



“We examine the relationship ...”: Grammatical Subject in Research Article Abstracts: Disciplinary and Functional Analysis

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Abstract

Research article abstract acts as an important device to manage information and to let the reader decide whether it is merit to continue reading the research article. In this paper, we intend to investigate the frequencies and discourse functions of types of grammatical subject (unmarked theme) used in research article abstracts from four disciplines. To this end, 300 research article abstracts were randomly selected (75 from each discipline) from leading prestigious journals in the four disciplines namely Applied Linguistics, Economics, Agriculture, and Applied Physics, and were analyzed based on Gosden's (1993) classifications that include 16 types of grammatical subject. The results indicated that only six types of grammatical subject were used in the corpus and the frequencies of these types varied across the four disciplines. Besides, the results reported high similarities concerning the discourse functions served using the grammatical subject types. Thus, it could be concluded that the selection and discourse functions of the grammatical subject types are imposed by conventions of writing research article abstracts. The results could add to the existing knowledge of writing research article abstract in the analyzed disciplines by increasing awareness concerning selections of grammatical subject types.

Keywords: cross disciplinary, functional analysis, grammatical subject, research article abstract

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Introduction

Members of the disciplinary community communicate new knowledge to other members through different genres among which is the genre of a research article (RA) abstract. Therefore, the RA abstract is considered as a significant research domain since it performs important roles in the disciplinary scientific community. It serves a variety of writings and readings purposes and functions. It aids writers squeezing important information and outcomes of an RA into a compressed unit and managing flow of information to be transferred in the scientific community (Martin & Rose, 2003). Besides, a RA abstract could play a momentous role in influencing gate keepers of a journal or organizers of a conference to publish or accept a RA. Writing a RA abstract with the above characteristics is quite challenging for writers (especially novice non-native writers). Thus, analyzing linguistic features such as Halliday's (1994) notion of theme in RA abstracts written by successful writers from different disciplines could equip writers with a clear image of how to have an appropriate selection of theme to realize the text development and flow of information best.

Halliday (1994) defines theme as the “element in a particular structural configuration taken as whole, organizes the clause as a message; that is the configuration theme and rheme” (p. 38). According to this definition, “a clause is made of two parts; a theme followed by a rheme. Themes are the starting point for the message; it is the ground from which the clause takes off, and helps the reader to know what the clause will be about and what is going to tell the reader” (p. 38).

Halliday (1994) classified theme as two kinds: marked and unmarked. Unmarked themes are realized as grammatical subjects and marked themes include all the linguistic elements, which come before the grammatical subject.

Theme is an important linguistic resource to reveal textual information and could equip us with a more thoughtful understanding of how discourse is developed (Ebrahimi, 2016; Lores, 2004; Martinez, 2003; North, 2005). Its importance also sources from the versatile significance role of the theme in clarifying “what the writer is writing about and how questions about epistemology, construction, or agency enter into the writer's thinking” (MacDonald, 1992, p. 539). The theme is also the best spot in the sentence, which could illustrate the association of semantics and syntax and it indicates the method of text development (Jalilifar, 2010; Khedri & Jalilifar, 2011; Wang, 2007). Thus, theme distribution is a prominent strategy of text development.

Having the importance of theme in mind, the selection of theme becomes a challenge for writers especially novice non-native writers (Lores, 2004) The selection of theme becomes more challenging when the text is not long and limited

in word count such as the genre of RA abstracts. This challenge is due to the fact that Halliday's notion of theme is descended from Systemic Functional Grammar (SFG) theory that fronts the claim that "language is a social phenomenon, and in dealing with language it works at the level of the text as a unit of meaning" (Forey, 2004, p. 449). Theme has two features, grammatical and functional. By the grammatical feature it is meant the position of theme at the point of departure of the clause and by the functional feature it refers to the function of what the clause is about.

