Overview

1. Common mistakes (cont.)
2. Article Use (short Summary)
3. **Paper construction (Grammar Review)**
4. Ethical Issues
5. Q&A

Scientific Writing
-University of CAS-
Constructing a Research Paper I

Types of Research Publication

1. articles in Astrophysics, Theoretical physics, mathematics, economics, biostatistics, engineering
   * logical argumentation papers with general->specific structure
   * not in common IMRD structure (stars, black holes etc. difficult to experiment on)
   * known principles -> observations -> equations
   * mostly modeling work presented

Types of Research Publication

2. Review articles (sometimes called Meta-Analysis in Medical Research)
   * present historical view of the field, or
   * describe current state of knowledge, or
   * propose a theory or model to account for available data, or
   * call attention to some issue in a specific field

Types of Research Publication

3. Short Communications (SCs)

* very common in various fields
  all field disciplines: biology, archeology, geology
  folklore, architecture, ethnomusicology

* published in many regional journals, not necessarily in English

* usually report discoveries, case reports (Medicine), descriptions of technical improvements (Engineering)

* example: Michigan Birds and Natural History (published 4x a year), most articles published as SCs

Types of Research Publication

4. (Longer) Standard Empirical Research Papers

* typical organizational pattern of main manuscript body = IMRD

Introduction
Methods
Results
Discussion

in some journals:

Introduction
Results
Discussion
Methods

* in addition: Title, Abstract, Acknowledgements, Reference list, Supplementary Material

4. (Longer) Standard Empirical Research Papers

Title		-
Abstract	Unit 5:	Summary Writing
Introduction	Unit 2:	General-Specific; Unit 3: Problem-Solution; Unit 6: Critiques
Methods	Unit 3:	Process Descriptions
Results	Unit 4:	Highlighting Statements; Qualifications
Discussion	Unit 4:	Explanations
Acknowledgments		-
References		-

4. (Longer) Standard Empirical Research Papers

* Research environment highly competitive
-> to establish that research questions sufficiently interesting for publication
-> need to demonstrate familiarity with relevant literature
-> need to show that questions not answered by other groups before
-> need to compete against other articles for acceptance and recognition

-> need to prove that study is RELEVANT, SIGNIFICANT, NEW CONTRIBUTION

Positioning crucial!

Overview of Research Paper

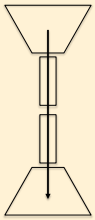
Fig. 10, p.222

Introduction (I)

Material & Methods (M)

Results (R)

Discussion (D)



General
↓
Specific

Specific
↓
General

Purpose of individual sections

Introduction	(WHY did you do it?)	providing rationale for manuscript attracting interest in work presented
Methods	(HOW did you do it?)	describes methodology, materials, procedures
Results	(WHAT did you find?)	findings are described findings are commented on
Discussion	(WHAT does it mean?)	provides explanation of what has been learned interprets data in the framework of literature

Important Reference for your Writing

-> as a result, each section different linguistic characteristics

Table 21 p. 223 – Features of the different sections

	Introduction	Methods	Results	Discussion
Present Tense	HIGH	low	low	HIGH
Past Tense	Mid	HIGH	HIGH	Mid
Passive Voice	low	HIGH	variable	variable
Citations	HIGH	low	variable	HIGH
Qualifications	Mid	low	Mid	HIGH
Commentary	HIGH	low	variable	HIGH

Standard Empirical Research Papers

-> similarities between Introduction and Discussion (on the one hand)

-> similarities between Methods and Results (on the other hand)

-> more 'concrete' inner sections, more 'conceptual' out sections

Order of discussing the different sections:

1. Methods
2. Results
3. Introduction
4. Discussion
5. Title
6. Abstract
7. Acknowledgement

1. Methods

* easiest section to write (method as means, not end, of experimental work)

* can be written while doing experiments

* all standard methods used in one lab written up in manuscript form?

