ENGLISH FOR SCIENCE AND TECHNOLOGY

Research Paper (III)
Macrostructure

- Primary structure: sections
- Secondary structure: moves or sections’ parts
Macrostructure

Primary structure

IMRD pattern. Swales (1990)

Procedure

Title

Abstract

Introduction

Methods/Materials

Results

Discussion

Acknowledgments

References
Purpose

○ Introduction
  ● State the problem
  ● Attract interest in the topic

○ Methods
  ● Describe methodology, materials or subjects and procedures

○ Results
  ● Describe findings - presentation of data

○ Discussion
  ● Give account of what has been learned in the study.

○ What was the problem?

○ How did you study the problem?

○ What did you find?

○ What do these findings mean?
Introduction

Swales (1990)

- Establishing a research territory
- Establishing a niche
- Occupying the niche
Moves in Research Paper Introductions (Swales, 1990)

- Establishing a research territory
  - By showing that the general research area is important, central, interesting, problematic, or relevant in some way (optional)
  - By introducing and reviewing items of previous research in the area (obligatory)
- Establishing a niche
  - By indicating a gap in the previous research, or by extending previous knowledge in some way (obligatory)
- Occupying the niche
  - By outlining purposes or stating the nature of the present research (obligatory)
  - By listing research questions or hypothesis (in some fields)
  - By announcing principal findings (in some fields)
  - By stating the value of the present research (in some fields)
  - By indicating the structure of the RP (in some fields)
Occupying the niche

By outlining purposes or stating the nature of the present research (obligatory)

- Purposive (P) The author or authors indicate their main purpose or purposes
  - The aim of the present paper is to give...

- Descriptive (D) The author or authors describe the main feature of their research.
  - This paper reports on the results obtained...
By listing research questions or hypothesis (Optional)

- This paper uses a sample to investigate whether one’s occupational status influences the importance one attributes to maintaining overall appearance, and occupation influences one’s choice of type of hair grooming establishment. Specifically, we test two hypothesis...
Occupying the niche

By announcing principal findings (Optional)

If there is an Abstract, do you need to give the main findings three times?
  - Abstract
  - Introduction
  - Results
By **stating the value of the present research** (Optional)

- Discussion: Give account of what has been learned in the study
  
  - The present work extends the use of the last model to asymmetric, body-vortex cases, **thus increasing the range of flow patterns that can be investigated**. In addition, an effort is made to improve the numerical procedure to accelerate the convergence of the iterative solution and to get a better rollup of the vortex lines representing the wake.
Occupying the niche

By outlining the structure of the text
(Optional)

- When your text is unusual in some way, such as not using a standard IMRD format.
- In theoretical physics, mathematics, and in those fields (biostatistics, engineering, economics) that use computer modeling the standard IMRD pattern does not apply. They have a general-specific structure where argument moves typically from known principles, to observations, and then to equations designed to account for the observed phenomena.
Occupying the niche

By outlining the structure of the text (Optional)

- The plan of this paper is as follows. Section II describes the current arrangements for regulating exchange rates within the EC. In Section III a theoretical model is constructed which is designed to capture these arrangements. Experimental parameters are then tested in Section IV. Finally, Section V offers some suggestions for the modification of the current mechanisms.
Materials and Methods

- Describe methodology, materials or subjects and procedures
Methods

- The easiest section to write
- Describes how materials were used in the experiment and how the data were collected, so that others can repeat the experiments.
- Sections are variable-common subsections:
  - Materials
  - Apparatus
  - Subjects/participants
  - Statistical procedures
The technician identifies the virus strains in the lab. The technician separately grows and harvests the virus. The technician purifies and inactivates the virus. The technician blends the inactive virus strains together with a carrier fluid and dispenses them into vials.
Results

- Describe findings
- Presentation of data
Emerging results pattern

- Procedure/justification (optional)
- Location statement
- Statement of general findings
- More specific statements
- Example/Case/commentary (optional)
Results

- Description of findings, accompanied by variable amounts of commentary

- Two ingredients:
  - Overall description
  - Presentation of data
Presentation of data

- Sometimes data is displayed in a table, graph, figure, or some other kind of nonverbal illustration and is later incorporated in the main text. These writing subtasks have been called *data commentaries*.

- There are two dangers:
  - To simply repeat in words what the data has expressed in nonverbal form, i.e. to offer description rather than commentary.
  - To read too much into the data and draw unjustified conclusions.
Data commentary

- Purposes (at least three of these):
  - Highlight the results
  - Assess standard theory, common beliefs or general practice in light of the given data.
  - Compare and evaluate different data sets.
  - Assess the reliability of the data in terms of the methodology that produced it.
  - Discuss the implications of the data.
Structure of data commentaries

- Elements in the following order:
  - Location statements and/or summary statements
    - (refer readers to important information in a table, chart, graph or other figure—a kind of metadiscourse)
  - Highlighting statements
    - (central section, are generalizations that can draw from the details of the data displayed)
  - Discussion of implications, problems, exceptions, recommendations, etc
Example:

