

**Exploring Phrasal Complexity Features in Graduate Students'
Data Commentaries and Research Articles***

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Abstract

The present study aimed at exploring phrasal complexity features in data commentaries produced by graduate students and in research articles written by expert writers. To this end, 25 empirical RAs in the field of Applied Linguistics and 158 data commentaries generated by graduate students of English Language Teaching were comparatively examined. The results revealed that students approximated expert writers in terms of producing two linguistic features (i.e., N+N structures and nominalizations). However, they differed significantly from expert writers in generating four linguistic elements (i.e., attributive adjectives, appositive structures, *of*-genitives, and PPs as noun post-modifiers). The results also revealed that expert writers' texts comprise varied presence of exceedingly complex patterns of pre-modification, triple/quadruple/quintuple (pre)modification, a hybrid of novel appositive structures, and multiword hyphenated adjectives. Conversely, graduate students' language could be characterized by less variety, single/dual (pre)modification, a far less extensive range of noun-participle compounds functioning as nominal pre-modifiers, linguistically limited complex modifications, and minimally multifarious patterns of use associated with N+N formulations. Overall, the findings can give fresh insights into the needs of the L2 student writers in developing an academic text.

Key Words: Phrasal Complexity Features, Pre/post modifiers, Data commentary, Research Article, Academic Writing.

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Introduction

Of the various genres of academic writing, the research article has particularly captured the attention of many researchers. Being the “pre-eminent genre of the academy” (Hyland, 2009a, p. 67), the research article (henceforth RA) is of primary importance for teaching and functioning in academic writing (henceforth AW), assisting second language learners in understanding and gaining academic and professional discourse. Recent studies on AW have shown that developing a research article is not only demanding but also challenging to novice research writers, doctoral students, and researchers who use English as a Second Language (ESL) (Kwan, 2010; Hanauer & Englander, 2013). More specifically, one domain of RAs that represents challenges to novice researchers is the results section (Basturkmen, 2009; Lim, 2011b). This can be attributed to the fact that the results section is generally perceived as an informative and enlightening segment of an article whereby the novel and highly sought-after findings are presented and reported (Lim, 2011b). Students are generally believed to have little previous practical knowledge of writing it; they may have experienced writing literature reviews in their writing assignments, yet not many of them have already reported and interpreted results from a study they have carried out (Basturkmen, 2009).

Another area of academic writing relevant to the presentation of results- in which student writers as well as teachers in science fields encounter difficulty- concerns pictorial modes of presentation of results and findings, and we include tasks designed to investigate this area of academic writing proficiency in our study. In numerous academic disciplines, key research findings and experimental/ statistical data are often visually presented in the form of tables, figures, graphs, charts, diagrams or some other types of infographics or “non-verbal illustration” (Swales & Feak, 2012, p. 139). These types of pictorial presentation of data can be generally embedded in the main text or sometimes may be conventionally included as an appendix. This kind of “data-focused writing subtasks” is called *data commentary* (Swales

& Feak, 2012, p. 139). Recognized as a demanding AW task, data commentary (henceforth DC) is defined as “the verbal comment on visual material” (Nordrum & Eriksson, 2015, p. 59).

Nordrum and Erikson (2015), investigating DC in science writing, reported the challenge of writing and understanding DCs on visual materials by university students of various disciplines. They suggested that specialized teaching materials for an ESP course require a better and vivid account of the various linguistic functions and rhetorical goals of DCs in different settings. This is especially important since DC has multitudinous shared purposes with the results section of RAs. For example, accentuating the results of research, interpreting and evaluating these results, discussing the significance and implications of the results are among the more generally prevalent purposes of DC with results section (Swales & Feak, 2012).

Additionally, the results section of research articles and data commentaries can be directly relevant in terms of communicative purposes they embrace. The main communicative functions of these two academic sub-genres are predominantly represented by the two frequently governing obligatory moves, namely, reporting results and commenting on results whereby detailed information on results and findings are explained, commented, compared, interpreted, evaluated, and interactively reproduced in words (see Basturkmen, 2009; Nordrum & Eriksson, 2015; Ruiying & Allison, 2003; Swales & Feak, 2012). Considering the considerable importance of these two genres in the realm of EAP, one linguistically-oriented strand of research is grammatical features characterizing these two academic sub-genres. Among the textual features and linguistic devices of AW, phrasal complexity features (PCFs) are reported to be hallmarks of modern academic discourse and recently, applied linguists have focused on such features (e.g., Ansarifard, Shahriari, & Pishghadam, 2018; Biber, Gray, & Poonpon, 2011; Lan, & Sun, 2019; Lan, Lucas, & Sun, 2019; Staples, Egbert, Gray, & Biber, 2016; Taguchi, Crawford, & Wetzel, 2013).