This paper contributes to the debate by examining the distribution of unmarked theme types across four subject disciplines namely: Applied Linguistics (henceforth, AL), Economics (henceforth, Eco), Agriculture (henceforth Agri), and Applied Physics (henceforth AP). We presume that the selection of linguistic features is influenced by their disciplinary context (Afros & Schryer, 2009; Hyland, 2009; North, 2005) , and hence the authors' realizations and use of discourse functions of unmarked theme types (henceforth Grammatical Subject (GS)) in RA abstracts can differ with disciplinary variations. What motivated us to focus on GS is founded on MacDonald's (1992) argumentation that GS choices are sensitive to disciplinarity. She expounds that "the grammatical subject slot is ... the most important spot for determining what a writer is writing about and how questions about epistemology, construction or agency enter into the writer's thinking" (1992, p. 539). This claim has also been emphasized by others (e.g., North, 2003; Vande Kopple, 1994, to name a few). They believe that GS highlights the writers' beliefs and values and brings to light the shared knowledge between writers and readers from the same domain.

To meet aim of this study, researchers intend to answer the following questions:

1. How frequent are the types of GS in the RA abstracts from the four disciplines namely AL, Eco, Agri, and AP?

2. What are the discourse functions performed by using the types of GS in the RA abstracts from the four disciplines namely AL, Eco, Agri, and AP?

Literature Review

Systemic functional grammar (henceforth, SFG), the most well-known component of a broad social semiotic approach to language called Systemic Functional Linguistics (henceforth, SFL), is a grammar model originally articulated by Halliday in 1960s. SFG is mainly concerned with the available choices to speakers or writers of a language made by their grammatical systems. These choices are assumed to be meaningful and relate speakers' or writers' intentions to the concrete forms of a language.

Matthiessen and Halliday (1997) argue that SFL considers the clause as made by a combination of three metafunctions: a) interpersonal metafunction that deals with speaker and listener interaction and how grammatical choices help enacting the social role generally and speech role particularly through dialogic interactions such as establishing, changing, and maintaining interpersonal relations; b) ideational metafunction that deals with ideation which is the grammatical choice for structuring our experience of the world around and inside us; and c) textual metafunction that deals with text development and this is done through presenting the ideational and interpersonal meanings as shared information between speaker and listener in text unfolding in context. Theme is one of the major textual systems is the resource for providing a local context for a clause through selecting a local point of departure in the flow of information. According to Halliday's (1994) classification of theme, unmarked themes are realized as grammatical subjects.

Several researchers have focused on the use of GS in different genres of academic writing among which are research article sections and abstracts (Ebrahimi, 2017; Ebrahimi & Chan, 2014; Gosden, 1993; Lores, 2004). Ebrahimi and Chan (2014) studied the functional use of GS in RA abstracts from two disciplines of Economic and Applied Linguistics. They analyzed 60 RA abstracts (30 from each discipline) using Gosden's (1993) classifications of GS's types and discourse functions. They found that disciplinary differences were quite clear concerning the discourse functions enacted through the use of GSs. They concluded that academic writings such as RA abstracts are shaped based on the rules and conventions of disciplinary writings.

Ebrahimi (2017) investigated 40 research article introductions from four disciplines for the realization and discourse functions of GS. He selected his corpus from high-prestigious journals. He analyzed the corpus based on the classifications suggested by Ebrahimi (2014) that included eight types of GS. His findings suggested that the selection of GS types was guided by the nature of disciplines. The findings suggested the necessity of the cross-disciplinary study of GS. In relation to discourse functions, it was reported that findings stress impose of rhetorical functions of introduction sections on the realizations of discourse functions.

Gosden (1993) investigated discourse functions of the GS in a corpus of 36 research articles written by native writers from the three disciplines of Physics, Chemistry, and Biological sciences. To analyse the data, Gosden used Davies' (1988, 1996) categorization of discourse functions of the grammatical subject. Davies (1988, 1996) categorized the discourse function of the GS into four domains and each domain into some sub-domains which are as follows: a) the participant domain, b) the discourse domain, c) the hypothesized and objectivized domain, and d) the real-world domain. The result indicated that two-third of sentence-initial

elements were grammatical subjects. This means that writers in all three disciplines selected the grammatical subject as a point of departure. Moreover, the study reported the dominance of the real world domain, which occupied three-quarters of all the grammatical subjects. According to Gosden (1993), the greater use of the real-world domain was a result of the self-evident nature of the scientific RA. He concluded that grammatical subject is visualized differently in research article rhetorical sections. He also concluded that the differences between the sections were strongly shown through the thematic structure.