* should be completed by end of experimental part

-> no loss of valuable time required for writing other parts

1. Methods

* usually divided into subsections

a) materials
b) apparatus
c) definitions
d) subjects/participants
e) statistical procedures

1. Methods

* in some journals extremely condensed (expanded versions in supplementary information)

* in other journal elaborately extended

TIP

-> discuss with your PI/ lab head what journals most likely chosen

-> study ***Instructions to Authors*** of all the relevant journals

1. Methods

* in social sciences, methods part very important, often described in great detail

* in natural science/engineering, standard methods often available
  -> not required in detail, usually reference + modifications sufficient

* development of method sometimes main point – different emphasis

2. Results

* compare to Material covered in Unit 4

* relevant concepts

a) Judging the right strength of claim
b) Using location statements
c) Highlighting key findings from the data
d) Rounding figures and making generalized comparisons

2. Results - Commentaries

Table 24. Commentary found in Results Sections

Type of Commentary	Number of Papers (max. = 20)
Justifying the methodology	19
Interpreting the results	19
Citing agreement with previous studies	11
Commenting on the data	10
Admitting difficulties in interpretation	8
Pointing out discrepancies	4
Calling for further research	0

Thompson (1993)

2. Results – Organization

* result section may or may not have subsections

-> to study before writing

* each section of particular pattern

1. Procedure/Justification (optional)
2. Location statement
3. Statement of general findings
4. More specific Statements
5. Example/Case/Commentary (optional)

2. Results – Organization

* in biomedical manuscripts, usually following structure:

1. In order to_____..., we _____... using ... [technique].

study	performed
investigate	initiated
test	crystallized
check	manipulated
verify	isolated
assess	overexpressed
identify	abolished
detect	incubated
analyze	analyzed

? can you find this construct in published papers of your choice?

2. Results – Organization

* in biomedical manuscripts, usually following structure:

2. main results

As shown in Figure 1a, ... resulted in ... _____.

an increase
were increased
were found increased
a reduction
were reduced
abolishing
was abolished
repression
was repressed

Results – Organization

* in biomedical manuscripts, usually following structure:

3. Commentary

These results _____ that....
Together, these results _____ that ....
In summary, these results _ _ that ...

suggest
suggested
indicate
indicated
show
showed
implies
implied

3. Introduction

* most important point: attract readership!

* different to course work: you always have a reader!

-> first part of introduction is to appeal to your audience

3. Introduction

Just as plants compete for light and space, so writers of research papers compete for acceptance and recognition!

-> writers commonly use organizational pattern that contains three "moves"

Table 26 p.243

3. Introduction
Create-A-Research-Space (CARS) Model

* used in response to two types of competition

1) Competition for research space
2) Competition for readership

Table 26 p.243

Move 1: Establishing a research territory

Move 2: Establishing a niche

Move 3: Occupying the niche

3. Introduction
Create-A-Research-Space (CARS) Model

Table 26 p.244

Move 1: Establishing a research territory

* showing that the general research area is

a) important, central, interesting, problematic, or relevant (optional)
b) introducing and reviewing items of previous research in the area (obligatory)

3. Introduction
Create-A-Research-Space (CARS) Model

Move 2: Establishing a *niche* (obligatory)

a) indicating a gap in the previous research
b) by extending previous knowledge

niche...context where a particular piece of research makes particular good sense

3. Introduction
Create-A-Research-Space (CARS) Model

Move 3: Occupying the niche

a) outlining purposes or stating the nature of the present research (obligatory)
b) listing research questions or hypotheses
c) announcing the principal findings
d) stating the values of the research presented
e) indicating the structure of the research paper

3. Introduction

Language Focus: Citation and Tense

* tense choice flexible
* two-thirds of all citing statements use one of these three patterns:

	TENSES USED
1) Reference to **single studies** (Researcher activity as agent) →	PAST
2) Reference to **areas of inquiry** (Researcher activity not as agent) →	PRESENT PERFECT
3) Reference to **state of current knowledge** (No reference to researcher activity) →	PRESENT

Language Focus: Citation and Tense

Examples

1) Single studies (Past Tense)

Jones (1997) investigated the cause of illiteracy.

