Wissenschaftlichen Arbeiten

Scientific writing & presentation
# Time table (changes)

<table>
<thead>
<tr>
<th>W.</th>
<th>Date</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>11.01.12</td>
<td>Scientific writing &amp; presentation (1)</td>
</tr>
<tr>
<td>12</td>
<td>18.01</td>
<td>Scientific writing &amp; presentation (2)</td>
</tr>
<tr>
<td>13</td>
<td>25.01</td>
<td>Scientific writing &amp; presentation (3)</td>
</tr>
<tr>
<td>14</td>
<td>01.02</td>
<td><strong>Poster presentation (Exam)</strong></td>
</tr>
<tr>
<td>15</td>
<td>08.02</td>
<td>Feedback etc.</td>
</tr>
</tbody>
</table>
Scientific research cycles

Use right format & Style
1. Publication
2. Presentation
   2.1 Poster
   2.2 Talk

Use right tools and right reading behavior

Use right methods
Experimental research

1. Come up ideas
2. Validate it using scientific methods
3. Literature research
4. Write up the results
5. questions
Goals of scientific research

- Long term goal
  - Better understanding the nature and improvement of humanity

- Short term goal
  - To disseminate the research results
    - Publication – Scientific papers
    - Written report
    - Talk
    - Poster presentation
Publication
Scientific papers
1. A stereotyped format

- The format of a scientific paper has been defined by centuries of developing tradition, editorial practice.
  - Title
  - Abstract
  - Introduction
  - Materials & Methods
  - Results
  - Discussion
  - Conclusion

- Note: Individual journal may have a few different styles.
The standards of a scientific paper

2. Precise language
   - Clean
   - Clear
   - Unemotional

Note: The essential characteristic of scientific writing is *Clarity.*
The standards of a scientific paper

3. A single, clear direction

Avoid tangents and digressions, remove those distractions

Katz, From Research to Manuscript
Title

- Title should be the fewest possible words that accurately describe the content of the paper.
- Omit all waste words such as ‘A study of...’, ‘Investigations of ...’, ‘Observations on ...’
- Indexing and abstracting services depend on the accuracy of the title
- An improperly titled paper may never reach the audience for which it was intended.
- So be specific!
Title examples

- No negative priming without cognitive control.
- Attention, awareness of contingencies, and control in spatial localization: A qualitative difference approach.
- Spatial context learning survives interference from working memory load.
- Surprise-induced blindness: A stimulus-driven attentional limit to conscious perception.
- The speed of feature-based attention: Attentional advantage is slow, but selection is fast.
- The nesting of search contexts within natural scenes: Evidence from contextual cuing.
- Parallel and serial grouping of image elements in visual perception.
- The role of relational information in contingent capture.
Title examples

Nature

- Supermassive black holes do not correlate with galaxy disks or pseudobulges
- Probing the electromagnetic field of a 15-nanometre hotspot by single molecule imaging
- Grains and grain boundaries in single-layer graphene atomic patchwork quilts
- Development of asymmetric inhibition underlying direction selectivity in the retina
- Spatially asymmetric reorganization of inhibition establishes a motion-sensitive circuit
Abstract

- To enable the reader to identify the basic content of a document quickly and accurately.
- Should succinctly state the principal objectives and scope of the investigation where these are not obvious from the title.
- Should concisely summarize the results and principal conclusions.
- Should not include details of the methods employed unless the study is methodological.
- Must be brief. (usually 250 words, max 500 words)
- Omit figures, tables, and references (if it’s possible)
Abstract examples

• No negative priming without cognitive control.

There is evidence that the efficiency of selective attention depends on the availability of cognitive control mechanisms as distractor processing has been found to increase with high load on working memory or dual task coordination (Lavie, Hirst, de Fockert, & Viding, 2004). We tested the prediction that cognitive control load would also affect the negative priming effect produced when a distractor from 1 trial appears as a target on the next trial. We measured priming on trials that involved either high or low cognitive control load, and found that under high control load, negative priming was eliminated, and could even be reversed to positive priming, suggesting that the negative priming effect depends on the availability of cognitive control resources.
Abstract examples

