Genre analysis of artificial intelligence research article abstracts:Local versus international journal

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Abstract

The generic structure of research article (RA) abstracts has been studied across disciplines and cultures. Taking a different approach, this study aims at exploring and comparing the constituent moves of RA abstracts in a local and an international journal in the field of Artificial Intelligence. To this end, Bhatia's model of four-move abstracts was applied to 30 RA abstracts, 15 from the local and 15 from the international journals, published in 2017. The results revealed that the Methods and Results moves were obligatory in both local and international abstracts, while the Conclusion move was absent in most RA abstracts in both local and international journals. The findings unfolded the obligatory nature of the Purpose move in international abstracts as well. The results can carry some pedagogical implications for academic writing instructors in order to enhance their applicants' understanding of the generic norms of academic discourse communities.

Keywords: Academic writing, artificial intelligence, genre analysis, moves, research article abstracts.

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1. Introduction

Creating texts to report research studies requires special attention and writing for scholarly publication is often challenging for writers. Many non-native speakers of English, who are novices to the academic discourse communities, struggle with the new genres that they face in their academic reading and written assignments and fail to recognise the communicative purpose of their writing, as well as the linguistic conventions and organisation that characterise different academic texts. This problem is often related to the quality and quantity of formal training in academic writing.

In this sense, research articles (RAs), as the main channel of sharing research findings among scholars and the most reviewed and analysed type of academic written discourse, have attracted scholars' attention. A large number of studies have explored various aspects of RAs, including historical evolution (Salager-Meyer, 1999), social construction (Myers, 1990) and the structural and organisational features of RAs introductions (Swales, 1990; Swales & Najjar, 1987). Other sections of RAs like the Results sections (Brett, 1994; Williams, 1999), Discussion and Conclusion sections (Hopkins & Dudley-Evans, 1988; Holmes, 1997; Ruiying& Allison, 2003) andAbstracts (Hyland, 2000; Salager-Meyer, 1999; Samraj, 2005) have also been investigated.

Over the past decades, researchers have investigated a large number of textual components and features of academic writing, such as the use of tense and aspect (Burrough-Boenisch, 2003), modality (Vassileva, 2001), as well as the use and function of adjectives (Soler, 2002), nouns (Flowerdew, 2003) and reporting verbs (Thompson & Ye, 1991). Various academic written genres, such as textbooks (Hyland, 2000; Moore, 2002) and conference papers (Rowley-Jolivet, 2002), have also been studied. Besides, numerous researchers have conducted a host of studies on written and spoken genres, such as the RA (Swales, 1990), grant proposals (Connor &Mauranen, 1999) and sales promotion letters (Bhatia, 1993).

Ataiand Habibie (2012) explored sub-disciplinary variations and generic structures of RA introductions (RAIs) in three sub-disciplines of applied linguistics (AL), namely English for Specific Purposes and Psycholinguistics and Sociolinguistics, using Swales' (1990)CARS model. In another study, Samraj (2005) compared the generic structure of RAIs and RA abstracts, which form a genre set from two related fields, Conservation Biology and Wildlife Behaviour.

Moreover, Bazerman (1994) extended the concept of the genre set into the notion of systems of genres and explored the system for patent creation and concluded that scrutinising a genre system requires analysing interrelated genres resulting from generic turns taken by the members of that system. Genre relations have been investigated across academic and popular genres (Adams Smith, 1990; Fahnestock, 1986; Myers, 1990). Connor and Mauranen (1999, p. 60–61), in their recent article on grant proposals, stated that ''groups of related genres and subgenres have not been systematically investigated'' and expressed their hope that future genre studies would provide ''greater illumination in generic interrelations''.

The RA abstract is a specific genre set and its structure and variations across disciplines and cultures have been studied quite extensively (Hyland, 2000; Melander, Swales& Fredrickson, 1997). For example, Huckin (2001) found that abstracts from biomedical articles often exclude the Purpose move. Melander et al. (1997) scrutinised the abstracts of three disciplines (across two languages) and found out that the linguistics and biology abstracts produced in the American context are different in their overall organisation. Such studies have highlighted the importance of this academic genre within various disciplines and cultures.

Most of the previously conducted studies have represented the macro-organisation of various genres in terms of their constituent moves and have unravelled the lexico-grammatical features that characterise these moves. Another group of researchers has conducted cross-linguistic and cross-cultural studies of various genres (Ahmad, 1997; Connor, 1996) and many scholars have analysed the discursive features characterising various genres across different disciplines (Melander et al., 1997;

Samraj, 2002; Swales & Najjar, 1987). To continue the genre analysis line of research and bearing in mind the importance of cross-linguistic variations of academic genres and the prominent status of abstract among academic genres, this study aims at comparing the structures of abstracts in terms of their constituent moves between local and international publications in the field of Artificial Intelligence. In particular, this article pretends to observe if the structure and organisation of the constituent moves of the abstracts would differ across academic RAs published locally and internationally (Samraj, 2005). This study has attempted to address the following research questions:

1. What are the constituent moves of RA abstracts in a local and an international journal in the field of Artificial Intelligence?
2. How do the RA abstracts differ in a local and an international journal in the field of Artificial Intelligence in terms of their constituent moves?