According to Biber and Gray (2016), present-day AW is often expressed using these phrasal complexity features. Such PCFs generally encompass attributive adjectives (*sit-down restaurant*), pre-modifying nouns (*health issue*), nominalizations (*consumption*), appositive noun phrases as noun post-modifiers (*As shown on the graph, the violent line, people aged between 44-54, displays the highest rate of increase in attending cinema*) of-genitives (*the rate of illiteracy*), and prepositional phrases (PPs) as noun post-modifiers (*illiteracy rate by region and gender in different countries*). Several studies have recently documented that PCFs are among key linguistic features of academic written prose and are closely bound up with higher linguistic proficiency and sophisticated writing production in both first language (L1) and second language (L2) (Parkinson & Musgrave, 2014; Staples et al., 2016). Biber and Gray (2016) and Gray (2015) demonstrate that all professional academic writers exploit PCFs in the texts they produce. Likewise, Staples et al., (2016, p. 178) assert that student writers are pursuing these trends and are inclined towards these disciplinary norms.

More importantly, these six grammatical features of structural compression are reported to have dramatically expanded in frequency in AW in the last two centuries (Biber & Gray, 2016). This finding may imply that the use of these linguistic elements is increasing significantly in AW; hence, it is essential for novice research writers to acquire these linguistic elements (Biber & Gray, 2016; Parkinson & Musgrave, 2014). However, these noun-modifying phrasal features have remained relatively under-researched with reference to written academic texts generally produced by graduate students (GSs) and expert writers (EWs), and there is little empirical evidence to show how these phrasal linguistic devices are constructed and used to characterize AW tasks performed by non-native speakers of English compared to EWs. The only exception to this is a recent corpus-based investigation conducted by Ansarifard et al., (2018) on phrasal complexity in AW. The researchers compared three categories of abstracts produced by the Iranian GSs of Applied Linguistics and the EWs from the same discipline in terms of noun modifiers. Their corpora consisted of 99

abstracts from master's theses, 64 abstracts from PhD dissertations and 149 abstracts from published RAs by expert writers.

Drawing on the proposed developmental stages of syntactic complexity propounded by Biber et al., (2011), Ansarifar et al., (2018) attempted to test empirically the developmental stages through examining 16 types of grammatical features including finite dependent clauses, non-finite dependent clauses, and dependent phrases produced in the three corpora. They found that the MA writings varied considerably from the expert writings in terms of the four types of modifiers. Yet, Ansarifar et al., (2018) found no important difference in the use of noun modifiers except for prepositional phrases as noun post-modifiers between the PhD group and EWs.

Despite its possible merits, this study seemed to suffer from several drawbacks that might deserve due consideration. Methodologically, the period during which the abstracts were published (i.e., 2004-2015) could be better restricted to a shorter time span (e.g., a period of five years) in order to minimize potential and frequent changes within the discipline (Holmes, 1997). Furthermore, contrary to the authors' claim, and as also asserted by Yang (2013), the study cannot be considered dynamic developmental research in order to observe the development of grammatical patterns. Rather, it is a static corpus-based research project investigating grammatical linguistic features produced in the three corpora as finished products. Hence, the study seems unable to respond to the developmental stages of syntactic complexity because the starting point of the GSs from whom the data were gathered and the end point they reached are virtually unknown or might be different.

Inspired by such pedagogical concerns, the current study thus comparatively investigated the deployment of phrasal complexity features in data commentaries as an instance of written academic texts produced by graduate students of English Language Teaching (ELT) and in research articles written by expert writers in Applied Linguistics. We explored their texts to draw a comparison between data description tasks performed by graduate students and results sections of RAs written by top-tier disciplinary experts in order to identify the

similarities and differences of the possible modifiers they use. Despite the possible register differences, the comparison might help us judge the extent to which the usage of PCFs in the texts produced by graduate students conforms to or deviates from RAs as the standard criterion. Therefore, this study could contribute to the research on L2 writing by broadening our understanding of how PCFs were used to characterize the results sections of RAs and data commentaries accordingly. Doing this may afford us new insights into discourse and text conventions of published academic texts particularly in the results sections as well as data commentaries in specific purposes contexts.

We can also obtain insights into the way skilled researchers utilize language to express these essential linguistic features within their academic texts and discover areas to target in the second language writing instruction since one of the domains that merits an equal amount of attention is the linguistic characteristics of L2 writers' textual generation (see Hinkel, 2004; Staples et al., 2016). Awareness and recognition of PCFs could further help L2 student writers understand how to use language to perform academic writing tasks as well. It is thus hoped that the study could possibly equip L2 student writers with a deeper understanding of the prototypical lexicogrammatical patterning, which appears to be generally acceptable to community (inter)disciplinary gatekeepers (e.g., journal editors). Accordingly, the following research questions stand out:

- 1) What PCFs characterize the data commentaries performed by graduate students and the results sections of the RAs written by expert writers in Applied Linguistics?
- 2) How different/similar are PCFs employed by the graduate students from/to those of the writers of results sections of RAs?

Method

Following a mixed methods research approach (MMR), we integrated both qualitative and quantitative methods of analysis to specify and tally the rate of occurrences of PCFs in both data commentaries and results sections of RAs. This kind of twin research design synergizes

the strengths of quantitative and qualitative designs and serves as an explanatory design to identify different perspectives of a phenomenon in a single study (Tashakkori & Teddlie, 2003). We finally compared the GSs' writing in terms of modifiers to those of texts published in international journals by disciplinary experts.

Corpus Selection

In order to identify the patterns of linguistic similarities and differences across the texts produced by graduate students and expert writers, two corpora including student-created texts (data commentaries) and results sections of RAs were utilized for the present study.

