Discourse functions of grammatical subject in results and discussion sections of research article across four disciplines

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Abstract: This research analyzes the discourse functions of grammatical subjects used in results and discussion sections of research articles across four disciplines. To this end, sixteen results and discussion sections from four disciplines, namely, English Language Teaching, Economics, Biology and Civil Engineering (four from each discipline), were analyzed using the categorizations of discourse functions of grammatical subjects established by Gosden (1993). There were marked disciplinary differences in terms of the discourse functions served through the application of the grammatical subjects in the four sets of the results and discussion sections. These disciplinary differences were clearly shown in all the four domains of the discourse functions of the grammatical subject along with their subcategories. This result suggests that the discourse functions of the grammatical subject are strongly related to the public aims, norms and conventions of specific disciplines as well in the contexts in which it is realized.

Keywords: Grammatical subject, discourse function, results and discussion section, disciplinary difference

1. Introduction

In recent years, academic writing has attracted the interest of numerous researchers. The genre of research article (RA), among other genres of academic writing, has received the greatest attention. This attention is due to the key role of RA in the legitimating of claims and disciplines (Berkenkotter and Huckin,1995; Hyland, 1996). Johns and Swales (2002) relates this attention to the intensive review process that RA goes through before getting "valorized and ratified by the very fact of being published" (p. 13). To Peacock (2002), this attention sources from the fact that RA plays a significant role in the circulation of academic knowledge which necessitates meeting the often-stringent requirements of a disciplinary community. In other words, disciplinary writing could be specific to the discipline, representing variation between different disciplinary communities, that are characterised by a broadly agreed set of common goals and a suitable degree of relevant content and discoursal expertise (Swales, 1990; Afros and Schryer, 2009; Hyland, 2005, 2008, 2009; Hyland and Tse, 2004; Vande Kopple, 1986, 1994; Belcher and Braine, 1995). To Swales (1990) and Belcher and Braine (1995), success in constructing a RA involves an understanding of the rules and conventions of the discipline. In the same line of argumentation, Hyland notes that disciplinary differences result in specificity in the macro and micro structures of the academic writing (e.g. RA) (2009, 2000). Hyland also argues that disciplinary writers draw on the 'persuasive practices of their discipline, encoding ideas, employing warrants, and framing arguments in ways that their potential audience will find most convincing' and in claim making about their research, they keep in mind their readers' 'likely objections, background knowledge and rhetorical expectations' (2008, p. 3). These clear arguments have opened up and rationalized the research in the area of disciplinary difference in RA writing.

Having these arguments on board, many researchers in the last two decades have taken on Swales' (1990) overview of RA and investigated disciplinary difference in the use of linguistic features. To begin, Khedri et al. (in press) worked on the mapping of interactive metadiscourse markers in the results and discussion sections of RAs from different disciplines. Hyland (2005) tried to find out how stance and engagement markers are realized in academic pieces of work by RA writers that belonged to different disciplines. Harwood (2005) studied the use of inclusive and exclusive pronouns in the RAs from five different disciplines. Chan and Ebrahimi (2012) explored the discourse functions of the context frame in the RA abstracts taken from two disciplines. As the extant literature reveals, all these studies attest to the fact that there is a disciplinary difference in the use of linguisitic features used by RA writers while constructing their discourses. Accentuating the nature of disciplinary practice could focus on the notion of theme which has received little attention. In this sense, some scholars, such as Gosden (1992), remark that one of the linguistic features which

appears to have potential to signal disciplinary difference and rhetorical functions of the RA sections is Halliday's notion of theme.

Halliday's notion of theme is descended from Systemic Functional Linguistic (SFL) 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). Halliday (1985, p. 39) defines theme as "the point of departure of the clause" and "what the clause is about." This definition shows that 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 is meant the function of what the clause is about.

Davis (1988, 1997) forwards a two-part analysis of theme; namely, obligatory topical theme realized by the grammatical subject (GS) and optional context frame (CF) realized by any element preceding the GS. In the current research, we follow the same categorization and to realize the theme we only count those linguistic features which enact as GS. What motivated us to do so 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 (North, 2003; Vande Kopple, 1994). They believe that GS highlights the writers' beliefs and values and bring to light the shared knowledge between writers and readers from the same domain.