2. Method

2.1. Corpus

A total of 30 RA abstracts were randomly selected from the archive of two refereed journals in the field of Artificial Intelligence:15 abstracts from a local journal, *The Journal of Artificial Intelligence & Data Mining (JAIDM),* published by Shahrood University of Technology Press in Iran, and written by Iranian researchers in English and 15 abstracts from the *Journal ofArtificial Intelligence,* an international refereed journal in the field*.* In order to control the time factor, all the abstracts included in the sample were published in 2017.

2.2. Framework

The abstracts of these articles were analysed by adopting Bhatia's (1993) model of genre analysis for RA abstracts (see Table 1). The structure of RA abstracts has been discussed in terms of the major sections of the RA, namely Introduction, Methods, Results and Discussion, resulting in four moves: Purpose, Method, Results and Conclusion. Santos (1996) proposed an additional move called 'situating the research' for the RA abstracts in AL. This move includes two steps, 'statement of current knowledge' and 'statement of problem'.

In another study of abstracts from several disciplines (Hyland, 2000), five moves were introduced relating to RA abstracts. Similar to Santos (1996), Hyland (2000) suggested a new move called 'Introduction', where the context of the paper and research motivation is provided.

This article focuses on four main moves of RA abstracts, including Purpose, Methods, Results and Conclusion, based on Bhatia's (1993) model and analysed the constituent moves of RA abstracts in a local and an international journal.

Table 1 presents the two most known models of the constituent moves of RA abstracts.

Table 1. The framework for RA abstracts analysis

Bhatia's (1993) model	Function	Hyland's (2000)model	Function
		Introduction	Establishes the context of the paper and motivates the research or discussion.
Introducing the purpose	What the researcher did.	Purpose	Indicates purpose, thesis or hypothesis outlines the intention behind the paper.
Describing the methodology	How the researcher did it.	Method	Provides information on design, procedures, assumptions, approach, data, etc.

Summarising the results	What the researcher found	Product	States main findings or results, the argument, or what was accomplished
Presenting the conclusion	What the author concluded.	Conclusion	Interprets or extends results beyond the scope of the paper, draws inferences, points to applications or wider implications

2.3. Procedure

The RA abstracts were analysed in terms of their constituent moves. Both researchers separately identified the moves and an inter-coder reliability of 0.95 was obtained. The areas of disagreement were negotiated and, finally, the moves were counted and the results were reported.

3. Results

Table 2 presents the results of the analysis of the RA abstracts, indicating that abstracts in both local and international journals generally contained four moves, including Purpose, Methods, Results and Conclusion.

Table 2. The constituent moves of abstracts in local and international AI RAs

Constituent moves	Local journal	International journal
Purpose	8	15
Methods	15	14
Results	14	10
Conclusion	3	2

The further analysis of the constituent moves of the RA abstracts in the local journal revealed the presence of three obligatory moves, including Purpose, Methods and Results, while the Conclusion move was absent in 12 RA abstracts.

The Purpose of the study was the first move in the generic structure of the local abstracts represented as follows; nevertheless, this move was absent in almost half of the local RA abstracts.

- *The main goal of this paper is…*
- *Our aim is to classify…*
- *This paper deals with the…*
- *This paper establishes…*
- *The purpose of this study is ….*
- *This work/paper aims to …*
- *The main idea is to …*

The second move, Methods, consisted of some steps in which the utilised models, techniques or procedures of the study and various instruments were presented. This move was present in all the RA abstracts from the local journal.

- *In order to estimate the density distribution of data, the Weibull Mixture Model is utilised …..*
- *In this work, the required pixels are estimated using the radial basis functions and calculating the shape parameter c with the genetic algorithm.*
- *This protocol converts on-demand dynamic clusters to scalable cluster-based WSNs using boundary nodes and facilitates sensors' collaboration around clusters.*

The third move, Results, provided the findings of the study. All the articles in the local corpus, except for one, contained this move. This move was represented as follows:

- *The stimulation result of this work demonstrates/shows….*
- *The experimental results obtained show/indicate …*
- *The experimental results showed that….*
- *It is shown that…*
- *The results obtained are reported…*
- *The results achieved are …*
    - *Our experimental work shows …*
    - *We show statistically that …*
    - *Experimental results provide …*

The last move was the Conclusion. The results of the analysis demonstrated that 12 RA abstracts from the local journal lacked this move. In other words, most abstracts from the local journal just consisted of three main moves, including Purpose, Methods and Results.