Lores (2004) studied the realizations of thematic structure in RA abstracts. To this end, 36 RA abstracts were selected from four Applied Linguistic journals. The analysis was carried out using Gosden (1992) and Davies (1988, 1996) models of thematic structures. Results showed that thematic distributions and choices were different due to differences in the structures of RA abstracts.

The above-reviewed studies could help us to conclude that there is still a gap in the literature concerning detailed understanding concerning the use and discourse functions of GS types in RA abstracts. This gap may be noticed more when writers from disciplines other than ELT want to write RA abstracts. Thus, this study aims to fill the gap through careful analysis of data from the four disciplines to report on the GS types and functions.

Method

Corpus Compilation

To compile the corpus for this study, the following steps were taken. First, following Swales (1990), academic community is a discourse community which includes some disciplinary communities. This means that disciplinary communities are more specific discourse communities. According to Becher (1989, 1994), disciplinary community is as an academic tribe with its special set of intellectual values and its own “patch of cognitive territory” (p. 153). Becher (1989) classifies academic disciplines into four disciplinary areas of natural sciences (i.e., hard pure), humanities and social sciences (i.e., soft pure), science-based professions (i.e., hard applied), and social professions (i.e., soft applied). Next, to meet the classifications of disciplines suggested by Becher (1989), four disciplines of AL (as a representative of soft applied), Eco (as a representative soft pure), Agri (as a representative of hard pure), and AP (as a representative of hard applied) were randomly selected from which 300 RA abstracts from four subject disciplines (75 RA abstracts from each discipline) were analyzed. These abstracts were extracted from the RAs published from the 2010 to 2014, and all followed Swales’ (1990) IMRD (i.e., Introduction, Method, Result, and Discussion) structure. Details of the corpus are presented in Table 1.

Table 1
Details of Corpus

Discipline	Journal	No. of Abstract	Word Count	Years of Publication
Applied Linguistics	Applied Linguistics	75	15021	2011-2014
Economics	Oxford Economic Papers	75	12510	2011-2014
Agriculture	The Journal of Agricultural Science	75	23632	2011-2014
Applied Physics	The European Physical Journal of Applied Physics	75	11463	2011-2014

Taxonomy for Analysis

To analyze the data for the GS, this study relied on Gosden's (1993) taxonomy. The classification includes four domains of Participant, Discourse, Hypothesized, and Objectivized and Real World. This taxonomy presents a continuum of focus on the GS from real world to participant. In one extreme of the continuum, writer is participated visibly in the research process and in the other end, the focus is overtly on research-based real world entities and activities.

The four unmarked theme domains and the discourse functions of the unmarked themes are described and illustrated as follow:

A. Participant Domain is recognized through the use of discourse participant (e.g., *we*), participant viewpoint (e.g., *our experiments, our analysis*), and interactive participant (e.g., *Smith (1987)*).

B. Discourse Domain refers to discourse event / process (e.g., *the conclusion*), macro discourse entity (e.g., *the study, this article*), micro discourse entity (e.g., *results, the method*), interactive discourse entity (e.g., *previous studies*), and empty discourse theme (e.g., *it is concluded*).

C. Hypothesised and Objectivised Domain refers to hypothesised viewpoint (e.g., *the possibility*), objectivised viewpoint (e.g., *one reason*), hypothesised entity (e.g., *the design*), and empty hypothetical and objectivised theme (e.g., *there is evidence*).

D. Real world Domain focuses on mental process (e.g., *deduction*), real world entity (e.g., *study participants*), real world event and process (e.g., *conceptualising WTC as a dynamic system*), and empty real world theme (e.g., *it was found*).

Procedures

To meet the aim of the study, the following steps are taken. First, 300 RA abstracts (75 from each discipline) were randomly selected and saved into a word format. Second, after collecting the data, the researchers identified the GS of each t-unit. To this end, the researchers read the 300 RA abstracts carefully and identified all the used GSs. The unit of analysis was the T-unit defined as a clause complex that contains one main independent clause together with all the hypotactic clauses that are dependent on it (Fries, 2002).

To minimize the level of subjective judgment, the coded data sample was reviewed by three Ph.D. students in Applied Linguistics for a consistency check. To this end, the three raters checked a sample of 60 RA abstracts from the corpus. If any, the differences in GS identifications were subject to negotiation and discussion to reach an agreement. Finally, results are presented and discussed.

