Moves, steps and linguistic signals in RA discussion sections

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Outline

1. Introduction

2. Corpus and method

3. Results and discussion
   - Moves and steps
   - Lexico-grammatical resources

4. Conclusions

Introduction

- The IMRD model in RAs

- Previous studies:

  - macrostructure (Peng, 1987; Nwogu, 1997; Holmes, 1997; Bhatia, 1993; Posteguillo, 1999; Ruiying & Allison, 2004; Swales, 2004)
  - specific sections: discussions (McKinley, 1983; Adams Smith, 1984; Hopkins and Dudley-Evans, 1988, 1996; Dudley-Evans, 1994; Lindeberg, 1994; Salager-Meyer, 1994; Berkenkotter & Huckin, 1995; Skelton, 1997; Holmes, 1997, 2001; Lewin & Fine,1996; Lewin et al., 2001; Peacock, 2002; Ruiying & Allison, 2003)

- Our objectives:
  - to check how far the moves and steps identified in the discussion section by Ruiying & Allison (2003) prove valid for RAs in the fields of Computer Science, Robotics,Telecommunications and Nanotechnology
  - to identify linguistic signals to express the rhetorical purposes of moves and steps in discussion sections

Method

-Corpus: 46 RAs

11 Computer Science
10 Nanotechnology
15 Robotics
10 Telecommunications

-Analysis procedure:

- identifying moves and steps with reference to Ruiying & Allison's 7-move scheme

- proposing a new category when a communicative function did not appear to fit with those found by Ruiying & Allison

- obtaining a modified, more detailed model

Results and discussion

The Discussion section in RAs

- Aim:

To establish the writers' credibility and persuade the audience of the validity of their findings in order to reassert a title to the 'niche' created in the introduction and occupied in the Method and Results sections.

- **Move 1: Background information**

Step 1. Reviewing theoretical items
Step 2. Restating a gap
Step 3. Restating purpose
Step 4. Restating method
Step 5. Specifying issues analysed
Step 6. Announcing principal findings

Results and discussion

Move 1: Background information (39/46 RAs)

Step 1. Reviewing theoretical items (7 RAs)

Authors base their investigation on previous theoretical and empirical data for two purposes, either for presentation of previous results or for reference to widely accepted knowledge. (Ex.1-2)

Step 2. Restating a gap (3 RAs)

Authors indicate a gap in the previous research, which justifies their study. As a result, the linguistic signals used in the Introduction section to indicate a niche which the present research intends to occupy, reappear in the Discussion section. (Ex.3)

Step 3. Restating purpose (10 Ras)

Once the state-of-the-art has been presented, the author clearly specifies the purpose or purposes of the research. (Ex.4-7)

Results and discussion

Move 1: Background information

Step 4. Restating method (12 RAs)

The method followed in the study is also typically restated at the beginning of the Discussion section. (Ex.8-9)

- Lexical verbs meaning *use* and *perform*: *use*, *employ, utilise, develop, carry out, conduct, run, perform, do ...*
- Nouns, such as *approach, method, design, experiment, scheme*, *choice, criterion*,
- Lexical verbs indicating process: *average, calculate, simulate, introduce, measure emulate, apply.*

Step 5. Specifying issues analysed (14 RAs)

As for the points analysed in the study, authors present them sequentially or each point of the study can also be explicitly specified through subheadings. (Ex.10-12)

Introductory phrases: *at the beginning, now, the next question, one first issue, in particular we considered, specifically we focus on, for...*

Step 6. Announcing principal findings (3 RAs)

The writer's effort gone into the research is made clear and somewhat highlighted, although with modesty and sincerity in some cases, as explicit and non-personal expressions and the mention of limitations indicate. (Ex.13)

Results and discussion

Move 2: Reporting results (33/46 RAs)

Results: *effects*, *findings*, *attitudes*, *solution*, *procedure* and *observations*

Certainty markers:

- Research acts. They represent experimental activities or actions carried out in the real world. They occur in statements of findings: *show* (the most frequently used), *illustrate, present, result in, find, demonstrate, indicate, give, display, prove, obtain, achieve, derive, cause, yield, occur, produce, give the result, conform, support*; or procedures: *depict, plot, list*. (Ex.14-16)

- Cognition acts. They are concerned with the researcher's mental processes: *observe, see*. (Ex.17)

- Discourse acts. They involve linguistic activities and focus on the verbal expression of cognitive or research activities: *propose*. (Ex.18)

