

International Standards of Good Scientific Practice

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Outline

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1. Introduction - FAQs

- How long do I need to store my data?
- My supervisor expects to be a co-author on all of the papers that I produce – is this right?
- I let colleagues use my data – shouldn't they include me as a co-author?
- When can I omit outliers in my data?
- Is it OK to use a figure from another paper or presentation?
- I suspect that a colleague is falsifying results – what should I do?
- Etc., etc. ...

2. Why does GSP matter?

- Science is the search for truth
- Science is incremental – we build on other people’s work; two steps forward, one step back
- Hence, science depends on transparency and trust
 - I need to know whose work you are building on
 - I need to know how you did your work
 - I need to trust that you are disclosing all, and hiding nothing
- These needs are mutual – scientists depend on each other, and on public trust
- Failure to adhere to GSP impedes and ultimately destroys science!

Well-known examples of misconduct

- Gregor Mendel (Genetics, Austria)
 - Results too good to be true? Not necessarily misconduct.
(See http://www.genomicseducation.ca/informationArticles/intro/inheritance_mendel.asp)
- Hwang Woo-Suk (Veterinary Science, South Korea)
 - Published two articles published in *Science* in 2004 and 2005 claiming to have created human embryonic stem cells by cloning
- Eric Poehlman (Medicine, USA)
 - Falsified data in 17 federal grant applications and 10 published articles
(See <http://www.nature.com/nature/journal/v434/n7032/full/434424a.html>)
- Bruno Frey (Economics, Switzerland)
 - Self-plagiarism, five articles concerning the Titanic disaster in five different journals (See https://en.wikipedia.org/wiki/Bruno_Frey)
- Guttenberg, Schavan (Germany)
 - Ministers forced to resign due to plagiarism in their dissertations

Why do scientists violate GSP?

- The pressures of 'publish or perish'
- Ambition, desire for recognition, competition with peers
- Personal problems
- Excessive (financial) incentives

Incentives for publication in China

- Some institutions in China offer significant monetary rewards for publication in high-ranked journals
- E.g. according to Jufang and Huiyun (2011) Zhejiang Chinese Medical University provided 100,000 RMB (\approx \$15,000) for publications in Nature or Science
(see <http://onlinelibrary.wiley.com/doi/10.1087/20110203/pdf>)
- “Too many incentives have blurred the reasons for doing science in some people's minds” (Lu Yongxiang, President of the Chinese Academy of Sciences, 2006)
(see <http://science.sciencemag.org/content/312/5779/1464.full>)

Why do scientists violate GSP?

- The pressures of ‘publish or perish’
- Ambition, desire for recognition, competition with peers
- Personal problems
- Excessive (financial) incentives
- Groups getting larger and projects more complex – coordination problems
- Supervisors over-extended, cannot keep up with all of the research for which they are responsible
- Erosion of standards?