Results

The RA abstracts were analyzed for the GS types and discourse functions. The results are presented and discussed in the following sub-sections. The GS types found in the RA abstracts are *Real World Event*, *Real World Entity*, *Discourse Participant*, *Macro Discourse Entity*, *Micro Discourse Entity*, and *Empty Theme*. Table 2 presents the overall distribution of the GS types across the four corpora. The results show that the various types of GS are present almost in all corpora with an exception of discourse participants type was absent in agricultural. The results are discussed in detail in the following sections.

Table 2
Frequency and Percentage of the GS Types

GS types	AL		Eco		Agri		AP	
	F	%	F	%	F	%	F	%
Real World Entity	142	33	130	33	459	68	199	47
Real World Event	32	7	28	7	105	25	86	13
Discourse Participant	47	11	127	32	-	-	28	6
Micro discourse Entity	97	23	38	10	74	11	51	12
Empty Real World theme	21	5	40	10	39	5	25	6
Macro Discourse Entity	89	21	34	8	19	3	18	4
Total	428	100	397	100	677	100	426	100

Note: AL: Applied Linguistics Eco: Economic Agri: Agriculture AP: Applied Physics

Table 2 presents the frequency distribution of real world entity GS in the four groups of writers. As shown in the table, Agri writers used real world entity GS more frequently compared to other subject disciplines, while AL and Eco writers denoted the least attention towards the use of this GS. These results could suggest that Agri writers are more into writing topic-based RA abstracts. As a result, such RA abstracts are more elaborative on the objects on which the study is carried out.

The real world entity GS type is used to serve three discourse functions namely: a) stating the significance of the study, b) referring to objects and stating related steps or procedures in the methodology, and c) referring to objects and stating the related results. An analysis of the corpus for the occurrence of this discourse function is shown in Table 3.

Table 3
Discourse Functions of the Real World Entity

Discourse Function	AL	Eco	Agri	AP
Stating significance of study	✓	✓	✓	✓
Referring to objects and stating related step or procedure in methodology	✓	✓	✓	✓
Referring to objects and stating the related results.	✓	✓	✓	✓

As shown in Table 3, the first function of GS type, stating the significance of the study, was present in all four sets of RA abstracts. Examples 1 and 2 present instances from the corpora.

Example 1: ***Grass growth in temperate regions*** is highly seasonal and difficult to predict. (Agri)

Example 2: ***Fast linear transformer driver (FLTD)*** has some advantages in repetitive operation compared with traditional pulsed power generators. (AP)

The second discourse function of this GS type states objects that is linked to the procedure in the methodology. An examination of the corpora revealed that this discourse function is present in all groups of RA abstracts. Examples from the corpus are presented in 3 and 4.

Example 3: ***Bayesian, classical and non-parametric approaches*** were used to evaluate the performance of GM crops v. their conventional counterparts. (Agri)

Example 4: ***A model*** is presented on the basis of thermionic emission and tunneling to explain the unusually high leakage current observed in these diodes. (AP)

The third discourse function of the real world entity GS type, referring to objects and stating the related results, was also present in the abstract of all four corpora. Examples extracted from the corpus are presented in 5 and 6.

Example 5: **Knowledge of orthography, part of speech, and meaning** showed different patterns of development with increasing encounters. (AL)

Example 6: At low fields, **drift velocity** increases linearly, but deviates from the linearity toward high electric fields. (AP)

The results in Table 2 indicate a disciplinary difference concerning the use of the real world event GS. This GS was frequently used in AP research articles abstract while there were few occurrences in AL and Eco abstracts.

For the discourse functions of the real world event, the result reported two discourse functions for this GS in the RA abstracts analyzed (see Table 4).

Table 4
Discourse functions of the Real World Event

Discourse Functions	AL	Eco	Agri	AP
identifying, explaining, or defining a process used or adapted in data collection, analysis and measurement	✓	✓	✓	✓
presenting the event from which the results are generated	✓	✓	✓	✓

The corpus was analyzed for the use of the first discourse function, which is to identify, explain, and define a process used or adapted in data collection, analysis, and measurement. The results showed that this function was present in all four corpora. Extracts from the corpus are presented in examples 7 and 8.

