Introduction to Scientific Communication

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Outline

Strategies for scientific communication

Efficiently using written and oral scientific supports

Convey a message, convince and carry the audience by the hand

The objectives of scientific communication:

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- When in the audience:
  - take the time to political aspects of conferences/work meetings
  - talk to whoever you heard of, you know from their works/articles
  - take the opportunity to see/read new things.

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- Never submit anything official if based on weak "conjectures"! Especially so if the conjecture is likely not to hold.

Strategies for scientific writing

General instructions for document writing

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  - **Readability and usability:** the paper usually targets a specialized but as large as possible audience
    $\Rightarrow$ You want the work to be used!
    $\Rightarrow$ Don't make the paper more complicated than it is to impress the reader!

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- **PLAGIARISM !!**: Beyond unacceptable, must be reported! May imply blacklisting or life banishment!
  $\Rightarrow$ Even self-plagiarism is banned!

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- **Readers of long papers might get tired:** make sure long papers deserve to be so long! Overwriting a paper annoys readers who won't read it.

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- second-level reading: detailed organization is clear, well sectioned, using clear “environments”.

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  $\rightarrow$ Results may be introduced in a separate "Main Results" section prior to the methods, especially in math papers. This avoids the main result to be found on page 53 and helps the reader to know where the paper is getting at.

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  1. list of all papers USED in the text
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  - be careful when using over-statements: “a new paradigm”, “a revolutionary framework”, etc.
- choose appropriate wording
  - avoid common uninformative/waste words, e.g. “use”: never use use
  - avoid all possible confusions, e.g. “ECG of a monkey using . . . ” (who uses what?), “Data Augmentation for Speech Recognition for Under-resourced Languages” (two targets?)
  - use natural keywords!
    $\Rightarrow$ Some important information (e.g. practical application of the main math result) may never be spotted in search engines.

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  - avoid criticism of old articles (your ideas often come from a modern look at them)
  - make an exhaustive analysis of the literature in order not to miss any actors
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- Don't enforce good results, be honest
  - Avoid showing only corner case scenarios, this will be spotted!
  - Don't hide alternative techniques that work better.
  - Sometimes, papers justifying that a technique is bad are good papers.
  - Often, plots are a support for proven results. They don't stand themselves as proofs.

Question every table with large number of zeros

Temp [°C]	Growth in 48 h [mm]
-50	0
-40	0
-30	0
-20	0
-10	0
0	0
10	0
20	7
30	8
40	1
50	0
60	0
70	0
80	0
90	0
100	0

Table: Effect of temperature on growth of oak seedlings

Not all numerical data must be put in a table

Temp [°C]	No. of expt	Aeration of growth medium	Growth
24	5	+	78
24	5	-	0

Table: Effect of aeration on growth of *Streptomyces coelicolor*

Nocillin	K Penicillin
5/35 (14)	9/34 (26)

Table: Bacteriological failure rates

When to use tables?

- If repetitive data must be presented
- If few determinations $\Rightarrow$ data in text
- Put table (column) into words if reasonable
- Question every table with large number of zeros
- Give only significant data

Good Table

Parameters for downlink transmission scheme

Bandwidth [MHz]	f_S **[MHz]**	**FFT size**	**# occupied SC**
2.5	3.84	256	151
5.0	7.68	512	301
10.0	15.36	1024	601
15.0	23.04	1536	901
20.0	30.72	2048	1201

Table: Parameters for downlink transmission scheme

How to arrange tabular material

- Like elements should read down not across
- Words in a column are lined up left
- Number lined up right (or at decimal point)
- Vertical rules are normally not used
- Avoid double rules
- Avoid exponents in table headings
- Follow the guidelines/instructions if provided

How to design effective graphs (1)

When to use a graph

If data shows pronounced trends

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- Ensure self-containedness of graphs/caption for **first reading pass!**

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Symbols and legend

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- Use different symbols or different types of connecting line (e.g. dashed, dotted, etc.)
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  $\Rightarrow$ not visible when printed black&white
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- Ensure consistency of display with the rest of the document!
- Don't shrink/distort images, don't make ugly low-resolution copy-paste!

