PACN–INASP Post-Congress Workshop on Scientific Writing

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Workshop Goals

- To help researchers obtain knowledge and skills useful in
  - Writing and publishing journal articles
  - Giving oral and poster presentations
  - Preparing grant proposals
- To foster motivation and confidence with regard to writing, publishing, and presenting
- To promote sharing of the knowledge and skills obtained

Topics for Today

- Welcome and Introductions
- Approaching a Writing Project
- Choosing a Target Journal and Using Its Instructions to Authors
- The Structure of a Scientific Paper
- Preparing the Methods, Results, and Tables and Figures
- Preparing the Discussion, Introduction, and References

Welcome and Introductions

Thanks and a Welcome

- Thanks to
  - Supporters
  - Organizers
  - Hosts
  - Others
- A warm welcome

Introductions

- Attendees
  - Name
  - Affiliation
  - Field of work
  - Research topic
- Facilitator
  - Professor Barbara Gastel, Texas A&M University and AuthorAID
- Co-Facilitators
  - Dr Shileshi, Chemical Society of Ethiopia and Kotebe College of Teacher Education
  - Dr Pete Licence, University of Nottingham
  - Mrs Bethlehem Fetene, PACN
  - Dr John Clough, Syngenta
  - Dr Alejandra Palermo, RSC
  - Dr Amy Styring, RSC

Types of Sessions

- Lectures (with discussion interspersed; comments and questions welcome)
- Small-group discussions
  - Identifying key points from the lectures
  - Raising questions
  - Planning to apply the lecture material
  - Starting to revise parts of papers
- Brief reports from small groups

Intended characteristics of workshop

- Practical
- Interactive
- Enjoyable
- Productive

Some Tech Requests

- Please silence your phone.
- If you have an urgent phone call, please leave the room to talk.
- During the presentations, please do not use the Internet unless asked to do so.

AuthorAID

- A project of INASP (the International Network for the Availability of Scientific Publications)
- Purpose: to help developing-country researchers to write about and publish their work

Main AuthorAID Components

- Workshops
- Online resources
  - Resource library
  - Blog
  - E-learning
  - Discussion list
- Mentoring
- Networking
- Small grants

www.authoraid.info

Approaching a Writing Project

Overview

- Establishing the mindset (attitude)
- Knowing the ethics
- Preparing to write
- Doing the writing
- Revising your work

Establishing the Mindset

- Remember that you are writing to communicate, not to impress.
- Realize that those reading your work want you to do well.
  - Journal editors
  - Peer reviewers
  - Professors

    The purpose of their constructive criticism is to help you succeed.

Knowing the Ethics

- Authenticity (not fabrication)
- Accuracy
  - Providing complete data (not only those supporting your hypothesis)
  - Avoiding inappropriate manipulation of images such as photographs
  - Using appropriate statistical procedures

Knowing the Ethics (cont)

- Originality
  - Not republishing the same findings (except under special circumstances, with the original source cited)
  - Not submitting the same manuscript to two or more journals at once
  - Not dividing one small research project into many tiny papers (“salami science” or “cucumber science”)

Knowing the Ethics (cont)

- Credit
  - Citing sources of information and ideas (also aids credibility, helps in finding out more)
  - Avoiding excessive use of others’ words
    - Recording sources when copying items or taking notes
    - Placing in quotation marks, or indenting, items used verbatim
    - Perhaps drafting some items while not looking at the source materials

Knowing the Ethics (cont)

- Observing copyright and obtaining needed permissions
- Ethical treatment of humans and animals (and documentation thereof in publications)
- Disclosure of conflicts of interest
  - Financial
  - Other

A Resource on Ethics

On Being a Scientist: A Guide to Responsible Conduct in Research, 3rd edition (2009)

- From the US National Academies
- Largely for graduate students
- Available online at http://www.nap.edu/catalog.php?record_id=12192
- Video available at the same website

Preparing to Write

- Use published items as models.
- Obtain and review instructions.
- Perhaps consult a style manual—for example:
  - The ACS (American Chemical Society) Style Guide
  - Scientific Style and Format
- While you are gathering content, write down ideas that occur to you.

Preparing to Write (cont)

- Do lots of "prewriting"—for example:
  - Stack papers in the order you plan to cite them.
  - List points you want to make.
  - Perhaps make an outline.
- If you're having trouble formulating ideas, perhaps do something else for a while.

Doing the Writing

- Schedule specific times to write.
- Start with whatever part you find easiest.
- Don't interrupt your writing to search for small details.
- Realize that often in writing there is no "one right way" but rather a series of problems with more than one solution.

Revising Your Work

- Note: Good writing is largely a matter of good revising.
- First revise your writing yourself. Then get feedback from others and revise more.
- Consider having an editor help you.
- Avoid the temptation to keep revising your writing forever.