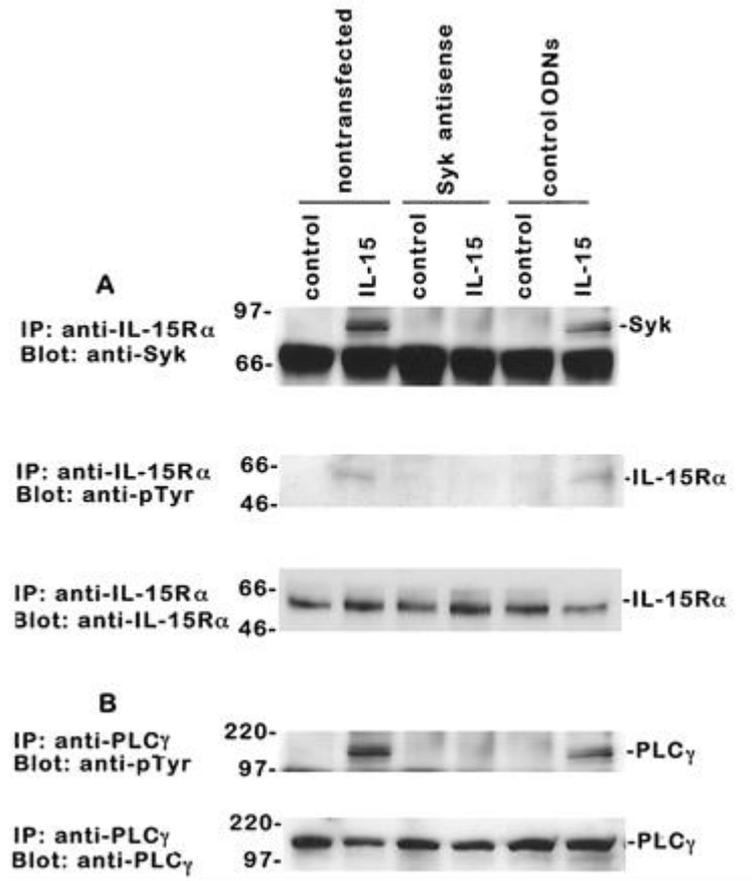
3. Key dimensions of GSP

- Before we begin: differences of opinion and unintentional errors do not constitute violations of GSP!
- Honest errors can advance science, if it is possible to trace and correct them
- Misconduct can result from ignorance and insufficient training
- Hence, teachers and supervisors must alert and inform students and young scientists about GSP early in their studies/careers
- What we will not cover: GSP in potentially harmful experimentation with humans (mostly medicine)

3.1 Data management

- What can go wrong?
 - Inventing or manipulating data or facts
 - Selection/suppression of data or facts
 - Manipulation of data in tables, graphs, figures and photos
 - Failure to accurately disclose how data were collected and processed
 - Failure to archive data to permit future replication
 - Failure to make data available to peers for replication and further study
 - Inventing or misrepresenting personal data (e.g. regarding one's degrees, publications, affiliations)

Data manipulation – an example



- Top of panel A is identical to top of panel B, but labelling and interpretation different
- From Bulanova et al. (2001): The IL-15R α Chain Signals Through Association with Syk in Human B Cells. *The Journal of Immunology*, 167: 6292–6302
- Article was retracted: See <http://retractionwatch.com/2011/02/03/three-more-bulfone-paus-retraction-notice-out-in-journal-of-immunology/>

3.2 Intellectual property rights

- What can go wrong?
 - Plagiarism
 - Acceptance of unjustified co-authorship
 - Claiming co-authorship of someone who has not given his/her explicit consent
 - Making use of information that you have obtained as a peer reviewer of someone else's work
- Note: You may make use of ideas provided by anonymous peer reviewers of your work. This is the only situation in which it is OK to use other people's ideas without giving credit!

What is plagiarism?

- “Plagiarism is presenting someone else’s work or ideas as your own, with or without their consent, by incorporating it into your work without full acknowledgement. All published and unpublished material, whether in manuscript, printed or electronic form, is covered under this definition. Plagiarism may be intentional or reckless, or unintentional. Under the regulations for examinations, intentional or reckless plagiarism is a disciplinary offence”
(University of Oxford)

(<https://www.ox.ac.uk/students/academic/guidance/skills/plagiarism?wssl=1>)

What is plagiarism?

- Internet makes it easier to plagiarize, but also easier to detect plagiarism
- Difficult for students
 - Do I have to cite everything that is not my own?
 - With the exception of common knowledge: Yes
 - Better too many than too few citations in your writing
 - Unless a verbatim quote is absolutely necessary, try to put things in your own words
 - Not always easy, especially if English is not your mother tongue...

Plagiarism – an example

- Data copied from a Masters Thesis (below) without giving credit (right)
- Source: von Tiedemann, *Good Scientific Practice*, lecture, University of Göttingen