Example: Bad Graph

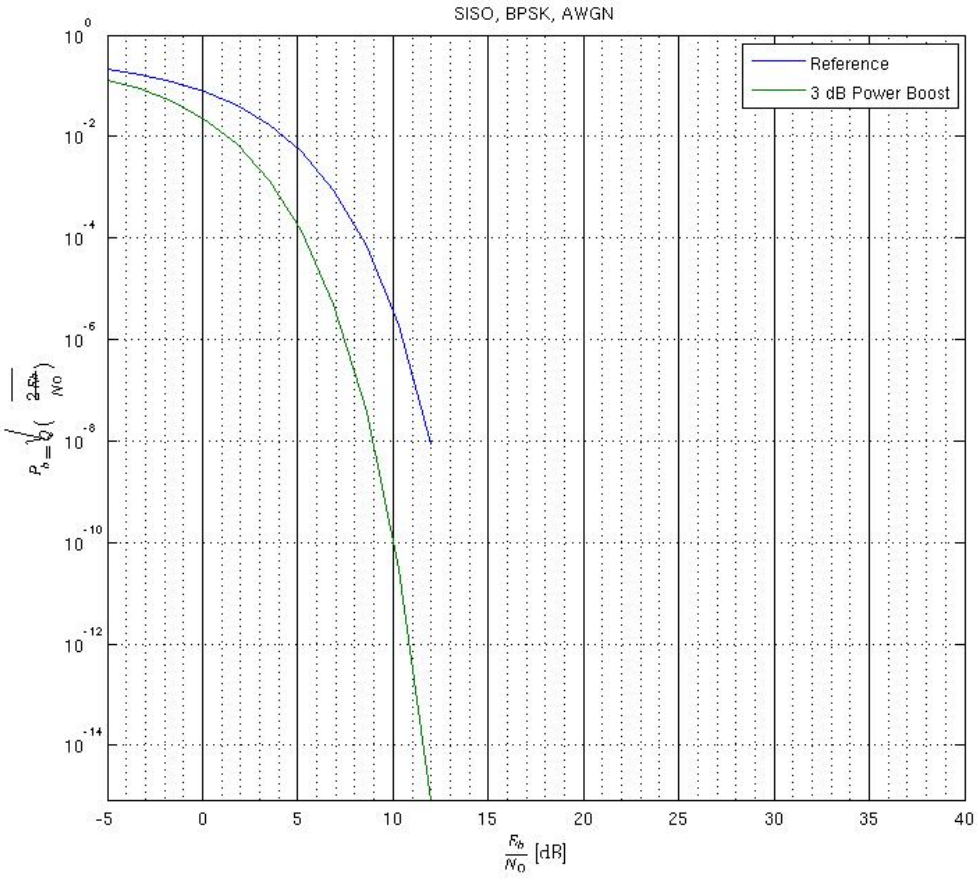
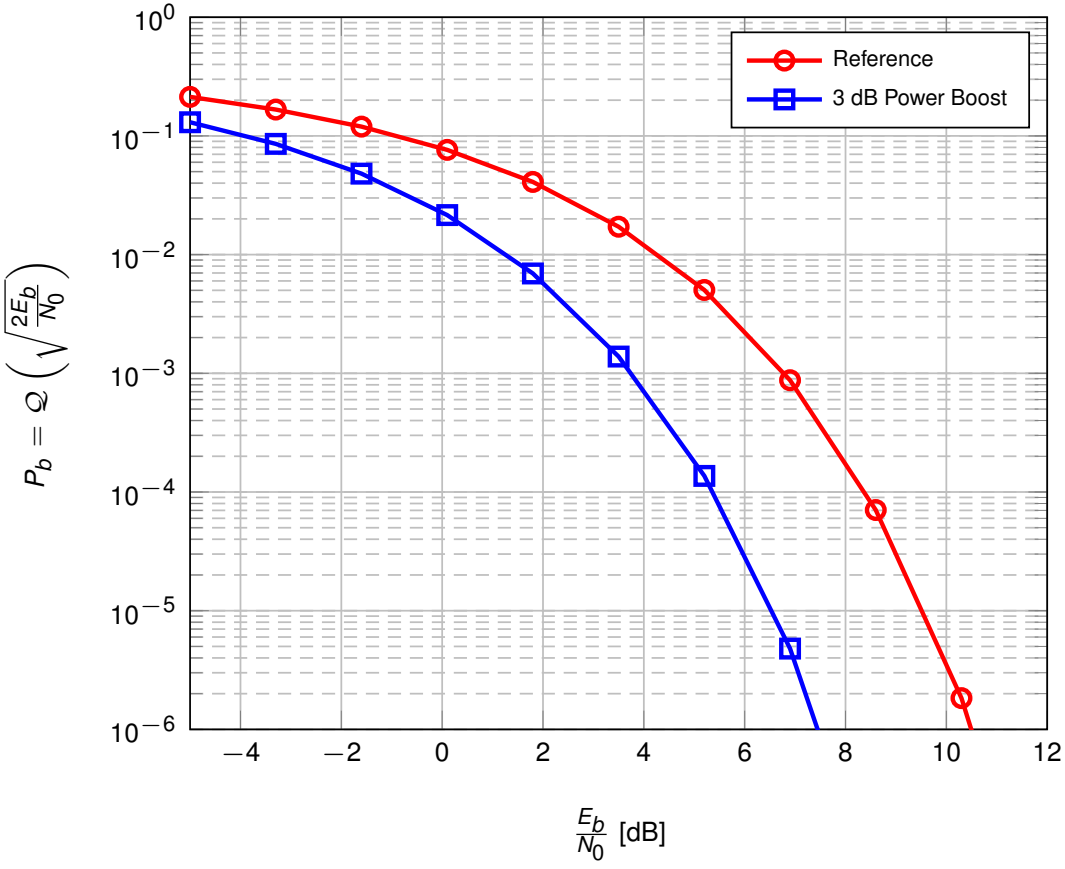


