Across Disciplinary Study of Textual Devices in Research Article Abstracts Written by Native and Non-Native Writers of English

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Abstract   This study aims to study the textual device types and discourse functions in research article abstracts written by native and non-native writers of English from four disciplines namely Applied Linguistics, Economics, Biology, and Mechanical Engineering. The corpus of this study was 200 research article abstracts (50 from each discipline). Of the 50 research article abstracts from each discipline, 25 were written by native writers of English and 25 written by Iranian non-native writers of English. The corpus, then, was analyzed based on the analytical framework proposed by Ebrahimi (2014). Findings suggest that the textual devices' selections, frequencies and discourse functions are affected and imposed by the nature of discipline and nature of the genre of RAA. The result also indicated that there is a difference between native and non-native writers of English in dealing with these devices.

Keywords   Genre, Research article abstract, Textual devices, Discipline, Native and non-native writers

1. Introduction

The research article abstract (henceforth RAA) as the point of departure of most research articles has progressively become a critical part in the writing of the research article (henceforth RA). It is an important genre of study as it serves pivotal functions. To Pho (2008), as it is the first part of RA that is read, thus it serves the function of selling accompanied RA. Martin (2003) pointed that the importance of RAA sourced from the fact that very few journals would not entail an RAA forwarded along with the main RA. Another importance sourced from that members of academic disciplines have become more and more dependent on reading RAA to be updated as nowadays, disciplinary members are faced with explosion of information in the world. It also saves the readers' time by indicating whether to continue reading the accompanying RA or ignore it (Hyland, 2000). Writers have to carefully present main claims and findings in the RAAs and present themselves as competent community members to convince readers to take their claims and findings onboard. The RAA plays vital role in the publication process as they determine the acceptance / rejection for publication in journals and conference proceedings (Huckin, 2001). Therefore, these functions are enough to make the writer of RAA to be "under close scrutiny while writing up RAA" (Hyland, 2000 P.65) and make the task of writing RAA to be quiet challenging specially for novice writers. To win the challenge, writers, in addition to presenting disciplinary content, need to be successful in presenting linguistic features of RAA that help readers' better comprehensibility and understanding of RAA.

Due to the above mentioned functions, in the last three decades, a number of researchers have studied RAA from one or more disciplines for the linguistic features (Hu and Cao, 2011; Kanoksilapatham, 2013; Lores, 2004; Pho, 2008; Salager-Meyer, 1992; Stotesbury, 2003). Salager-Meyer (1992) analyzed the realizations of verb tense and modality in the rhetorical structure of abstract from discipline of medicine. Lores (2004) analyzed the rhetorical structure and realization of theme in applied linguistic abstracts. Pho (2008) studied the linguistic realizations of rhetorical structures of abstracts from two disciplines of applied linguistics and educational technology. Kanoksilapatham (2013) scrutinized the linguistic realization of rhetorical structures of abstracts from discipline of civil engineering. Stotesbury (2003) scrutinized on the use of evaluation markers in abstracts across disciplines. Hu and Cao (2011) focused on the analysis of hedge and boost metadiscourse markers in applied linguistics abstracts published in English and Chinese-medium journals. These studies reveal that RAA writing, to a certain extent, vary in linguistic feature according to disciplines. The studies reviewed in literature

motivated this study to scrutinize the types and discourse functions of textual devices used in the RAAs written by native and non-native writers of English from four different disciplines of Applied Linguistics (henceforth AL), Economics (henceforth Eco), Biology (henceforth Bio) and Mechanical Engineering (henceforth ME).

