft	Preparation, creation and/or presentation of the published work, specifically writing the initial draft (including substantive translation)
Writing - Review & Editing	Preparation, creation and/or presentation of the published work by those from the original research group, specifically critical review, commentary or revision – including pre-or postpublication stages
Visualization	Preparation, creation and/or presentation of the published work, specifically visualization/ data presentation
Supervision	Oversight and leadership responsibility for the research activity planning and execution, including mentorship external to the core team
Project administration	Management and coordination responsibility for the research activity planning and execution
Funding acquisition	Acquisition of the financial support for the project leading to this publication

Managing co-authorship: Communicate early and openly

- Open lines of communication throughout the research process are vital.
  - You should talk openly and frankly.
  - It’s the team’s responsibility to create a communication environment without fear of reprisal, demotion, or other punishment.

- Most important part of this process:
  - Voicing one’s investment,
  - Creating transparency about publication strategies,
  - Mutually recognizing each other’s goals,
  - Building flexibility into the process, and
  - Establishing commonly accepted criteria for making these basic decisions.

3. Honest reporting

- An ethical standard that demands that research publications comply with expectations for transparency, openness, and reproducibility.
- Typical ethical issues
  - Publication bias
    - systematic suppression of a certain type of research results in published papers, such as negative hypothesis tests or replications, or
    - systematic preference given to innovative and novel findings rather than confirmations of known findings
  - HARKing (hypothesizing after the results are known)
  - *p*-Hacking (the misuse of data analysis to find patterns in data that can be presented as statistically significant)

Publication bias

- occurs when the outcome of an experiment or research study influences the decision whether to publish or otherwise distribute it.
- Known as the file-drawer problem: often investigators decline to submit results when they are found not to support initial hypotheses
- Consequence: the publication of “negative” or “insignificant” results is impeded
- Then, published studies are no longer a representative sample of the available evidence.

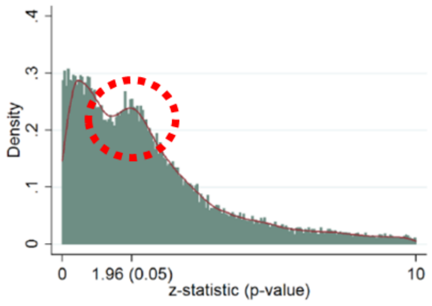
HARKing

- The false portrayal of a post hoc hypothesis as if it were an a priori hypothesis.
  - Can invalidates the idea of a priori hypothesis generation and subsequent testing.
  - Can lead to scholars not communicating valuable information about what did not work
  - Can lead to distorted publications limited to ideas and findings without a faithful representation of the scientific process through which these ideas were born.
  - Risks increasing levels of Type 1 errors: if one attempts (too) many post hoc analyses on the same data, some tests will generate false positives simply by chance
  - Risks favoring weaker theories that post hoc accommodate results rather than correctly predict them.

p-Hacking

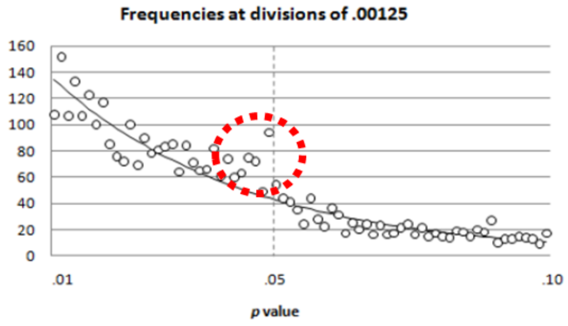
- occurs when researchers collect or select data or statistical analyses until nonsignificant results become significant.
- Significant results increase the chance of being published but when published data are biased, data synthesis might lead to flawed conclusions.
- Means that we do not know if the strength of the relationship found is purely an artifact of the sample, the analytical method used, or legitimate judgment
calls made by the researcher.

Economics
Brodeur et al (AEJ:A, in press)
"Star Wars: The empirics strike back"

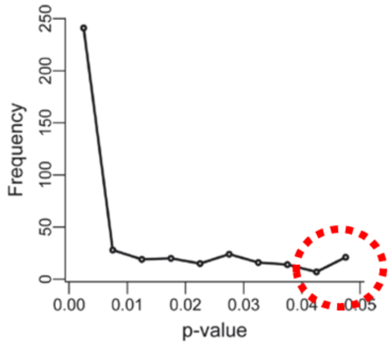


(b) De-rounded distribution of z-statistics.

Psychology
Masicampo Lalande (QJEP, 2012)
"A peculiar prevalence of p values just below .05"



Biology
Head et al (PLOS Biology 2015)
"Extent and Consequences of P-Hacking in Science"



Recommendations for honest reporting

- **Pre-registration**: make hypotheses public prior to data colletion and analysis
- **Open science**: publicly share raw data used in analysis
- **Register procedures**: Make analyses (e.g., codes, programs) available to others
- **Conduct replications**: repeat studies to see if results remain robust

4. Appropriate use of language

- Refers to the wording of scientific reports so they are not biased in terms of gender, race, orientation, culture, or any other characteristics.

- Stipulates using gender-responsible, ethnicity-responsible, and inclusive language wherever possible.

- Guidelines:
  - **Specificity**
    - describe specific behaviours rather than stereotypes: e.g., calling a behavior “dominant and opinionated” instead of “typically male”.
  - **Labelling**
    - Refer to concrete labels rather than abstract class tags, e.g., referring to countries’ populations—Mexicans or Chinese—instead of classes like “Hispanics” or “Asians”
  - **Professional acknowledgments**
    - Use professional classifications, not personal labels, like “medical practitioner” or “doctor” instead of “female doctor.”

Summary: Ethics in information systems research

- The role of ethics:
  - Professional code of conducts for IS scientists
- Fundamental principles of scientific ethics:
  - Maintaining honesty and integrity through the scientific process
- Ethics and scientific conduct:
  - Ethical clearance and independent ethics review
- Ethics and scientific writing:
  - Plagiarism, publication bias, honest reporting and appropriate language.

End of Chapter 7