METADISCOURSE STRATEGIES IN RESEARCH ARTICLES: A STUDY OF THE DIFFERENCES ACROSS SUBSECTIONS

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Abstract

The implicit rhetorical features of academic writing which has so far eluded a comprehensive systematic characterization have made teaching it a challenging task for a large group of practitioners in academic setting. One such feature of academic writing susceptible to cultural mentalities is metadiscourse marking, which is supposed to be one of the important rhetorical aspects in the writing process. Therefore, through analyzing interactive and interactional metadiscourse strategies use, this study makes an attempt to find out the normal metadiscursive distribution in the various cognitive-generic structures within the socio-genreic structure of research articles (RAs). For the purpose of this study, a small corpus of 54 research articles from social and natural sciences was selected for a close manual qualitative analysis. It appeared that, though globally similar in many ways, different IMRD sections (i.e. Introduction, Method, Results and Discussion) of RAs which follow different cognitive genre types (i.e. conviction, description, argumentation, etc.) use interactive and interactional strategies differently. The findings are analyzed and implications are drawn for the teachers and learners of writing research articles in English for Academic Purposes (EAP) classes. It is argued that without such characterizations the writers from different nationalities might generalize the norms of their own culture, which are in most cases inconsistent with the conventions of English language.

1. Introduction

The disadvantage experienced by those who use English as a foreign language in writing for publication is well documented both in the fields of applied linguistics (e.g. Flowerdew, 1999; Kaplan & Baldauf, 2005; St. John, 1987) and science (e.g. Benfield & Feak, 2006; Benfield & Howard, 2000). Attributing part of such a disadvantage to differing mentalities, van Dijk et al. (1997) maintain that the social and cultural trends of human societies are realized in language, discourse and communication, and that every speech community may have its own norms, values and ways of communication. Moreover, Dahl (2004) observes that academic writers leave traces of themselves in their writing which may be linked to their national culture. Interestingly enough, the rhetorically-loaded aspects of discourse are better candidates to carry such diverse identities.

A study of all possible genres of written communication across various discourse communities, which use several ritualized ways of communication (Swales, 1990), is beyond the scope of single studies. However, from among several genres, research article (RA) is a widely practiced genre of communication among members of academic discourse community for the introduction of new findings and claims (Koutsantoni, 2006) and for receiving peer feedback. Communication through writing for publication in academic journals is supposed to be both a prestigious and a highly structured form of communication. Writing RAs has proved to be a very specialized activity with many visible and invisible layers. However, teaching writing for such advanced purposes has usually lacked any treatment of higher and less visible levels of discourse. In addition, culture-specific mentalities have always added to the intricacy of the challenge.

According to Littlewood (1996), in teaching academic writing in EFL situations, an important task is to find ways of introducing students

to the patterns and conventions of academic discourse while, at the same time, helping them to express their own voice through writing. If students do not learn to operate the conventions to which their readers are accustomed, the readers may find their writing difficult to process and evaluate it negatively. A balance must therefore be found between, at the one extreme, dull conformity to external norms and, at the other, unconstrained self-expression (Littlewood, 1996).

A significant amount of contribution to teaching academic writing comes from genre analysis. Genre analysis, which has gained momentum in recent EAP models, provides a useful framework for the analysis of language use for a variety of linguistic and teaching purposes (Bhatia, 2006). In other words, genre analysis is an attempt to extract explicit and implicit conventions in order to contribute to genre theory and also provide a tangible framework for the new members.

Researchers who analyze RAs for applied linguistics purposes attend to a wide variety of focuses from moves and strategies (Bhatia, 1999) to rhetorical features (Hyland, 2005). Persuasion, as an important objective in authoring RAs, is arguably partly achieved by employing metadiscourse. In simple words, metadiscourse, as defined by Hyland (2005), refers to an array of self-reflective expressions used to negotiate interactional meaning in a text, assisting the writer to express a viewpoint and engage with readers as members of a particular community. According to him, rhetoricians, applied linguists and composition theorists agree on using metadiscourse to refer to various linguistic tokens employed to guide or direct a reader through a text so that both the text and the writer's stance is understood.