Thus, this exploratory research aims to accentuate the discourse functions of GS in the results and discussion section of RA across four disciplines namely, English Langauge Teaching (ELT), Economics (Eco), Biology (Bio) and Civil Engineering (CE). It should be noted that the data of this study (RAs) were extracted from international journals that are published in ESL context. The particulars of the data are stated in the methodology section.

To fulfill the aim of this research, the following questions guide the research:

1. How do RA writers from four different disciplines use the GS to convey discourse functions in the results and discussion section?

2. What are the various manifestations of the GS in four disciplines in writing the results and discussion section?

2. Method

2.1 Data collection

To account for the cross-disciplinary nature of this study, the researchers relied on Becher's (1989) taxonomy of disciplines to select disciplines which could be

representative of the spread of disciplines across the academic context. To Becher (1989), disciplines are classified into soft and hard sciences. Disciplines in the humanities and social sciences are grouped under soft sciences while science disciplines are grouped as hard sciences. Having Becher's (1989) taxonomy on board, four disciplines of ELT and Eco representing soft science and Bio and CE representing hard science were selected for this study. Next, four journals of Social Sciences and Humanities, Science and Technology, Tropical and Agriculture Science and Economics and Management were selected. These journals are all international and institutional flagship journals published by Universiti Putra Malaysia and had received indexing in Scopus.

Then, the data for this study were collected. The data included sixteen results and discussion sections (four from each discipline) extracted from sixteen RAs which were published as regular papers in the above mentioned journals.

During the data collection, some constraints were noted: a) We tried to control the tentative effect of time periods which may affect disciplinary practice of RA writing. So, only recently published RAs, between 2010 and 2011, were selected; b) Only RAs which are shaped through Swales' (1990) IMRD structure were included in our data and c) We narrowed the research and focused only on two dominant rhetorical sections of the RA, that of results and discussion. This focus was motivated by the fact that results and discussion sections have great potential for textual investigation. The results section is where researchers a) present, highlight and give comments on new findings (Brett, 1994); and b) rationalize the employed method, justify the findings, compare, contrast and elaborate on the similarities and the differences of their findings with the earlier reported ones (Swales, 2004). The discussion section is where researchers make claims concerning how their findings contribute to and integrate with the disciplinary existing knowledge (Basturkmen, 2012).

In the RAs selected for this research, both sections of results and discussion were combined and presented as a single unit under the section of results and discussion. This combination will help in the scrutiny of the presence of GS in a longer flow of discourse. The combination also could be justified on the grounds that the nature of the result section may necessitate presenting the statistical results of the experiment and the interpretation of the result (discussion) close to each other (Mirahayuni, 2002). The description of the data is presented below (Table 1).

Table 1. Description of the data

	ELT	Eco	Bio	CE
Number of results and discussion sections	4	4	4	4
Length of results and discussion sections (range)	706-2316	477-1089	717-1585	575-1120
Total number of words of results and discussion sections	4741	3248	4729	3745
Total number of GSs in each discipline	120	81	103	123

2.2 Analytical framework

To analyze the GSs for their discourse functions, this research relied on Gosden's (1993) categorization. Gosden's categorization includes four domains, which are: Participant, Discourse, Hypothesized and Objectivized and Real World, thus representing a continuum of text focus of the GS from the Participant to Real World. Towards one end, there is an overt presence of the writer as a visible participant in the research process; towards the other end, there is an overt focus on research-based entities and activities of the real world in terms of the physical and mental entities and activities. Gosden's (1993) categorization is supported by earlier suggestions of Martin (1986) and Davies (1988). Martin suggests that having a "successful" balance between interactional (participant) and topic-based (real world) discourses could result in the perceived success in writing (1986). Davies (1988), similarly, suggests that writers use the GS as a means through which they present themselves and their viewpoints to the community in very obvious and subtle ways. This may result in a progressive decline of writer visibility along the continuum moving from the participant domain to the real world domain.

