Recipes for cooking a successful paper

Preparing a manuscript
for a peer-reviewed international journal

Lecture 2: Writing

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Going step by step

- Before you start writing
  - What is scientific publication? Who are its authors? Scholarly journals. Citing others. Impact factor. The story, message, carrier, target group.
- Writing: the simplest step of publication
  - Structuring the manuscript: IMRAD. Titles and subtitles. The role of and rules for Abstract, Introduction, Theory, Methods, Results, Discussion, Acknowledgements.
- Illustrating the message
  - Figures. Figure captions. Mandatory images. Design principles. Crowds or emptiness? Tables. Internal and external links & cites.
- Ready to print?
  - Final formatting. Keywords. Highlights. Secrets of successul submission. Nasty and helpful referees. Proofs.

After the choice of the journal: Journal Format and Conventions

- Ensure familiarity with journal format and style **in all aspects**
- Follow journal convention for annotation and institution
- Do not expect the reviewers/editors to reformat your ms – especially references –
  - you will annoy them
  - you will be seen as lazy
  - Your chances will be smaller

Components of writing

I: Structuring the manuscript

- IMRAD
- Titles and subtitles.
- The role of and rules for
  - Abstract
  - Introduction
  - Theory/Model/Material
  - Methods
  - Results
  - Discussion
  - Acknowledgements

II: Expressing the thoughts - From words to sections

IMRAD: format of a regular manuscript

Basic content

- Title
- Authors
- Abstract
- **I**ntroduction
- **M**aterial and Methods
- **R**esults
- (**A**nd)
- **D**iscussion

Technical details and supporting information

- Affiliation
- Acknowledgement
- References
- Tables
- Figures
- Legends/captions
- Appendices
- Keywords
- Highlights

Procedure

1. Decide on the message
2. Decide on a journal
   - Download instructions
3. Develope the story
4. Write Material/Methods
   - Start the reference list
5. Summarise results
   - Create figures
   - Create tables
6. Write Introduction and Discussion
7. Finalise the references
8. Assemble/order the tables and figures (in numerical order)
9. Select a tentative title
10. Write the abstract
11. Revise the entire draft
12. Sleep on it
13. Revise the manuscript
    1. Repeat (12).-(13)
14. Get approval of all authors
15. Re-read the MS
    - Improve sentence structure
    - Improve word choice
    - Correct typos
16. Ask colleagues to read MS
17. Have the text polished by a native speaker
18. Submit the manuscript

General hints & conventions

- Scientific writing: Brevity & Clarity
  - Many journals have limits on length
  - Less is more: avoid ballast

Usual conventions

- Introduction: present tense
  - What has been previously published
  - Why the study was done
- Materials/Methods: past tense
  - How the study was conducted
- Results: past tense
  - what was found
- Discussion: present tense
  - Explanation of the results;

Title

- ISI WoS: 409 292 769 titles (18.02.2012)
- "Business card" of your work
- Used by many for the first scanning of information
- Not interesting in 0.2 seconds? – nobody reads

The goal: provide specific information in as few words as possible

- ~a commercial or an advertisement
- Usually a phrase
- Can be a complete sentence

Title: principles

- Should be generic – projecting the principles:
  - *Cusp formation as a function of granular re-packing*,
    - rather than: *Cusps developed at Pirita Beach, Tallinn.*
  - NOT location specific [=> local interest, not international]
- Short but specific
- Expressing the core development
- Select words suitable for a "running head"

Hints for a title

- Provide specific information
  - in as few words as possible
- Be informative and lucid (easily understood, completely intelligible)
  - Nonlinear components of ship wake waves
  - Joint influence of river stream, water level and wind waves on the height of sand bar in a river mouth
- Include a subtitle, if further detail is needed
  - Fast ferry traffic as a qualitatively new forcing factor of environmental processes in non-tidal sea areas: a case study in Tallinn Bay, Baltic Sea
- You report changes: show the direction
  - Poor: Effect of amino acids...
  - Good: Reversal effect of amino acids ...
  - In doubt or challenged: Do amino acids reverse ...?
- Avoid (nonstandard) abbreviations