Figure: BER vs. SNR, BPSK, AWGN

Example: Good Graph



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- Absolutely avoid verbiage and paraphrasing
  - "It is clearly shown in Figure 1 that ..." $\rightarrow$ "Figure 1 shows that ...".
  - Figures and tables content must be **explained**, not **repeated** in text

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    $\Rightarrow$ in fact, even avoid "we" which is not common in English (We observe... $\Rightarrow$ It is seen... / Fig X shows ...).
- Absolutely avoid verbiage and paraphrasing
  - "It is clearly shown in Figure 1 that ..." $\rightarrow$ "Figure 1 shows that ...".
  - Figures and tables content must be **explained**, not **repeated** in text
- Stick to usual paper rules
  - figures, tables are referenced, not given "below" or "on the next page".
  - only number what is referenced (unless for peer-review)
  - etc.

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- **Paper size**:
  - Most papers are the pinnacle of months of work, so it is tempting to overwrite them
  - Keep the paper efficient: clear and simple so to convey the information fast and reliably
  - Respect page limitations: journals adapt themselves to most practical format
  - Readers won't read too long articles
  - When proofs are long and little informative for the contribution, keep them in appendices

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  - Overleaf (multiple features, easy for beginners)
  - Plmlatex (governmental, secured)

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- Important extra packages:
  - insert new features/modules with `\usepackage{ThePackage}`
  - for plots/graphs: use `pgfplots` (fully latex compliant), don't copy-paste Matlab/Python output!
  - for drawings: use `tikz`

Strategies for scientific writing

How to write a short (conference-type) article

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- **Opening your mind to other subjects**:
  - Use those papers/seminars/talks/conferences/tutorials to discover new topics
  - Some meetings/conferences privilege very new contributions, even missing target: exploit them!
  - Often, papers/talks of interest were available online 6 months before.
    $\Rightarrow$ To be kept in mind for your own presentation!

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- Carefully read or ask for the conference/meeting instructions.

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- be prepared to adapt the scientific "jargon" to the community of interest.
- if not exactly your field, do not miss essential references from this community.

Instructions for long (journal-type) documents

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- **Efficiency**: keep the content simple and clear (but well commented), not long for the sake of writing a "real" contribution
  $\rightarrow$ Even a work of 2 years does not justify to be overly written.
  $\Rightarrow$ Do not try to reach the page limit, this is a stupid idea!
  $\rightarrow$ More information is often too much information.

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- **Discussion and Conclusion**:
  - Make it efficient. Smart unequivocal comments.
    $\rightarrow$ Fight against painful philosophical or empty discussions!

Strategies for scientific writing

How to design slides

Overall information about seminar/conference/workgroup presentations

- In most cases, 15–20min long
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- Convince the whole community of your strengths
  - the community is small (everybody knows everybody else): people off your field will talk about your presentation
  - keep in mind that you're only at the beginning: your presentations are building your career!

