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COMPARATIVE GENERIC ANALYSIS OF DISCUSSIONS OF ENGLISH AND PERSIAN COMPUTER RESEARCH ARTICLES

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The main purpose of this study is to explore and examine the rhetorical structure of Iranian and English computer research articles (RAs) discussions by means of comparing move structures as presented in discussion sections of English and Persian computer RAs with the purpose of recognizing rhetorical preferences used by English and Persian authors in this particular area. To this end, 46 research articles written by native English writers and native Persian writers were analyzed based on Swales' (1990) Eight-Move Structure (EMS) to find out the conventions or moves of discussion sections. Frequency and Chi-square test were used to examine the difference between the two groups of discussion sections. The results of the study demonstrated that Move 1 "Background Information" and Move 2 "Statement of Results" were present in the majority of English RAs and they were identified as the most frequently used moves or "Conventional Moves", while only Move 2 "Statement of Results" was identified as the most frequently used move or "Conventional Move" in the Persian corpus. Moreover, the findings showed that the majority of RAs discussions across the two corpora were opened with Move 1 "Background Information". The findings of this study are hoped to add to the body of knowledge in the realm of ESP studies.

Key words: Rhetorical move, discussion section, computer, research article, eight-move structure (EMS)

1. Introduction

Writing, especially academic writing, as a multi-purpose and challenging activity is used in different environments such as academic settings and for different purposes such as writing research articles (hence, RAs) to publish in national and international journals. RAs, as a variety of genres of the academic writings, have received extensive attention in the realm of genre analysis because of "their importance for the circulation of academic knowledge" (Peacock, 2002: 480).

Writing in English is a complex task, especially for ESL/EFL researchers who intend to write RAs, theses, etc. Hyland (2009) stated that writing for publication can be laborious for novice non-native English speaking researchers. If a paper frames ideas and employs forms

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of argument which readers are likely to find familiar, the process of publication will be accelerated (Hyland, 2000). Lack of awareness of rhetorical conventions of language can be described as one of novice non-native English speaking academics' problems. An emerging problem facing all journals is the increasing number of submissions from non-English-speaking parts of the world, where the standard of written English may fall below the expectations of a scientific publication (Scully and Jenkins, 2006). For many non-native researchers, writing a research article in English would be a difficult activity. This is because many RAs are written in researchers' native language and also because of the variety of languages (Kanoksilapatham, 2007).

There are many studies that have evaluated research articles from a genre-analytic perspective (Bhatia, 1993; Dudley-Evans, 1986; Swales, 1990). Much research has been done on how to write different sections of RAs from the view of generic structure. Several studies on the abstract RAs (Bhatia, 1993; Samraj, 2005; Pho, 2008; Marefat and Mohammadzadeh, 2013), introduction section of RAs (e.g., Swales, 1981, 1990; Bhatia, 1993; Khani and Tazik, 1997; Hirano, 2009), method section (e.g., Brett, 1994; Gollin-Kies, 2014), and result section of RAs (e.g., Brett, 1994; Yang and Alison, 2003; Atai and Fallah, 2004; Kanoksilapatham, 2007; Bruce, 2009), conclusion (e.g., Dudley-Evans, 1994; Yang and Alison, 2003) and discussion sections of RAs (Hopkins and Dudley-Evans, 1988; Berkenkotter and Huckin, 1995; Swales, 1990; Atai and Fallah, 2004) have been conducted. Many researchers maintain that writing discussion sections of research articles is troublesome. John (1987) pointed out that the abstract nature of introduction and discussion sections are more problematic than the other more formulaic sections of method and results. According to Parkinson (2011, p.164), it is difficult to write the discussion section of RAs because of "...[The] complicated conditional and purposive argument represented in discussion section conducts reader towards acceptance of the writer's knowledge". Hess (2004, p. 1238) maintained that the discussion must always be written for the reader to understand the study and the focus of the writer should be on highlighting the study data. Hess (2004) emphasized the elements comprising the discussion. According to Hess (2004, p.1239), these elements state the study's major findings, explain the meaning and importance of findings, relate findings to those of similar studies, consider alternative explanations of findings, state the clinical relevance of findings, acknowledge the study's limitations and make suggestions for further research. Discussions are often developed from method and results sections as to how to interpret the findings (Weissberg and Buker, 1990) with the purpose of the "explanation of why the results occurred as they did" (Bitchener, 2010, p.179).