It is also worth mentioning that within the past forty years or so, trends in ESP in general, and EAP in particular, have come a long way (e.g. *register analysis*, *skill-based teaching,* etc.) to finally opt for genre-based teaching of writing where the concepts like social and cognitive genre and rhetorical structure play a significant role in teaching writing (Basturkmen, 2006; Bruce, 2003, 2005).

However, despite a wide interest in such analyses, no effort is made so far to compare and contrast different sections of the popular social genre of RAs which allegedly have different cognitive genre (see Bruce, 2003). Thus, for a genre-specific characterization of academic writing, it is quite helpful to investigate different sections of research articles to find out how certain metadiscursive strategies associate with certain cognitive genres. To capture yet more finesse, an attempt is also made to study a variety of disciplines which apparently follow the tenets of different research paradigms.

In view of the above, on the whole, finding out about the currently practiced norms of employing metadiscourse in different sections of RAs across sciences can provide insight into the rhetorical structure and, hence, can be used in academic writing classes. Therefore, this study sets out to analyze RAs to discover how authors take advantage of metadiscourse strategies to help them reach their audience in the canonical sections of RAs across sciences, and then compares and contrasts the use of different strategies in an attempt to provide a pedagogically useful picture of RAs' internal structure.

2. Method

The RAs dealing with so-called natural sciences (NS) and social sciences (SS) were taken to be the corpus of the study. It should be noted that since NS and SS are generally associated with different research paradigms (Guba & Lincoln, 1994), it was thought that a sort of *paradigmatic identity* could prompt different rhetorical choices and, hence, different ways of metadiscourse marking.

For the purpose of this study, 54 research articles were selected from the *sciencedirect* database. In order to ensure a reasonable coverage across sciences, we randomly selected six disciplines, that is, linguistics, education and ethnography from the SS and physics, biology and medicine from the NS. Three journals from each discipline, and then three articles from each journal were randomly selected to build the corpus of the study.

Since this study was interested to find answers to the questions relating to the distribution of metadiscourse in the canonical divisions of RAs, namely *Introductions*, *Methods* and *Results and discussions* (Swales, 1990), the journals that did not follow this format in one way or another were discarded and replaced by random alternatives.

A recent taxonomy of metadiscourse formulated by Hyland (2005), which appears in Table 1 below, was taken as the model. It should be noted that Hyland's model was preferred for being recent, simple, clear and comprehensive (Abdi, Tavangar & Tavakkoli, 2010).

Table 1: An interpersonal model of metadiscourse (Hyland, 2005: 49)

Category	Function	Examples
Interactive	**Help to guide the reader through the text**	**Resources**
Transitions	express relations between main clauses	In addition; but; thus; and
Frame markers	refer to discourse acts, sequences or stages	finally; to conclude; my purpose is
Endophoric markers	refer to information in other parts of the text	noted above; see figure; in section 2
Evidentials	refer to information from other texts	according to X; Z states
Code glosses	elaborate propositional meaning	namely; e.g.; such as; in other words
Interactional	**Involve the reader in the text**	**Resources**
Hedges	withhold commitment and open dialogue	might; perhaps; possible; about
Boosters	emphasize certainty and close dialogue	In fact; definitely; it is clear that
Attitude markers	expresses writers' attitude to proposition	unfortunately; I agree; surprisingly
Self mentions	explicit reference to author(s)	I; we; my; me; our
Engagement markers	explicitly build relationship with reader	consider; note; you can see that

The list of about 400 lexical items appearing in Hyland (2005, pp. 218-224) was used for analysis. However, since no comprehensive list exists, as admitted by some scholars (Ädel, 2006; Vassileva, 2001), in keeping with the main criteria of metadiscourse forms (Hyland, 2005), some forms not mentioned in the list were also recognized in the process of analysis through a discussion with colleagues.