2. Methodology

Research Design and Sampling Procedure

This study is cross-disciplinary and contrastive in nature. To ensure the cross-disciplinary nature of the study, we selected disciplines that represent the spread of disciplines across the academic context. To this end, Becher's (1989) taxonomy was employed to select the disciplines. According to Becher (1989), academic disciplines are grouped into soft and hard sciences. Hard science includes science disciplines while soft science includes the disciplines in the humanities and social sciences. Becher (1989, 1994) further classified the disciplines into pure and applied within each science. The pure disciplines are "theoretical" and "reflective" in nature while the applied disciplines are "practical" and "active" in nature. therefore, having Becher's (1989, 1994)

categorization of disciplines in mind, four disciplines of Eco (soft-pure), AL (soft-applied), Bio (hard-pure) and ME (hard-applied) were selected for this study. To ensure the contrastive nature of the study, RAAs written by native writers of English were selected and compared with RAAs written by Non-native (Persian) writers of English.

Having the disciplines selected, next was selecting the journals. To extract RAAs published by Native writers of English, the four journals of 'English for Specific Purposes', 'Economic Modelling', 'Biologica' and 'Journal of Mechanical Engineering' were selected. These journals are published by Elsevier and indexed in Thompson and Reuters. To extract RAAs published by Non-native writers of English, the four journals of 'Iranian Journal of Applied Linguistics', 'Economic Modelling', 'Iranian Journal of Biology' and Mechanical Aerospace Engineering' were selected. These journals are published in Iran and indexed in Islamic Science Center (ISC).

From the above mentioned journals 200 RAAs were selected. Thus, 50 RAAs represent each discipline (25 written by native writers of English and 25 written by non-native writers of English (Persian writers)). All the RAAs were extracted from RAs published in 2012 to 2014 issues of the above mentioned journals.

Table 1. The Analytical Framework of Textual Devices

	Type	**Definition and Example**
Textual Devices	*Additive*	The textual devices aim to add arguments together.
		Finally, it has been demonstrated that disgust sensitivity is positively associated with neuroticism (Druschel & Sherman, 1999; Haidt et al., 1994; Hennig, Possel, & Netter, 1996), ***and*** it is generally assumed that this basic personality factor increases vulnerability to psychopathology (e.g., Claridge, 1997).
	Contrastive	The textual devices aim to contrast arguments together.
		It is clear that elevated CO_2 affects plant growth in either unstressed or stressed environments, ***but*** little information is available in the literature concerning the combined effect of elevated CO_2 and metal contamination on plant physiochemical processes.
	Appositive	The textual devices aim to provide a specific instance for a general statement.
		Each faculty is in turn divided into a number of different 'schools', which are themselves often divided into separate 'divisions', reflecting the different research interests within the school. Thus, ***for example***, the Faculty of Arts and Humanities hosts the School of English Studies, within which are the four Divisions of Medieval Studies, Modern English Language, Modern English Literature, and Drama.
	Consequence	The textual devices aim to show that conclusion is being drawn.
		In general, and based exclusively on syntax, two types can be distinguished: yes/no questions and wh- questions.
	Sequence	The textual devices aim to order arguments with respect to their order of occurrences.
		First, instead of words for the target and attribute stimuli, we used pictures. ***Second***, we individualized the IAP, so the children could identify themselves more easily with the stimuli.
	Time	The textual devices aim to order arguments chronologically
		Recently, optoelectronic systems, which track light-emitting or light-reflecting markers attached to a subject's articulators, have become more prevalent.

Unit of Analysis

In text analysis, selection of the unit of analysis is one of the crucial points. This study relied on T-unit as the unit of analysis. T-unit is defined by Fries (1994) as a clause complex which contains one main independent clause together with all the hypotactic clauses which are dependent on it. In this study, only textual devices that occurred at the sentence boundaries were analyzed. This is because initial position of the main clause (sentence boundaries) makes the major contribution to the text's method of development (Halliday, 1985).

Analytical Framework

This study adopted the analytical framework suggested by Ebrahimi (2014). The rationale behind the adaptation is that this analytical framework is the recent and more comprehensive one. The types and definition of the textual devices are presented in Table 1.

Procedure

To analyze the corpus for the textual devices types and discourse functions, the following analytical procedures were taken.

