Presenting Science in Publications:

_The Basic Questions_

Answer the following questions before you decide to write:

- What do I have to say?
- Is it worth saying?
- What is the right format for my message?
- What is the audience for my message?
- What is the right journal for my message?

Richard Smith

Why do Scientists Publish?

Scientific reasons
- to present new results or methods
- to rationalize published results
- to summarize the state of a field

Strategic reasons
- to maintain funding
- status (personal or institutional)
- to “claim” a subject
- to qualify for PhD defense, promotion, …

Quality

= scientific content + presentation style

Average rejection rates of quality journals: 30-50%

Scientific writing:

clarity
objectivity
accuracy
brevity

clarity

- Ordinary, short, familiar, non-technical terms are better than long, grand, unfamiliar, technical and abstract vocabulary.
- Avoid complicated sentences

_English is a foreign language for many readers_
objectivity

- unbiased, unemotional, and truthful
- give evidence to support your argument, while acknowledging any merit in other theories

Separate results from interpretation

accuracy

- facts need to be accurate and complete.
- no vague, ambiguous, or misleading statements

Carefully check all data and procedures you report

brevity

- efficient word usage
- brief Introduction
- brief Discussion
- effective illustrations and tables
  - picture ~ 250 printed words
  - effect >> 1000 words !!!!

Ethical Obligations of Authors

- present an accurate account and an objective discussion
- write concisely (journal space is precious)
- provide sufficient detail and references for repetition of research
- cite pertinent literature (avoid excessive self citation)
- identify hazards
- no fragmentation of research reports
- inform editor of related publications under consideration
- no duplication of previously published work (except letter, review)
- identify source of all information quoted (except common knowledge)
- criticism of other work is permitted, but not of persons
- coauthors share responsibility and accountability for contents


Stages in Publishing a Paper

1: ‘Prewriting’ stage
2: Writing the paper
3: Editors, referees, revision, rejection
4: Page proofs
5: Promotion of your paper

Stage 1: ‘Prewriting’ stage

- write the main message in one sentence
- examine and select data, complete enough?
- review related literature, identify key papers

- determine who the (co)authors are
  - select a journal
    - scope - audience
    - format (Instructions for Authors)
Authorship: Who to Include?

- anyone who
  - writes or revises part of the paper?
  - contributed substantially to the work?
  - can take responsibility for at least part of the paper?
  - can defend the entire paper?
  - is a good friend?

Authorship: Order of Names

- student, others (coach), supervisor
  or
- supervisor, others, student

my preference:
- Main author/investigator, …, most responsible author

For example (typical situation in Eindhoven):
PhD student, MSc student, Collaborator, Daily Coach, Thesis Advisor

Stage 1: ‘Prewriting’ stage

- write the main message in one sentence
- examine and select data, complete enough?
- review related literature, identify key papers
- determine who the (co)authors are
- select a journal
  - scope - audience
  - format (Instructions for Authors)

Types of Publications

- Article, Full Paper
- Letter, Rapid or Priority Communication
- Note, Research Note, Shop Note, etc.
- Review
- Letter to the Editor
- (Conference Proceedings)

Catalysis Journals

- Journal of Catalysis
- Catalysis Letters
- Applied Catalysis
- Journal of Molecular Catalysis
- Reaction Kinetics and Catalysis Letters
- Catalysis Reviews - Science and Engineering
- Catalysis Today
- Topics in Catalysis

Catalysis in General Journals

- Journal of American Chemical Society
- Journal of Physical Chemistry
- Physical Chemistry - Chemical Physics (PCCP)
- Applied Surface Science
- Nature
- Science
- Angewandte Chemie

Limerick, July 4th 2005
Impact factor, Citation Half Life, 2004

<table>
<thead>
<tr>
<th>Journal</th>
<th>Impact Factor</th>
<th>Citation Half Life</th>
<th>Publisher</th>
</tr>
</thead>
<tbody>
<tr>
<td>J Catal</td>
<td>4.1</td>
<td>8.7</td>
<td>Elsevier</td>
</tr>
<tr>
<td>Catal Lett</td>
<td>1.9</td>
<td>6.0</td>
<td>Kluwer</td>
</tr>
<tr>
<td>Appl Catal A Gen</td>
<td>2.4</td>
<td>5.0</td>
<td>Elsevier</td>
</tr>
<tr>
<td>Appl Catal B Env</td>
<td>4.0</td>
<td>4.7</td>
<td>Elsevier</td>
</tr>
<tr>
<td>J Mol Catal A Chem</td>
<td>2.3</td>
<td>4.4</td>
<td>Elsevier</td>
</tr>
<tr>
<td>J Mol Catal B</td>
<td>1.5</td>
<td>3.7</td>
<td>Elsevier</td>
</tr>
<tr>
<td>Catal Today</td>
<td>3.1</td>
<td>5.6</td>
<td>Elsevier</td>
</tr>
<tr>
<td>Topics in Catalysis</td>
<td>2.5</td>
<td>3.9</td>
<td>Kluwer</td>
</tr>
<tr>
<td>Catal Comm</td>
<td>1.9</td>
<td>2.4</td>
<td>Elsevier</td>
</tr>
<tr>
<td>Micro Meso Mater</td>
<td>2.1</td>
<td>4.3</td>
<td>Elsevier</td>
</tr>
<tr>
<td>Angew Chemie</td>
<td>9.1</td>
<td>5.2</td>
<td>Wiley-VCH</td>
</tr>
<tr>
<td>J Am Chem Soc</td>
<td>6.9</td>
<td>8.7</td>
<td>ACS</td>
</tr>
<tr>
<td>J Phys Chem B</td>
<td>3.8</td>
<td>4.1</td>
<td>ACS</td>
</tr>
<tr>
<td>Stud Surf Sci Catal</td>
<td>0.5</td>
<td>7.2</td>
<td>Elsevier</td>
</tr>
</tbody>
</table>