Table 5 shows the most common sources of infection for U.S. businesses. As can be seen, in a great majority of cases, the entry point of the virus infection can be detected, with e-mail attachments being responsible for nearly 9 out of 10 viruses. This very high percentage is increasingly alarming, especially since with a certain amount of caution such infections are largely preventable. In consequence, e-mail users should be wary of all attachments, even those from a trusted colleague. In addition, all computers used for e-mail need to have a current version of a good antivirus program whose virus definitions are updated regularly. While it may be possible to lessen the likelihood of downloading an infected file, businesses are still vulnerable to computer virus problems because of human error and the threat of new, quickly spreading viruses that cannot be identified by antivirus software.
Tables and Figures

- Table 5 shows the points of entry of computer viruses for U.S. businesses.
- Table 2 provides details of the fertilizer used.
- Figure 2 plots the two series for the last five years.
- Figure 4.2 gives the results of the second experiment.
- The most common modes of computer infection are shown in Table 5.
- The details of the fertilizer used are provided in Table 2.
- The two series for the last five years are plotted in Figure 2.
- The results of the second experiment are given in Figure 4.2.
Location elements

- Table 5 shows *that* home disks are the major source of computer viruses.
- Table 2 gives the active ingredients in the fertilizers.
- Figure 4.2 suggests *that* the experimental results confirm the hypothesis.
Location elements

- Indicative summaries merely indicate what kind of research has been done.
  - Table 5 shows the most common sources of infection.

- Informative summaries additionally give the main results.
  - Table 5 shows *that* e-mail attachments are the most common source of infection.
Linking as-clauses

- As shown in Fig. 1 and Fig. 2, the companies used in this survey varied significantly in geographical location, size, and method of operation.
- As can be seen in Table 5, the overall rate of recall, while low, also showed considerable variation.
Highlighting Statements

- Central sections of data commentaries - Generalizations drawn from the details of the data display.
  - Spot trends or regularities in the data.
  - Separate more important findings from less important ones.
  - Make **claims of appropriate strength**.

- Organization: usually ordered from general to specific, i.e., major claims are followed by minor claims.
Appropriate Strength of claim

- Ways of moderating
  - Expressing probability
    - Modal auxiliary (may, might, could...)
    - Likely, unlikely, possible, probable
  - Distance
    - Semi-auxiliaries (seems, appears)
    - According to...., based on ....
  - Generalization
    - Tend
      - Many, in most..., a majority of...
  - Weaker verbs
    - Unsound policies of the IMF led to/contributed to the financial crisis.
Highlighting statements

- Qualifying comparisons
  - Fifty-six percent of girls reported restrictions on going out late at night as opposed to 35% of boys.
    - Problem: reader unable to read the numbers
  - Instead opt for:
    - More girls reported restrictions on going out late at night than did boys.
    - Fewer boys reported restrictions on going out late at night.
      - Problem: vagueness of more and fewer.
Alternatives

- Almost exactly twice as many boys reported...
- A marginally smaller percentage of girls reported...
- Slightly over twice as many boys reported...
- Close to three times as many boys reported...
- Boys exceeded girls in the times they reported... by a ratio of 2.5 to 1.
Discussion of implications, problems, exceptions, recommendations...

- Requires original thinking
- Find a way to discuss data.
- Such a discussion can help you position yourself as knowledgeable: offer a brief explanation and perhaps suggest what work could be done to overcome problems.
Discussion

• Give account of what has been learned in the study-answer questions raised in the Introduction
- should be more than a summary (interpretative).

- Enlarge upon the significance of your new results and explain how they add to existing knowledge.

- Should go beyond the results, describe a series of points
Discussion moves

1) Points to consolidate your research space (obligatory)
   - Report your accomplishments by highlighting major findings.
   - Relate and evaluate your data in the light of previous research.
   - Interpret your data by making suggestions as to why your results are the way they are.
   - Anticipate and deal with potential criticisms (only if necessary).

2) Points to indicate the limitations of your study (optional)

3) Points to recommend a course of action and/or to identify useful areas of further research (optional)
Linguistic features

- Phrases of generality (Move 1)
  - Overall
  - In general
  - On the whole,
  - In the main,...
  - With... exception(s)...    
  - The overall results indicate...
  - The results indicate, overall, that...
  - In general, the experimental samples resisted...
  - With one exception, the experimental samples resisted...
Expressions of limitation (Move 2)

- For stating limitations in one’s research scope.
  - It should be noted that this study has been primarily concerned with...
  - 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...

- For stating that certain conclusions should not 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...
A useful alternative is to place the limitation in an opening phrase.

- Notwithstanding its limitations, this study does suggest...
- Despite its preliminary character, the research reported here would seem to indicate...
- However exploratory, this study may offer some insight into...
Hedges

- Methods and Results: objective recounting
- Discussion: subjective

Higher incidence of hedging:
authors put forward controversial ideas or interpretations and hence most feel the need of protecting themselves from counter argument or other forms of attack.