Two main types of sections according to communicative purpose

Framing sections
Purpose: to place the RR into a larger context

Core sections
Purpose: to describe the actual research work

Variations in the organization of the main sections
- I+M+R+D / I+R+D+M
- I+M+R&D / I+R&D+M

Two main types of headings in M-sections
- IMRAD: Methods section, Materials and methods, Experimental (generic terms)
- Topic-specific headings referring to the specific method or MADT, for example:
  - Data collection
  - Case study
  - Protein microarrays
- Subheadings in RAs are always topic-specific headings

M-Sections
SECTION ORGANIZATION AND HEADINGS AND SUBHEADINGS

Framing sections

Introduction: Links the problem investigated to the common ground (I-section)

Core sections
- Methods: Describes the means applied or developed to deal with the problem (M-section)
- Results: Describes the novel outcomes achieved (R-section)

Discussion: Links the novel findings to the common ground and shows their significance for the field (D-section)
Methods Downplayed

Methods downplayed in exp journals

Journals:
- Biochemistry
- Cell
- Journal of Biological Chemistry
- Cell Biology Journal of Molecular Biology
- Molecular/Cellular Biology
- Physical Review, Physical Review Letters
- Proceedings of the National Academy of Sciences

350 articles: The 1st 10 articles of the third issue of each journal every 15th year from 1944 to 1989 (Only 5 of the journals were being published in 1944, 7 in 1959, and 11 in 1974)

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of Method down-sections</th>
<th>No. % Method down-sections played</th>
</tr>
</thead>
<tbody>
<tr>
<td>1944</td>
<td>46</td>
<td>0 0%</td>
</tr>
<tr>
<td>1959</td>
<td>68</td>
<td>11 16%</td>
</tr>
<tr>
<td>1974</td>
<td>110</td>
<td>30 27%</td>
</tr>
<tr>
<td>1989</td>
<td>120</td>
<td>54 45%</td>
</tr>
</tbody>
</table>

Variations in the organizations of main sections in topic specific RAs

- **Series sections:**
  consecutive sections all referring to the same topic, e.g.:
  - I+M+R+R+R+D
  - I+M(existing)+M(novel modifications)+R+D
  - I+M+M+M+R&D

Example of series sections for M-sections

- **I+M**(theory) + **M**(existing model) + **M&R**(novel modification) + **D**

  - **Introduction (I)**
  - **Assumptions (background theory) (M)**
  - **Model (existing model) (M)**
  - **Coherence calculations (novel contribution) (M&R)**
  - **Results (Verification results) (R)**
  - **Discussion (D)**

Example of series sections headings for an M-section

- **Topic-specific headings,** all referring to aspects of the method or MADT:
  1. Introduction (I)
  2. Aerosol Generation and Sampling (M)
  3. Processing and Conditioning of Soot (M)
  4. DMA–APM Measurements (M)
  5. Results and discussion (R&D)

Paragraphing in M-sections

- **Top-down organization is common in many M-section paragraphs**
  - **TSs will focus on aspects of the method**
  - **In some M-sections, (some) paragraphs may NOT have TSs, only Sus**
    - Such "topless paragraphs" are most common when standard procedures and methods are described.
  - **Headings and subheadings establish topic.**

- **Combined methods and results sections**
  - I+M&R+R(validation)+D:
    - Only when the main contribution of the RA is a novel or modified MADT
Example of top-down paragraph from an M-subsection (topic-specific)

4. The surveyed building

TS The building surveyed was a Central London architects’ office (Reid Architecture), a 1950s building refurbished in 2001/2002.

Su1 The open plan offices are located on three floors… each with approximately 32 workstations (in a similar arrangement) at an occupant density of 1 person per 7.7 m² (Fig. 1), which is higher than recommended by the British Council of Offices Guide (2005).

Su2 Each floor has windows along almost the whole length of two sides (facing south-east and south-west) ...

Main communicative purposes of M-sections:

- To clarify how the method or MADT functions / was applied (Informative)
- To demonstrate that the method or MADT was correctly applied, i.e.,
  - to establish the credibility of the means used (Persuasive)

Example of a “top-less” paragraph from an M-subsection (IMRAD)

2.2 Experimental design

Su1 The treated SFW was digested in anaerobic batch digesters, using wide-mouth 1-L Erlenmeyer flasks which had a working volume of 0.6 L.

Su2 Each bioreactor had a gas-tight rubber stopper with an outlet equipped with a sampling septum for withdrawing biogas samples, and a gas-tight bag for collecting biogas.