Hints for a title II

- Begin with an important term
  - Avoid beginning with A, The, Results, Study, etc.
  - Poor: An experimental study of wind waves and ship wakes in Tallinn Bay (Soomere and Rannat, 2003)
  - Good: Sand accumulation under varying lithohydrodynamic conditions in the coastal area of the north-eastern Baltic Sea (Kask et al. 2010)
- Avoid evaluations
  - Omit subjective terms such as novel or innovative
  - The reader is appropriate one to make such judgements
  - Poor: A novel method for determining the molecular weights ..
  - Good: A rapid method for determining ...
- Avoid serial titles
- Check the Instructions to Authors
  - Nature: no active verbs, numerical values, abbreviations
- Provide a running title (<50 characters)

The meaning of Abstract

- A mini-paper
- Gives actual data in extremely condensed form
  - Presents the core Message
  - Explains what has been done
- Should be understood on its own
  - certainly without reading the paper
- Used as the 2nd level in search for information
- Gateway to the paper: to read or not to read

- Is NOT a plan or indicative summary
  - (these explain what will be done)

Writing an Abstract

- Must be concise
- It is NOT a detailed summary of the entire paper
- Normally references not quoted
- Overall: < 1 typescript page
- Usually <150 words or <500 characters
  - No room to waste words
  - A common error: saying "The results will be discussed ..." – tells really nothing

The help-file: the shortlist of questions: Why? How? What?

- WHY did you study it?
  - Can be omitted if the objective is clear from the title
- HOW did your study it?
  - Elaborated only if the paper is on methodology
  - Otherwise very brief or almost omitted
- WHAT did you find?
  - Selectively include only the most important findings
- WHAT does it mean?

Abstract: 4 components only

- 1-2 sentences each ONLY!
  - (i) the aims of the paper
  - (ii) the methods & techniques used
  - (iii) the major results or findings
  - (iv) the main implications from the research

Curiosities

Protein Synthesis Group, Shanghai Institute of Biochemistry, Academia Sinica. 1975. Total synthesis of crystalline glucagon by the method of solid state phase condensation of fragments. Acta Biochem. Biophys. Sinica 7:119-138.

Abstract. Chairman Mao taught us, "One should seriously sum up one's experience." Looking back at the experiences of our own and of others in the past decade or so on the total synthesis of [....], we have analysed the inherent contradictions of the two alternative routes of synthesis on the basis of the dialectical viewpoint of "one divides into two." [...] A new synthetic strategy was developed ....

Cited from Y.T.Yang, An outline of scientific writing. World Scientific, 1995.

A classical example with a redundant phrase

We analytically investigate the nonautonomous discrete rogue wave solutions and their interaction in the generalized Ablowitz-Ladik-Hirota lattice with variable coefficients, which possess complicated wave propagations in time and are beyond the usual discrete rogue waves. When the amplitude of the tunnel coupling coefficient between sites decreases, these nonautonomous discrete rogue wave solutions become localized in time after they propagate over some certain large critical values. Moreover, we find that the interaction between nonautonomous discrete rogue waves is elastic.

Yan and Jiang, 2011, under review

HOW did your study it?

WHY did you study it?

WHAT did you find?