Questions to Consider in Revising

- Does the manuscript contain everything it should?
- Does it contain anything it shouldn't?
- Is all the information accurate?
- Is the content consistent throughout?
- Is everything logically organized?
- Is everything clearly worded?

Questions (cont)

- Are points stated briefly, simply, and directly? In other words, is everything concise?
- Are grammar, spelling, punctuation, and word use correct throughout?
- Are all figures and tables well designed?
- Does the manuscript comply with the instructions?

Wishing you much success with your writing projects!

Choosing a Target Journal and Using Its Instructions to Authors

Identifying a Target Journal

- Decide early (before drafting the paper). Do not write the paper and then look for a journal.
- Look for journals that have published work similar to yours.
- Consider journals that have published work you cite.

Some Factors to Consider

- Aims and scope of journal
- Audience
- Prestige
- Access
- Impact
- Publication time
- Quality of reproduction
- Publication costs, if any
- Likelihood of acceptance

Using the Journal's Instructions

- Obtain the journal's instructions from its website.
- Read the instructions to authors before starting to prepare your paper.
- Consult the instructions while preparing your paper.
- Check the instructions again before submitting your paper.

Some Questions the Instructions May Answer

- What categories of article does the journal publish?
- What is the maximum length of articles?
- What is the maximum length of abstracts?
- Does the journal have a template for articles? If so, how can it be accessed?
- What sections should the article include? What are the guidelines for each?

Some Questions (cont)

- What guidelines should be followed regarding writing style?
- How many figures and tables are allowed? What are the requirements for them?
- In what format should references appear? Is there a maximum number of references?
- In what electronic format should the paper be prepared?

Mini Exercise

- Look at the instructions to authors from a journal in which you might like to publish.
  - How long are the instructions?
  - What topics do the instructions address?
  - What else do you notice?
- Share your observations with people near you, and be ready to share them with the full group.

Beyond the Instructions

- Look at some recent issues of the journal. Doing so can help you gear your paper to the journal.

The Structure of a Scientific Paper

The IMRAD Format for Scientific Papers

- **I**ntroduction: What was the question?
- **M**ethods: How did you try to answer it?
- **R**esults: What did you find?
- **A**nd
- **D**iscussion: What does it mean?

A More Complete View

- (Title)
- (Authors)
- (Abstract)
- **Introduction**
- **Methods**
- **Results**
- **Discussion**
- (Acknowledgments)
- (References)

Some Other Structures

- With the methods section at the end (IRDAM)
- With a combined results and discussion section (IMRADRADRAD . . .)
- With a conclusions section at the end (IMRADC)
- Other
- Question: In your research area, what is the usual structure of papers reporting research?

Mini Exercise

- Look at a sample paper that you brought. Notice how it is structured.
  - Is it in IMRAD form? If not, what form is it in?
  - What else do you notice about its form?
- Compare your findings with those of some people near you.
- Be ready to report some observations to the full group.

Title

- The fewest possible words that adequately indicate the contents of the paper
- Important in literature searching
- Should not include extra words, such as “A Study of” or “Observations on”
- Should be specific enough
- Generally should not include abbreviations
- (Running title: short version of title—appears at tops of pages)

Mini Exercise

- Look at the title of an article that you brought. Consider
  - What’s good about the title?
  - What about the title might be improved?
- Compare your findings with those of some people near you.
- Be ready to report some observations to the full group.

Authors

- Those with important intellectual contributions to the work
- Often listed largely from greatest contributions to least
- Head of research group often is listed last
- In some fields, listed alphabetically
- Important to list one's name the same way on every paper

The Abstract

- Briefly summarizes the paper
- Should be organized like the paper (for example, in sort of a mini-IMRAD format)
- In some fields, there are structured abstracts (with standardized headings).

Orders of Reading and Writing Sections of a Paper

- People read the sections of scientific papers in various orders.
  - What's your favorite order? Why?
- You can write the sections of a scientific paper in any order.
  - What's your favorite order? Why?
- A convenient order in which to write the sections: Methods, Results, Discussion, Introduction

Preparing the Methods, Results, and Tables and Figures

Main Source of Information for These Lectures

- *How to Write and Publish a Scientific Paper, 7*th edition, by Robert A. Day and Barbara Gastel (2011)

The Methods Section

Purposes of the Methods Section

- To allow others to replicate what you did
  - In order to test it
  - In order to do further research
- To allow others to evaluate what you did
  - To determine whether the conclusions seem valid
  - To determine whether the findings seem applicable to other situations

Methods: Basic Information to Include

- In most cases, overview of study design
- Identification of (if applicable)
  - Equipment, reagents, organisms, etc used (and sources thereof)
  - Approval of human or animal research by an appropriate committee
  - Statistical methods

Methods: Amount of Detail to Use

- For well-known methods: name of method, citation of reference
- For methods previously described but not well known: brief description of method, citation of reference
- For methods that you yourself devise: relatively detailed description

Methods: The Words and More

- Should be written in past tense
- In some journals, may include subheads
- May include tables and figures—for example:
  - Flowcharts
  - Diagrams of apparatus
  - Tables of experimental conditions

Methods: A Suggestion

Look at the methods sections of some papers in your target journal. Use them as models.