Example 7: **The effects of these investments** are also compared to the effects of investments to developed economies (DCs). (Eco)

Example 8: **High-speed current-voltage measurements and Hall measurements over the temperature range 27–300 K** were used to study hot-electron dynamics. (AP)

The second discourse function was presenting the event from which the results are generated. This discourse function that is similar to other discourse functions was found to be present in all four disciplines. Extracts from the corpus are presented in examples 9 and 10.

Example 9: Therefore, **selection for increased growth or LS** may have a negative genetic effect on the other traits. (Agri)

Example 10: Indeed, **these evolutions** show an abrupt increase that is observed when the charge packet aspect occurred in the sample under high dc applied voltage. (AP)

The results in Table 2 indicate that there are significant disciplinary differences between the four disciplines concerning the use of the discourse participant GS. As shown in Table 2, discourse participant is absent in Agri while it is frequently used in Eco.

The data were also analyzed for the discourse functions that are served by the use of the discourse participant GS. The discourse functions of discourse participants GS in RA abstracts and their occurrence in the corpora are presented in Table 5.

Table 5
Discourse Functions of the Discourse Participant

Discourse Function	AL	Eco	Agri	AP
Authorizing aim of study	✓	✓	-	✓
Authorizing a step or a procedure of methodology	✓	✓	-	✓
Authorizing findings of a study	✓	✓	-	✓

As shown in Table 5, the first discourse function is to state the aim of study. The results showed that this discourse function was present in RA abstracts in the three disciplines (Examples 11-12).

Example 11: *We* examine the relationship between R&D, product innovation, and exporting for a sample of new technology based firms (NTBFs) in the UK. (Eco)

Example 12: In this work *we* report on the characteristics of (Ni / Au) / AlGa_n / Ga_n / SiC Schottky barrier diode (SBD). (AP)

The second discourse function of discourse participants is to state the authority of writers concerning the method of a study. The analyses revealed the presence of this function in all three corpora (Examples 13-14). The use of this discourse function can help writers to catch the readers and editors' attention towards the significance and contributions of a study.

Example 13: *We* apply Extreme Bound Analysis (EBA) on a panel of up to 120 countries covering the period 1960–2001. (Eco)

Example 14: To obtain the electron temperature as a function of the applied electric field and power loss as a function of the electron temperature, *we* used the so-called mobility comparison method with power balance equations. (AP)

The last discourse function of discourse participants is to present the authority of writer towards the findings of the study. This discourse function was also present in three corpora (Example 15-16).

Example 15: *We* found that, of the items that were difficult though composed of familiar words, ~40 per cent involved metaphor. (AL)

Example 16: *We* find interesting dynamics in the sector. (Eco)

The results in Table 6 indicate that AL writers refer more to the micro discourse entity GS in the thematic position compared to the other three groups of writers. This could indicate that in AL RA abstracts, writers thematize the micro discourse entity GS type to guide writers through the rhetorical sections of RA abstracts and to leave the responsibility of ideas, claims, arguments, and information presented to the study itself and set them free from taking the responsibility.

An examination of the corpus indicates that the micro discourse entity can be used to serve four functions which are as follows: direct mention of the aim of the study, direct mention of the methodology, direct mention of the findings obtained, and direct mention of the review of the literature. The presence of these four functions in the corpus is presented in Table 6:

Table 6
Discourse Functions of the Micro Discourse Entity

Discourse Function	AL	Eco	Agri	AP
Direct mention of aim of a study	✓	✓	✓	✓
Direct mention of methodology	✓	✓	✓	✓
Direct mention of findings obtained	✓	✓	✓	✓
Direct mention of literature review	✓	✓	-	-

The first discourse function is the direct mention of objectives or aims of the study (Examples 17-18). These examples could indicate the importance of explicit mention of the aim of the study. It seems that writers want to help readers to decide to read the RAs or not by clearly stating the aim of the study. Such a function could also help to realize the rhetorical functions of introduction section of RA following IMRD structure.