The four grammatical subject domains and the discourse functions of the GS are described and illustrated in the following section.

The Participant Domain

1. *Discourse Participant*: The GS is clearly recognized through the use of 'we', even in the case where there is a single named author (e.g., *we*).
2. *Participant Viewpoint*: The GS is characterized by the use of 'our', with a focus on research outcomes and activities, rather than reporting (e.g., *our experiments, our analysis*).
3. *Interactive Participant*: Researchers are referred to by name in citation (e.g., *Smith (1987)*).

Discourse Domain

1. *Discourse Event/Process*: The GS does not refer to investigative events and research processes as described in experimental sections, but rather to discourse acts and the process of their discussion and reporting (e.g., *the conclusion*).
2. *Macro Discourse Entity*: The GS refers to integral units of discourse (e.g., *the study, this article*).
3. *Micro Discourse Entity*: The GS refers to parts or internal entities of a discourse (e.g., *results, the method*).
4. *Interactive Discourse Entity*: The GS refers to previous community-validated, macro discourse entities (e.g., *previous studies*).

5. *Empty Discourse Theme*: In this and other domains, an empty theme is shown by it/there choices and shares any of the indicated domain criteria (e.g., *it is concluded*).

Hypothesised and Objectivised Domain

1. *Hypothesised Viewpoint*: The GS refers to comments and judgment on research matters; it expresses a writer's perception of degrees of uncertainty or explicit hedging, which are realised through an obligatory modality (e.g., *the possibility*).
2. *Objectivised Viewpoint*: A high degree of evaluative modification implies an acknowledged or given status, which is frequently reinforced by the use of the timeless present tense (e.g., *one reason*).
3. *Hypothesised Entity*: The GS refers to modes of testing and carrying out research and their means of expression. Accordingly, the GS is hypothetical or theoretical in nature (e.g*., the design*).
4. *Empty Hypothetical and Objectivised Theme*: The GS is charactrised by seemingly formulaic patterns (e.g., *there is evidence*).

Real world Domain

1. *Mental Process*: The GS focuses on intellectual processes and entities that are part of the investigative real world research domain. Hypothesised and objectivised viewpoints are often based on the outcomes of these mental processes which are again realised through nominalised forms (e.g., *deduction*).
2. *Real World Entity*: The GSs are typically material entities and objects concerned with the physical world (e.g., *study participants*).
3. *Real World Event and Process*: The GSs are actions and procedures executed in or resulting from scientific research activities (e.g., *conceptualising WTC as a dynamic system*).
4. *Empty Real World Theme*: The GSs are postponed real world entities, research events and processes and reference to mental process (e.g., *it was found*).

2.3 Unit of analysis

This research analyzes only the GSs of main clauses. The reasons being: a) main clause provides a clear picture of the discourse function of the GS, without focusing on secondary organization; b) main clause plays a major role in the text's organization and increases genre awareness (Fries and Francis, 1992; Berry, 1989); and c) initial position of the main clause makes the major contribution to the text's method of development (Halliday, 1985).

2.4 Procedure

The gathered data were analyzed through the following steps. Firstly, the selected RAs, those taken from the electronic versions of the constituent journals and those that were

scanned manually, were traversed to Rich Text format for computer storage. Then, in order to establish the size of the corpus, a word count was run on the whole data. Secondly, the GSs were identified and analysed for their discourse functions using Gosden's (1993) categorizations. Thirdly, the frequency and percentage of discourse functions of the GSs in each discipline were calculated. Fourthly, findings were compared and contrasted to find out the possible similarities and differences across disciplines.

To increase the reliability of the data analysis, a sample analysis of four results and discussion sections (one from each discipline) were verified by two raters who are pursuing their PhD in Applied Linguistics. Once concordance was established, the researchers proceeded with the rest of the analyses.

3. Results and discussion

3.1 Grammatical Subject domains

The data were analyzed for the manifestation of the four grammatical subject domains and the result is presented in Table 2.