The Results Section

The Results Section

- The core of the paper
- Often includes tables, figures, or both
- Should summarize findings rather than providing data in great detail
- Should present results but not comment on them
- (Note: Some journals, however, combine the Results and the Discussion.)

Verb Tense for the Results Section: Past Tense

Examples:

- A total of 417 samples were analyzed . . . .
- _____ increased, but _____ decreased.
- The median salary of these chemists was _____.
- Three of the mixtures exploded.
- This difference was not statistically significant.

Results Sections of Papers with Tables or Figures

- How much should the information in the text overlap that in the tables and figures?
  - Not extensive overlap
  - In general, text should present only the main points from the tables and figures
  - Perhaps also include a few of the most important data
- Remember to mention each table or figure. Do so as soon as readers might want to see it.

Mentioning Tables and Figures: Some Writing Advice

- In citing tables and figures, emphasize the finding, not the table or figure.
  - *Not so good*: Table 3 shows that chemists who attended the workshop published twice as many papers per year.
  - *Better*: Chemists who attended the workshop published twice as many papers per year (Table 3).

Results: A Suggestion

- Look at the results sections of some papers in your target journal.
- Notice items such as the following:
  - Length
  - Organization
  - Inclusion of subheads (or not)
  - Number of tables and figures
- Use these results sections as models.

Tables and Figures: Some Basics

Tables: A Few Suggestions

- Use tables only if text will not suffice.
- Design tables to be understandable without the text.
- Organize each table in a logical way.
- If a paper includes a series of tables, use the same format for each.
- Be sure to follow the instructions to authors.

Figures: A Few Suggestions

- Use figures (graphs, diagrams, maps, photographs, etc) only if they will help convey your information.
- Avoid including too much information in one figure.
- Make sure any lettering will be large enough once published.
- Follow the journal's instructions.

Discussion Question

- If you have data that could be presented in either a table or a figure, how do you decide which one to use?

A General Suggestion

- Look at tables and figures in journal articles presenting research similar to yours
  - In your target journal
  - In other good journals
- Use these tables and figures as models when designing your own tables and figures.

Sources of Further Information

- "*Almost* Everything You Wanted to Know About Making Tables and Figures," Department of Biology, Bates College (http://abacus.bates.edu/~ganderso/biology/resources/writing/HTWtablefigs.html)
- Writing and Publishing Scientific Papers, Part 2 (from China Medical Board course), accessible at http://www.authoraid.info/resource-library?type=all&subject=preparing_tables_and_figures&lang=all

Brief Exercise

- Look at the methods and results sections of the sample articles that you brought.
- For each, please notice the following:
  - How are these sections structured and worded?
  - Are there tables and figures? If so, how are they?
  - What do you notice that you could use as a model?
  - What questions do you have?
- Discuss your observations and questions with one or more people sitting near you. Be ready to present some to the full group.

Exercise on the Morning Presentations

- Please break into groups of about 4 people.
- Identify points from this morning that will be most useful for you to remember.
- State and discuss any questions you have about the lecture material.
- Be ready to present some main points and questions from the discussion.

Brief Discussion of Exercise

- What are some points from this morning that will be most useful to remember?
- What are some questions that group members have about this morning's lecture material?

The Discussion

Discussion

- One of the more difficult parts to write, because have more choice of what to say
- Often should begin with a brief summary of the main findings
- Should answer the question(s) stated in the introduction (or address the hypothesis or hypotheses stated in the introduction)

The Discussion: Some Possible Content

- Strengths of the study
  - For example, superior methods, extensive data
- Limitations of the study
  - For example: small sample size, short follow-up, incomplete data, possible sources of bias, problems with experimental procedures
  - Better to mention limitations than for peer reviewers and readers to think that you're unaware of them
  - If the limitations seem unlikely to affect the conclusions, can explain why

The Discussion: Possible Content (cont)

- Relationship to findings of other research—for example:
  - Similarities to previous findings (your own, others', or both)
  - Differences from previous findings
  - Possible reasons for similarities and differences

The Discussion: Possible Content (cont)

- Applications and implications—for example:
  - Possible uses of the findings (in industry, environmental policy, health care, etc)
  - Relationship of the findings to theories or models:
    - Do the findings support them?
    - Do they refute them?
    - Do they suggest modifications?