The manual frequency count was used following the Systemic-Functional Grammar (SFG) of Halliday (1978, 1994), as opposed to the machine-supported concordancing strategies recently used on a wide scale in corpus linguistics. In computer-assisted analysis, there is a risk of assuming external reference items as metadiscourse, which could damage the validity of research. However, in order to achieve a higher reliability in our manual analysis, three colleagues examined the corpus and the final data is the average of three independent data.

In the corpus of this study, some RAs were shorter than others. Thus, an average of 56000 words for every nine articles from each discipline, estimated from average length, was taken as the criterion length. The *Introduction* and *Method* sections each constituted 14000 words of the average (a small difference in the original corpus was ignored to have a round number) and the *Results and discussions* (RD) sections constituted the remaining half. The raw frequency counts of all metadiscourse strategies were adjusted to the above criterion length and the calculations were carried out on the adjusted data in order to ensure more validity.

3. Results

The manual and qualitative search for the ten metadiscourse strategies made available the data that appears in Table 2 below[1].

Table 2: Distribution of metadiscourse markers in different parts of research articles across sciences

		interactive						interactional						
		Tra	Fra	End	Evi	Cod	total	Hed	Boo	Att	Sel	Eng	total	G-totall
SS	I	420	350	48	**1157**	260	2235	365	113	56	120	33	687	2922
	M	158	341	114	215	234	1062	74	27	17	239	20	377	1439
	RD	**848**	**510**	311	578	297	2544	**798**	330	**107**	**425**	**84**	**1744**	4288
	total	1426	1201	473	1950	791	5841	1237	470	180	784	137	2808	8649
NS	I	356	161	86	1029	255	1887	363	101	81	164	6	715	2602
	M	195	107	261	345	**341**	1249	173	92	26	125	27	443	1692
	RD	768	221	**668**	849	294	**2800**	720	**401**	86	300	50	1557	**4357**
	total	1319	489	1015	2223	890	5936	1256	594	193	589	83	2715	8651
total	I	776	511	134	**2186**	515	4122	728	214	137	284	39	1402	5524
	M	353	448	375	560	575	2311	247	119	43	364	47	820	3131
	RD	**1616**	**731**	**979**	1427	**591**	**5344**	**1518**	**731**	**193**	**725**	**134**	**3301**	**8645**
	total	2745	1690	1488	4173	1681	11777	2493	1064	373	1373	220	5523	17300

Interestingly, Table 2 reveals that the NS and SS, on the whole, have a very small difference in terms of interactive (5841 versus 5936), interactional (2808 versus 2715) and total (8649 versus 8651) metadiscourse markers. This could mean that metadiscourse marking is widely recognized as a useful rhetorical instrument in the process of persuasion in RA writing among the practitioners of both NS and SS. However, as appears in Table 2, the interactive metadiscourse was employed about two times more than the interactional metadiscourse (11777 versus 5523).

The highest frequency is underlined (separately for interactive and interactional strategies) in any row and boldfaced in any column in Table

2. That is, the most frequently employed strategy in any section is underlined, and any section which attracted the highest number of a certain strategy is shown by boldfacing the relevant row.

Meanwhile, different IMRD sections of the RAs are separately compared across sciences taking into consideration the interactive, interactional and all types of metadiscourse the results of which appear in Table 3 below.

Table 3: Chi-square values of comparing introduction, method and results and discussion sections of research articles

	SS	NS	total
interactive	628	614.2	1186.33
interactional	1097.5	7454	1828.7
total	1408.4	12727	2651.5

d.f.: 2   level of significance: 0.01 χ^2 critical value: 9.21

As shown in Table 3, there is a significant and quite meaningful difference in the use of metadiscourse strategies in the canonical subsections of research articles considering both interactive and interactional groups of strategies across sciences.