A significant point concerning the discussion is its tendency towards other sections. Swales (1990: 170) pointed out that results and discussion sections sometimes tend to be merged and refers to "additional or substituted sections labeled Conclusions, Implications or Applications and so on". Some scholars report that the conclusion section is a part of the discussion section and as a matter of fact, the discussion and conclusion sections may be presented as alternative equivalent sections (e.g., Posteguillo, 1999; Swales 1990). Swales and Feak (1994, p.195) note that the two terms discussion and conclusion are very similar and their differences are mainly conventional and applicable to certain fields or journals. In a study conducted by Yang and Allison (2003), it is precisely clarified how the result, discussion, conclusion, and pedagogic implication sections tend to relate to one another.

Several studies have been conducted on the discussion sections of RAs, e.g. discussion sections, in sociology, political science, and history RAs (Holmes, 1997), in economics, business and financial articles (Lindeberg, 1994), and across a wide range of sciences (Berkenkotter and Huckin, 1995). Hopkins and Dudley-Evans (1988) analyzed the discussion sections of natural science articles. There were 11 moves recognized in the discussion sections of natural science articles in which the second move was identified as an obligatory move. These moves consisted of background information, statement of the result, (un)expected outcomes, reference to previous research (comparison), explanation of unsatisfactory results, exemplification, deduction, hypothesis, reference to previous research (support), and recommendation, and justification.

Rezaee and Sayfour (2009) investigated the introduction and discussion sections of Iranian ISI and non-ISI medical journals in English based on Nwogu's (1997) model. The results indicated that the two corpora consist of moves and sub-moves with similar frequencies and all moves of introduction and discussion presented in Nwogu (1997) were applied in the two corpora. Examining the introduction sections of the two groups, move 1 (presenting background information) and move 3 (presenting new research) were the most frequent moves with 32 times of frequency in the two corpora. Move 2 (explaining specific research outcomes) with 31 and 29 times of frequency had the most frequent move in discussion sections of the Iranian ISI and non-ISI English medical journals respectively.). Although the number of cross-cultural genre studies of difference sections of RA written by Persian native speakers are not small (e.g. Rezaee and Sayfour, 2009; Jalilifar, 2011; Hasrati and Gheitury, 2012; Marefat and Mohammadzadeh, 2013), there are no studies on discussion sections of Computer RAs.

Undoubtedly, studies on genre analysis of RAs would be highly relevant to ESP as language learners are required to get familiarized with those certain patterns used for communicative purposes within discourse community. As Bhatia (1997) puts it " Before learners undertake any goal-driven communicative activity they need to become aware of appropriate rhetorical procedures and conventions typically associated with the specialist discourse community they aspire to join"(p. 65). Thus, to present the discourse patterns used in discussion sections of computer RAs and its pedagogical implications in ESP courses, the present study has explored the moves and conventions employed in English and Persian Computer discussion sections RAs. By analyzing the rhetorical pattern and identifying the rhetorical moves, this study could help both experienced and novice researchers to report their research findings in an appropriate style.

2. The Present Study

This study examines the rhetorical structure of Iranian and English Computer RAs discussion sections and investigates the rhetorical structure of Iranian and English computer research articles by addressing the following two questions:

1. What are the move structures of the discussion sections of English and Persian computer research articles?
2. Is there any significant difference between Persian and English Rhetorical moves that constitute the generic structure of discussion sections of computer research articles?

3. Methodology

3.1. The Corpus of Research Articles in Computer

To explore and investigate comparatively the rhetorical structure of discussions research articles across English and Persian, two corpora comprised of 46 RAs discussions were compiled. To select the two corpora used in the present study, a list of accessible, most prestigious, and representative journals published in the field of Computer was compiled through checking library references of several major universities as well as searching the Internet. Eleven high impact and well-reputed journals, six English and five Persian, were selected through consulting the experts and graduates in this field. According to Nwogu (1997, p. 121), reputation is defined as "the esteem which members of an assumed membership hold for a particular publication or a group of publications". The corpus of the study was randomly selected from RAs published from 2010 to 2014.