First, 50 RAAs (25 written by Native and 25 written by Non-native writers of English) from each discipline, 200 RAAs in all, were extracted from the target journals and converted into word file. Second, the researchers proceeded to identify the textual devices of each T-unit by reading carefully all the RAAs. In this step, to mitigate the threat of false identification of textual devices, three raters were invited to check a sample of 32 RAAs from the corpus. The three raters are three PhD students pursuing their PhD in Applied Linguistics. If any, the differences in textual devices identifications were subject to negotiation and discussion to reach an agreement. Third, the researchers read the RAs again to detect the discourse functions of the identified textual devices. In this stage, the researchers again referred to the three PhD raters as the researchers, in some cases, have partial understanding or misunderstanding of the RAAs. This would be more vital in detecting the discourse functions of textual devices in the Bio, Eco and ME RAAs as the researchers has little or no knowledge about topics covered in these RAAs. In addition, in the cases where the researcher could not understand the content to detect the discourse function, the researcher would discuss the content with an M.A. or PhD candidate practicing the same discipline.

Finally, the frequency and discourse functions of the textual devices were recorded and tabulated to be discussed. In the discussion section, those textual devices types, which occurred for more than ten percents in at least one discipline, were discussed.

3. Results and Discussion

The RAAs were analyzed for the textual devices types and discourse functions and the results obtained are presented and discussed in the following sub-sections. The textual devices types found in the RAAs are additive, contrastive and consequence.

3.1. Additive Textual Device

The data were analyzed for the realization of the additive textual device and the findings are presented in Table 2. It is evident from the findings that this textual device in some of disciplines received the highest attention compared to their counterparts in other disciplines. The findings in Table 2 suggest that in all four disciplines native and non-native tendencies are different. This could suggest that in AL and Eco RAAs, non-native writers prefer to write RAAs, which are more elaborative in nature. In Bio and ME RAAs, the findings are just reversed. In these disciplines, native writers prefer to make their RAAs to be more elaborative possibly to indicate the more elaborative and detailed nature of the studies of these disciplines.

Table 2.   Frequency and percentage of the Additive textual device

	AL	Eco	Bio	ME
Native writers	3 (22%)	10 (36%)	13 (52%)	11(65%)
Non-native writers	21 (49%)	23(48%)	24(45%)	25(51%)

The data were analyzed to highlight the discourse functions performed by the use of the additive textual device and the findings are presented in Table 3. Based on the findings in Table 3, this textual device is used to tie steps or procedures in methodology (example 1-4). This discourse function was common across all disciplines suggesting that the writers are imposed to connect the steps or procedures and report the methodology section in a brief manner to meet the word limit imposed by the journal papers format. It could also aid the writer to state more details by using small number of words.

Table 3.   Discourse function of the Additive textual device

	Discourse Functions	AL		Eco		Bio		ME	
		N	Non	N	Non	N	Non	N	Non
1	Tie steps or procedures in methodology	✓	✓	✓	✓	✓	✓	✓	✓
2	Tie findings obtained	✓	✓	✓	✓	✓	✓	✓	✓

Example 1: The methodology used in this study was generally based upon Hodge and Kress's (1996) framework *and* the texts were compared and contrasted to find the traces of gender and/or race of the candidates. (AL/Non/14)

Example 2: ***Moreover***, social cost or welfare loss of monopoly in the same market is measured by the use of Cowling & Muller Methods in 2007. (Bio/Non/12)

Example 3: Data were analyzed using SPSS and Mstatc *and* averages were compared by LSD test. (Bio/Non/3)

Example 4: The Kutta condition is also used at the trailing edge of the hydrofoil for partial cavitation ***and*** the continuity of tangential velocity condition is used for supercavitation. (ME/Non/2)

The additive textual device is used to tie findings obtained in the study (Example 5-8). It seems that using this textual device could be due two reasons. First, this device helps in connecting the findings and as stated above could save space in the limited in words genre of RAA. Second, it could help the writer to state the related findings together and explicitly show this relation.