Table 2. Frequency and Percentage of Subject Role Domains

	ELT (%)	Eco (%)	CE (%)	Bio (%)
Participant Domain	7 (6)	4 (4)	-	14 (12)
Discourse Domain	38 (31)	23 (29)	19 (18)	21 (17)
Hypothesized and objectivized Domain	12 (11)	14 (17)	5 (5)	1 (1)
Real World Domain	63 (52)	40 (50)	79 (77)	87 (70)
Total	120 (100)	81 (100)	103 (100)	123 (100)

The findings revealed salient points in relation to the manifestations of participant domain (See Table 2). Concerning this domain, a marked disciplinary difference among the four disciplines in focus was reported by the data analysis. While this domain was totally ignored by CE writers in developing their results and discussion sections, Bio writers showed the greatest disposition towards this domain by dedicating 12% of their total GSs to this domain. The other two disciplines showed a similar tendency towards the language use that characterised this domain, presenting it only in 6% of their GSs.

Exclusion of the participant domain by CE writers suggests that they did not wish to present themselves and their viewpoints more overtly while writing the results and discussion sections of their RAs (Davies, 1988). Manifestation of the GS in this domain result in a more interactional text (Martin, 1986). Greater inclination of the use of this domain in the Bio results and discussion sections could suggest that Bio writers sought to validate their findings through an association with major findings from other studies.

Based on the figures obtained, disciplinary difference in the use of GS in the discourse domain is highly noticeable (See Table 2). ELT and Eco writers showed a greater disposition by dedicating 31% and 29% of their total GSs to the manifestation of this domain compared to the other two disciplines of CE and Bio which presented this domain in a reduced number constituting 18% and 17% of the GS use respectively. This may be translated to mean that in soft science disciplines, Eco and ELT in this research, writers concentrated directly more on the research outcomes and products of the participants and tried to make an external link between their ideas and earlier ones proposed by other writers in the discipline. This result also suggest that Eco and ELT results and discussion sections, compared to the other two disciplines, were written with more reliance on the rhetorical goals of the generic components (Example 1) confirming the claim made by Gosden (1993). The focus on this domain in soft science disciplines make the results and discussion sections to be less interactional.

> Example 1: ***The results*** show that the plasicity deformation occurred at about 74 Gauss points after 20 sec of seismic excitation. (CE 2)

A marked disciplinary difference regarding the application of the hypothesized and objectivized domain was also revealed by the data analysis (See Table 2). While CE and Bio writers showed little interest to include this domain, ELT and Eco writers, in turn, used this domain in frequencies that accounted for 11% and 17% of such GSs. This reflects the ELT and Eco writers' inclination towards situating their viewpoints and comments on their research outcomes and hypothesized conclusions in the GS position (Example 2). The result could also be explained on the grounds that ELT and Eco writers showed preference to focus more on the elaboration of research activities (Example 3).

> Example 2: ***One reason to find the participants of this study as high strategy users*** may be due to the participants' level of education, i.e. as post graduate EFL learners. (ELT 2)

> Example 3: ***The underlying principle for internal consistency*** is that, the individual items or indicators of the scale should all be measuring the same construct and thus be highly inter-correlated. (Eco 1)

As the figures in Table 2 show, the real world domain was more dominant in CE and Bio results and discussion sections (71% and 77% respectively). This finding suggests that GSs in the Eco and CE results and discussion sections are more topic-based which results from a minimal emphasis on writer's visibility (Example 4).

> Example 4: ***The top part of the dam*** experiences higher acceleration at the crest of about 1.02g and 1.1g for the two cases with and without sediment, respectively. (CE 2)

3.2 Participant domain

The data were analyzed for the participant domain subcategories and the result is presented in Table 3.