3.2. Codification of data

The analysis was based on Swales' (1990) eight-move structure. Frequently, in the process of identifying moves, the unit of the move analysis was the sentence (e. g., Holmes, 1997; Atai and Fallah, 2004; Abedi, 2013). The process of recognizing moves in RAs discussions went through the following stages: first, reading sentence by sentence of the entire discussion sections in order to get proper understanding of communicative purposes presented in those sections. In most cases, the analysis of data required repeated readings for the move identification and where a sentence apparently was comprised of two moves, it was identified to the move that seemed to be more dominant (e.g., Del Saz-Rubio, 2011; Ozturk, 2007). The second stage went through marking linguistic and discourse markers, lexical items, and propositional meanings of the text segment for assigning moves within the text segment. Sometimes, it was too difficult to assign the communicative moves within the discussion section. Hence, we examined sections such as abstracts and their key words as well as result sections. Scrutinizing different parts of abstracts especially the result sections of abstracts for determining some moves within discussion sections such as statement of results could help the researchers to make that move clearer.

To avoid subjectivity and ensure the reliability of the study, the corpora were analyzed by two coders, one a computer expert and the other one with expertise and experience in coding move analysis.

Swales' (1990) eight-move structure (EMS) and the descriptions of moves are as follows:

Move 1 (background information) is the statement about 'theoretical and technical information' as already addressed earlier in the RA;

An example of Move 1 extracted from the corpus is as follows:

- *This paper mainly focuses the user behavior for the next generation IPTV networks.*

Move 2 (statement of results) is the claim made by the writer as the direct answer to their research question(s);

An example of Move 2 extracted from the corpus is as follows:

- *The result exposed that proposed CBCCAT model proved better in performance when compared with the existing approach of DCIM model.*

Move 3 ((un)expected outcome) is the statement or comment on whether or not the research results or finding are as they are expected;

An example of Move 3 extracted from the corpus is as follows:

- *As such, the conceptual framework and model are expected to offer researchers in integrated assessment useful insights in environmental regime theory.*

Move 4 (reference to previous research) is the rhetorical attempt of writer(s) to link the present research finding(s) to the available relevant knowledge or information for the purpose of comparison or supporting the present findings;

An example of Move 4 extracted from the corpus is as follows:

- These findings from our empirical study are consistent with findings from the insightful work of Choudhury and Sabherwal (2003) and Poppo and Zenger (2002) which suggested that client firms would use a portfolio of formal and informal controls to ensure the success of OSD projects.

Move 5 (explanation) is the writer's rhetorical attempt to logically convince readers why such unexpected or extraordinary results or findings occur in the present study;

An example of Move 5 extracted from the corpus is as follows:

- Another explanation for the insignificant results is that inter-firm relational norms only control firm's opportunistic behavior but will not be able to deter service provider's individual employees from purposeful or accidental information leakage.

Move 6 (Exemplification) is only an illustration or samples to strengthen or support the explanation;

Move 7 (deduction and hypothesis) is the writer's claim on the level of interpretation of the research findings to a larger scope of topic or area;

An example of Move 6 extracted from the corpus is as follows:

- *We believe, however, that at this stage it is not possible and may be even undesirable, to actually include knowledge on environmental regimes directly into the computer models used in integrated assessments.*

Move 8 (recommendation) is writer's suggestion on the application or implementation of the research findings in practical ways and/or suggestion for further studies on the same or similar topic.

An example of Move 8 extracted from the corpus is as follows:

- *Therefore, in the future we will apply the tree to another area as a testing spatial dataset to study the performance of the proposed algorithm on a new area.*

This research study followed Amnuai and Wannaruk's (2013) criterion for justifying and classifying each move in every RA as the obligatory, conventional, and optional move. According to Amnuai and Wannaruk (2013), if the degree of occurrence of a move in each RA is 100%, it is classified as 'obligatory'; if the degree of the occurrence of a move is below 60%, it is considered as 'optional', and if the occurrence ranges from 60-99%, it will be regarded as 'conventional'.

4. Results

Table 1 below demonstrates the results of the comparison of microstructures in discussion sections of English and Persian RAs. Results in Table 1 shows that there are no significant differences in the frequency of the moves identified in English and Persian corpus.