Other possible communicative purposes of M-sections:

- To establish that (an aspect of) the method or MADT was:
  - was valid for dealing with the problem investigated (Informative/persuasive)
  - especially interesting or innovative (Informative/persuasive)
  - to establish a basis for claiming novelty (Informative) in the R- or R&D-section
  - To allow for reproduction (Informative)

M-Sections

COMMUNICATIVE PURPOSES

Main communicative purposes of M-sections: Reproducibility

- Journals vary in the degree to which their methods descriptions would be sufficient to reproduce the method.
- All methods descriptions must establish credibility, i.e., demonstrate convincingly that the means was viable and correctly carried out
  - This is the focus in our course
Variation in M-sections depending on the main contribution of the RA

- The main novel contribution may be:
  - New findings, insights, data produced using an existing method or MADT:
    - The M-section describes the existing method applied (possibly with modifications)
    - The R-section describes the novel contribution

Variation in M-sections depending on the main contribution of the RA

- The main novel contribution may be:
  - a new or modified method or MADT
  - The M-section describes the novel contribution
  - The R (R&D)-section describes:
    - the value, interest, novelty of the method/MADT
    - possibly the data supporting the claims of novelty and value
    - and/or verification results, entitled, for example, Performance, Test runs, Simulations, Results!!
    - But the novelty contribution is the method/MADT

Skim headings, subheadings and TSs

- To determine whether:
  - an existing method was used:
    - in standard ways
    - modified slightly
    - modified in important ways
    - a new or modified method is the major contribution

- To gain an overview of:
  - the main elements/type of approach/steps used/procedures used

Skim headings, subheadings and TSs

- To keep current about methods / MADT development in the field
- To find any innovative methodological aspects (typically in longer paragraphs with indicators of modifications in the TS)

Reading M-/M&R-sections actively

Skim headings, subheadings and TSs

- To determine whether:
  - an existing method was used:
    - in standard ways
    - modified slightly
    - modified in important ways
    - a new or modified method is the major contribution

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Skim headings, subheadings and TSs

- To keep current about methods / MADT development in the field
- To find any innovative methodological aspects (typically in longer paragraphs with indicators of modifications in the TS)

Note how the discourse is used to establish credibility

- Is the discourse:
  - purely factual?
  - factual with brief explanations (a phrase from time to time)?
  - factual with lengthy explanations (full sentences)?
  - evaluative/argumentative about the value and interest of (aspects of) the means used / developed?

- Note what discourse is typical for different journals / areas / particular authors
Read actively to figure out writer purpose

- Is the author’s purpose to show that the research was
- carried out well and correctly
- carried out especially well (e.g. was very thorough, precise, reliable, non-invasive, etc.)?
- valid for dealing with the problem?
- superior to other existing / common means?
- innovative? clever? inexpensive? novel?

M-section: main purpose and topic

- Main topic: the means used to study or solve the problem, i.e., the inputs, materials, subjects, etc. used or studied and the method or MADT (model, approach, device, design or theory) applied or developed
- Main purposes: to describe the means used (informative purpose) and to establish credibility by showing that it was correctly applied and/or that it was a valid means of dealing with the problem investigated, sometimes to allow for reproducibility or to establish a basis for claiming novelty (persuasive purpose).

Main communicative purposes of M-sections: Reproducibility

- In laboratory-experimental RAs, notice whether the methods descriptions
- would allow a specialist to reproduce the methods
- only demonstrate its credibility to a knowledgeable referee or reader

Moves in M-Section

- Move 1: Establish a context for credibility: orient the reader to the method / MADT / and provide background to ensure they will be able to understand and appreciate its interest and value
- M-Move 2: Establish credibility: demonstrate by factual description/logical explanation that the inputs / means were applied correctly according to the standards of the field
- M-Move 3: Strengthen credibility: show that the means / inputs were particularly good / better than previous ones / make a methodological contribution beyond being correct or viable / dealt with problems in interesting or clever ways

Moves and steps in M-sections

Showing that a credible, superior or novel means was used to deal with the problem investigated

M-Move 1

Establish a context: orient the reader to the method / MADT / and provide background to ensure they will be able to understand and appreciate its interest and value

Optional in many journals, especially when the means used is standard.
Common steps in M-Move 1

**Orienting steps:**
- **Step:** Overview of the section / a subsection, e.g., important main ideas/aspects (*section overview*)
- **Step:** Presentation of the section goals in applying (aspects of) the means (*main goals*)
- **Step:** Overview of the main inputs and procedures/e.g., materials / subjects studied / components/steps/techniques (*inputs and procedures overview*)

