

SCIENTIFIC WRITING WORKSHOP

Date : 01 Nov 2022; 12.30 pm to 1.30 pm

Venue : OCH, Function Room 1

Presenter : Ms Sruthi Jagannathan, Office of Research, Duke-NUS Medical School

MY BACKGROUND IN SCIENCE COMMUNICATIONS

Since
July
2021

Currently working as Scientific Editor, Office of Research,
Duke-NUS Medical School.

2011-
2021

Worked at Mechanobiology Institute, National University of
Singapore: as Scientific Writer and Editor

Expertise

Writing feature/news stories, review-style articles
Editing manuscripts and grants
Analyzing complex scientific literature

WHAT WILL THIS WORKSHOP COVER: AGENDA

Day 1 Agenda:

- Why effective communication is important in science
- How to write with the reader/audience in mind
- Key elements of scientific writing
- Ways to emphasize the key message in the article
- Language tips to improve writing
- Overview of the writing process

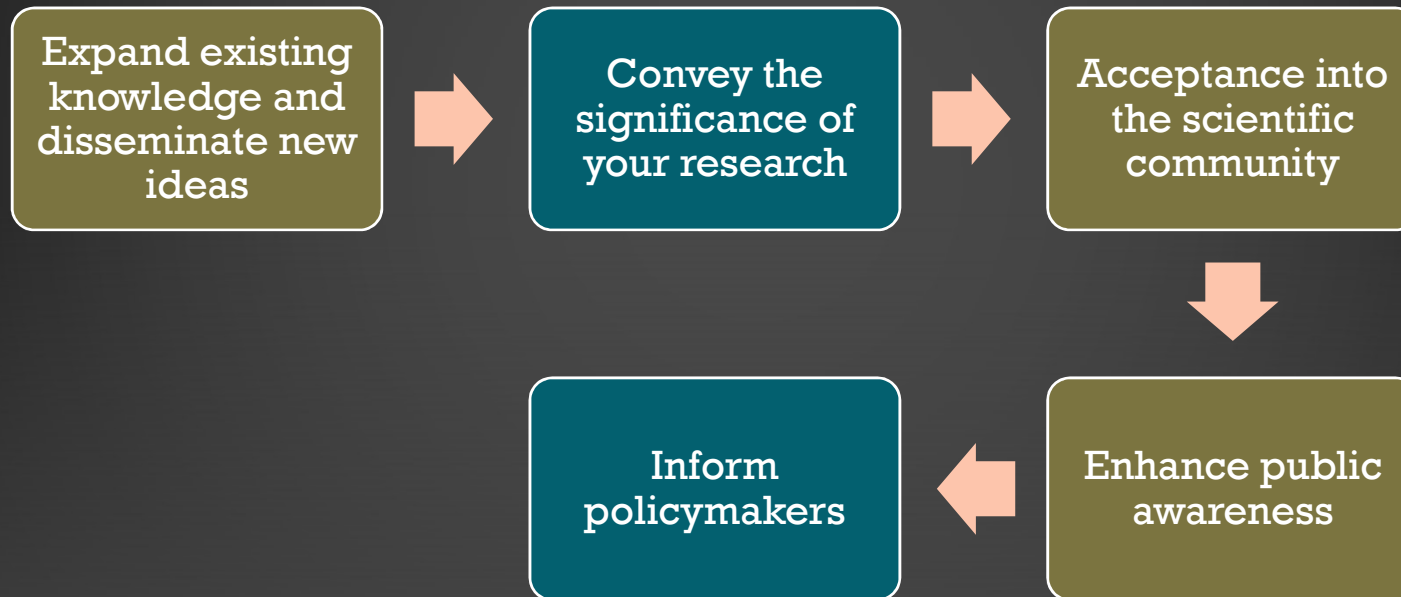
Day 2, Agenda:

- Preparing to write about your research
- Structure of a manuscript
- Composing the various sections of a manuscript
- Structure of a grant proposal
- Composing a convincing grant proposal

WHY IS EFFECTIVE COMMUNICATION IN SCIENCE IMPORTANT?