4. Discussion

Table 2 provides a full perspective to the frequency of markers, yet we will only discuss the findings that could provide a useful implication to writing research articles. To begin with interactive metadiscourse, as can be seen in Table 2, *evidentials* are the most frequently used metadiscourse strategy in the Introduction section of social, natural and total corpus. This signifies that citation is the most important strategy to effectively identify a gap and convince audience as to the necessity of a new study (Barton, 1993). Clearly, without enough citation, it is difficult to plausibly fulfill the CARS (i.e. Create A Research Space) function (Swales, 1990, 2004) and prove that you are keeping abreast of your relevant discipline. It is interesting to see that except for evidentials, all

other strategies are most frequently seen in RD section of the total corpus, where the expected authority and scholarship from the researchers motivates more generous use of metadiscursive forms in an effort to project an academically plausible face.

Transitions and *frame markers* are highly employed by SS writers (in RD section), while NS writers most frequently took advantage of *endophoric markers* (in RD section) and *code glosses* (in Method section). It could be argued that, due to the nature of the science, SS writers need more signposting, as claimed by Hyland (2005) and Taboada (2006) to ensure that the audience is on the right track and appropriately follows the discussion, and more frame marking to display what they are doing in the discussion. Meanwhile, NS writers feel they need more reference to other parts of their prose to avoid prolixity. This could be attributed to overall more information density and more figures, tables and formulas in the RD section of research articles (Abdi, et al, 2010). Furthermore, they need more glossing in that the extent of concepts requiring explanation well outnumbers SS while introducing their M section.

The case of interactional metadiscourse looks more intriguing. Except for *boosters* which are most frequently employed by NS writers in RD section, probably attributable to the objectivity of the data, *hedges*, *attitude markers*, *self-mentions* and *engagement markers* are all most frequently used by SS writers in RD section. It turned out that SS writers feel more need for interactional involvement in composing the RD section of their articles (Abdi, 2002). They most frequently (contingently) evaluate the propositions, communicate their emotional thoughts and expose participants (i.e. writer and audience) within the prose (Thompson, 2001). This is expected on the grounds that SS deals with people in the first place and interactional options are critical in dealing with human issues.

The findings of this study also provide useful hints for academic writing when viewed from *section* perspective. As shown in Table 2, the Introduction section in both sciences used more *evidentials* from among

interactive strategies, and more *hedges* from among interactional strategies. As mentioned above, *evidentials* are necessary to build a new study on and prove that you are aware of the mainstream research. *Hedges*, on the other hand, are critical strategies in establishing the need for a study in that, admittedly, research areas are for the most part uncharted lands that require cautious handling.

In the Method section, however, social sciences took advantage of *frame markers* more to clarify the methodical steps and procedures, while NS writers employed the highest number of *evidentials*. This is expected as SS writers try to report their methodological options as clearly as possible due to the fuzzier nature of their methods as compared to NS writers (Smagorinsky, 2008). However, it appears that authority plays a more notable role in designing the method of research in NS.

Yet, in the RD section, *transitions* are the most prevalent strategies in SS and total, while *evidentials* are highly employed in NS. This signifies that, as noted earlier, SS writers try to make sure that the flow of arguments is rightly signposted to ensure successful communication. In NS, on the other hand, although *transitions* are also abundantly employed to materialize the above goal, *evidentials* prevail due to the nature of NS, which requires more authority.

As displayed in Total row, *evidentials* are the highly employed interactive strategy and hedges are the highly used interactional strategy. Transitions, frame markers, code glosses and endophoric markers follow evidentials in interactive, and self-mentions, boosters, attitude markers and engagement markers follow hedges in interactional category, respectively.

It should be noted that, as illustrated in Table 2, although we selected the highest occurrences for discussion, sometimes the difference between the highest and the next highest is quite minimal (e.g. *evidentials* and *code glosses* in Method section of NS; *transitions* in RD sections of SS and NS; etc.), which requires caution when used in discussions and training classes.