Corpus 1

Drawing on a stratified sampling method, 40 full-length RAs in the discipline of Applied Linguistics were initially obtained from four high-impact internationally refereed academic journals (i.e., *Journal of Second Language Writing*, *Language Learning*, *TESOL Quarterly*, *The Modern Language Journal*). Specifically, 10 articles from each of the four journals were selected in order to have an equal distribution. Additionally, the key criteria for selecting the foregoing journals were that they generally represent a wide variety of academic research achievements and enjoy a worldwide reputation and readership. Another criterion was their ranking and impact factor (IF) reported in the Journal Citation Reports.

In an attempt to minimize potential disciplinary variation and possible changes in the genre (Holmes, 1997; Lim, 2010), the RAs were obtained from the most recent issues of each journal, published between 2017 and 2018. The motivation behind this decision was to reflect the linguistic features of the present-day AW (Biber & Gray, 2016). The RAs were written in English by various authors in Applied Linguistics. Care was also exercised to choose only one paper from every author. The status of native and non-native research writers of English appearing in the selected journals was not also a deciding factor when creating the present corpus since the target discourse community that maximizes high academic visibility for a research writer is an

international one, “most members of which include nonnative-speakers” (Parkinson, 2011, p. 166).

Subsequently, RAs following the acknowledged IMRD organization format (e.g., Introduction, Method, Results, and Discussion) were chosen to maintain uniformity and consistency among the datasets. As a standard configuration, IMRD is “generally self-explanatory” (Ruiying & Allison, 2004, p. 267) and is employed as a “guideline for experienced writers” (Hutter, 2015, p. 14). However, a limited number of RAs did not comply fully with the IMRD representing variations such as ILMRD IMRDC, IMRC and ILMRDC; they yet possessed a clearly recognizable separate section as results section. Additionally, the RAs from the selected journals were purely confined to empirical data-driven research (Swales, 2004). Several types of RAs presenting article reviews, review essays, editorials, meta-analysis, special issues and theoretical RAs were excluded. This left 25 empirical RAs to be examined. The remaining RAs were then converted from PDF to Word file (DOC files) and a header showing the article name, the author name, the journal, and year of publication was added to the beginning of the file.

The other sections of articles (e.g., introduction, method, discussion, conclusion, reference) were removed as they fell outside the scope of the study. To attain a corpus of similar size, thereafter, formulas, symbols, tables, figures, and footnotes embedded in the RAs were deleted. Another reason for this was that DCs produced by graduate students were devoid of these. After file conversion and clean-up process, the shortest results section of RAs was 400 and the longest was 2780. In total, the experts’ writing corpus consisted of 28, 173 words (Table 1).

Table 1. Descriptive Details of the Results Sections of RAs Produced by Expert Writers

No of Results Sections	Minimum text length	Maximum text length	Words(average)	Words (total)	Std. Deviation
25	400	2780	1127	28173	627.452

Corpus 2

The second corpus for the study was gathered from 23 first-year master's students and 6 first-year doctoral students studying English Language Teaching at Shahid Chamran University of Ahvaz (SCUA)- a state-run university in Iran- during the fall semester of 2017 (see Table 2 for demographic information about the participants). Participants were all native speakers of Persian. Because their participation was on a voluntary basis, the number of the participants varied from session to session ranging from 15 to 23 as some of the participants failed to attend all the sessions of the course. Right at the outset of the study, the graduate students were asked to allow their writing tasks to be used for the study.

Table 2. Demographics of the Participants

Educational Level	No of the Participants	Gender		Total
		Male	Female	
Master's	23	11	12	29
PhD	6	3	3	

Regarding the English language proficiency of the participants, a note on how Iranian students are admitted to graduate studies is in order. The Iranian students are admitted to master's programs through a rigorous and extremely competitive gatekeeping University Entrance Exam (UEE), which focuses on content as well as language, and they are accepted to doctoral programs through stringent academic standards encompassing both participation in UEE and an appraisal of their previous academic research achievements at their master's programs. These MA and PhD students, having studied between four and seven years respectively, before entering into their current degree programs, had already taken a number of prerequisite writing courses such as an Introduction to Writing, Paragraph Development, Letter Writing, Essay Writing, and Advanced Writing during their (under)graduate studies.

They were thus assumed to enjoy a fairly high command of academic English.

Task

In order to investigate PCFs in graduate students' texts, samples of academic writing task 1 (Academic Module) were adopted from the recently available IELTS (International English Language Testing System) books published between 2011 and 2016 (i.e., Cullen, French, & Jackeman, 2014; Loughed, 2016; Williams, 2011). The visual modes in this type of task necessitate the target language use (TLU) content (Moore & Morton, 1999), correspond closely to data commentary, and can contain academic writing course content or components as their discourse modes can bear some resemblance to those of real university tasks (i.e., essay writing) and "reflect some of the features of academic language" (IELTS, 2017).

In IELTS AW Task 1, test takers are required to describe the data visually presented in the infographics (e.g., graphs, tables, charts, and diagrams) or may be asked to explain data, describe the stages of a process or describe an event or object (IELTS, 2017). Following this, initially 50 AW topics were randomly selected. Thereafter, to control the prominence of the topic appropriateness and difficulty on writing performance and to minimize the potential bias of some writing topics, special care was exercised to select the topics, which were politically, religiously, culturally, and controversially bias-free (Huang, Hung, & Plakans, 2018).