“Science is not finished until it is communicated”

- Mark Walport, UK's Chief Scientific Advisor (2013-2017)



GOOD WRITING SKILLS IN SCIENTISTS

Scientists write a lot
throughout their
academic/research career

Less of independent writing;
more of collaborative writing

Often involved in peer-
reviewing as part of editorial
boards

Regularly need to mentor
students and provide critical
feedback

WRITING FOR THE AUDIENCE

The main objective of scientific writing should be to **convince** the audience

Popular Science Articles

- General public/lay audience

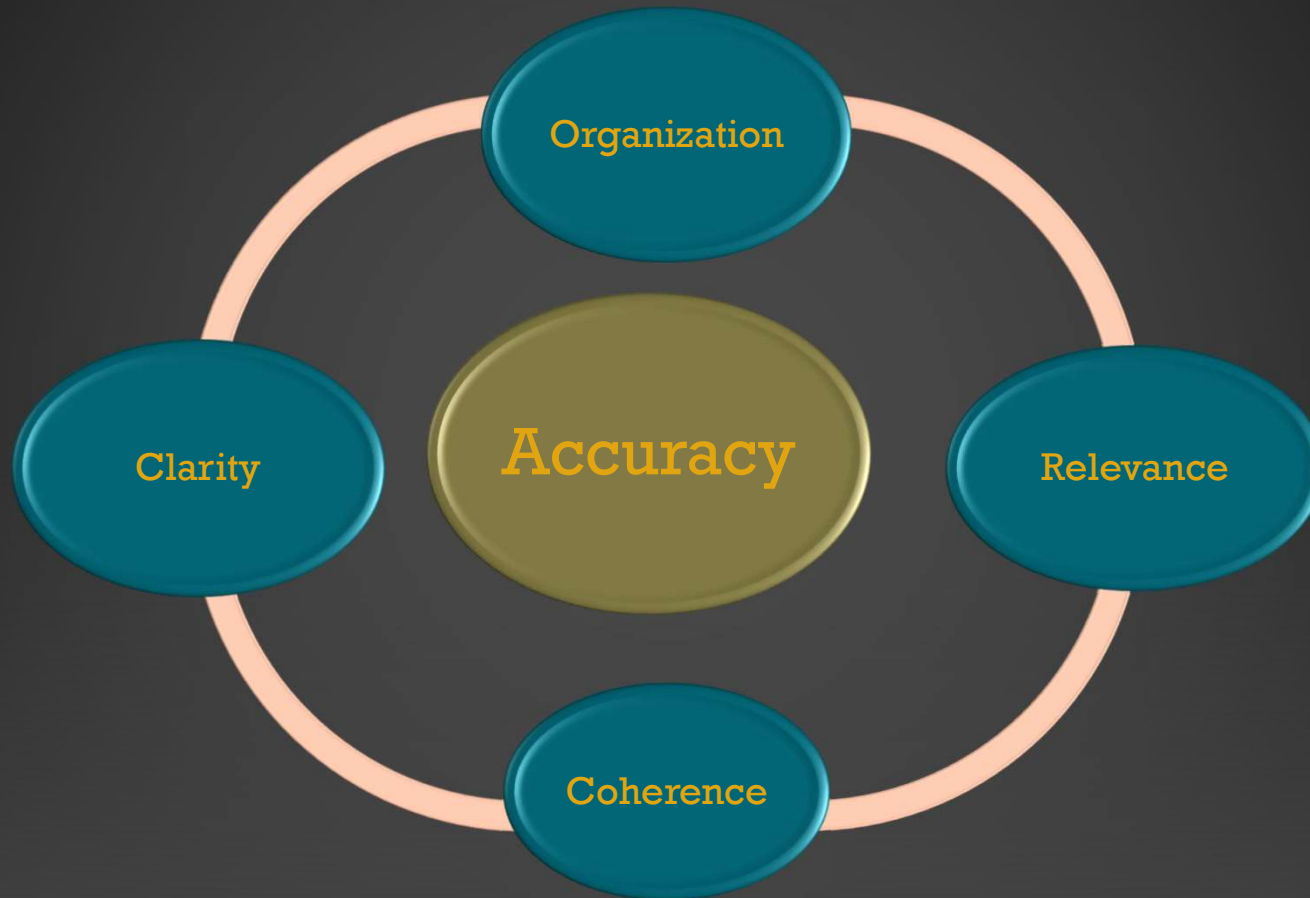
Scientific Manuscripts

- Peer reviewers; journal editors; broader scientific community

Research Proposals

- Grant reviewing panel

KEY ELEMENTS OF SCIENTIFIC WRITING



- ✓ Right content for each section, right order of the sections

Manuscripts



Research proposals



ORGANISING YOUR PARAGRAPHS

Main structural units around which the manuscript is built

One idea per paragraph

Short paragraphs → more white spaces → easy reading

First and last sentence of the paragraph as power positions : to emphasize important information

Logical flow of ideas within and between paragraphs
(sequential in time; general to specific)

Use of transition words (eg., thus, however, furthermore, in addition). Do not overuse!

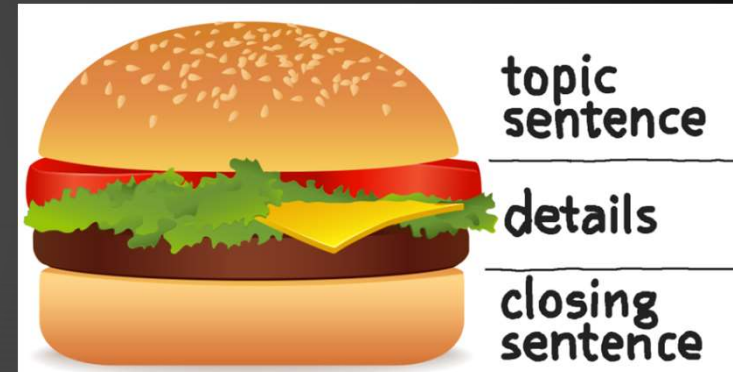


Image source: <https://gptutorsg.com/blog/how-to-effectively-craft-topic-sentences-and-avoid-common-mistakes/>

Q. What did you eat for breakfast today?

A1: I ate something protein-based.