Considering the RA abstracts from the international journal, the first two moves, i.e. Purpose and Methods, were clearly stated. The Purpose move was represented as follows:

- *In this article, we present a new and substantially improved model for…..*
- *In this paper, we present Structured Learning Modulo Theories, a max-margin approach ….*
- *This paper proposes a unified approach to….*

The Methods move was inserted using such expressions as follows:

- *In this work, we formalise hierarchical clustering as an integer linear programming (ILP) problem with a natural objective function and the dendrogram properties enforced as linear constraints.*
- *We develop exact formulations of the correlation clustering task as Maximum Satisfiability (MaxSAT), the optimisation version of the Boolean satisfiability (SAT) problem. For obtaining cost-optimal clusterings, we apply a state-of-the-art MaxSAT solver for solving the resulting MaxSAT instances optimally, resulting in cost-optimal clusterings.*
- *This ground LP is solved using lifted linear programming.*

However, some articles lacked the Results move, and just 2 out of 15 RA abstracts contained the Conclusion move. The Results move was presented as follows:

- *We show that such a framework can easily be embedded in a more general process and we illustrate this on the problem of finding the optimal Pareto front of a bi-criterion constrained clustering task.*
- *Our experimental work shows that even for small data sets finding the global optimum produces more accurate results.*
- *Experimental results on classic benchmarks provide clear evidence of the remarkable improvements that are obtained with respect to related approaches.*

Overall, the abstracts from the local and international groups of articles were quite similar considering the inclusion of the second and third moves and exclusion of the fourth move. However, the results of the analysis have shown that international RA abstracts seemed to have an additional move before the first move that might be called Introduction (Hyland, 2000) or Situating the Research (Santos, 1996). This move provided some introductory information related to the articles and/or a review of the existing literature.

4. Discussion

The results of the analysed RA abstracts show that both local and international ones generally followed the accepted conventions based on the norms of the English academic discourse community.

For the most part, both local and international RA abstracts presented four linearly sequenced moves, including Purpose, Method, Results and Conclusion.

However, a significant difference between the international and local abstracts was the tendency to omit the Results move in the international abstracts. The frequency of occurrence of this unit is 66.66% in the international abstracts as opposed to 93.33% in the local abstracts written in English.

A detailed analysis of the Conclusion move also revealed a certain degree of homogeneity between the local and international abstracts. The members of both the international and the local scientific communities showed a clear preference for the omission of Move four, which can be regarded as an optional rhetorical element.

Moreover, some degrees of divergence were observed in the frequency and distribution of the first move, Purpose. This rhetorical option tended to be mentioned in the international RA abstracts (100%), whereas its frequency was considerably lower in the local abstracts (53.33%). The analyses carried out in this study indicated that the abstracts written in English for international journals reflected Hyland's (2000) five-move structures articles because they seemed to have an additional move before the first one. In other words, the local abstracts in the same field are less rhetorically complicated.

The findings of this study are in line with those of Huckin (2001), which revealed the exclusion of Move 1, Purpose, in biomedical RA abstracts. Moreover, the existing discrepancies between local and international RA abstracts reflect the possible influence of cultural background on the academic conventions of norms (Melander et al., 1997).

5. Conclusion

This study strived to explore and compare the constituent moves of RA abstracts in a local and an international journal in the field of Artificial Intelligence. Applying Bhatia's model of four-move abstracts to 30 RA abstracts from a local and an international journal revealed that the Methods and Results moves were obligatory in both local and international abstracts, while the Conclusion move was absent in most RA abstracts in both local and international journals. The findings also unravelled the obligatory nature of the Purpose move in international abstracts.

The results of this study can be used to teach advanced-level students the structure of RA abstracts in their disciplines. Besides, the findings may raise the awareness of postgraduate students and novice researchers who need to realise the importance of applying either Bhatia's (1993) four-move structure or Hyland's (2000) five-move structure in their abstract writing, since these two models capture the important information that should be available in the abstract.

Finally, this study emphasises the need for conducting more genre analysis studies across various disciplines and languages. This study only investigated the RA abstracts of two sets of local and international journals in the field of Artificial Intelligence, while other disciplines can also be included in genre analysis by further research.

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Appendix A. Articles in corpus

A.1. International articles: artificial intelligence

3. Guns, T., Dries, A., Nijssen, S., Tack, G.& De Raedt, L. (2017). MiningZinc: a declarative framework for constraint-based mining.*244*, 6–29.
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12. Costa, F. (2017). Learning an efficient constructive sampler for graphs. *244*, 217–238.
13. Yao, T., Choi, A.&Darwiche, A. (2017). Learning bayesian network parameters under equivalence constraints. *244*, 239–257.
14. Bartlett, M.&Cussens, J. (2017). Integer linear programming for the bayesian network structure learning problem. *244*, 258–271.
15. Lindauer, M.,Hoos, H., Leyton-Brown, K.& Schaub, T. (2017). Automatic construction of parallel portfolios via algorithm configuration. *244*, 272–290.
16. Mısır, M.&Sebag, M. (2017). Alors: an algorithm recommender system. *244*, 291–314.
17. Bessiere, C., Koriche, F., Lazaar, N.& O'Sullivan, B. (2017). Constraint acquisition. *244*, 315–342.

A.2. Local articles: the JAIDM

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