Table 3. Frequency and Percentage of subcategories of *Participant Domain*

	ELT (%)	Eco (%)	CE (%)	Bio (%)
Discourse Participant	-	2(2)	-	1 (1)
Participant Viewpoint	-	1 (1)	-	-
Interactive Participant	7 (6)	1 (1)	-	13 (11)
Total this domain	7 (6)	4 (4)	-	14 (12)
Total	120 (100)	81 (100)	103 (100)	123 (100)

The discourse participant as a subcategory of the participant domain was applied sparsely by Eco writers (2%), while it is used only once by Bio writers and totally excluded from use by CE and ELT writers. Eco writers realized this type of GS through the pronoun *"we"* (Example 5). As Ivanic (1998) noted, all texts carry information about the writer, but first person pronoun is the most powerful means of this self-mentioning. In the same line of argumentation, Hyland (2005) explained the use of first person pronoun on the grounds that it is the means through which the writers categorically show their stance concerning their arguments, readers and community. Findings in relation to this GS imply that the use of explicit reference to the author by Eco writers show their tendency towards gaining authorial identity by adopting a particular stance (Hyland, 2001). As with Martin (1986) and Martinez (2003), this suggests that Eco results and discussion sections are more interactional and argumentative.

> Example 5: **We** can see that labour productivity in Malaysian
> manufacturing sector is still very much depending on labour. (Eco 3)

Concerning the participant viewpoint, another subcategory of the participant domain, this GS manifestation was used only once by Eco writers, while writers in the other three disciplines did not resort to its use at all. The findings illustrated that this GS was applied to emphasize the finding of the study (Example 6).

> Example 6: **Our result** generally agrees that tourism, trade and
> economic growth are highly interrelated in the long run. (Eco 2)

As the figures in the Table 3 show, a marked disciplinary difference concerning the interactive participant (Example 7), the third subcategory of the participant domain, was reported by the data analysis. The result showed that Bio writers made more use of this GS, while it was not found in the analysed CE results and discussion sections. This could reflect that CE writers, in developing the results and discussion sections, did not use such GS expression for interactive purposes which originate in the external world of

the academic community, rather they dealt more with the substance of the study (Gosden, 1993). This result also implies that Bio writers preferred to give implicit validation to the results and discussion sections by presenting and challenging earlier results in the related area and they also leaned to the presentation of their own stance towards other studies through agreement/inclusion and disagreement/exclusion (Gosden, 1993). Bio results and discussion sections were also found to be more statistically meaningful compared to other disciplines, since they are contrasted and compared with the related studies (Ghadessy, 1999). More resort of Bio writers towards the interactive participant GS might illustrate their preference for representing ideas from other sources to guide the reader's interpretation and establish an authorial command of the subject. This allows the writers to show *who* is responsible for the ideas, arguments and positions presented in the text (Hawes and Thomas, 1997; Hyland, 2005).

> Example 7: **Stone (2001)** showed that water use efficiency (calculated the same as WP in this study) with water deficit increased as maize yield increased. (Bio 1)

3.3 Discourse domain

The data were also analyzed for the subcategories of the discourse domain and the result is presented in Table 4.

Table 4. Frequency and Percentage of subcategories of *Discourse Domain*

	ELT (%)	Eco (%)	CE (%)	Bio (%)
Macro Discourse Entity (%)	3 (2)	-	-	3 (3)
Micro Discourse Entity (%)	27 (22)	22 (28)	15 (14)	17 (13)
Empty Discourse Theme (%)	4 (4)	-	3 (3)	-
Interactive Discourse Entity (%)	1 (1)	-	-	-
Discourse Event/Process (%)	3 (2)	1 (1)	1 (1)	1 (1)
Total this domain	38 (31)	23 (29)	19 (18)	21 (17)

Evident in the figures in Table 4, the most frequent subcategory of the discourse domain is the micro discourse entity. This GS manifestation was also remarkably different in the results and discussion sections of the disciplines in focus. The interesting point reported by the data analysis was the greater tendency of Eco and ELT writers, representing soft science, to manifest this GS in 28% and 22% of the total GSs in turn compared to CE and Bio writers, representing hard science, where this GS was used in 14% and 13% of the GS positions respectively. This finding reflects that writers of soft science disciplines used this GS to support their arguments by comparing and contrasting them with earlier ones (Example 8) (Hyland, 2005). They also used this GS to aid readers to have a better understanding of the result by directing them to information presented in tables or figures (Example 9).