The causes of illiteracy were investigated by Jones (1997).

Language Focus: Citation and Tense

Examples

2) Area of inquiry (Present Perfect)

The causes of illiteracy have been widely investigated (Jones 1977, Ferrara 2000, Hyon 2004).

There have been several investigations into the causes of illiteracy (Jones 1977, Ferrara 2000, Hyon 2004).

Several researchers have studied the causes of illiteracy[1-3].

Language Focus: Citation and Tense

Examples

3) State of current knowledge (Present)

The causes of illiteracy are complex (Jones 1977, Ferrara 2000, Hyon 2004).

There have been several investigations into the causes of illiteracy (Jones 1977, Ferrara 2000, Hyon 2004).

Illiteracy appears to have a complex set of causes[1-3].

Language Focus: Citation and Tense

1) Jones (1997) found that illiteracy ***was*** correlated most closely with poverty.
-> maybe today that previous finding/assumption not valid any longer (in the ***past*** only)

2) Jones (1997) found that illiteracy ***is*** correlated most closely with poverty.
-> writer implies a ***wider generalization*** is possible (into the ***present***)

Move 2 – Establishing a Niche

* establishes the motivation for the study

* Move 2 connects move 1 (What has been done?) with Move 3 (What is present research about?)

* indicates the gap in knowledge

* usually, only one single sentence (or even half a sentence)

Example

Animals make feeding decisions based on their nutritional state, ***however***, how exactly metabolic information is sensed by the nervous system ***remains unknown***.

Language Focus: Negative Openings in Move 2

However, little information...
, little attention...
, little work...
, little data...
, little research...
, little evidence...

Uncountable

However, few studies...
, few investigations...
, few researchers...
, few attempts...
, few reports...
, few calculations...

Countable

Language Focus: Negative Openings in Move 2

To Note 2:

No studies/data/calculations... ***None*** of these studies/findings/calculation...

BEWARE: be absolutely sure that there are NO other studies!

Trick: ?

Language Focus: Negative Openings in Move 2

To Note:

No studies/data/calculations... ***None*** of these studies/findings/calculation...

BEWARE: be absolutely sure that there are NO other studies!

Trick: ***To our knowledge***, no other studies have shown...

Move 2: Raising a question or a hypothesis

However, it remains unclear ***whether***...

It would thus be of interest to learn ***how***...

If these results could be confirmed.., they would provide strong evidence for...

The findings suggest that this approach might be less effective ***when***...

It would seem, therefore, that further investigations are needed ***in order to***...

-> various sentence connectors available (apart from ***however***)

Move 3: Occupying the Niche

Completing an introduction

Four possible final elements (not all found in scientific papers)

a) research questions or hypothesis (commonly requested by biomed journals)

b) announcing principle findings (often rejected by journals, too often inserted by authors)

c) value of research presented (better kept for discussion section)

d) structure of the research paper (rarely encountered in biomed journals)

4. Discussion Section

* most problematic section to provide general guidelines
* varies considerably, both among disciplines and among journals in the same discipline
* life sciences: long discussion imply weak methods and results
* social sciences: long discussions considered paramount for successful paper
* authors can assume that reader familiar with results and methods -> greater freedom

4. Discussion Section

* principal difference to Results section:

Results deal with facts -> facts are descriptive

Discussions deal with points -> points are interpretive

4. Discussion Section

* more than just summary of results
* they should be a combination of some of the following points:

more theoretical
more abstract
more general
more integrated with the field
more connected to the real world
more concerned with implications

4. Discussion Section

* start with general reorientation to the study as a whole

some skeletal expressions:

In this paper we have investigated...
The main purpose of this paper has been to...
The survey reported on in this study has produced a wealth of data.