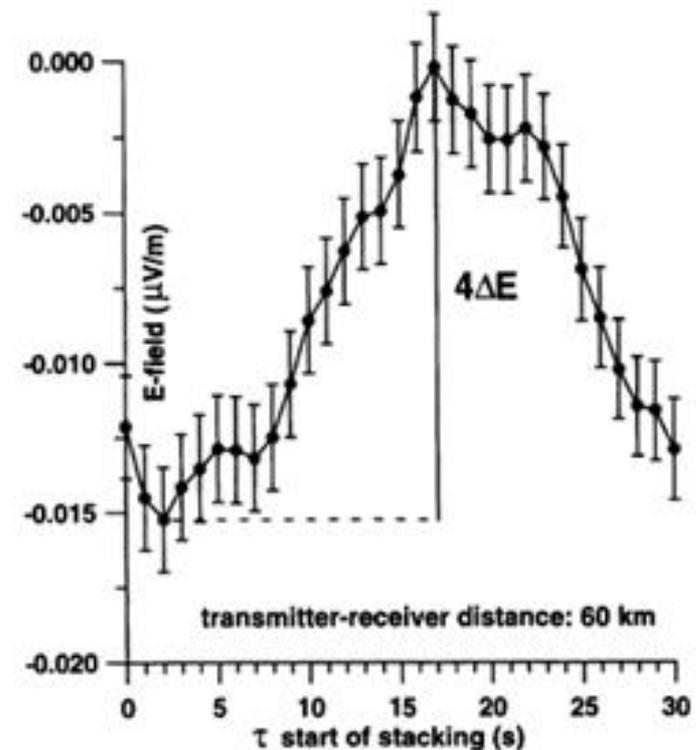
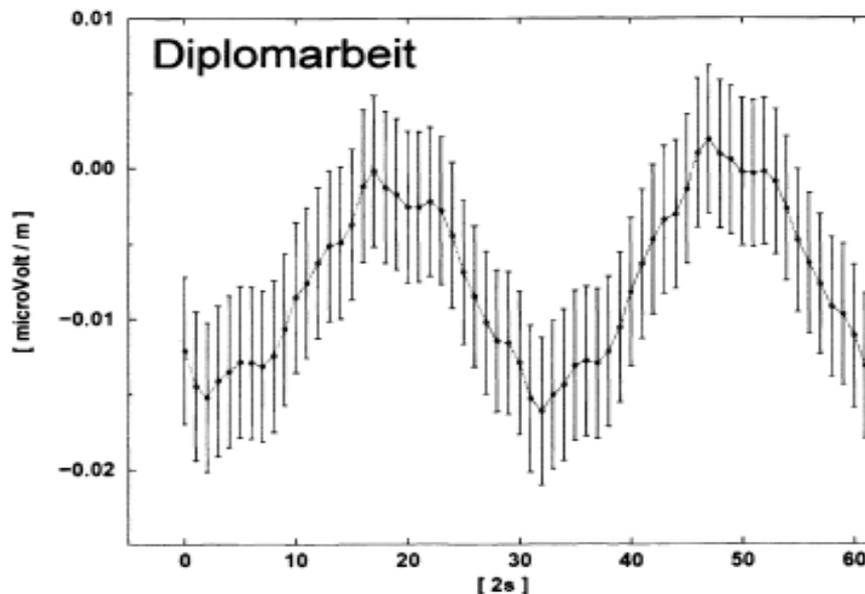


FIG. 4. Stacked differences as a function of the start of stacking τ for a transmitter-receiver distance of 60 km. The difference $4\Delta E$ between the maximum and minimum yields the desired signal ΔU , which is $\Delta U = (\Delta E/4)$.

3.3 Authorship (I)

- Three conditions for authorship
 - i. Each author must have made a substantial contribution to the concept and planning of the research, or to the analysis and interpretation of the data
 - ii. Each author must have significantly participated in drafting and/or critically reviewing the paper
 - iii. Each author must provide full consent on the final version of the paper, which includes agreement on the complete list of authors

Authorship (II)

- The following do not justify authorship
 - Provision of funding or facilities (e.g. office space, laboratories)
 - Simple collection, recording or provision of raw data
 - Being the head or chief of the institution where research took place (so-called honorary authorship)
- Important: Authorship means that you are responsible and accountable for the entire content of a paper!
- More limited contributions merit mention in the ‚Acknowledgements‘, but not authorship

Authorship (III)

- The order of authorship is important, but can lead to conflict with collaborators
 - Conventions differ among fields of science
 - The order is usually alphabetic, unless you want to signal a first author
 - To emphasize first authorship (or if the first author's family name is Aaron), a footnote can be used
 - Sometimes the “corresponding author” is highlighted to indicate precedence

Authorship (IV)

- Anticipation and communication are especially important when two or more students work together on a paper
 - For example, when two students both want to include a paper in their respective cumulative dissertations
 - The sum of the subjective contribution shares to a joint paper is generally $\geq 100\%$ 😊
 - Discuss authorship openly with your co-authors early in the collaboration, and at regular intervals, to anticipate and avoid conflict