Table 1
 Moves and Their Frequency within 46 Research Articles Discussions in English and Persian

Moves	English RAs		Persian RAs	
	Frequency	Percentage	Frequency	Percentage
Move 1 Background information	22	95.65%	17	73.91%
Move 2 Statement of results	22	95.65%	22	95.65%
Move 3 (Un)expected outcome	1	4.34%	1	4.34%
Move 4 Reference to previous research	6	26.08%	8	34.78%
Move 5 Explanation	6	26.08%	5	21.73%
Move 6 Exemplification	0	0%	0	0%
Move 7 Deduction and hypothesis	3	13.04%	4	17.39%
Move 8 Recommendation	12	52.17%	17	73.91%

As for the number of moves in the English and Persian corpus, Table 1 indicates that move 1 was observed 22 times in the English RAs and 17 times in the Persian ones. Move 2 had the same frequency in both corpora with 22 times frequency. Move 3 appeared once in the two corpora. Move 4 was present in 6 and 8 English and Persian RAs respectively. Move 5 was observed 6 times in the English RAs and 5 times in the Persian RAs. The absent move in the present study within the both corpora was Move 6. Move 7 appeared 3 and 4 times in the English and Persian corpora respectively. The last move, Move 8, was present in 12 English RAs and 17 Persian ones. Figure 1 displays a graphical representation of the moves.

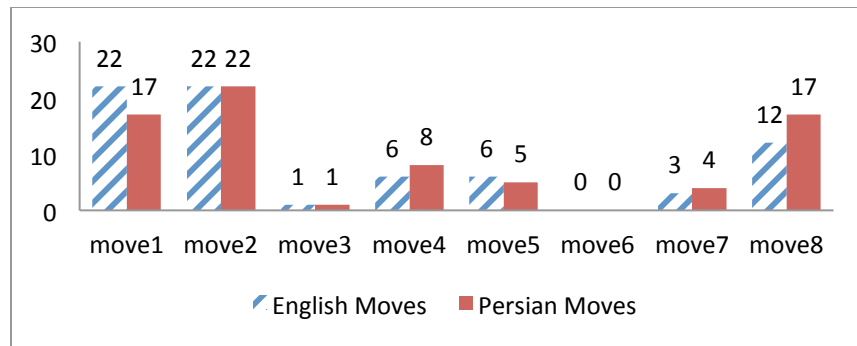


Figure 1 Graphical Representation of the Number of Moves in English and Persian RAs

As Figure 1 shows, Move 1 "Background Information" and Move 2 "Statement of Results" are the most frequently used and dominant moves in English RAs. They were present in 95.65% of discussion sections of RAs and are classified as the conventional move in this research. The most prominent move recognized in Persian RAs was Move 2 "Statement of results" and it was present in 95.65% of discussion sections. Following Annuai and Wannaruk (2013), this move is identified as conventional.

Move 1 "Background Information" and Move 8 "Recommendation" with 73.91% occurrence in Persian RAs acquired second place in terms of the degree of the frequency and are labeled as the conventional move. In the English corpus, Move 8 is also identified as the second most frequently used move presented in 52.17% of English discussion sections, and classified as an optional move. The other moves in both corpora had the least amount of frequencies and identified as less frequently used moves or optional moves. To examine to what extent the differences in the two corpora are significant, Pearson chi-square test was conducted (see Table 2)

Table 2

Pearson chi-square results for the two English and Persian Corpora

Move		df	Asym. Sig.
Move 1	Background information	1	.423
Move 2	Statement of results	1	1.00
Move 3	(Un)expected outcome	1	1.00
Move 4	Reference to previous research	1	.593
Move 5	Explanation	1	.763
Move 7	Deduction and hypothesis	1	.705
Move 8	Recommendation	1	.354

As presented in Table 2, the results of Pearson chi-square test indicated that there was no statistically significant difference in the frequency of the entire moves in discussion sections of English and Persian RAs. Thus, it can be concluded that there was no difference between English and Persian authors in applying rhetorical moves that constitute the generic structure of the discussion section of computer research articles.

Table 3 represents the frequency of occurrence of opening moves in the English and Persian corpora. As Table 3 indicates, the opening move in 87% of English research articles was Move 1 background information and the remaining 13% is associated with the Move 2 statement of results. 70% of Persian corpus also was opened with Move 1 and Move 2 with a 30% presence recognized as the next opening move among Persian RAs.