Example 17: *The goal of this paper* is to assess the impact of the euro on the relationship between firm size and exports. (Eco)

Example 18: *The aims of this work* were to measure the entrance and exit dose for patient treated for head and neck tumors. (AP)

The next function was to highlight some important aspects of methodology. This discourse function was common in all four disciplines (Examples 19-20). This could suggest that writers intend to highlight contributions of their studies in the

methodology section. Some aspects of methodology could highlight the importance of experiment and could help readers to have a clear image of how the experiment was carried out in the study.

Example 19: ***The data used*** are rich and allow us to account for potential ability bias. (Eco)

Example 20: ***This method*** is also faster than numerical integrations of Biot and Savart law. (AP)

Another important function served using the micro discourse entity GS type was highlighting results obtained. This function was also common in the four sets of RA abstracts analyzed (Examples 21-22). This discourse function is not surprising, as the writers prefer to leave the responsibility of findings to the study and free themselves.

Example 21: ***Results*** show that societal trust positively and significantly influences group loan contribution rates, that group lending appears to create as well as harness social capital, and that peer monitoring can have perverse as well as beneficial effects. (Eco)

Example 22: ***These results*** may provide some insights into switching magnetization electrically for spintronics and presenting independent tunneling states in a single junction for multi-value storage memory applications. (AP)

The last discourse function in the list is the reference to the existing literature. This discourse function was reported to be not ignored in Agri and AP RA abstracts analyzed (Examples 23-24). Such use of GS could help to link the study to the existing literature and highlight that the current study is in line with the existing literature.

Example 23: ***Previous research in this area*** is limited in that it: (i) has focused on items from Coxhead's Academic Word List (2000), which is skewed towards certain disciplines, and focuses only on reading needs; (ii) has not investigated variation across levels of study; and (iii) creates a possibly false dichotomy between generic and discipline-specific vocabulary. (AL)

Example 24: ***Previous studies*** that examine the simultaneous setting of income taxation and education policy have overwhelmingly concluded that optimal education policy should be regressive. (Eco)

The results presented in Table 2 indicate that the empty real world theme has received little attention from the writers of RA abstracts from four disciplines. The results also mentioned that in comparison with other disciplines, Eco writers dedicated greater attention to the use of this GS type.

The empty real world theme was used to serve the function of postponing the results and discussion.

Table 7
Discourse Functions of the Empty Real World Theme

Discourse Function	AL	Eco	Agri	AP
Postponing results and discussion	✓	✓	✓	✓

This function was common in all four groups of RA abstracts (Examples 25-26). Table 7 presents the discourse function enacted through the use of empty real world theme.

Example 25: *There* are marked differences in behaviour between the planning and implementation stages, as well as between the fiscal policy of EU countries and other OECD countries. (Eco)

Example 26: *It* is found that CdS films grown at lower solution temperature (60 °C) give a higher charge carrier recombination rate at CdS / P3OT interface and larger short-circuit current density and energy conversion efficiency values in the corresponding solar cells, in comparison with the 80 °C deposited ones. (AP)

The results presented in Table 2 indicate the disciplinary differences concerning the use of the macro discourse entity GS. As it is evident in Table 2, AL writers have dedicated more attention to the use of this GS type compared with other subject disciplines. The use of this GS type was somehow similar in two disciplines of Agri and AP RA abstracts.

The discourse function that was commonly served by the use of the macro discourse entity in the four sets of RA abstracts was to refer to the aim of the study (Examples 27-28).

Table 8
Discourse Functions of the Macro Discourse Entity

Discourse Function	AL	Eco	Agri	AP
To state aim of study	✓	✓	✓	✓
To present the contributions to existing literature	-	-	✓	-
To state the results obtained	✓	-	-	-

This discourse function might suggest that the clear reference to the aim of the study by the writers using this GS type could suggest that the contributions and significance of the study is completely stated in the aim of the study.

Example 27: ***This article*** examines how Spanish-speaking Latina (im)migrants position themselves relative to US language policies. (AL)

Example 28: ***This study*** examines how current field crop cultivars, adapted to northern long-day conditions and short growing seasons, have responded to the elevated temperatures, especially with regard to determination of yield potential and quality. (Agri)

In Agri and AL RA abstracts respectively, this GS types was used to serve the discourse functions of a) direct reference to the literature (Example 29) and b) direct reference to the results obtained (Example 30). These two functions could suggest that writers sometimes intend to help readers to see where the contributions and significance of their studies are. In these two discourse functions, writers see the contributions and significance of their studies are to be presented in relation to the existing literature or according to the results obtained.