Biased but in Doubt: Conflict and Decision Confidence

Human reasoning is often biased by intuitive heuristics. A central question is whether the bias results from a failure to detect that the intuitions conflict with traditional normative considerations or from a failure to discard the tempting intuitions. The present study addressed this unresolved debate by using people's decision confidence as a nonverbal index of conflict detection. Participants were asked to indicate how confident they were after solving classic base-rate (Experiment 1) and conjunction fallacy (Experiment 2) problems in which a cued intuitive response could be inconsistent or consistent with the traditional correct response. Results indicated that reasoners showed a clear confidence decrease when they gave an intuitive response that conflicted with the normative response. Contrary to popular belief, this establishes that people seem to acknowledge that their intuitive answers are not fully warranted. Experiment 3 established that younger reasoners did not yet show the confidence decrease, which points to the role of improved bias awareness in our reasoning development. Implications for the long standing debate on human rationality are discussed.
Body of an article

Using an outline to prepare the article

- List
  - The key points/ elements/ keywords
  - Logic
  - Using Mind map
- Determine
  - the purpose of your paper
  - The audience
Body of article

- Good scientific writing is: A, B, C
  - Accurate
  - Brief
  - Clear

- Suggest reading article:
  - Scientific writing: the good, the bad, and the ugly, Gross et al.
Body of article

- 6 common faults
  - Gobbledygook
  - Plodding style
  - Failure to follow the prescribed format
  - Misuse of words
  - Inconsistency
  - Failure to edit or proofread thoroughly

Scientific writing: the good, the bad, and the ugly, Gross et al.
Body of article

'value:Word usage in scientific writing

Examples by ‘Scientific writing booklet’, Marc E. Tischler.

Using ‘google’ to find it!

http://www.biochem.arizona.edu/marc/Sci-Writing.pdf
Introduction

- Research review and research background
  - Warum habe ich die Studie durchgeführt?

- Tell readers the open unsolved questions in current research
  - Important and Relevant literature
  - Attract readers’ interests

- Propose how you want to solve the open issue(s)
  - By formulating research questions, readers may understand independent variables and dependent variables as well as methods you may use in the method
  - E.g. To examine XY effect, we use ...
Introduction

- Introduction should give the reader a clear research background
- Be aware the reader may not know your research area
- Introduce other studies with some details.

Common mistake: Forget the reader is not familiar with the topic!
Before:

Nijhawan (1994) studied flash-lag effect and he suggested that motion extrapolation can be account for this phenomena. However, Eagleman et al. (2000) opposed his account and proposed Postdiction account for the flash-lag effect. ...

What is ‘flash-lag effect’?
‘motion extrapolation’?
‘postdiction account’?
A moving object appears to be ahead of a spatially aligned flashed object. This phenomenon, which has been termed as the flash-lag effect.

To account this phenomenon, Nijhawan (1994) suggested that the position of the moving object is extrapolated forward to compensate for neural delays in the visual pathway.

However, an alternative account has been proposed by Eagleman et al. (2000) that the flash resets motion integration and the position of a moving object is determined about 80 ms after a flash onset.
Materials and Methods

- Provide enough detail
  - Reproducible for others
- Subjects
- Equipment and materials
- Procedure
  - What was done
    ‘Uninterested’ part, yet receive most criticize in review phase.
Materials and Methods

- The key to a successful methods section
  - Right amount of information
    - Too much → laboratory manual
    - Too little → hard to replicate

- If you follow a widely known method, simply name the principle
- If you made changes to a published procedure, describe the changes
- If you use a new method, describe it in full
Three subjects participated in the experiment. Each had normal or corrected-to-normal vision. Subjects sat in a darkened experimental booth with a chin rest 57 cm from a Macintosh high resolution CRT whose refresh rate was 66.7 Hz. A pair of vertically aligned white (34.5 cd/m2) squares translated horizontally 5.04° above a white (34.5 cd/m2) fixation point on a dark background (0.01 cd/m2). Each square subtended 0.90° (Fig. 3). The distance between the squares (1.80°) was constant, and they moved concurrently at 11.84°/s.
Results

- What was found or seen?
  - Decide on a logical order for presentation
    - Numbers and statistics
    - Tables
    - Figures

- Clear, concise, complete
Discussion and conclusions

To answer
- What do your findings mean?
- Why are they important?

Your task
- To interpret your results
  - What is new in your work
  - Why it matters
- Discuss both the limitations and the implications of your results
- Link to other relevant studies
Discussion and conclusions

- Watch for symptoms of megalomania
  - Avoid exaggerated or extravagant claims for your work
- Carefully distinguish between facts and speculation
- Discuss any possible errors or limitations in your methods
- Outlook next steps of unsolved issues / conflicts
Acknowledgments

- Include any substantial help received from organizations or individuals
  - Funding
  - Research assistants
References

- Include all references you cited in the text
- Using reference software Endnote / Mendeley
Home work

Read one classical scientific paper, pay attention to the structure of the paper, writing format etc.