Table 3
 The Frequency and Percentage of Opening Moves in English and Persian Corpus

Opening Moves	English Corpus		Persian Corpus	
	Frequency	Percentage	Frequency	Percentage
Background Information	20	87%	16	70%
Statement of Results	3	13%	7	30%
Total	23	100%	23	100%

Table 4 displays the frequency of occurrence of closing moves in English RAs. Table 4 indicates that the closing move in 60% of English RAs was Move 2, i.e. statement of results. The findings show that 30% and 10% of English discussion sections were closed with the Move 8, recommendation and Move 1, background information, respectively.

Table 4
 The Frequency and Percentage of Closing Moves in English RAs

Closing Move	English Corpus	
	Frequency	Percentage
Statement of Results	14	60%
Recommendation	7	30%
Background Information	2	10%
Total	23	100

Table 5 indicates the frequency of occurrence of Persian closing moves. Accordingly, 65% of Persian discussion sections are closed with Move 8 recommendation and 13% of discussion sections were closed with Move 4, reference to previous research. The next

closing move, Move 2, was present in 13% of Persian discussion sections and the remaining 9% of discussion sections were closed with Move 5, explanation.

Table 5

The Frequency and Percentage of Closing Moves in Persian RAs

Closing Move	Persian Corpus	
	Frequency	Percentage
Recommendation	15	65%
Reference to Previous Research	3	13%
Statement of Results	3	13%
Explanation	2	9%
Total	23	100%

5. Discussion

The first research question to deal with in the present study was which move structures are used in the discussion sections of English and Persian Computer research articles. In response to the first research question, the findings of English corpus indicated that move 1 background Information as well as move 2 statement of results have the same frequencies and are identified as the most commonly used moves with 22 times of frequency in English computer research articles. The next most dominant move was move 8 recommendation which occurred 12 times. The presence of the other moves in this corpus including move 4 reference to previous research and move 5 explanation with 6 times of frequency, and move 7 deduction and hypothesis and move 3 (un)expected outcome appeared 3 and 1 times respectively. The sixth move exemplification was absent in the English corpus. Thus, English RAs included all moves except move 6 exemplification. Moreover, the results revealed that move 2, statements of results is the most dominant move for 22 discussion sections of Persian computer RAs. Move 1 background information and move 8 recommendation were present in 17 RAs. The remaining moves are classified as the least frequently used moves: Move 4 reference to previous research appeared 8 times, move 5 explanation was present in 5 RAs, and move 7 deduction and hypothesis and move 3 (un)expected outcome were observed in 4 and 1 RAs respectively. This corpus lacked move 6 exemplifications. It can be concluded that the English and Persian researchers did not tend to use move 6 exemplification in writing discussion section of computer RAs.

In response to the second question of whether there is any significant difference between Persian and English rhetorical moves that constitute the generic structure of discussion sections of computer research articles, the results of the study demonstrated that there is no significant difference across English and Persian discussion sections. The results

of move analysis of both corpora revealed that move 1 background information was present in more English RAs than Persian ones. This move along with move 2 had identical frequencies and it is identified as the most commonly used move in English RAs, but it was the second most substantial move in Persian corpus. In any case, they are classified as a conventional move in both corpora. The analysis of this move indicated that there was no statistically significant difference between two groups of writers in utilizing this move. The finding of this study is in line with Safnil's (2013) findings. Safnil found this move as one of the most common moves in discussion sections of social science and humanities RAs written in Indonesian by Indonesian writers. Salmani Nodoushan (2012) conducted a study on move structure of Iranian and Non-Iranian MA graduates' thesis discussions and those of journal paper authors based on Yang and Allison' model. In this research, move 1 background information was assigned as conventional move in terms of Rasmeenin's (2006) framework for classifying moves as obligatory, conventional, and optional.