Impact factor, Citation Half Life

IF 2004:
• citations in 2004 to articles in 2002/2003
divided by # of articles published in 2002/2003
Typical range: 1-3 for topical journals
4-8 for general journals
~10 for reviews
>20 Science, Nature

Citation half-life:
• the number of years, going back from 2004,
which account for 50% of the total citations received by the journal in 2004
Typical range: 3-6 years

Stage 1: Prewriting Stage

follow course ‘Technical Writing and Editing’
read books, e.g.:
• How to write a paper, (George M. Hall, Ed.),
  BMJ Publishing Group, London, 1994
• Scientific Papers and Presentations, M. Davis,
• The ACS Style Guide, A Manual for Authors and
• The Elements of Style, W. Strunk and E.B. White,

Stage 2: Writing the Paper

Basic Structure:
• Abstract
• Introduction
• Experimental
• Results
• Discussion
• Conclusion
• References

Stage 2: Writing the Paper

The Main Value of a Paper

1. Results!!
   (including experimental section)

2. Interpretation ?

Hence, separate results from interpretation

Limerick, July 4th 2005
Use High-Quality Illustrations

- Careful with graphics programs (Excel, Powerpoint produce default poor figures, etc.)
- Meaningful labels on curves, not in legends
- Include ‘as-measured’ data (noise is ok!)
- Informative captions
Stage 2: Writing the Paper

Basic Structure:

• Abstract
• Introduction
• Experimental
• Results
• Discussion
• Conclusion
• References

The Introduction

To write an effective introduction you must

• know your audience
• keep it short
• explain the reader what you have done
• explain why it’s important
• convince them that you have done better than what has gone before
• try as hard as you can to hook them in the first line

Richard Smith

The Discussion

• keep it short!!!
• state the main results (justify shortcomings)
• note previously published findings, avoid long evaluations
• explain inconsistencies/differences, highlight new aspects
• discuss implications for practice, understanding, etc.
• outlook (need for further work, etc.)

A.A. Spence

Sections that usually get too little attention…

• Abstract most read part of a paper
• Key words essential for many people to find your paper
• Figure captions Figure + Caption tell a complete story
  no ‘one-liner captions’ please
• Title main attention getter
• References not too many; avoid excessive self citation

The Title

often long, complicated and …. boring

because scientists

• are terrified of journalism, anxious to avoid any hint of sensationalism
• fear scientific imprecision

J.S. Lilleyman
Science writing, refereeing, ethics
Hans Niemantsverdriet

Title
- brief
- specific
- attractive
- contains signal words

What to do about Writer’s Block?

The Golden Rule
Write First!! - Then Get it Right

The Ideal Paragraph
- starts with a strong introductory sentence
- ends with a clear concluding sentence

Stage 2: Writing the Paper

write in a convenient order ……

- Experimental brief but complete
- Results clear figures and tables, informative captions
- Discussion summarize key results, assess their value, place in context, discuss significance
- Conclusion preferably a list
- Introduction key literature only, question and motivation
- References not too many, avoid excessive self citation
- Title specific, challenging
- Abstract what, why, how, and significance

‘Strong’ paragraph
from a paper on Mo catalysts in hydrotreating of oil

The active catalyst contains molybdenum in the sulfidic form. XPS spectra of initially oxidic samples taken from the reactor after 1, 2, and 12 hours of oil treatment indicate that molybdenum gradually transforms from the Mo(VI) state characteristic of MoO₃ to Mo(IV) with the binding energy similar to MoS₂. In addition, the spectra contain a peak due to sulfur 2s electrons. About 65% of the molybdenum is in the Mo(IV) state after 1 hour of reaction; conversion to the sulfide is complete after 2 hours. Deactivation is not observed over the 12 hour test period. Hence, we conclude that the working hydrotreating catalyst consists of molybdenum disulfide.

Limerick, July 4th 2005
Authors: Read Instructions!!!

In particular:

- submission (paper 3-5 copies, or on line?)
- double spacing
- reference style
- copyright transfer
- covering letter (suggest referees?)

Scientific Community

Publisher

Scientific Community

 referees

“Quality”

“Quantity”

Editor: Intermediate

Scientific Community (referees)

Editor (e.g. Journal of Catalysis)
- assesses the quality (incl. novelty) of a manuscript
- rejects poor or deficient manuscripts (40-50%)
- assists authors to improve their manuscript

Referee: Enemy or Friend?

Often a helpful friend, but...

Ethical Obligations of Reviewers

- every scientist has an obligation to do a fair share of reviewing
- should refuse manuscripts outside his/her area of expertise
- should judge objectively, respect intellectual independence
- sensitive to conflicts of interest (e.g. his own future publications)
- refuse to review work of (co)authors that are too close
- treat manuscripts as confidential
- explain judgments, supported by references; no unsupported assertions
- should be alert to correct and complete citation of relevant work
- should act promptly, i.e. within 2-3 weeks
- should not use or disclose unpublished information without consent


Editor’s Decision

- acceptance
  (direct acceptance is rare)
- revision, minor or major
  (normal)
- rejection
  (25-35%)

Authors have the right of rebuttal !!!!!
Author:

• consider all comments carefully
• revise paper where appropriate
• write reply to the referee reports
• indicate actions taken
• submit revised paper asap
  (i.e. within 2-3 weeks)

Stage 5: Promoting your paper

Average number of citations:

1 per paper per year!

• send preprints & reprints to people who should know your work
• give presentations
• put abstract and best figure(s) on web page
• .................

References

• How to write a paper, (George M. Hall, Ed.), BMJ Publishing Group, London, 1994