Due to research practicality, seven types of visual materials revolving around general topics (i.e., reasons for study, a survey of adult education, estimated world illiteracy rates, leisure time, food budget, mobile phone, and building construction) were finally randomly chosen for masters' students. For the doctoral students, five types of non-verbal data on general topics (i.e., cinema attendance, public transportation, museums, work performance, and higher colleges of technology) were also randomly selected. The PhD students, admittedly, were more academically engaged and so they felt more pressed for time. For this

reason, to avoid any imposition on them they participated in only five sessions. The given topics required the participants to describe or explain the non-verbal data in their data description tasks. PhD and MA students were met in different separate sessions. In order to avoid disclosing the topics we decided that different topics would neutralize their communication before any session. Taken all together, the selected topics of visual materials were assumed to be of general interest and familiar to all participants or at least close to their everyday reality (Sancho Guinda, 2012a).

Procedure

The participants were initially made aware of the purposes of the study and then their verbal consent was obtained for participation. Thereafter, the timed-impromptu task presentation was introduced at the outset of each class to avoid the influence of any writing instruction. Subsequent to that, the selected tasks were administered to the master's participants on seven separate sessions within a period of seven weeks. For the doctoral students, five different data description tasks were administered on five sessions, and they were thus required to respond to each task individually.

The participants were asked to describe the infographics in their own words using at least 300 words for each task within 30 minutes. This assisted the participants to prevent from being weary and continue to focus on the writing task (Yang, 2015). The participants were not allowed to write collectively or work in pairs, in order to gauge accurately how they exploit PCFs in the texts they produced. The visual materials were all in the forms of three bar charts, two pie charts, one diagram, and one line graph for the master's participants. For the doctoral students, one line graph and four bar charts were presented. The commentary writing tasks were presented without any supporting materials in order to allow the participants for spontaneous writing without any "field-specific background knowledge required" (Yang, 2015, p. 35). Taken together, each participant of the master's group individually wrote between four and seven data commentaries about the same topics in the same order and the doctoral group produced between

three and five data commentaries about the above-stated topics. These tasks were all performed without any explicit accompanying rhetorical instruction on PCFs.

Having collected the tasks from the participants, the researchers later began manually tallying the total number of each dataset (i.e., students' writing and experts' writing). In doing so, it was found that in response to seven writing tasks, the master's students produced 134 written texts, totaling 22, 569 words and doctoral participants produced 24 written texts, totaling 5987 words. Not all graduate students completed all tasks. In total, graduate students produced 28, 556 words (see Tables 3 & 4). Additionally, it should be noted that the minimum and maximum text length reported in Table 5 was based on sum of words each student wrote in all the tasks he or she completed which ranged between 2 to 7 tasks. Overall, the corpora analyzed consisted of 56,729 words. Accordingly, Table 5 illustrates the size of the selected corpus produced by GSs and EWs.

Table 3. Descriptive Details of Data Commentaries Produced by Master's Students

Sessions	Participants	Data Commentaries	Minimum text length	Maximum text length	Words (total)	Words (average)
1 st session	18	18	124	260	3057	169.83
2 nd session	19	19	100	253	2835	149.21
3 rd session	20	20	100	265	2925	146.25
4 th session	21	21	100	225	2930	139.52
5 th session	15	15	107	268	2764	184.27

6 th session	18	17	100	252	3254	180.78
7 th session	23	23	134	400	4804	208.87
		134			22569	168.39

Table 4. Descriptive Details of Data Commentaries Produced by Doctoral Students

Sessions	Participants	Data Commentaries	Minimum text length	Maximum text length	Words (total)	Words (average)
1 st session	6	6	236	309	1629	271.50
2 nd session	4	4	150	306	871	217.75
3 rd session	6	6	172	344	1397	232.83
4 th session	4	4	218	306	1007	251.75
5 th session	4	4	231	312	1083	270.75
		24			5987	248.91

Table 5. Descriptive Details of Data Commentaries and Results Sections of RAs Produced by Groups

Group s	No	Minimum text length	Maximum text length	Words (total)	Words (average)	Std. Deviation
GSs	29	455	1786	28556	984.69	338.166
EWs	25	400	2780	28173	1126.92	627.452

Data Analysis Procedure

In order to analyze the possible PCFs that the groups produced in their texts, each writing sample was double-checked by one of the researchers. To achieve an accurate identification of linguistic features of interest, two university instructors in Applied Linguistics who had already published papers and enjoyed many years of teaching experiences were then invited to rate the produced text writings. In

order to make the purpose of our study clear and to afford a full picture of PCFs for the raters, we convened a briefing and training meeting with the raters to expound on the intended PCFs prior to the analysis. The meeting was initiated with a general introduction on the primary goals of the study. Thereafter, the PCFs were introduced and clarified to the invited raters. Given the relevant experience of the raters, it was felt that they might not need an extensive training.