Statement of results was the first dominant move in Persian as well as English corpus and it is classified as conventional. The results showed that there was no significant difference in applying this move by English and Persian writers. Safnil (2013) identified this move as one of the most prominent moves in his study. The findings of the study were in line with Atai and Fallah's (2004) study. Their findings revealed that move 2 statement of results was the most frequently used move in English and Persian applied linguistic RAs. Move 3 (un)expected outcome is classified as the less commonly used move and optional in both corpora. This move was observed in 1% of RAs in relation to other moves and it appeared in 4.34% of RA with no respect to the other moves in both groups. The results of the study showed that there was no statistically significant difference between two groups of RAs. In Fallahi and Erzi's (2003) investigation on discussion sections of applied linguistics written by native English speakers, it was found move 3, unexpected outcome, appeared in about 1% of RAs. Move 4, reference to previous research, is identified as an optional move in English and Persian corpora since it is rarely used by the two groups of writers. The results of the study indicated that there was not any statistically significant difference between the two corpora. The findings of this study contrasted to findings of Atai and Fallah's (2004) research. In their research, this move was reported as an obligatory move with respectively 33 and 20 times of frequency in applied linguistic RAs written by English and Persian native speakers. Move 5 explanation is also identified as an optional move in these two corpora. This move was present in 8% and 7% of English and Persian RAs without regard to other moves. The results of the study indicated that there was no statistically significant difference in the use of this move in English and Persian corpora. In a

study by Fallahi and Erzi (2003), move of explanation was present in 7% of applied linguistic RAs and classified as the least common move used by native English speakers.

Move 6 exemplification was not employed by the writers of the two corpora and it is classified as an optional move. The findings of the present study revealed that there was no statistically significant difference in using this move by writers of English and Persian RAs. The findings of this study coincide with the research conducted by Atai and Fallah (2004). In their research move 6 or exemplification is considered optional in English and Persian applied RAs with 16 and 2 times frequency respectively. Deduction and hypothesis is classified as move 7 in Swales' model. This move was rarely used in both corpora and labeled as an optional move in the current study. The results of the study indicated that there was not any statistically significant difference between the two groups of corpora. Recommendation, as the last move in Swales' model, is identified as the most frequently used move across two groups of RAs, but it is classified as an optional and conventional move in English and Persian corpora respectively. The findings of the study demonstrate that there is no statistically significant difference across English and Persian corpus in making use of this move by two groups of writers. Martin (2003) and Tahririan and Jalilifar (2004) noted that researchers are highly dependent on their sociocultural factors in their academic writing. According to Marefat and Mohammadzadeh (2013, p. 47), "The influencing factor is not the native language but rather the norms of the community for which the scholar writes." The findings of this study demonstrated that the researchers in the two languages showed similar patterns in using moves and sub-moves in the discussion sections of computer RAs.

6. Conclusion

The main purpose of the study is to find out the rhetorical structure presented in computer English and Persian RAs. As the findings of the study show, there are some similarities in the extent of frequency between both corpora. Moves presented in two groups of data have quite similar frequencies. Move 1 background information, move 2 statement of results, and move 8 recommendation are the most common moves in the corpus under investigation. Another similarity is the lack of move 6 exemplification in English and Persian RAs. In addition, the current study indicates that English and Persian authors have no tendency to follow Swales' model in writing the discussion sections of computer RAs.

The results of the current study can be applied for the genre theory as well as for the pedagogy. Samraj (2005, p. 153) maintained that the findings of previous studies on academic genres have been applied in pedagogical applications. The findings of the study

can be applied to help novice researchers with rhetorical structures found in academic writings in different sub-disciplines. Familiarization with the generic structure of texts can help researchers to be more successful in their writing ability in educational and academic settings. The pedagogical implications of the study are to assist Computer students to learn norms and well-established rules in developing Computer research articles. Lack of knowledge about the genre and text structures in academic discourse settings will lead to the reader's misunderstanding of texts and text types. However, "It is likely that the production of appropriate and relevant materials and syllabi for EAP/ESP courses requires an awareness of the range of genres, the ways in which genres span disciplines and, equally, the ways in which they vary according to discipline and perhaps even to sub-discipline" (Holmes, 1997, p. 333).

From a pedagogical perspective, genres and text structures can aid learners to know about discourse community and take part in this field. The results of the study present practical and pedagogical implications to teach conventions of writing to EFL students, to make Persian academics in particular move-sensitive about writing English computer discussions in an effective way and to increase learners' language awareness as well. The major limitation of the present study is to only examine Computer discipline, thus not allowing for an exhaustive cross-disciplinary analysis of computer RAs. The present study does not claim to present an exhaustive list of moves series. Furthermore, the structure exhibits rhetorical moves that incorporate several degrees of flexibility in their positions. Some rhetorical moves have more stable positions in the overall organization of computer research articles, while others are less stable. This study presents a limited number of discussion sections of computer research articles. Therefore, we suggest that a larger sample of discussion sections should be used in future cross-disciplinary research.

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