A2: I woke up early today. I exercised for sometime, after which I walked my dog. Once I got back home, I took a shower and ate scrambled eggs for breakfast. I am now thinking what to eat for lunch.

A3: I wanted something protein-based. I ate scrambled eggs.

Research hypothesis: The immune responses identified here may form the basis of a novel therapeutic strategy against chemo-resistant breast cancer.

A. Cancers are a major public health concern globally. They are caused by the uncontrolled proliferation of cells and can affect any organ in the body. While benign tumors stay localised at the site where they originated, malignant cancers can spread to secondary regions in the body and are one of the leading causes of death in the world. Of the several types, breast cancers are one of the most commonly-occurring cancers in women. As is the case with most cancers, breast cancers have a poor prognosis when left undiagnosed in their early stages. Amongst the various subtypes, drug-resistant breast cancers are the most challenging to treat and usually lead to rapid decline in patients' condition. This has called for the development of novel therapeutic strategies that don't involve the use of drugs.

B. Breast cancers are one of the most commonly-occurring cancers in women. Similar to most cancers, breast cancers have a poor prognosis when left undiagnosed in their early stages. Amongst the various subtypes, drug-resistant breast cancers are the most challenging to treat and usually lead to rapid decline in patients' condition. This has called for the development of novel therapeutic strategies that don't involve the use of drugs.