WHAT does it mean

Key words

- They do not reflect the quality of research
- Used for indexing for electronic searching
  - Some journals: Title words are already key words
  - Other journals: Key words must be taken from a specific list
- List 'additional' key words

Modelling of wave climate and sediment transport patterns at a tideless embayed beach, Pirita Beach, Estonia

Keywords:
Sediment transport
Sediment distribution
Beaches
Wave climate
Wave modelling
Tallinn Bay

Typical sequence of reading

1. Title: Does it has any relevance to my interests?
2. Abstract Could the paper be important for me?
3. Introduction Does it give something to me now?
4. Conclusions Anything to remember?
5. Rest of the paper dedicated reader, in very few cases

The Introduction

- Read before the rest of the paper
- Perhaps the most difficult part to write
- The purpose: provide the background information that the reader needs to understand your paper

- States the nature of the problem
- Sets the scene
- Leads on to the purpose/aims
- Contains a part of literature

- The reason
- The findings
- Specialized background

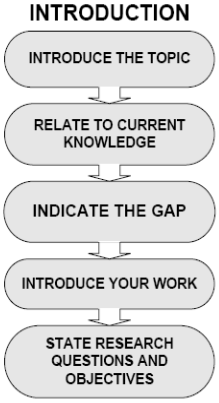
Hints

- The reader is assumed to have a basic familiarity with subject
  - Exclude elementary information
  - Normally no references to standard textbooks
  - Present only what a specialist should know
- Specifies nature and scope
- Gives a brief summary of previous work
  - Just to bring the reader up to date on the topic
  - Including your own previous work
  - Not a place to show your talents
- Aims to evoke interest
- Brief enough to avoid losing the readers' attention

"Trinity" of a good introduction

(I) General background
(II) Previous findings by others
(III) Your examination of the questions addressed

- Very briefly: your approach
- Ask **The Question**
- [principal finding – on the level of keywords]
  - Organisation of the paper



After Hengi & Gould (2006)

Example

The existence of particularly high (freak or rogue) waves on the sea surface is often observed. Freak waves occur much more frequently than it might be expected from surface wave statistics whereas they are particularly steep.

General background

This interesting (and dangerous) phenomenon is explained by various theories (see, for example, Kharif and Pelinovsky [1] and references therein). Stressing the importance of currents, bathymetry, interaction with internal waves, etc. that may contribute to forming of freak waves (see Peregrine [2], Jonsson [3], Shyu and Phillips [4], Donato et al. [5], White and Fornberg [6] and bibliography therein), we focus here on interaction of solitary waves.

Findings by others

Our examination

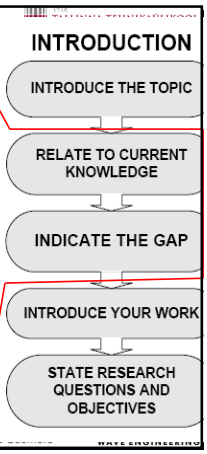
Soomere and Engelbrecht, Wave Motion, 2005

Abbreviations and footnotes

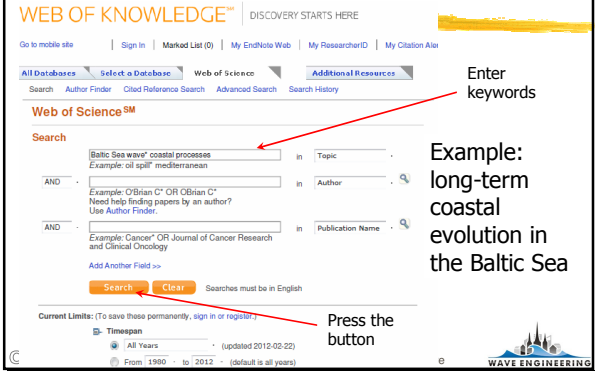
- Abbreviations save space
  - South-western → SW
  - Environmental Impact Assessment → EIA
- Define at the first mention
  - Only reasonable if used >4-5 times
- Footnotes generally not recommended
- Still extremely useful during writing
  - Additional information that would make the body text too complicated
  - Details of references (which pages, citation)
  - Notes for yourself