In terms of significance testing, it is worth noting that as appears in Table 3 above, χ^2 values in all cells exceed critical value, as expected. If any value was below the critical value, it could be said that the difference was due to chance. However, this finding confidently shows that the different sections of RAs follow a different rationale and argument structure in terms of metadiscourse employment across sciences. However, although such a result could be attributed to the difference in length[2], attributing it to the varying nature of the RAs' subsections seems also quite plausible (Swales, 1990).

A quite interesting result was seen in the pattern of metadiscourse distribution across sections of RAs which appears in Table 4 below. The almost similar distribution of the markers throughout groups of disciplines is surprising. Although, as discussed above, the types of employed strategies vary significantly, this can be attributed to the universal functions of different parts of RAs among all academics. Also, this finding shows that there is a conventionally, though implicitly, agreed proportion of metadiscourse which writers inadvertently follow.

As can be seen, virtually half of the markers appeared in RD section, which constitutes the last half of most RAs. Nevertheless, although Introductions and Methods were (adjusted to be) similar in length and, together, they nested the first half of the markers, the Introduction sections had attracted approximately twice as many markers as compared to Methods sections. The most plausible explanation for such a distribution would seem to be the fact that in Methods the writers report the procedures and the design of their studies which are, to a large extent, part of external realities (Hyland, 2005) lifting the need for metadiscourse marking.

Table 4: Distribution of metadiscourse in different sections of research articles

	SS	NS	total
I	%33.79	%30.08	%31.93
M	%16.63	%19.56	%18.10
RD	%49.58	%50.36	%49.97
total	%100	%100	%100

In contrast to the Method section, in the Introduction, writers challenge the present situation and make an endeavor to convince the community as to the necessity of their studies, hence requiring more metadiscursive intrusion.

5. Conclusion

This study set out to investigate the distribution of Hyland's (2005) metadiscourse strategies within the canonical divisions of research articles across sciences. It appeared that though globally similar in many ways, NS and SS writers of research articles favored different strategies in different sections. Therefore, based on this findings, it can be concluded that due to the differences in cognitive-generic structure of different sections and also the nature of NS and SS branches of science, authors of RAs build metadiscourse strategies into their diction quite differently essentially in an attempt to fulfill the conventionally-expected rhetorical function.

Integrating the conclusions with implications, it could be said that the findings of this study provide the following implications for academic writing classes. The most important point is that metadiscourse marking is a widely-used rhetorical strategy in writing RAs (Hyland, 1998), and that it should be attended to in one way or another in any writing syllabus. Secondly, the prevalence of certain strategies across certain sections or sciences provides that different sections require specific focus which emanates from different rhetorical orientations.

Notably, it was made clear that evidentials play an important role in setting the ground for new inquiries in the Introduction section of

research articles, and ensuring the audience that the writer is well aware of the mainstream literature and the areas requiring attention. Of course, transitions were the next highly employed in Introduction section as they are necessary for any eloquent argumentation. Hedging is also used to mitigate propositions as they are most of the time lacking ideal evidence.

It was also found that Methods favor frame marking and evidentials and also code glossing (as shown in Total row) to clarify procedures and concepts and build on authority, and hedges and self-mentions to cater for probabilities and expose researchers. RD sections, on the other hand, which host about %50 of all metadiscourse markers, drew on evidentials, transitions and hedges, which have proved useful in constructing effective arguments.

It is hoped that this characterization would offer a rough image of metadiscursive structure of different sections of research articles. Coupled with other studies in the future, this study could help develop a more plausible academic writing syllabus, which brings less visible rhetorical features of research articles under the spotlight to help avoid possible overgeneralizations from native culture.

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Notes

[1] It should be noted that it was the *search process* that was qualitative (as opposed to mechanical) rather than the final data.

[2] Although not appearing here, it was also the case even when the number of markers in RD section was divided in two to have a hypothetical similar length in each three canonical sections of RAs.