Example 29: ***Previous research*** has demonstrated changes in crop growth, dry matter (DM) partitioning and lint yield of cotton after the application of plant growth regulators. (Agri)

Example 30: ***The study*** clearly shows that the interaction of different complexity measures change over time. (AL)

Discussion

The results presented in the earlier section are discussed from the most frequent to the least frequent GS types. The most frequent GS type was the real world entity that could result in writing less personal RA abstracts. Results, as to the frequencies of the real world entity are in line with Ebrahimi (2017) and Ebrahimi et al. (2014). The similarity could suggest that even in writing different academic genres, such GS is considered as an important anchor point in text development.

The results showed that the first discourse function of real world entity GS type, stating the significance of the study, was present in all four sets of RA abstract. That means the writers used this feature in the RA abstract to show the readers the importance of their study as well as to make them to read the accompanying RA. Moreover, the second discourse function of real world entity which states objects that are linked to the procedure of the methodology was found to be presented in the RA abstracts of all four corpora. The writers used this discourse function to ease the comprehension of the objects that is related to a step and to increase the validity of the study. Understanding such relation could help the readers in better comprehension of the results generated base on the methodology. Furthermore, the third discourse function of real world entity GS type, referring to objects and stating

the related results, was presented in the RA abstracts of the four corpora. The use of this discourse function in the RA abstract could create cause and effect relationship between the objects and the results, which, as a result, make the abstract easier to comprehend and increase the validity of the study.

The results concerning the frequency of the real world event GS: the results indicate a disciplinary difference concerning the use of this GS. The greatest use was in AP RA abstracts and the least occurrence in AL and Eco RA abstracts. Based on this finding, it can be argued that the use of this GS is guided by the nature of the discipline. The difference could attribute to the focus of AP writers on the processes that occurred in the study. They feel more need of including these processes possibly to provide the reader with a clearer view of their research. In addition, the greatest disposition could be attributed to the experiment-based nature of the research in the AP discipline. In this discipline, writers feel a greater need to refer to the processes involved to set out the experiment. Such a reference could be contributed to a better interpretation of the experiment.

The discourse functions performed through using the real world event GS were identifying, explaining, or defining a process used or adapted in data collection, analysis, and measurement. As the real world discourse function was common in all four disciplines, it could help to argue that the writers intend to show the contribution of their studies in the method section of the RA abstract as well as other rhetorical sections. In other words, the authors used this discourse function to increase the chance of publication and motivate the readers to go through the RA. In addition, it could help the writers to set a relationship between the method section and the result section of the RA abstract, which in turn could increase the validity of the study as the results are rationalized.

Results reported disciplinary differences concerning the frequency rate of using the discourse participants GS. The frequent use of this GS type in the Eco discipline indicates that Eco writers prefer to express their stance in the abstract and to take responsibility for their claims in their studies. In another word, the use of discourse participants in the corpus indicates the writers' authority and confidence in their evaluation as well as the commitment to their claims. On the other hand, the low frequency of this GS type in AP discipline might express the writers' less motivation to take responsibility for the findings. The low frequency of discourse participants can put the writers safe concerning the possible falsification of their arguments. The results reported here are in contrast to the findings of Ebrahimi et al. (2014) study, in which little attention was given to the use of discourse participant GS. This could indicate that the use of discourse participants is discipline-specific.

The presence of the first function of discourse participant, stating the aim of the study, shows the authority and position of the writers in relation to the aim of the

study, in all disciplines; this indicates that all writers had attempted to convince the editors and then the readers about the authenticity of the study. In addition, based on Hyland's (2009) model of RA abstract writing, stating the aim of the study is an obligatory step in writing RA abstract. Thus, this finding could help to argue that writers preferred to show their authority by authorizing the aim of the study. The presence of the second discourse function, stating the authority of writers concerning the method of the study, indicates that writers tried to catch the readers and editors' attention towards the significance and the contributions of the study. The writers in all four corpora preferred to authorize the contributions and the significance of their study in the method section.