3.4 Publication

- What can go wrong?
 - Self-plagiarism (see Bruno Frey above)
 - Be honest with yourself – what is really different in paper B?
 - When in doubt include cross-references to related papers
 - Salami slicing: dividing work that could be reported in a single publication into smaller publications
 - Predatory journals
 - Predatory journals falsely claim to conduct peer review, and charge authors for quick publication in reputable-sounding journals
 - See Bohannon, J. (2013): Who's afraid of peer review? *Science*, 342: 60-65 (<http://science.sciencemag.org/content/342/6154/60.full>)
 - See Beall's List (currently off-line?)

3.5 Conflict of interest

- What can go wrong?
 - Financial or personal (e.g. family) interest in scientific results
 - Financial support from organizations with a financial or political interest in your results
 - You are asked to review a paper or grant application that has direct bearing on your own work
 - You are asked to review a paper or grant application by individuals to whom you wish to be loyal (colleagues, collaborators, friends) or against whom you bear a grudge
- Be aware of these conflicts, remove yourself if possible, full disclosure if not

3.6 Supervision and mentoring

- Supervisors and mentors are responsible for ensuring that all of their students (post-docs, graduate and undergrads) are aware of GSP
 - Lead by example, maintain the highest standards
 - Discuss the rules of GSP
 - Explain procedures for dealing with conflicts and suspected misconduct

4. Dealing with violations of GSP

- To be eligible to receive public funding, universities in many countries (e.g. Germany) must establish policies and procedures for investigating and reporting instances of alleged research misconduct
- The German Research Foundation has adopted 17 recommendations for safeguarding GSP, including:
 - §6 Duty of disclosure, consequences
 - §7 Ombudsmen and -women
 - §8 Pre-investigation by the university ombuds committee
 - §9 Formal investigation by the investigation committee
- See DFG: *Safeguarding Good Scientific Practice*
(http://www.dfg.de/download/pdf/dfg_im_profil/reden_stellungnahmen/download/empfehlung_wis_s_praxis_1310.pdf)

§6 Duty of disclosure, consequences

- Any reported suspicion of misconduct will be pursued
- Proven violations will have disciplinary and/or legal consequences
- A whistleblower's anonymity must be fully protected
- Any and all investigation processes will be thoroughly documented in writing

§7 Ombudsmen and –women, and §8 Pre-investigation

- The University appoints independent ombudsmen/women (in Göttingen currently 3)
- These individuals are independent individuals who receive allegations and carry out preliminary investigations
- In some cases, the ombudsmen/women may mediate a solution between opposing parties
- If the ombudsmen/women conclude that a suspicion of misconduct is confirmed, they refer the case to the investigations committee

§9 Formal investigation by investigation committee

- In Göttingen the investigation committee is comprised of three professors and two external members (usually judges)
 - Decides whether further hearings are needed
 - The committee can draw on reviews by subject experts
 - Finally decides whether allegations have been confirmed
 - Decides whether disciplinary or legal consequences are warranted
 - Informs the university president of its decisions and proposes appropriate sanctions

Possible penalties

- Formal written sanction
- Temporarily restricted or suspended right to apply for research grants
- Temporary exclusion from university committees and/or national research committees
- Cuts in university budget allocations for research
- Cuts in pay
- Dismissal

- In any case, a lasting stain on your scientific reputation!

The whistleblower

- There is an obligation act when you suspect misconduct
- Failure to report misconduct is itself a violation of GSP
- The whistleblower is not the cause of the problem; those who engaged in misconduct are!
- However, frivolous or malicious accusations of misconduct are a serious problem
- Ask for advice
 - Trusted colleagues, senior scientists
 - Department Head, Dean
 - Ombudsman/woman
- All are obliged to treat your request confidentially

Conclusions

- Science is a great occupation
 - Freedom to think critically and to nurture curiosity
 - Membership in a community of illustrious and inspiring individuals (even if it is only junior membership☺)
- The price of admission is playing by the rules of Good Scientific Practice
- P.S.: These slides are work in progress. If you use them, please acknowledge the source. Comments, suggestions and corrections are very welcome