Visual aids:

- Reference to figures and tables (Comp and Nanotech)
- Reference to algorithms (Robot and Telecom). (Ex.19-22)

Results and discussion

Move 3: Summarising results (12/46 RAs)

- Author's personal attribution: *We demonstrated how the problem of … We were able to prove that…* (Ex. 23)

- Writer invisibility:
  In the research presented here, it was experimentally found that... Spectral analyses show... (Ex.24)

- Non-human actors and impersonal sentences include references to visual aids:
  As summarized in Tables 1-3, ... (Ex.25)

Results and discussion

Move 4. Commenting on results

- Aim: to persuade the academic community to accept the new knowledge claims in order to consolidate research space.

Step 1. Interpreting results
Step 2. Comparing results
Step 3. Accounting for results
Step 4. Evaluating results
Step 5. Indicating limitations of results
Step 6. Exemplifying

Results and discussion

Move 4. Commenting on results (44/46 RAs)

Step 1. Interpreting results (35 RAs)

Logical arguments are interwoven with authorial comments directed at the reader showing the author's estimation of the achievement of research goals.

Evaluative lexis:

- *important, surprising, critical, ill-suited, effective, valuable, advantageous*
- *improvement*, *contribution* and *increase*, adjectives such as *acceptable, significant, high, large, effective, valuable, advantageous*
- *importantly, significantly, interestingly, strongly, considerably, especially*

Results and discussion

Move 4. Commenting on results (44/46 RAs)

Step 1. Interpreting results (35 RAs)

- **Discourse resources**:
  - Imperatives: *recall that, note that, observe from table 1 that...*
  - Certainty markers*: obviously, it's clear*
  - Sentence adjuncts: *unfortunately*
  - Sentence conjuncts: *on the other hand, nevertheless, however, furthermore, consequently, so, then, therefore, hence, thus,as a consequence*
  - Source attributions: *as can be seen from tables 1 and 2, as it was shown in the second example of the paper*
  - Reformulation expressions: *in other words, it means that, this means that*

Results and discussion

Move 4. Commenting on results (44/46 RAs)

Step 1. Interpreting results (35 RAs)

- **At the grammatical level**:
  - Comparatives: *significantly quicker* (Ex. 26)
  - Evidential verbs: *show, demonstrate, indicate, prove*
  - Speculative verbs: *seem, appear* or *suggest*
  - Deducing verbs and opinion verbs: *obtain, see, notice, derive, conclude, believe* and *consider*
  - Modals: *may be considered the worst of …* (Ex. 27)

Results and discussion

Move 4. Commenting on results (44/46 RAs)

Step 2. Comparing results (22 RAs)

- Earlier accomplishments in the field:
  Previous tests demonstrate…
- Previous data already mentioned in the RA:
  Table 1 compares the two approaches discussed in the previous section.
- Agreement with other researchers: *support* (Ex. 28-30)
- Consistency, importance and efficiency (Ex. 31-33)
- Evaluative verbs express disagreement with other researchers' claims (Ex. 34-35)
- Implicit negative evaluation of previous research through link words of contrast:
  In contrast to, on the other hand, whereas, however, in contrast, on the contrary, unlike
- Improving previous research (Ex. 36)

Results and discussion

Move 4. Commenting on results (44/46 RAs)

Step 3. Accounting for results (27 RAs)

- The 'cause-effect' lexical chain:
  - Nouns such as *reason, guideline, reasoning and result.* (Ex. 37)
  - Adjectives such as *attributable, reasonable, related to, understandable* (Ex. 38)
  - Research act verbs such as *give rise to, result from, lead to, cause, come from, happen* (Ex. 39)
  - Link words such as *due to* (by far the most frequent one), *therefore, then, since, because, as (*Ex. 40)
  - Rhetorical questions and answers (Ex. 41)

- Unsatisfactory results:

  this would be a worrying result, may be as hard a problem as, may miss, seems intractable, it is not certain that, did not seem to have played any significant part, leading to premature failure of the material, errors are unavoidable

Results and discussion

Move 4. Commenting on results (44/46 RAs)

Step 3. Accounting for results (27 RAs)

- Mitigating language: (Ex. 42)