The Discussion: Possible Content (cont)

- Other research needed—for example:
  - To address questions still unanswered
  - To address new questions raised by the findings
- Other

Discussion (cont)

- Typically should move from specific to general, rather like an inverted funnel (opposite of introduction)
- In some journals, may be followed by a conclusions section
- In some short papers, is called “Comment” rather than “Discussion”

The Discussion: A Suggestion

- Look at the discussion sections of some papers in your target journal.
- Notice items such as the following:
  - Length
  - Types of content
  - Organization
  - Phrases commonly used
  - Citation of references
- Use these discussion sections as models.

The Introduction

Purposes of the Introduction

- To provide background
  - In order to help readers understand the paper
  - In order to help readers appreciate the importance of the research
- To identify the question(s) the research addressed
  - Sometimes stated as a hypothesis or hypotheses

Length of Introduction

- Articles in biomedical journals: tend to have short introductions (a few paragraphs or less)
- Articles in some other journals: tend to have long introductions
- How about introductions to articles in your research area?

Gearing the Introduction to the Audience

- Papers in relatively general journals: Introduction must provide basic background information.
- Papers in specialized journals: Introduction can assume that readers have more knowledge about the research topic.

Structure of the Introduction

- Introduction typically should be funnel-shaped, moving from general to specific
- A common structure:
  - Information on importance of topic
  - Highlights of relevant previous research
  - Identification of unanswered question(s)
  - Approach you used to seek the answer(s)
  - (In some cases, the main findings)

Overall Structure of a Paper: Like an Hourglass

The Introduction: A Suggestion

- Look at introductions of some papers in your target journal.
- Notice items such as the following:
  - Length
  - Types of content
  - Organization
  - Citation of references
- Use these introductions as models.

When to Write the Introduction

- Sometimes wise to write the introduction last
  - "Until you know what you're introducing, you can't introduce it."
- Sometimes useful to write it first, to help provide focus
- After writing all the sections of the paper, revise the paper as a whole (typically several times).

Citing References

Functions of References

- To give credit to others for their work
- To add credibility to your work by showing that you used valid information sources
- To help show how your work is related to previous work
- To help readers find further information

References: Importance of Accuracy

- Studies show that many references are inaccurate.
- For references to fulfill their functions, they must be accurate. Therefore
  - Make sure that you accurately state what the cited material says.
  - Make sure that all information in the citation (for example, author list, article title, journal title, volume, year, pages) is accurate.

Another Reason Your References Should Be Accurate

Often, authors whose work you cite will be your peer reviewers. Inaccurate references to their work will not impress them favorably.

Formats

- Various formats exist for citation in text—for example:
  - Accuracy of references is important (Day and Gastel, 2011).
  - Accuracy of references is important.[3]
- Various formats exist for items in reference lists—for example:
  - Pineda D. 2003. Communication of science in Colombia. Sci. Ed. 26:91-92.
  - Pineda D. Communication of science in Colombia. Sci Ed 2003;26:91-2.

A Reminder

Be sure to use the format that your target journal requests.

- For the citations in the text
- For the reference list

Citation Management Software

- Examples: EndNote, Reference Manager, RefWorks, Zotero
- Allows you to keep a database of references
- In many cases, provides the citations and references in the proper format for your target journal

Placement of Citations

- Ambiguous:
  - This compound has been found in humans, dogs, rabbits, and squirrels (Tuda and Gastel, 1997; Xie and Lozano, 2008; Flores, 2002).
  - This compound has been found in humans, dogs, rabbits, and squirrels.[1,4,7]
- Clear:
  - This compound has been found in humans (Tuda and Gastel, 1997), dogs (Xie and Lozano, 2008), and rabbits and squirrels (Flores, 2002).
  - This compound has been found in humans,[1] dogs,[4] rabbits,[7] and squirrels.[7]

Other Advice on References

- If you haven't read an item, don't cite it.
  - Discussion question: If an article isn't freely accessible online, how might you obtain it?
- Check each reference against the original source.
- Carefully follow the journal's instructions to authors.
- Use other articles in the same journal as models.

Brief Exercise

- Look at the introduction, discussion, and references of the sample articles you brought.
- For each, please notice the following:
  - How are the introduction and discussion structured?
  - How are references used?
  - What do you notice that you could use as a model?
  - What questions and other observations do you have?
- Discuss your observations and questions with one or more people sitting near you. Be ready to present some to the full group.

Small-Group Session

- Please meet in your groups.
- Identify points from this afternoon that will be most useful for you to remember.
- State and discuss any questions you have about this afternoon's lecture material.
- Start using material from today to revise your paper.
- Prepare a 3-minute summary of your group's discussion.

Suggested Evening Activity

If your schedule permits, review the notes from today, and consider how points presented apply to your work.

Feel free to do this exercise either individually or with one or more other workshop participants.