Example 5: ***Furthermore***, no marked differences are found in terms of the extent of concordance between the CARS model and the move structure of the RAs analyzed. (AL/Non/4)

Example 6: Inflow of skilled labor increases wage inequality in the long run ***and*** its effect on foreign investment is positive. (Eco/N/7)

Example 7: The *malp* gene is shown to be species-specific ***and*** the use of a *malp* PCR described here could prove to be a useful adjunct to IS*1550* detection as confirmation of the presence of *M. fermentans* in clinical material. (Bio/ N/1)

Example 8: The resistant force are increased ***and*** the acceleration is decreased. (ME/Non/4)

3.2. Contrastive Textual Device

The findings in Table 4 suggest that native writers compared with their non-native counterparts used more of the contrastive textual device. It could indicate that native writers favor to rationalize their claims, arguments, and findings by contrasting them with other studies claims, arguments, and findings. Some of the evidences from the date analyzed suggested that these contrasting are done within the same study's claims, arguments, and findings. Presentations of claims, arguments, and findings in such a manner might help in rationalizing ad validating them.

Table 4. Frequency and percentage of the Contrastive textual device

	AL	Eco	Bio	ME
Native writers	6 (43%)	8 (29%)	8 (32%)	5(29%)
Non-native writers	6 (14%)	11(23%)	11(21%)	4(8%)

The data were analyzed for the discourse functions performed by the use of the contrastive textual device and finding is presented in Table 5. The only discourse function is contrasting findings (Example 9-12). This discourse function could indicate that writers prefer to signify and rationalize their findings by contrasting them together. It seems, in addition, that this textual devices could be a signal to catch the reader's attention to the findings, which are highlighted by the writer by the use of this textual devices.

Example 9: Compared to the oral uptake moves captured through the audio-data, the analyses revealed a significantly higher frequency of uptake moves in the uptake sheets following teacher-initiated FFEs, *but* a lower frequency of uptake moves was found in the case of learner-initiated FFEs. (AL/Non/18)

Example 10: In case of technology shock, there is no special difference between two scenarios. ***But***, inflation targeting makes less movement in non-oil production and inflation. (Eco/Non/16)

Example 11: ***However***, differences detected for rPAV in the proportion of mice responding to the same dose of treated and untreated vaccine suggested that further assay development to increase the sensitivity of the latter design may be warranted. (Bio/N/18)

Example 12: ***In contrast***, the corresponding local problem (neglecting boundary conditions associated with the rigid parts of the system) is found to be convectively, but not absolutely, unstable to small-amplitude disturbances in the absence of wall damping. (ME/N/12)

3.3. Consequence Textual Device

The data were analyzed for the realization of the consequence textual device and the findings are presented in Table 6. As it is evident from the figures in Table 6, non-native writers are more into the use of this textual device suggesting that such a textual device acts as a signal to stress the rationalized based nature of the arguments, claims, and findings of the study.

Table 5. Discourse function of the Contrastive textual device

	Discourse Functions	**AL**		**Eco**		**Bio**		**ME**	
		N	Non	N	Non	N	Non	N	Non
1	Contrast findings	✓	✓	✓	✓	✓	✓	✓	✓

Table 6. Frequency and percentage of the Consequence textual device

	AL	Eco	Bio	ME
Native writers	1 (7%)	4 (14%)	2 (8%)	-
Non-native writers	5 (12%)	5(11%)	10(19%)	10 (20%)

Table 7.   Discourse function of the Consequence textual device

	Discourse Functions	**AL**		**Eco**		**Bio**		**ME**	
		N	Non	N	Non	N	Non	N	Non
1	Signify topic, method, or finding of a study	✓	✓	✓	✓	✓	✓	✹	✓