Presenting the most important or related information

Helps the reader focus on the important points

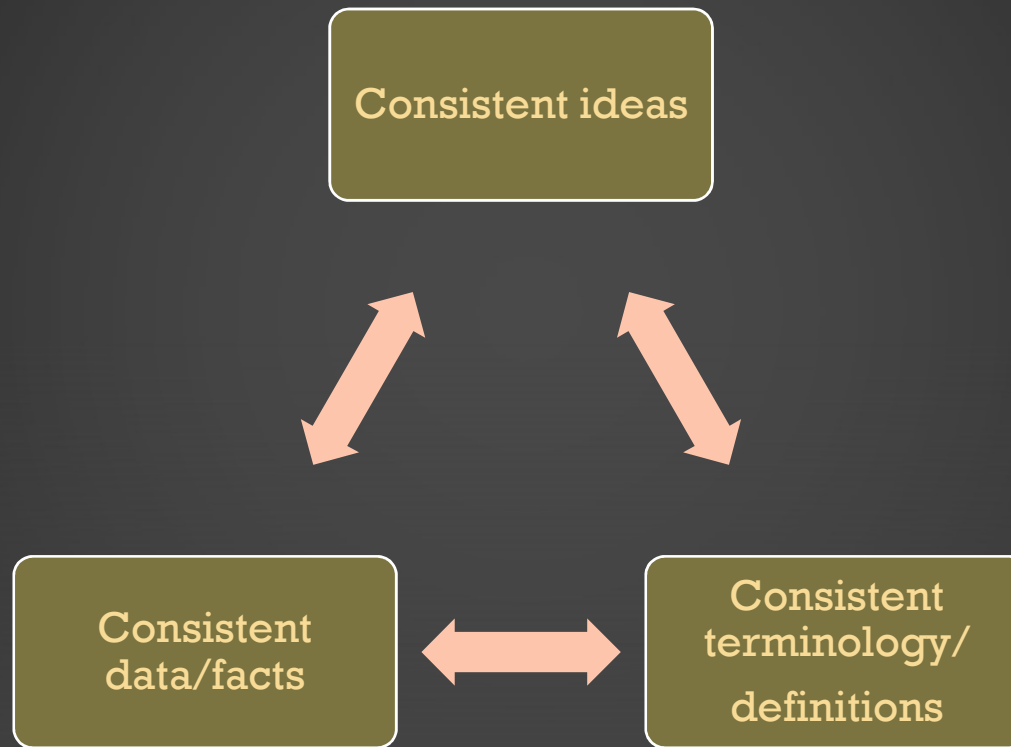
Helps to conform to the length guidelines for each section

Introduction: citing the most-related literature; not including very broad information

Methods/Results : presenting top 3-5 most-important findings observed and methodologies employed

Discussion: in the context of the study findings and the knowledge gap addressed in the introduction

- ✓ Maintaining consistency in writing



Organisation



Relevance



Coherence



**Clear
scientific
writing**



GETTING INTO THE SHOES OF YOUR AUDIENCE

Reading/interpreting text is an energy-consuming process

Bad scientific writing leads to the reader spending a disproportionate amount of energy to interpret the text

Structure vs substance interpretation: readers interpret based on structure first and then based on substance

More energy spent on deciphering structure: less energy left for deciphering substance

'Emphasis' key to conveying the take-home message to the reader

Placing the most significant message at strategic locations or power positions to guide reader interpretation:

- 1. Main clause vs subordinate clause*
- 2. End of sentence or paragraph*

Adding length/
bulking up the key
message

Use of semantics to show
significance

Repeating important
information at multiple
places

Main clause or independent clause:

- Have a subject and verb, and can stand on their own
- **Readers interpret content in main clause as more important**

E.g., protein A cannot phosphorylate protein B

Subordinate clause or dependent clause:

- Begins with a conjunction and cannot stand on their own
- **Readers interpret content in subordinate clause as less important**

E.g., when it is inactivated

Experiment time!!!!

EMPHASIS IN WRITING

Although technology helped us stay connected, the pandemic had led to increased loneliness and depression.

Although the pandemic had led to increased loneliness and depression, technology helped us stay connected.

EMPHASIS IN WRITING

Technology helped us stay connected, but the pandemic had led to increased loneliness and depression.

The pandemic had led to increased loneliness and depression, but technology helped us stay connected.

‘Emphasis’ key to conveying the take-home message to the reader

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EMPHASIS IN WRITING: THE LENGTH FACTOR

Although technology helped us stay connected, the pandemic had restricted social interactions and led to loneliness and depression.

Although the pandemic had led to loneliness and depression, technology revolutionised the way we interact with each other and helped us stay connected.