> Example 8: ***This finding*** is consistent with Grunert, 2002 study, which revealed that quality labels would allow consumers to explore and experience new characteristics of food products. (Eco 1)

> Example 9: ***Fig. 18*** summarizes the results gathered from the distribution of the plastic deformation at the lower part of the dam and at the end of the earthquake excitation. (CE 2)

In terms of the macro discourse entity, another subcategory of the discourse domain, the result reported that this GS realization received little attention from the writers of the disciplines in focus. While this GS was totally excluded in the CE and Eco results and discussion sections, it was manifested only in 3% and 2% of the GS positions in the ELT and Bio results and discussion sections in turn. The point to note about the application of this GS is the manner of emphasis given to impact the significance of the results or findings (Example 10), to support the arguments (Example 11), and to present earlier findings (Example 12).

> Example 10: ***This study*** did not match Hojjati's (1998) who found men obtained a higher overall strategy mean than women. (ELT 2)

> Example 11: ***The above studies*** also revealed that WP was strongly increased if crop water deficit was induced. (Bio 1)

> Example 12: ***These studies*** mostly found the learners as medium strategy users. (ELT 2)

The other subcategory of the discourse domain which writers dedicated a small portion to its realisation in the GS positions was the empty discourse theme. This GS was only used by ELT (4%) and CE (3%) writers. It suggests that writers of these two disciplines resorted to introduce evaluative comments which could make their results and discussion sections more interactional (Example 13).

> Example 13: ***It*** was assumed that a difference of less than 15% between the predicated and the observed water levels at each sub-reach of Langat River was acceptable. (CE 4)

In the case of the discourse event/process, writers in all the four disciplines also showed little interest to include this GS in the sentence initial position. ELT writers resorted more to include this GS to refer to the discourse acts and process of discussing and reporting in this section (Example 14).

> Example 14: ***A likely explanation*** is the traditional rote memorization strategies that Asian learners once were reported to have prefered might differ from the specific memorytechniques reported in the SILL. (ELT 2)

The interactive discourse entity, as one of the subcategories of the discourse domain, was not included by writers of the three disciplines of Eco, CE, and Bio and was used

only once by the ELT writers. To Gosden (1993), this could indicate the lack of tendency towards referring to previous, community-validated macro discourse entities.

3.4 Hypothesized and objectivized domain

The data were also analyzed for the subcategories of the hypothesized and objectivized domain and the result is presented in Table 5.

Table 5. Frequency and Percentage of subcategories of *Hypothesized and Objectivized Domain*

	ELT (%)	Eco (%)	CE (%)	Bio (%)
Hypothesized Entity (%)	2 (2)	2 (2)	-	-
Empty Hypothesized and Objectivized Theme (%)	4 (4)	4 (5)	-	-
Objectivized Viewpoint (%)	5 (4)	6 (7)	4 (4)	1 (1)
Hypothesized Viewpoint (%)	1 (1)	2 (2)	1 (1)	-
Total this domain	12 (11)	14 (16)	5 (5)	1 (1)

Regarding the subcategories of the hypothesized and objectivized domain, the hypothesized entity and the empty hypothesized and objectivized theme subcategories were used only in the ELT and Eco disciplines representing soft science. This finding reflects that soft science writers used the hypothesized entity to focus on modes of testing and carrying out research and used the empty hypothesized and objectivized theme to focus on the use of formulaic patterns, such as, *"it is evidenced that"*.

In the case of the objectivized viewpoint, another subcategory of this domain, the gained findings signified a disciplinary difference between the four disciplines where the application of this GS fluctuated from 1% in Bio to 7% in Eco. A greater use of this GS construction led to more internal and writer-oriented results and discussion sections of the Eco writers (Example 15). CE and Bio writers excluded the hypothesized entity suggesting that in all the analysed results and discussion sections, the writers did not include GS to present the modes of testing and carrying out research.

> Example 15: **The least important indicator** was health conscious which means perception towards meat justifies 0.4% of the variances for health conscious dimension. (Eco 1)

3.5 Real world domain

The data were also analyzed for the subcategories of the real world domain and the result is presented in Table 6.