Literature search and overview

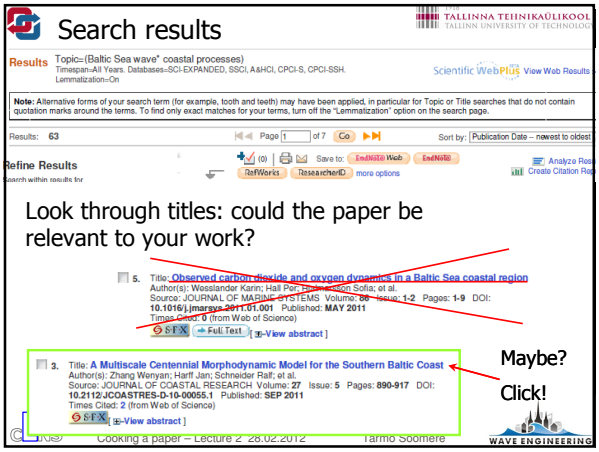
- Usually a part of Introduction & Material & Methods
- Frequently important in Discussion
- Demonstrates your knowledge in the field
- Credits important previous work
- Helps you greatly in putting your work into proper context
- Benefit from large databases



Try different combinations of keywords to get an overview of work in this field



Search results



Interesting claim or result?

Found something to rely on?

Coastline change of [...] is dominated by mechanisms [...] on different timescales. The coastlines of [...] are mainly reshaped by long-term effects of waves and longshore currents, while coastline change [...] is a combination of long-term effects of waves and short-term effects caused by extreme wind events.

- Note it down immediately
- Save full text of the claim
- Together with full bibliographic information
  - Include the citation and bibil.inf. into the text as a footnote

A Multiscale Centennial Morphodynamic Model for the Southern Baltic Coast: Zhang, Wenyan; Harff, Jan; Schneider, Ralf; Meyer, Michael; Wu, Chaoyu. JOURNAL OF COASTAL RESEARCH **Volume:** 27 **Issue:** 5, 890-917, 2011

Some papers are more popular than others

Working with quotations

- Seemingly strange text: 5-7 lines of quotations in footnotes for each line of main text
- Check from the source whether or not the quotation/fact/result is relevant to your paper
  - Note the exact place/page of the result in the source
- Condense the text iteratively
  - Move a double-checked previous result into the main text
  - Keep the core of quotation
  - Move the bibliogr.inf. into References
  - Group similar and repeating claims

Methods / Experimental procedures

- Usually the easiest part to write
  - You do not interpret data or reach conclusions
  - Unless the paper is on methodology
- References to standard textbooks are fine
- Briefly summarise
  - Basically the reader can repeat the work
  - And judge whether your procedures were sufficient
- Refer to authoritative standard methods
  - e.g CERC method for wave-driven sediment transport
- Reference others who have used the same
- Note differences
- Give in detail only if a "new method" which is the purpose of the paper

Theory and Background

- Very much the same as Methods
- Literature search normally necessary, see above
- Reference others who have used the same methodology or theory
  - Web sites are not authoritative references (no quality control)
- Refer to authoritative standard methods
- Concise but explicit
- Verbs usually in the past tense
  - Prefer: Enzyme A was purchased from Sigma
  - Worse: We purchased enzyme A from Sigma
  - because here emphasize should be on the material, not authors

Materials / Data

- Very much the same as Methods
- Describe data acquisition procedure
- Indicate possible uncertainties/errors or inhomogeneities
- Give an estimate of accuracy/error (both physical and of the procedure), reasons of exclusion of some data points (if any)
- Use subsections if necessary
  - Rule of thumb: one printed A4 double column page – one subsection
  - Subsection titles – "small sisters" of the Title

Results

- Feature main results of the stated aims of the paper
- Present 'analysed' data, not raw data
- Present as:
  - tables
  - graphs, or
  - model figures where possible

Two ways of saying things

The major reason for including two simulated data sets is that these sets reflect somewhat different features of waves in the study area. 136 char

The two simulated data sets reflect somewhat different features of waves in the study area 85 char

You have reason anyway

Economic use of words

- Communication is better through concise and lucid writing in a well-organised manner
- Avoid uninformative words