‘Emphasis’ key to conveying the take-home message to the reader

Placing the most significant message at strategic locations or power positions to guide reader interpretation:

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Technology helped us stay connected, but the pandemic had led to **devastating** effects on mental health.

‘Emphasis’ key to conveying the take-home message to the reader

Placing the most significant message at strategic locations or power positions to guide reader interpretation:

- 1. Main clause vs subordinate clause*
- 2. End of sentence or paragraph*

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LANGUAGE TIPS FOR GOOD WRITING

#1 Be clear and concise

#2 Don't try hard to make it stylish and elegant

#3 Use active verbs over nouns (avoid verb nominalisation)

#4 Keep the main verb close enough to the subject

#5 Use active voice over passive voice

#6 Use parallel sentence structure

#7 Avoid use of vague, very broad words

#8 Avoid use of jargons, acronyms, and words with no weight

ACTIVE VOICE VS PASSIVE VOICE EXAMPLES

To study the role of α -actinin-4 in the regulation of Shp2, two clones of *Actn4*^{-/-} MEFs were generated by the CRISPR/Cas9 method.

We generated two clones of *Actn4*^{-/-} MEFs using the CRISPR/Cas9 method to study how α -actinin-4 regulates Shp2 .

Phosphorylation of S6K is regulated by numerous cellular signals including nutrient availability.

Cellular signals, including nutrient availability regulates S6K phosphorylation.

The manuscript was written by me.

I wrote the manuscript.

VERBS OVER NOUNS PRACTICE

mTORC1 is a major regulator of ribosomal biogenesis and protein synthesis through the phosphorylation and activation of S6K.

mTORC1 regulates ribosomes biogenesis and protein synthesis by phosphorylating and activating S6K.

The sequencing of DNA samples was carried out by Next-Generation Sequencing.

DNA samples were sequenced by Next-generation sequencing.

To examine the requirement for raptor phosphorylation in the regulation of mTORC1 activity by energy stress, we carried out XXXXXX study

To examine if energy stress regulates mTORC1 activity through phosphorylated raptor, we carried out XXXXXX study.

SUBJECT-VERB DISTANCE EXAMPLES

We conclude that Shp2, in addition to contributing to F \bar{A} maturation and strengthening of mechanical forces at the F \bar{A} s, regulates the spatiotemporal dynamics of F \bar{A} s.

We conclude that Shp2 regulates the spatiotemporal dynamics of F \bar{A} s, in addition to contributing to F \bar{A} maturation and strengthening of mechanical forces at the F \bar{A} s.

Protein \bar{A} , as observed in our previous studies and reported by several other labs working in the field, bound to and activated protein B.

Protein A bound to and activated protein B, as observed in our previous studies and reported by several other labs working in the field.

PARALLEL SENTENCE STRUCTURE PRACTICE

I love reading, playing the piano, and to travel around the world.

I love reading, playing the piano, and travelling around the world.
I love to read, play the piano, and travel around the world.

Protein A plays a role in recruiting, phosphorylation and degradation of protein B

Protein A plays a role in the recruitment, phosphorylation, and degradation of protein B.

We isolated RNA from the tissue samples and RNA sequencing was performed.

We isolated RNA from tissue samples and performed RNA sequencing.

OVERVIEW OF THE WRITING PROCESS



Pre-writing

Writing

Revision

THE WRITING PROCESS

Pre-writing

70% of total
time

Collect,
generate and
organize
information

Think of key
messages to
present

Develop a rough
outline

Writing

10% of total
time

Put down the
ideas and facts
into organized
text

Write the first
draft quickly
and efficiently

Do not revise
while writing

Revision

20% of total
time

Read your work
out aloud

Eliminate clutter

Do a grammar
check

Get feedback
from others

References:

- Coursera: Writing in the Sciences
- <https://rede.tghn.org/workshops2020/manuscript-writing-2021/>
- <https://www.elsevier.com/connect/11-steps-to-structuring-a-science-paper-editors-will-take-seriously>
- How to write an effective research paper:
<https://www.youtube.com/watch?v=cMJWtNDqGzI>



See you tomorrow!!!

Thank you