Preparing the slides

General rules:

- Keep always in mind to be simple and clear:
  - Little content in each slide
  - Few slides (maximum 1/min)
  - No complete sentence, just few words, no verb
  - Constantly use bullet points
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General rules:

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  - Few slides (maximum 1/min)
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  - use at least 2min at the beginning for a **"marketing slide 0"**
    $\Rightarrow$ Grab people's attention by exciting slide 0, so they stick with you all along!
    $\rightarrow$ With one talk/15min, you need to get people's attention
    $\Rightarrow$ Worst case people have no clue what you say during 15min! This happens quite often!!
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- State-of-the-art must be well done
  - Make clear what has been done before, what's new here
    $\rightarrow$ Most people in the audience don't know the topic.
  - Correctly reference prior work
    $\rightarrow$ People in the room may work on the topic: they want to see their names!
    $\Rightarrow$ Worst case: you show off on a subject already covered by someone in the room!

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- Keep the talk/slides didactic
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  - Always recall again and again important points
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  - Stress the important points (red markers, specific boxes)
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- Conclusion is often done but not so necessary (after 15min, everyone should remember what you said!)
- Opening / discussion of technical problems to be solved is important
  - a new proof approach is often what will be reused after you
  - people in your field must feel there is some grain to grind

Before the presentation: Checklist

- Rehearse your presentation beforehand
  - Know at least your slides' content
  - Don't rehearse too much to gain make it feel natural
    $\rightarrow$ Over-preparation and stress are visible and annoying
- Check that your slides are functioning properly
- Get to the hall ahead of the audience
- Make sure the projector is working
- Assure that your slides project
- Check the lights
- Check the microphone if you use one
- Check that pens/chalks are available if board is needed

When comes the presentation

→ How to combat stage fright:

- Prepare so you feel confident
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- Obviously, don't read notes!
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- Stick to most important points or results
- Don't proceed too fast, especially at beginning
- Fit the allotted time slot (plan 9 min or 9.5 min if you have 10 min)
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- Beware of the "crazy pointer" behavior: slow and restricted use of it, use your hands instead!
  ⇒ Crazy pointers are very stressful, even painful!

Q&A period

- Irrelevant questions:
  - Deflect the discussion to something related you want to talk about.
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- If you lack the answer
  - Admit that you don't know (do not panic)
  - Sometimes people ask to check that you know
    $\rightarrow$ Don't make up a wrong answer.
  - Offer to provide the answer later
  - Say how to find the answer

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    - if available, use digital pen and mark your slides!
    - be very slow and precise with the mouse
      $\Rightarrow$ Nothing's more annoying than a crazy pointer/mouse!

Strategies for scientific writing

How to make a poster

Preparing the Poster

- Guidelines:
  - Follow IMRAD format
  - Use very little text
    $\Rightarrow$ most space for illustrations
  - Clear statement of purpose (abstract) at beginning, in bulleted points, not in sentences
    $\Rightarrow$ people will read that part from afar, so make it clear!
  - Major part are the results
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- Detailed content:
  - Short attention-grabbing title
  - Choose appropriate typeface
  - Use bulleted and numbered lists
  - Should be self-explanatory
  - Lots of white space is important
  - Guide the viewer (what to look at first, second, ...)
  - Poster should contain highlights

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- Take advantage of the chance for feedback/network
- Consider handouts with more details
- Have some copies of your paper or related research

The 20-point checklist

- **For all communications:**

[2pt] the message is unique, clear, and well conveyed

[2pt] the objective/motivation (problem statement with a progression from history, through state-of-the-art, to the "before and after this work") is crystal-clear

[2pt] the presentation is smartly structured according to the IMRAD format

- **Written communications:**

[2pt] two-level reading: first quick scan must tell the main story (clear environments, self-contained figures) / full scan must be exhaustive, reproducible, with no errors

[1pt] paper is self-contained, browsing is easy, all notations are defined and "simple"

[1pt] main results/visuals are smartly interpreted, not just described

[1pt] the conclusion is a smart opening with new questions, convincing continuation beyond the work: not a copy-pasted abstract!

[1pt] no error in syntax, grammar, spelling; appropriate language

- **Oral communications:**

[3pt] 2-min on first slide with only one "comprehensive" image

[2pt] minimal content on slides (no sentences, clear emphases, etc.)

[2pt] repeat again and again, browse back, use the audience visual feedback (adapt dynamically if you see your audience lost)

[1pt] never read notes or the slides: the slides support the talk, but **are NOT** the talk

EVIDENCE OF PLAGIARISM $\Rightarrow$ Disciplinary committee!!