Following this, a subset of 10% of the whole datasets was randomly singled out and distributed between one of the researchers and the invited raters in order to independently examine the results sections and commentary tasks for accurate recognition of PCFs. After about two weeks interval, we met again and the raters shared the writing samples in which PCFs were manually identified and accentuated. The manual analysis of the corpus was opted for in that some of the phrasal modifiers of interest could not be counted or identified by a computer software program such as Biber Tagger (1988)- a computational tool for automatically annotating texts. For example, phrasal modifiers such as *of*-genitives, appositive structures, and PPs functioning as noun post-modifiers require a human to code for instances; they cannot be identified, counted or tagged automatically (Biber & Gray, 2011). Gray (personal communication, July 12, 2017) recently admits that the Biber Tagger is not also reliably accurate with nominalizations. Additionally, since the Biber Tagger was not publically and commercially available for us to extract the two remaining linguistic features (i.e., attributive adjectives and pre-modifying nouns), we thus decided to examine the intended PCFs manually by a team of three raters.

Prior to moving on to the next phase, the divergent notions and disagreement on PCFs were resolved by a detailed and extensive discussion in a meeting. Additionally, there were a few cases (e.g., *of*-genitives and PPs as noun post-modifiers) for which we consulted two expert native speakers. Finally, in order to measure the degree of agreement and consistency between the raters regarding the rate of occurrences of the linguistic features in commentary writing tasks, Cohen's Kappa (k) was run. The Kappa coefficient was 0.70, which

indicates that the agreement between the raters was substantial. Having reached an overall agreement on the PCFs identified in the writing samples, the researchers then converted the raw counts of the linguistic features into a normalized rate of occurrences (per 1,000 words) for each writing text. This facilitated statistical direct comparisons across the texts of unequal lengths in the dataset (Biber, 1988; Yang, 2015).

Results

In order to investigate PCFs in the data commentaries generated by graduate students and results sections of RAs written by expert writers, the intended grammatical features based on the system of grammatical feature types laid out in Biber et al., (2010, 2011, 2016) were singled out. Table 6 presents the descriptive results for the deployment of PCFs produced by graduate students and expert writers. Figure 1 also visualizes the rates of occurrences of these grammatical features of interest.

Table 6. Descriptive Statistics for PCFs in Data Commentaries and Results Sections of RAs (Rate of Occurrence per 1, 000 words)

PCFs Produced by GSs and EWs		N	Minimum	Maximum	Sum	Mean	Std. Deviation
GSs	Attributive Adjectives (Feature 1)	29	39.83	68.08	1515.10	52.2447	7.78535
	Pre-modifying Nouns (Feature 2)	29	6.64	31.98	576.53	19.8803	6.73750
	Nominalizations (Feature 3)	29	16.64	42.25	865.45	29.8430	6.86753
	Appositive Structures (Feature 4)	29	.00	19.34	70.20	2.4207	4.09827
	<i>Of</i> -genitives (Feature 5)	29	.00	27.25	412.28	14.2164	5.73568
	PPs as noun post-modifiers (Feature 6)	29	33.64	66.85	1471.86	50.7539	9.36579
EWs	Attributive Adjectives (Feature 1)	25	32.12	84.08	1485.65	59.4259	14.19185

Pre-modifying Nouns (Feature 2)	25	7.64	52.84	451.25	18.0499	10.36244
Nominalizations (Feature 3)	25	14.29	75.16	882.49	35.2995	16.24023
Appositive Structures (Feature 4)	25	4.57	57.50	711.48	28.4594	13.56876
Of-genitives (Feature 5)	25	2.50	19.81	167.21	6.6884	4.83506
PPs as noun post- modifiers (Feature 6)	25	17.33	53.52	761.55	30.4619	10.19234