Table 6. Frequency and Percentage of subcategories of *Real World Domain*

	ELT (%)	Eco (%)	CE (%)	Bio (%)
Real World Entity (%)	49 (40)	26 (33)	24 (23)	70 (56)
Real World Event (%)	12 (10)	7 (9)	50 (49)	15 (12)
Mental Process (%)	1 (1)	4 (5)	4 (4)	-
Empty Real-World Theme (%)	1 (1)	3 (4)	1 (1)	2 (2)
Total this domain	63 (52)	40 (51)	79 (77)	87 (70)

Concerning the subcategories of the real world domain, the results indicated that the most predominant subcategory of this domain was that of the real world entity. The result showed a disciplinary difference in regards to the use of this subcategory by the four groups of writers. The highest application was in the Bio results and discussion sections (56%) and the least application was in the CE results and discussion sections (23%). This finding could be due to the need felt by the Bio writers to make a direct reference to material entities and/or physical objects used in the research as to make their writing concrete (Example 16). The second most frequent subcategory was the real world event. The interesting point noted was that CE writers used this subcategory in 49% of the GS positions while the other three groups of writers dedicated much fewer instances, which amounted from 9% to 12% of the total GSs representation. This might reflect a higher affinity towards presenting the process used in the research in the subject position (Example 17).

> Example 16: ***Maize*** is the crop that is most sensitive to variations in plant density. (Bio 1)

> Example 17: ***Coefficient of variation (COV)*** was used to evaluate and compare the variation between the data sets. (CE 3)

In relation to the other two subcategories of this domain, the mental process and the empty real world theme, the figures in table 6 registered hardly any interest on the part of the writers from all the disciplines in focus to include them in the GS position. This reflects the writer's disposition towards not giving a focus on intellectual entities and processes which are part of the investigative real world domain. Instead, they prefer to mention the real world entities or the research events/process in the GS position.

4. Conclusion

This research aimed to figure out the discourse functions of the GSs applied in the results and discussion sections of RAs from four disciplines namely, ELT, Eco, Bio, and CE. It also intended to add to the earlier claims that academic writing is shaped by the disciplinary background (Lovejoy, 1991; North, 2005; Hyland, 1998, 2008,2009).

In this research, findings illustrated disciplinary differences in the discourse functions served through the applied GSs in the four sets of the results and discussion

sections. These differences were clear in all the four domains of the discourse functions of the GS along with their subcategories. This possibly suggests the significance of the GS as a textual device which lies in close relation with the public aims, norms and conventions of specific discourse communities and as well the contexts in which it is realized.

Findings illustrated that the predominant domain was the real world domain to which CE and Bio writers showed a greater disposition suggesting the more topic based nature of the results and discussion sections in these two disciplines. The discourse domain was ranked second in receiving the writers attention to be included in the GS position. ELT and Eco writers showed a greater affinity to include this domain compared to their counterparts in CE and Bio disciplines. This suggests the ELT and Eco writers dealt more with the research outcomes; therefore, their results and discussions are seen to be less interactional. Concerning the hypothesized and objectivized domain, it was ranked third, receiving more attention from ELT and Eco writers. This indicates that the ELT and Eco writers went about more explicitly in the presenting of their viewpoints and comments on the research outcomes and hypothesized conclusion. The last domain in order was the participant domain. It was manifested more in Bio results and discussion sections indicating the more interactional nature of these results and discussions.

It should be noted that this research relies on data coming from journals that were all published by the University Putra Malaysia. Although these journals are internationally read, they are produced, edited and published in a particular context, and this might have played a role in the aims and particular ways of writing. Since genres are very much tied to the context within which they are found, more research on this issue is needed in order to confirm the generalizability of these findings in other contexts.

This research, through shedding light on the discourse functions of the GS and its application in different disciplines, could aid RA writers and readers in general and those from the disciplines in focus in particular, with the knowledge of how GS is applied to serve different discourse functions. In addition, the result of this research increases writers' awareness concerning disciplinary difference as an important aspect which helps in understanding the 'culture' of writing and getting familiar with the conventions and expectations of a particular disciplinary community.

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