The results indicated that AL writers refer more to the micro discourse entity GS type in the thematic position compared to other three corpora. This could indicate that in AL RA abstracts, writers thematize the micro discourse entity GS type to guide readers through the rhetorical sections of RA abstracts and to leave the responsibility of ideas, claims, arguments, and information presented to the study itself and set them free from taking the responsibility concerning arguments and claims. This is not in line with the study of Ebrahimi et al. (2014). In their study, they have reported greater use of this theme in the results and discussion section of research article analyzed from different disciplines. This could help to conclude that the use of such theme is highly related to the analyzed genre. The highly frequent use of this theme in Ebrahimi et al. (2014) study can be explained by the fact that writers are more willing to free them from taking the responsibility of findings, claims, and arguments in the result and discussion sections. The use of micro discourse entity can raise the validity of the study, which can be found among writers of AI and Agri. The frequency of this feature in the abstract section is higher than Ebrahimi's (2017) findings of introduction section. This could suggest that in RA introductions, writers feel less need to refer to micro discourse entity GS in the thematic position due to the nature of RA introduction section.

The results indicated that the empty real world theme has received little attention from the writers of RA abstracts in the four disciplines. The use of this GS may help writers postpone the information to the last section of the sentence. This structure is applicable mostly when the subject is long and it helps in devoting the responsibility to the study itself and it is in contrast with the discourse participant where writers take the responsibility by themselves. The little attention towards the use of this GS seems to be rooted in the fact that RA abstracts are limited in word count; thus, there is little space for such structure. The little use of this GS could help in keeping the RA abstract to be more subjective and personal. The results reported in this study are in line with Ebrahimi (2017) suggesting that the use of such GS type is rare in academic texts.

The empty real world theme was used to serve the function of postponing the results and discussion. This function was common in all four groups of RA abstracts. Such an application can tentatively suggest that the writers in all subject disciplines prefer to be less visible while reporting the research outcomes and claims. This could be discussed based on the information principle, which says that the writers present longer elements that carry a high load of information towards the end of the sentence. It seems that the writers use this theme along with reporting verbs to remain neutral concerning the research outcomes and claims.

The overall findings presented disciplinary differences concerning the use of the macro discourse entity GS. The findings showed that AL writers have dedicated more attention to the use of this GS type compared with other disciplines. The use of this GS type was somehow similar in the two disciplines of Agri and AP RA abstracts. The results reported here are in line with Ebrahimi and Chan's (2014) study in that both studies have investigated samples from the genre of RA abstracts. Moreover, the findings are in contrast with Ebrahimi et al. (2014) study in which the results and the discussion sections of RA were analyzed.

In general, it seems that in academic genres such as RA abstract from different disciplines only some types of GS are commonly used. The favored GS types are used to enact different discourse functions required by conventional features of genre or disciplines.

The results of the study can pedagogically benefit novice researchers, especially non-native speakers and post-graduate students, in their academic writing by learning the conventions of their own disciplines. This has become more important due to postgraduate students and researchers' pressure to publish and the possibility of getting rejected simply not by following the discipline convention (Peacock, 2011). Since getting published can lead to “an enhanced reputation, prestige, peer acceptance, and research grants” (Kanoksilapatham, 2007, p. 173), this has become a challenge for those novice or non-native researchers who are unable to develop their text scientifically adequately. Therefore, as Hyland (2007) states, “Genre-based writing instruction offers students an explicit understanding of how target texts are structured and why they are written in the ways they are” (p. 151).

Conclusion

This research aimed to study the realizations and the discourse functions of GS types in RA abstracts from four disciplines namely AL, Eco, Agri, and AP. The results were presented and discussed, thus we can conclude that in the four disciplines, writers preferred to use six GS types in the subject position. The results also pointed to some disciplinary differences with the frequencies of the GS types. As it is evident in Tables 3 to 8, these GS types were used to enact some discourse functions imposed by the rhetorical conventions of RA abstracts.

Despite its findings, the study also suffers from some limitations: first, this study analyzed only 75 RA abstracts from each discipline which could be considered

as one of the limitations of this study. Further studies could be replicated with higher sample size. Moreover, in this study, only four subject disciplines were analyzed. To move one step ahead and to validate findings of this study, a focus on more disciplines is necessary. In addition, other studies whose focus is on sections other than abstract can provide more insights into the variation of use in marked and unmarked GS types.

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