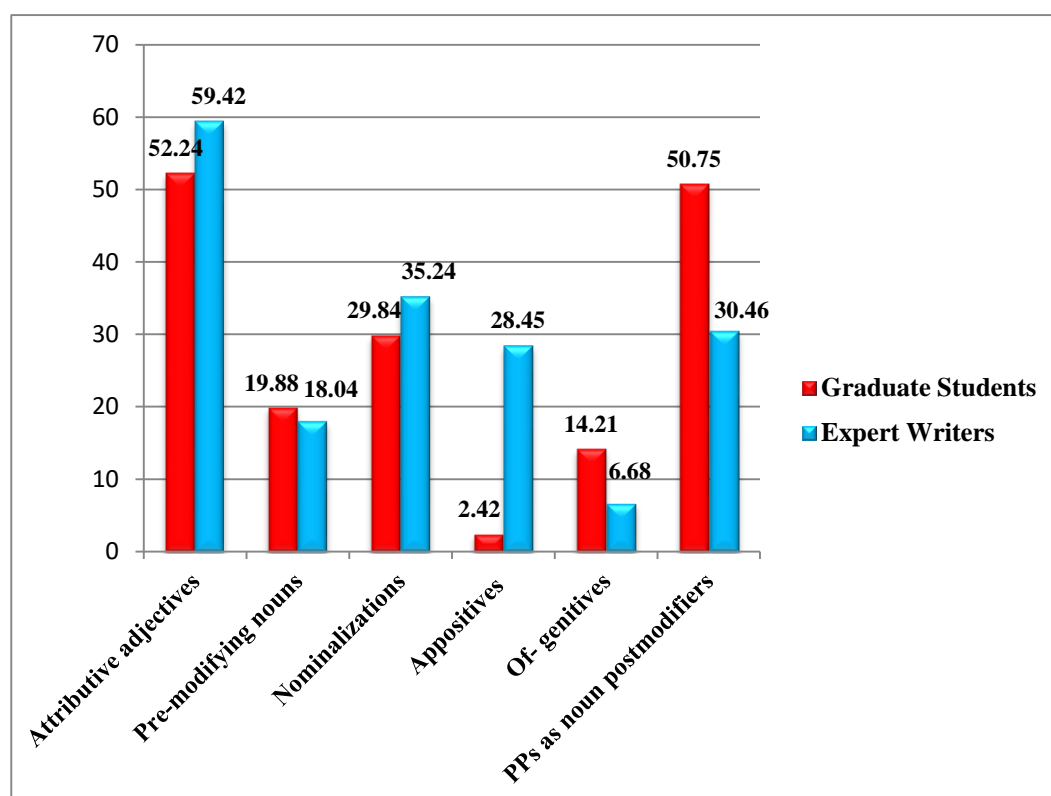


Figure 1. PCFs per 1000 Words

In what follows, a comparison is drawn between GSs' written texts to those of EWs in order to identify the extent to which each group exploits PCFs in the texts they produced. The comparison encourages us to delve more deeply into our two datasets quantitatively and qualitatively. Following this, a wide variety of patterns of use deployed

by the groups was found; this enabled us to offer how graduate students and expert writers exploited PCFs.

As revealed by Table 6, the most common types of noun-modifying phrasal features that the graduate students and expert writers drew upon in their writing texts were attributive adjectives ($M= 52.24$, $SD= 7.78$ and $M= 59.42$, $SD= 14.19$, respectively). That is, adjectives as noun pre-modifiers were found to be the first phrasal resources to yield the highest rate of occurrences among the six phrasal forms of modification. Biber and Gray (2016) report that despite being less common in science research writing, attributive adjectives are notably common in humanities academic prose. In our datasets, we found that both groups highly exploited these noun modifications, providing additional support for the previous results (Biber & Gray, 2016; Biber, Johansson, Leech, Conrad, & Finegan, 1999; Gray, 2015). Text excerpts 1 and 2 illustrate how attributive adjectives as a form of pre-modification (**boldfaced**) were used by graduate students and expert writers respectively.

Text Excerpt 1(GS)

The **given chart** shows **estimated world illiteracy** rates by region and by gender for the year 2000. As far as the region is concerned, **developed countries** represent the **lowest rate** of **illiterate people**. On the other hand, south Asia shows the **highest rate** of illiteracy. This shows that as we move from **developed** to **underdeveloped countries**, illiteracy increases.

Text Excerpt 2(EW)

The **approximate binominal distribution test statistic** of the **terminative-durative classification** showed the most **significant value**. Nonetheless, also the dynamicity classification as well as most the **pair-wise compared Vendlerian categories** proved to be significant.

Notwithstanding the marked similarity in frequency between the groups noted above, the results revealed that the difference between graduate students and expert writers was statistically significant.

Considering this, we made an endeavor to re-explore the two datasets to discover patterns of use of PCFs. Both groups principally used attributive adjectives in the form of three main types namely, single-adjectives, coordinated adjectives, and cumulative adjectives. However, expert writers also notably exploited other types of pre-modifiers known as noun-participle compounds functioning as nominal pre-modifiers. In the following, these adjectival pre-modifiers are explained in order of occurrence in each dataset.

The most frequent type of adjectives was single-adjectives (one-word adjectives) pre-modifying the head noun element. A substantial number of attributive adjectives in graduate students' dataset belong to this category, which could epitomize the graduate students' writings in terms of adjectival pre-modification. Below are examples of this category (shown in **bold italics**) exploited by GSs.

Example 1

greatest illiteracy, ***lowest*** rate, ***considerable*** change, ***main*** reasons, ***above-mentioned*** classification, ***female*** illiteracy, ***horizontal*** axe, ***meaningful*** difference, ***highest*** rate, ***similar*** rate, ***spacious*** playground, ***main*** building, ***particular*** subject, ***previous*** regions, ***rising*** trend, ***sharp*** increase, ***annual*** visitors

The second most frequent type of adjectival pre-modification was coordinated adjectives, also known as *and*-coordinated adjectives. This type of conjoined pre-modifiers coordinated with *and* was especially prevalent in the studied texts and was generally used "to identify two distinct attributes that are qualities of a single referent" (Biber et al., 1999). Following are examples of coordinated pre-modifiers (underlined) extracted from graduate students' writing texts.

Example 2

Male and female participants, developed and developing countries, unemployed and employed people, fast-food and sit-down restaurants, financial and monetary reasons, environmental and natural positions, social and political reasons, full and part time employees, Arabic and African states, cultural and religious background

The third most frequent type of pre-modifier was cumulative adjectives in which two adjectives are jointly placed on one another in front of the headword they pre-modify. In other words, one or two adjectival pre-modifiers co-occurred in pre-modifying positions successively to modify the head noun elements. Two patterns of use associated with this type of adjective that pre-modify the head noun element consecutively were also found in GSs' writing texts. Yet, these were less frequent but not uncommon (see Table 7).