**Common steps in M-Move 1**

**Orienting steps:**
- **Step:** General reasoning/assumptions behind the means used or developed (*general reasoning/assumptions*)
- **Step:** Help locating information/understanding tables/graphs/(sub)section organization (*help reading*)

**Common steps in M-Move 1**

**Orienting steps:**
- **Step:** General theoretical / methodological / practical background about the means (*methodological background*)
- **Step:** Background about the specific project / experiment (*project overview*)
- **Step:** Discussion / comparison of previous and/or alternative methods or means (*methods comparison*)

**M- Move 1:**

**Communicative aspects**

- **M-Move 1** is common when the method / MADT:
  - is unfamiliar to the audience
  - is one of several possible means
  - includes aspects not easily accepted by (some of) the audience

- **M-Move 1** are commonly found in the beginning of the section / a subsection
- **M-Move 1** are occasionally found in the within the section / a subsection when background or orientation is needed to clarify an aspect

- **Length** of **M-Move 1** varies greatly depending on reader background:
  - **M-Move’s 1** tend to be brief or non-existent in specialized journals.
  - But when they are lengthy, **M-Move’s 1** tend to indicate that the method is new or unfamiliar, even to the specialists in the field
  - **M-Move’s 1** tend to be lengthy in more general journals/journals with researchers using a great variety of methods/MADTs
Examples of Intro M-Move 1 establish a context:

This approach, based on the generalization of the well-known Navier-Stokes equations, is similar to that of Anderson and Jackson (1967) and Gidaspow (1994).

(General background + comparison)

The principle difference compared with a single-phase model is the appearance of the volume fraction for each phase, as well as mechanisms for the exchange of mass, momentum, and energy between the phases.

(Alternative methods + comparison of them)

Examples of internal M-Move 1:

- Su within a M-section paragraph
- In order to decide the degree of hydrolysis (DH) of wheat gluten, (Background reasoning) a modified for mol titration was employed.
- TS of fourth paragraph of M-section
- Given the relative importance of emissions from fossil fuels (IPCC, 2007), as well as the uncertainties that result from non-uniform quantification methods, … the focus here, as in other studies, is exclusively on CO2 emissions from fossil-fuel combustion . (Main goals)

Example of intro M-Move 1

2. Methods

The approach for this study was to: (1) conduct aquifer tests in the hand-dug wells; (2) interpret the test data using slug test and numerical methods and methods developed specifically for tests in large diameter wells; and (3) compare hydraulic conductivities between the different methods.

(Overview of main steps of the method)

M-Move 2

Establish credibility: demonstrate that the inputs / means were applied correctly according to the standards of the field

This move is obligatory and highly factual

Common steps in M-Move 2:

- Step: List or description of inputs and materials (Inputs and materials)
- Step: Describe experimental set-up / instrument(s) used or developed (Experimental set-up)
- Step: List or describe preparation steps, procedures, techniques, variables, equipment (Preparation method)

Example of intro M-Move 1

The two companies investigated are located 1100 km apart and work with different clients. Still there are substantial similarities in their production processes. Their organizations are is not process-oriented … but projects follow predefined paths involving … multiple activities (Figure 3). Most activities remain in-house, although some are performed by external consultants, …

(Background about a specific project)
Common steps in M-Move 2

- **Step**: List or describe main steps, procedures, techniques, variables, equipment, etc. *(Main steps)*
- **Step**: Describe verification method(s) *(verification method(s))*
  - In the M-section rather than in the R-section, typical for standard means

M-Move 2: Communicative aspects

- **Only M-Move 2 in the section**
- The Method/MADT is probably:
  - (Highly) Standard
  - (Highly) Familiar to the intended audience
  - (Highly) Accepted as a viable means of dealing with the research problem
- And other viable means are not considered important to mention

M-Move 2 mixed with M-Move 1: Communicative aspects

- **Predominantly M-Move 2 in the section**
- But with a few phrases/sentences/paragraph/subsection with M-Move 1*(background and orientation)*
  - M-Move 1 discourse may indicate:
    - the most important aspect/procedure/input /step of the means used
    - an innovation/non-standard use/researcher choice/controversy

M-Move 2 establish credibility: example of steps

4. Experimental Section

All experimental **data were obtained** at room temperature with a homebuilt STM[35] located in a UHV chamber with a base pressure <1(1010* T orr. STM images were acquired in constant-current mode, with the setpoint tunneling current **maintained by**… *(Facts about the procedure)*

M-Move 2 is the only move in the section.
1st paragraph with Su’s beginning in the TS