- Brief ~~in duration~~
- Sufficient ~~in number~~
- The wound was ~~of~~ serious ~~nature~~
- The solution was red ~~in color~~
- It was precooled ~~before use~~
- We repeated the experiment ~~again~~

Economic use of words II

- Many popular expressions can be expressed as a single word, or are better omitted altogether

At this point of the time	now
The reason was because	because
In view of the fact that	because
Was observed to be	was
In most cases	mostly
~~It would appear that~~	
Is suggestive of	suggests
As to whether	whether
In the vicinity of	near
It was evident that	evidently
In the event that	if

Economic use of words III

- Avoid grandiloquence = pompous style
- Impresses no one and provokes ridicule
- Avoid cliches and euphemisms
  - All in all → delete
  - If and when → if
  - The patient breathed his last → The patient died
- Use exact synonyms
  - Words that have nearly the same meaning
- Use tesaurus
  - Check the exact meaning of words from a dictionary, Google, Wikipedia etc.

Alternatives to one word "marked"

- Appreciable
- Considerable
- Conspicuous
- Extreme
- Great
- Intense
- Signal
- Significant
- Striking
- Decided
- Definite
- Distinct
- Remarkable
- excessive
- Extensive
- Extraordinary
- Large
- Notable
- Noteworthy
- Noticeable
- Pronounced
- Strong
- Substantial
- Unusual
- Astonishing
- Enormous
- Important
- Profound
- ...

Building a sentence

- A good sentence is topical: begins with the important item
  - The relationship F=ma was discovered by Newton
    - Suitable in a text on the history of physics
  - Newton discovered the relationship F=ma
    - Suitable in a biography of Sir Isaac Newton
- As short as possible
  - Avoid ambiguities
    - "The monkey was operated on by the surgeon when he was six weeks old"
    - "The monkey, when he was six weeks old, was operated by the surgeon"
- Being clear has the priority over perfect style
  - "... as of September 1, 257 people were dead ..." How many?

Scattered hints

- Follow either American or British style
  - but never a mixture of both
- Be careful with several adjectives in sequence
  - Sometimes the most concise is not the clearest
    - "Simian virus transformed fetal mammalian heart fibroplast"
    - "Simian virus transformed fibroplast from fetal mammalian heart"

Note the importance of the hyphen!

- Phrases longer than 3-4 words from other sources MUST be highlighted as quotations
  - Even if coming from your own previous work
    - Slightly longer quotations without special higlighting sometimes accepted in review works and monographs

Bricks of writing: paragraphs

- A paragraph = step in your story
- Describes a clearly identified part of the content
  - Remember "roadmap" for writing
- Normally 5-10 lines, 3-7 sentences
- Organise each paragraph!
- Start with a topic sentence
  - that explains the main point or idea
- Subsequent sentences provide the detail
  - This formula: sometimes considered less polished
  - But direct and intelligible; thus, perfectly acceptable
  - Start with this style, adjust when you gather experience

Writing a good paragraph

- Each paragraph expresses/covers only one point
- Each sentences establishes or supports this point – the topic of the paragraph
  - The sentences should illustrate their overlapping effect
- Explain why actions were taken
  - "All of the patient data were kept in paper files. The absence of even one clerk caused delays in the monthly reporting. Finally, management decided to interview some systems analysts"
  - "All of the patient data were kept in paper files, which took too much staff time to maintain. The absence of even one clerk would delay the monthly patient reports. Management wanted computerised recordkeeping, which would take less time and be more reliable, and finally decided to interview some systems analysts to develop the new system"
    - From J.T.Yang, An outline of scientific writing.