Table 7. Cumulative Adjectives in Pre-modifying Positions Used by Graduate Students

Structural Patterns	Patterns of Use	Structural Patterns	Patterns of Use
<i>full time male employers</i>	<i>Adj+ Adj+ noun</i>	<i>estimated illiteracy rates</i>	<i>Adj+ noun+ noun</i>
<i>dynamic civil society</i>	<i>Adj+ adj + noun</i>	<i>world illiteracy rates</i>	<i>Adj+ noun+ noun</i>
<i>young British people</i>	<i>Adj+ adj+ noun</i>	<i>sit down restaurant meals</i>	<i>Adj+ noun+ noun</i>
<i>several different countries</i>	<i>Adj+adj+ noun</i>	<i>different age ranges</i>	<i>Adj+ noun+ noun</i>
<i>observable drastic increase</i>	<i>Adj+ adj + noun</i>	<i>continuous increase pattern</i>	<i>Adj+ noun+ noun</i>
<i>constant annual record</i>	<i>Adj+ adj+ noun</i>	<i>different employment status</i>	<i>Adj+ noun+ noun</i>
<i>ongoing professional development</i>	<i>Adj+ adj+ noun</i>	<i>highest illiteracy percentages</i>	<i>Adj+ noun+ noun</i>

Compared to graduate students' writings, expert writers' writings in general encompassed a vast number of multiplex and variegated patterns of use associated with attributive adjectives as noun pre-modifiers. They deployed the aforementioned attributive adjectives (i.e., single-adjectives, coordinated adjectives, and cumulative adjectives) as well as other types of pre-modifiers known as noun-participle compounds functioning as nominal pre-modifiers. These pre-modifiers contain two or more words consisting of either *-ing* or *-ed*

inflectional endings. Given the significant proportion of this type of pre-modifier emerging from the dataset, in what follows, we classified them into five categories.

The first most frequent category of adjectival pre-modifiers was multiword hyphenated adjectives co-occurring in the attributive position. Having three, four, or even five words to pre-modify the head noun element, this group of adjectives enabled expert writers to utilize highly complex patterns of pre-modification within the nominal expressions. Expert writers preponderantly used this construction in their writings, implying their general tendency to pack a large amount of information into a single clause. Compared to graduate students' writings, such linguistically complex structures were conspicuously absent from the graduate student-created texts, hence seemingly typical of EWs' writings. Following are expressions with highly complex adjectival pre-modifier constructions that emerged from the EWs' writings.

Example 3

separate generalized linear mixed-effect modeling analysis, output-prompting feedback only group, successful context-inference practice, semester-long genre-based writing class, timed opinion-discussion writing task, meta-analytic effect-size point, various self-regulated writing strategies, two-way repeated-measures analysis, significant aptitude-proficiency links

The second most frequent category of pre-modifiers was multiple contiguous adjectives preceding the head noun element. This dense use of several adjoining attributive adjectives occurring in the dataset seems to be characteristic of EWs' writings, as they tend to compress the flow of detailed information via pre-modifiers into limited words as illustrated below. The following examples exhibit this multiplex structure:

Example 4

strictest composite scoring approach, lower secondary preservice teachers, strongest positive future images, written GJT total accuracy

scores, UK timed written site, Chinese secondary school EFL students, prominent ideal L2 writing self, oral prompt response task, higher L2 oral proficiency, approximate binomial distribution test statistic, (a)synchronous teacher electronic feedback

The third category of the adjectival pre-modifiers that occurred in EWs' writings was *noun+ hyphen+ -ing/ed compounds+ noun* (or *noun+ ing-/ed participle+ noun*). No instance of such a condensed structure emerged from GSs' writings while EWs employed this frequently. Note the following expressions illustrated in the results sections of RAs generated by EWs:

Example 5

flow- enhancing dimension, flow- inhibiting categorical counts, flow- enhancing experiences, flow-inhibiting frequency counts, flow- inhibiting task, input-providing corrective feedback, output-prompting feedback, flow-enhancing categorical counts, lexicon- triggered meaning negotiations

The fourth pattern of adjectival pre-modifiers utilized by EWs was *adjective+ hyphen+ noun+ noun*. Similar to the first pattern noted above, no example of this grammatical structure was found in GSs' writings. As an illustration of this, consider the following expressions:

Example 6

low- reference measurement, medium-size difference, difficulty-skill balance, lower-bound CIs, long-term achievement, short-term acquisition, immediate-feedback group, follow-up within-group analysis, immediate-feedback group, English-speaking learners, high-stake proficiency test

The fifth category of adjectival pre-modifiers predominantly used by expert writers was certain fixed participle forms incorporated into noun-participle compounds functioning as nominal pre-modifiers using "*based, related, specific, self, and oriented*". Biber and Gray (2016, p.188) assert that *based* and *related*, among others, are the two most prevalent compound participle forms incorporated into these constructions in modern science and social science research writing.

They further state that the noun-participle compound constructions are principally confined to informational writing in modern-day English. Note the following examples extracted from the EWs' writing texts:

Example 7

flow-related units of texts, grammar-related meaning negotiations, inter-and intra-cultural task-based interactions, genre-based writing instruction, mean-based analysis, writing-specific psychological profiles, field-specific benchmarks, subject-specific pedagogical content scales, learning-oriented feedback, performance-oriented feedback, desirable L2 self-images, lowest L2 writing self-regulation

Irrespective of the participial forms noted above, there were also a limited number of instances of the noun-participle compounds functioning as nominal pre-modifiers using *factor* (e.g., *five-factor solution, three-factor structure*) and *term* (e.g., *long-term achievement, one 3-month term*). In conclusion, there were yet a few instances similar to the aforementioned noun-participle compounds suggesting other patterns of use as illustrated in Table 8 below.