M-Move 3

**Strengthen credibility**: show that the means and inputs used or developed:
were particularly good / better than previous ones
make a methodological contribution beyond being correct, viable / were interesting or clever methodological solutions /were particularly viable for the problem studied
Optional but common

Common steps in M-Move 3

- **Step**: Include factual information allowing specialized readers to evaluate non-obvious ways the method/MADT was carried out particularly well:
  - for example, with great care, accuracy, precision, forethought, with keen awareness of limitations *(Non-obvious information)*
Common steps in M-Move 3
- Step: Explain non-obvious reasoning behind:
  - applying a specific aspect of the method or MADT
  - selecting materials/inputs/experimental set-up
  - choosing the method over another possible known/commonly used methods (non-obvious reasoning)
- Step: Point out that inputs/means were used/prepared with special care or thoroughness (special care)

M-Move 3: Communicative aspects
- M-Move 3 are often used to:
  - indicate/remind the readers of the interest or value of aspects of the method/MADT that are uncommon, unfamiliar to the audience and/or somewhat innovative
  - deal with aspects that are controversial or considered problematic by some in the audience

Common steps in M-Move 3
- Step: Describe special advantages of the inputs or means used or developed (advantages)
- Step: Show that a modification/innovation provided useful, necessary or important benefits (Beneficial modification/innovation)
- Step: Point out the ways that the means was particularly appropriate for dealing with the problem studied (Suitable for the problem)

Examples of M-Move 3, strengthen credibility
Continuous recording of the CCD output was performed using a DVD-video recorder (model DMR T2020, Panasonic, Secaucus, NJ); this allowed further analysis of cell movement through the field of view following the experiment. (Special benefits, advantages)

Common steps in M-Move 3
- Step: Point out specific aspects of particular interest to (part of) the intended audience (Audience appeal)
- Step: Point to the viability of the method, MADT in actual or potential applications (Applications of means)

Examples of M-Move 3
After printing each antibody the pins were washed with a pressure-jet pin washer and then vacuum-dried to eliminate carryover. Describe procedure (M-Move 2)? Reason for the procedure (M-Move 3)?
Specialist identified: several possible procedures exist for eliminating carryover
M-Move 3 strengthen credibility: examples of steps

Data were scaled such that the average median ratio value for all of the spots was normalized to 1.0 (separately for each biochip), on the premise that the average spot on the chip would represent unchanged protein expression.

Description of a step (M-Move 2)
Reasoning behind a procedure (M-Move 3)

In-class analysis

M-Move 3 strengthen credibility: examples of steps

The neighborhoods chosen are well suited for a comparison of the influence of geometry since, apart from the difference in urban geometry, they are similar.

(Show input was appropriate for the study method)

In-class Text Analysis

• "Ozone Storage Effects on Anthocyanin Content and Fungal Growth in Blackberries" "Materials and Methods.
• "Bridge and tunnel toll elasticities in New York: Some recent evidence" "Data and Methods" (not "Background" = M1: background about the specific project)

M-Move 3 strengthen credibility: examples of steps

To passivate the clean surface, molecular hydrogen was leaked into the UHV chamber and cracked on a hot (1800 K) tungsten filament.

Purpose?
Indicator of which standard procedure was chosen?
Indicator of the method being carried out well, thoroughly, accurately?

In-class Text Analysis

• TOP-DOWN ANALYSIS
  • Underline the section headings and any topic sentences you find.
  • Make notes about any communicative aspects of
    • Headings and Subheadings
    • TS succession and supports
In-class Text Analysis

* **Moves and steps analysis**
  * Identify any Moves and steps in “Ozone…”.
  * Identify any Moves and step in one part of "Data and Methods" in “Bridge and Tunnel toll…”
  * Choose
    * Either the first part (some paragraphs describing the variables, i.e., after paragraph 5)
    * Or the middle part (from Paragraph 6 to Functional form of the model)
    * Or the final part (from Functional form of the model, i.e., from paragraph 19 to the end of the section)

In-class Text Analysis

* **Moves and steps analysis**
  * Decide whether the M-section describes a method or MADT that is
    * standard and accepted or unfamiliar and/or requires (some) justification.
    * a standard-means or a part of the novel contribution or the main novel contribution

For the next Lecture/Discussion class

* In Preparation for our next lecture,
  please skim:
  * the Results and Discussion Sections of "Ozone Storage Effects…"
  * Results and Policy Considerations sections of "Bridge and Tunnel Toll Elasticities"
  * Underline headings, subheadings and topic sentences and then read the section.
* In Preparation for our next workshop:
  * Analyze your M-section
  * If you are going to lead a discussion please read and follow instructions carefully