Writing a good paragraph II

- Keep a consistent point of view
  - Maintain the same grammatical voice (act/pass):
    - "Topical applications of the drug did not improve the condition. The condition improved after small doses were delivered intravenously": passive + active
    - "Topical applications of the drug did not improve the condition. Intravenous delivery of small doses improved the condition"
      - From J.T.Yang, An outline of scientific writing.
- Maintain consistent structure
  - Sometimes attempts to avoid monotony hinder comprehension

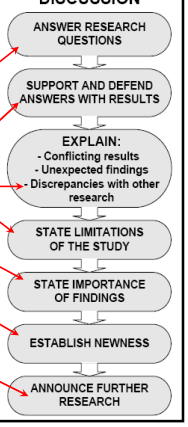
Discussion

- Takes the data reported in the Results section
  - Interprets the findings
  - Evaluates their significance
  - Examines the implications
- Usually the most challenging section to write
- Demonstrated how well you understand the results
- No need to be lengthy
- Sometimes merged with Results or Conclusions

Discussion: hints by Terry Healy

- Elaborate upon the findings
- Emphasise what is new, different to earlier authors
- Refer extensively to other authors
- Place your contribution in relation to existing published work and programs
- This is an essential characteristic of a paper for international readership

After Hengi and Gould (2006)



- Move from specific to general
- Start with The Question posed in the Introduction
- This question should be answered now – by a chain of arguments
- Specify what exactly is interesting and what is expected
- The beginning and ending of Discussion: prominent places for important ideas

Writing a good Discussion

- Begin with a topical sentence that returns to The Question
- Mention shortly new findings, knowledge or concepts that resulted from your study
  - Do NOT introduce again data or methods that were already presented
  - Do NOT introduce data that were not presented in the text before
  - Do NOT copy sentences from Results
- State whether you have achieved your goal
  - Perhaps found exceptions? Unexplained effects?
- Compare your results and interpretations with previously published work
  - Even though it may disagree with yours
  - Give fair credit to others whose work has been confirmed. Cite!
  - Be fair with those whose results differ
  - Explain, if possible, the disagreement impartially
    - From J.T.Yang, An outline of scientific writing.

Writing a good Discussion II

- Take care to label speculations as such
  - Journals permit some reasonable speculations if based on solid evidence
  - You can refer to published speculations as a starting point of new research
- Discuss any theoretical implications and possible applications
- Present the conclusions concisely
- Suggest the future studies, if any
- End with a short summary or conclusion
- Do NOT repeat material from other sections
  - From J.T.Yang, An outline of scientific writing.

Summary and Conclusions

- Summarise major findings
- List in importance (bullet points or numbers)
- Remember: many read only the Abstract and Conclusions
- Refer to aims/purpose of the paper

Acknowledgements

- Used to give credit to those who have materially or intellectually contributed to the research
  - Technical assistance
  - Advice from colleagues
  - Other research-related contributions
- Do NOT include: Contributions that do not involve research
  - Clerical/adminstrative assistance
  - Word processing, Translation, Copy-editing
  - Encouragement from friends
- Refer to funding assistance
  - Mandatory for research supported by targeted financing in Estonia from 01.01.2010
  - Success of Estonian Science Foundation grants counted based on paper with the relevant acknowledgement

Authorship versus crediting in Acknowledgement

- Authorship is limited to those who have made a *significant contribution* to the conception, design, execution, or interpretation of the reported study.
- All those who have made *significant contributions* should be listed as co-authors.
- Others who have participated in certain substantive aspects of the research project should be acknowledged or listed as contributors

Acknowledgements II

- Keep short
  - A standard formulation:
    - "This work was supported by the Estonian Science Foundation (grant No. 9125) and targeted financing by the Estonian Ministry of Education and Research (grant SF0140007s11). We thank Prof. A.X for his comments on the manuscript and Dr. X.Y.Z. or his technical assistance."
- Be aware of misinterpretations
  - Maybe Dr. X.Y.Z performed the experiments and Dr. A.X explained the data, and your contribution was limited to being the armchair general?
  - Make certain that Acknowledgements accurately reflect the situation
- Obtain prior permission from the person being acknowledged
  - Maybe he/she only read the draft and fully disagreed with your treatment?
  - Maybe he/she should be a coauhtor?