Good reports and presentations are formulaic. Preparing them is a learned skill.

They are not ‘inspiration at midnight’. Your raw ideas may be, but their refinement isn’t.

Common errors

1. Forgetting who your audience is
2. Failing to give the ‘big picture’
3. Failing to provide rationale
4. Too much detail

“Good writing reflects clear and precise thinking.”

“Writing generally forces clear and precise thinking.”

“Write a report, or make a presentation, that will interest your audience.”

“Learn from the papers you read and the talks you attend.”
One main point per paragraph or slide

Paragraph organization

- Lead sentence: Main point
- Elaboration (text)

Slide organization

- Title: Main point
- Elaboration (data, diagrams, bullet points)

Examples for the Introduction section

- Organismal/Cellular process
- “Cell division is fundamental to the growth, development and homeostasis of all multi-cellular organisms”
- The outstanding question related to your research
- Molecular basis
- “A conserved molecular network directs cell division”
- The outstanding question related to your research

Examples for the Results section

- To understand how {…}, I {…}.
- Basic conclusion from this analysis alone (broader connections only in Discussion)
- To determine if {…}, I {…}.
- Basic conclusion from this analysis alone (broader connections only in Discussion)
**Write daily** (between experiments in the weeks before the due date)

1. Write and revise an outline of headings and lead sentences
   - the 'story' should be clear from the lead sentences alone

2. Complete paragraphs with imperfect sentences and go over page limits
   - just get it down
   - add citations while you write (e.g. endnote or refworks--http://sites.utoronto.ca/ic/software/)

3. Quantify your data and prepare figures

4. Edit to make paragraphs and sentences concise
   - remove unnecessary points and use simple language
   - confirm accuracy
   - read all headings and lead sentences to make sure the 'story' is intact

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**Our poster boards are 4 feet by 4 feet**

Typical poster size: 9-12 letter-sized (8.5 by 11 inch) pages

Print in colour on quality paper
Slide organization

Title: Main point (Main conclusion)
Elaboration (data, diagrams, bullet points)

<table>
<thead>
<tr>
<th>Title page</th>
<th>Question Approach</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intro</td>
<td>Data</td>
<td></td>
</tr>
<tr>
<td>Intro</td>
<td>Data</td>
<td>Model Conclusions</td>
</tr>
</tbody>
</table>

Concepts can be presented with simple diagrams (avoid using review article diagrams that display unrelated concepts)

Contraction of one tissue region is often coupled with elongation of another
Presenting data from one replicated and controlled experiment

Representative samples

Myosin loss from furrows with rok RNAi

Quantification of all samples

General advice
• keep backgrounds and fonts simple so your schematics and data stand out
• fonts should be clearly readable 4 feet away
• avoid jargon (terms that might only be used in your lab or a specific research area)
• minimize text (for “all-text” slides → title plus 4, 1-2-line bullet points maximum)

• get feedback from lab mates on a full draft of the poster
Title page
- include the lab PI and the person who supervised you directly
  (allows you to present ideas from the lab that may not have been your own)

Introduction
- What is the big picture? Why is the problem important?
- What is the specific rationale for your research questions?

Methods
- use schematics

Results
- present in a logical order (not by the chronology they were done)

Conclusions
- a synthesis of the data that will require some thought (discuss with lab mates)

Include any acknowledgments of specific help or reagents at the base of Results slides or at the base of the Conclusions slide

Your poster is an aid for an oral presentation
Ask your lab PI if there is any data from the lab that should be kept confidential?

Practice your presentation (~12 minutes without interruption)

Don’t worry about nervousness—convert it into enthusiasm

Speak clearly

Maximize eye contact

Sense and pause for questions (listen to them carefully, ask for clarification)

Be yourself and show excitement for your work

Don’t be apologetic for incomplete work—suggest the next step
Present you data truthfully and openly

Of my many replicate micrographs or blots, which one should I show?

If my data failed to support my hypothesis, should I show it?

How do I present partially complete data?

What is “N”?

Should I show my quantifications as bar graphs?
True replication increases the sample size (N) and thus tests a hypothesis.

Pseudoreplication does not increase N.

“Suppose researchers hypothesize that male mice have lighter brains than female mice. They could... (1) weigh the brain of 1 male and 1 female mouse 5 times, or (2) weigh the brain of 5 male and 5 female mice once.

Both designs provide 10 data points to calculate a \( p \)-value, but the \( p \)-value is meaningless for the first design because the hypothesis is about sex differences, and there is only 1 member of each sex”

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Experimental unit (EU): the entity that is randomly and independently assigned to experimental conditions. The sample size (N) is equal to the number of EUs.

EUs must be independently allocated to experimental conditions

\[ \rightarrow \text{because animals in a litter, seeds in a pod, or cells in a tissue sample are expected to be more alike than individuals from different litters, pods or tissues} \]

The experimental intervention must be applied independently to each EU

\[ \rightarrow \text{because you cannot exactly replicate the application of a treatment to all individuals} \]

EUs must not influence each other, especially on the measured outcomes
What is N?

You hypothesize that a drug affects nuclear size.

1. You bath 10 embryos together in a drug, and quantify the size of the nucleus in 100 cells per embryo.
2. You individually inject 10 embryos with a drug, and quantify the size of the nucleus in 100 cells per embryo.
3. You repeat 1. in three separate weeks.

Beyond Bar and Line Graphs: Time for a New Data Presentation Paradigm

Figures in scientific publications are critically important because they often show the data supporting key findings. Our systematic review of research articles published in top physiology journals (n = 703) suggests that, as scientists, we urgently need to change our practices for presenting continuous data in small sample size studies. Papers rarely included scatter-plots, box plots, and histograms that allow readers to critically evaluate continuous data. Most papers presented continuous data in bar and line graphs. This is problematic, as many different data distributions can lead to the same bar or line graph. The full data may suggest different conclusions from the summary statistics. We recommend training investigators in data presentation, encouraging a more complete presentation of data, and changing journal editorial policies. Investigators can quickly make univariate scatterplots for small sample size studies using our Excel templates. You can use these
Fig 1. Many different datasets can lead to the same bar graph. The full data may suggest different conclusions from the summary statistics. The means and SEs for the four example datasets shown in Panels B–E are all within 0.5 units of the means and SEs shown in the bar graph (Panel A).

Fig 2. Additional problems with using bar graphs to show paired data. The bar graph (mean ± SE) suggests that the groups are independent and provides no information about whether changes are consistent across individuals.
2 reasons to avoid sloppiness

Did they take as much care with their experiments as this did with this presentation?

Small mistake put people on edge, making them more critical of the overall work (discussed by author Daniel Kahneman in *Thinking Fast and Slow*)

Strive for excellence not perfection

http://www.artsci.utoronto.ca/current/advising/ell
• Please leave your poster up so that other students can see it over the term
• If you need your poster for another event, please collect it before that event
• We will recycle your poster just before our next undergraduate research poster symposium (events held in September and April)