Table 8.   Frequency and percentage of the textual device types

		AL		**Eco**		**Bio**		**ME**	
		N	Non	N	Non	N	Non	N	Non
1	Additive	3(22%)	21(49%)	10(36%)	23(48%)	13(52%)	24(45%)	11(65%)	25(51%)
2	Contrastive	6(43%)	6(14%)	8(29%)	11(23%)	8(32%)	11(21%)	5(29%)	4(8%)
3	Consequence	1(7%)	5(12%)	4(14%)	5(11%)	2(8%)	10(19%)	-	10(21%)
4	Sequencer	1 (7%)	4(9%)	2(7%)	4(8%)	-	2(4%)	-	4(8%)
5	Appositive	1 (7%)	3(6%)	-	-	-	-	-	-
6	Verificative	1 (7%)	2(5%)	2(7%)	-	-	-	1(6%)	2(4%)
7	Place	1 (7%)	2(5%)	2(7%)	1(2%)	2 (8%)	1(2%)	-	2(4%)
8	Time	-	-	-	2(4%)	-	4(7%)	-	2(4%)
9	Cause	-	-	-	2(4%)	-	1(2%)	-	-
	Total	14	43	28	48	25	53	17	49

As for the discourse function, this textual device was used to signify topic, method, or finding of a study (Example 13-16). This discourse function is common to all four disciplines. Such a use is not surprising as the writer likes to stress and highlight the significance and rationale behind the selection of the topic or method of the study and to highlight the overall finding.

Example 13: ***Thus***, with a qualitative orientation, this study attempts to look at the judgmental validity of cloze as a test of reading comprehension. (AL/Non/5)

Example 14: ***Therefore***, it has an important role in the process of economic growth. (Eco/Non/11)

Example 15: ***Thus***, deamidation generated in manufacturing and storage does not fully determine the patient exposure to the attribute. (Bio/N/9)

Example 16: ***Thus***, for better accordance with the experimental results, a new method is used in which this method, the effect of a counter clockwise independent vortex, which is formed downstream of the flow in partial cavitation, has been studied. (ME/Non/2)

In summary of this section, Tables 8 present the results obtained regarding the frequency of textual device types.

4. Conclusions

This study aimed to study the textual device types and the discourse functions served by the employment of these devices in RAAs written by native and non-native writers of English from four disciplines namely AL, Eco, Bo, and ME. The results were presented and discussed and from the discussed results we can conclude that the textual devices' selections, frequencies and discourse functions are affected and imposed by the nature of discipline and nature of the genre of RAA. The result also indicated that there is a difference between native and non-native writers of English in dealing with this elements.

5. Limitations and Suggestions

Prior to the presentation of the implications of the findings in this study, it is deemed necessary to discuss briefly the limitations of the study. First, this study is limited in terms of sample size. It only analyzed 25 RAAs from each discipline. This number of RAAs might be not enough to enable generalization of the reported findings. Thus, a further study could be suggested that could increase the sample size of RAAs.

The number of disciplines focused on in this study is also another issue. It only focused on four disciplines. To further validate such a study, a focus on more than four disciplines could yield more representative and generalizable findings.

Another limitation stems from the selections of RAAs of data based RAs. Thus, the findings of this study could not be generalized to RAAs of theoretical and review RAs. It could be suggested that more studies could be embarked upon to study the other different subgenres of RAs and compare the findings to establish similar or different patterns and structures.

Finally, the findings and the limitations also point to the need for further work on the analytical framework used in the study. It is in need of further validation or even modification. Therefore, more research could move towards this direction as a sound and proven analytical framework lays a strong foundation for meaningful data analysis in related studies.

6. Implications

The findings reported in this study have an implication for EAP textbook developers. A survey in the available textbooks dealing with teaching RAA writing shows that these textbooks mostly dedicated little attention to the writing of RAA. This little attention is mostly dedicated to the rhetorical structure of the RAA and it seems that the linguistic features used in the RAA are neglected. Thus, the findings of this study could clearly assist the textbooks developers to include information about how textual devices as important linguistic features are used and how it serves different discourse functions in the RAA.

In addition, the findings reported in this study stress the fact that writing is restricted by the disciplinary conventions and writers' background knowledge of English language. Therefore, EAP instructors, who run RAA writing courses, need to aware learners about how discourse functions enacted by employment of different textual devices are restricted by the disciplinary conventions and writers background knowledge of English language. This could enable learners to have more conscious selections of textual devices to serve the discourse functions.

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