4. Discussion Section

Table 27 Discussion moves, p. 270

Move 1	points to consolidate your research space	obligatory	extensive, longest part
Move 2	points to indicate the limitations of your study	optional but common	usually short
Move 3	points to recommend a course of action and/or to identify useful areas of further research	optional, though quite common in biomed papers	usually short

4. Discussion Section

* considerable variation, but some patterns:

a) **short summary of main results**
b) **discussion of literature**
---
c) general conclusion
d) referring to a theory
e) commenting of methodology
f) limitations of study

4. Discussion Section

* considerable variation, but some patterns:

a) **short summary of main results**
b) **discussion of literature**
---
c) general conclusion
d) referring to a theory
e) commenting of methodology
f) limitations of study

Opening a Discussion Section

Table 28 Details of the Opening Move

Move 1a	Report your accomplishments by highlighting major findings
Move 1b	Relate and evaluate your data in the light of previous research
Move 1c	Interpret your data by making suggestions as to the reasons for your results
Move 1d	Anticipate and deal with potential criticisms

Discussion Section

Language Focus: Expressions of Limitation

It should be noted that...
This analysis has concentrated on...
The findings of this study are restricted to...
This study has addressed only the question of...
The limitations of this study are clear:...
We would like to point out that we have not...

Discussion Section

Language Focus: Expressions of Limitation

Typical openings for statements about conclusions NOT to be drawn

However, the findings do not imply...
The results of this study cannot be taken as evidence for...
Unfortunately, we are unable to determine from this data...
The lack of...means that we cannot be certain...

Discussion Section

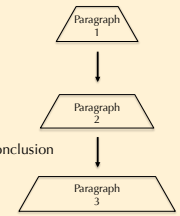
Cycles of Moves

* each paragraph or section covers one result

* same procedure repeated for each section

* starting with specific result –> move to more general conclusion

* such cycling far less common in Introduction



5. TITLES

* usually written last
* probably the part that go through most rounds of revisions
* your article will be known by its title
* good titles should attract readers

Title Requirements

* should indicate the topic of the study
* should indicate the scope of the study (significance)
* should be self-explanatory to readers in the field

Title Requirements

* in some cases nature of study to be included (experiment, case report, survey)
* length of title journal-specific, but usually not longer than ~20 words
* in some journal, title more like full sentences
* in others, short and lacking all unnecessary words (articles, verbs)
* avoid 'clever', 'joke', or 'trick' titles

TIP: follow the conventions of your journal of choice (Instructions to authors)

6. Abstracts

Approach 1: Result-driven Abstract
-> mostly about findings

Approach 2: Summary Abstract
-> contains synopses of all sections of your paper

6. Abstracts

Subheadings (usually not visible)

Background
Aim
(Method)
Results
Conclusion

Abstracts – Tense Use

* Opening statement usually in PRESENT or P PERFECT
* Results mix of PAST and PRESENT
* Conclusions almost always in PRESENT

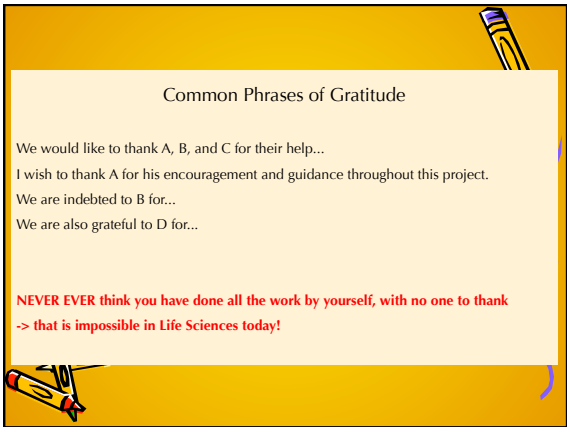
-> choosing present tense produces effect of **liveliness and contemporary relevance**

-> often used in journals like Science and Nature

Acknowledgements

"...the first thing I want to know is who has been talking to whom."

1. Financial Support
2. Thanks
3. Disclaimers


Common Phrases of Gratitude
We would like to thank A, B, and C for their help...
I wish to thank A for his encouragement and guidance throughout this project.
We are indebted to B for...
We are also grateful to D for...
NEVER EVER think you have done all the work by yourself, with no one to thank
-> that is impossible in Life Sciences today!