  - Epistemic nouns: *possibility, assumption, evidence, suggestion, speculation*
  - Speculative verbs: *seem, suggests, expect, predict, speculate*
  - Discourse act verbs: *mean, argue, imply, explain, point out*
  - Cognition act verbs: *assume, suppose, attribute, consider, estimate, suspect*
  - Epistemic adjectives: *likely, unlikely, possible*
  - Adverbs: *arguably, perhaps, seemingly, certainly, significantly, hardly, most likely, safely, intuitively, presumably, inevitably, probably*
  - Boosters: *does seem to be, as seems to be the case, this seems to be the case*
  - Epistemic modals: *may, would, can*

Results and discussion

Move 4. Commenting on results (44/46 RAs)

Step 4. Evaluating results (19 RAs)

- The main communicative function: to argue about the relevance, usefulness and contribution of the research carried out.

- The author highlights the strengths of his study so as to consolidate his research space → a more direct and committed language:

assertive phrases and lexis with positive value
(Ex.43-45)

Results and discussion

Move 4. Commenting on results (44/46 RAs)

Step 5. Indicating limitations of results (Ex.46-47)

- New step (4 RAs)
- Weaknesses in the research → lexis with negative value

Step 6. Exemplifying results (Ex.48-49)

- New step (3 RAs)
- Examples to clarify or specify a statement

Results and discussion

Move 5. Summarizing the study (9/46 RAs)

- The writer moves the reader's attention away from comments on specific results to focus on a more general view of his study.

(Ex. 50-51)

Move 6. Evaluating the study (11/46 RAs)

Step 1. Indicating limitations (8 RAs)

Explicit acknowledgement of limitations can be interpreted both as strategic hedging to protect the author from criticism and as justification of the need for further work.

- Negative statements and nouns with negative value (e.g., *limitations, gap* or *caveat*) (Ex. 52-53)

Results and discussion

Move 6. Evaluating the study (11/46 RAs)

Step 2. Indicating significance/advantages (8 RAs)

To consolidate the research space: positive evaluation of the importance, originality and advantages of the research. (Ex.54-56)

- *An advantage* of the current study is …
- Our findings are *important*…
- *…the effectiveness* of the approach…

Step 3. Evaluating methodology (3 RAs)

The writer emphasizes the adequacy of the method employed in his study.

Terms with positive value and intensifiers. (Ex. 57)

- *the method is appropriate*
- *[…] of this electronic method are very attractive…*
- *Indeed, a very important property of the proposed method*

Results and discussion

Move 7. Deductions from the research

- Aim: linking the present research to the wider scenario of the discipline and indicate further research and possible applications.

Step 1. Planning further research
Step 2. Recommending further research
Step 3. Drawing implications

Results and discussion

Move 7. Deductions from the research (34/46 RAs)

Step 1. Planning further research (8 RAs)

Discussions end by mentioning the author's particular plans for further research or the research already underway. (Ex. 58-60)

- *Further studies are underway...*
- *...will be examined later in the project*
- *We plan to develop schemes to …*

Step 2. Recommending further research (12 RAs)

The 'question' and 'need' lexical chain suggests unexplored areas of future research. (Ex.61-64)

- ... populations *remains an important question for future research*.
- *A final, but equally important challenge, is a need to …*

Mitigation of the strength of the recommendation: modals (*can, could*, *would, should*). (Ex.68-71)

Results and discussion

Move 7. Deductions from the research (34/46 RAs)

Step 3. Drawing implications (7 RAs)

The author points out practical applications. The 'application' lexical chain collocated with the modals *can* and *might* clearly signals the step.

- Usefulness and applicability of the study: (Ex. 72-75)
  - *... will significantly reduce the detection time*.
  - *... is suitable for a number of applications.*
  - *might prove effective in other applications, such as* **...**
  - ... and *can easily be applied to them. It can also be applied to ...*

Conclusions

- **Adequacy of Ruiying & Allison's model** to describe engineering Ras discussions.

- **Moves 1, 2 and 4** (*Direct reference to the findings*) appear in a high number of discussion sections in our corpus.
- The communicative function of discussions is on *Commenting on results*.
- **Move 7** *(Deductions from the research)* is the most frequent move when providing a general view of the study.

- **Step1** (*Interpreting results*) and **step 4** (*Evaluating results*) in Move 4 occur most frequently.
- **New steps** have been identified in Moves 1, 4 and 7 that elaborate and refine the complexity of the information.

- Linguistic signals: **attitudinal markers** combined with the **narration of discovery of events** indicate the pragmatic overlap among them.

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