Table 8. Hyphenated Adjectives in Pre-modifying Positions Used by Expert Writers

Hyphenate preposition noun+ noun	Hyphenate + adjective+ noun	noun+ Hyphenate adjective+ noun	prefix+ Hyphenate adjective+ noun	Hyphenate prefix+ noun+ noun
<i>in-school opportunities</i>	<i>child-internal factors</i>		<i>intra-cultural group</i>	<i>post-chat compositions</i>
<i>between-subject factors</i>	<i>norm-adequate performance</i>		<i>inter-cultural group</i>	<i>post-interaction writing</i>
<i>within-subject variables</i>	<i>first-person singular subjects</i>		<i>post-FTF compositions</i>	
<i>by-participant random</i>	<i>first-phase preservice teachers</i>		<i>non-verbal intelligence</i>	

Another structural type of pre-modification, noun+ noun constructions (N+N sequences), as shown in Table 6 (GSs: $M = 19.88$,

$SD = 6.73$ and EWs: $M = 18.04$, $SD = 10.36$, respectively), shows a much less frequency rate than that of attributive adjectives which similarly pre-modify the head noun. This lower rate of occurrence could suggest that the N+N constructions were not strongly favored by graduate students and expert writers in our datasets although recent studies have shown that the frequency of the use of N+N sequences in modern written academic texts is pervasive and is one of the defining characteristics of the grammar of present-day academic writing (Biber & Gray, 2016; Biber, Grieve, & Iberri-Shea, 2009; Pastor-Gómez, 2010; Staples et al, 2016). Findings indicated that graduate students and expert writers' writings embraced a number of multifarious patterns of use associated with N+N combinations. We found out that the dominant pattern of use of N+N constructions found in graduate students' writings was N+N sequences, albeit a few patterns of use of N+N+N sequences were observed (see examples 8 and 9).

Example 8

N+N sequences

leisure time, employment status, leisure activities, literacy rate, age group, work environment, job security, promotion prospects, team spirit, bus rides, men graduates, cinema attendance, work performance, subway ridership, cinema industry

Example 9

N+N+N sequences

fast food consumption, mobile phone users, mobile phone services, housewives leisure time, car park section, cinema attendance rate

In addition to the above-mentioned sequences, which were shared patterns between the groups, deeper considerations revealed that expert writers exploited even longer and more complex N+N constructions consisting of four pre-modifying nouns (i.e., N+N+N+N constructions). This can be in good agreement with Biber and Gray (2016) who report that the sequences of multiple pre-modifying nouns preceding head noun are viewed as a functional expansion in present-day academic writing. Nevertheless, no instances of the use of such multiple

complicated pre-modifying noun combinations were found in graduate students' writings. Note examples 10-12 extracted from the results sections of RAs written by expert writers:

Example 10

N+N sequence

task complexity, task difficulty, modality effects, flow experience, dynamicity classification, study variables, entry characteristics, examination experience, content analysis, target sentences, motivation questionnaire, multicollinearity problems, criterion measures

Example 11

N+N+N sequences

Regression coefficient results, treatment task performance, fixation duration measures, learning opportunity measures, teaching practice activities, context inference condition, emotion factor scores, university entrance certificate, content richness ratings

Example 12

N+N+N+N sequences

Challenge-skill balance dimension, second pass reading duration, grammaticality judgment test scores, listening comprehension test scores, elimination model comparison procedure, listening proficiency test scores, regression analysis training set

Analysis of the data also revealed that, as reflected in Table 6 above, the use of nominalizations ($M= 29.84$, $SD= 6.86$ and $M = 35.29$, $SD=16.24$) was not a highly frequent linguistic feature between the two groups and the difference between GSs and EWs was not also statistically significant. This is in contrast to the frequent rates of occurrences of nominalizations reported in academic writing (Biber & Gray, 2011; Biber & Gray, 2016; Jalilifar, Saleh, & Don, 2017). Additionally, the use of *of*-genitive constructions by expert writers yielded a lower proportion of use ($M= 6.68$, $SD= 4.83$) compared to that of graduate students ($M=14.21$, $SD= 5.73$), and marked a meaningful difference.

Text Excerpt 3 (GSs)

In Denmark, UK, Sweden and Italy more than eighty percent of the people use cellphones as a tool of communication.

Text Excerpt 4(GSs)

To sum up, the more developed a country, the less the rate of illiteracy and...

Text Excerpt 5 (EWs)

The validity of the two-factor solution was further confirmed...

Text Excerpt 6(EWs)

The results of Model 2A showed no effects...

Another area in which graduate students and expert writers were found to differ significantly in the use of PCFs was appositive noun phrases. The proportion of appositive noun phrases as post-modifiers used by graduate students yielded the lowest proportion of PCFs ($M=2.42$, $SD=4.09$) whereas expert writers incorporated a large portion of appositive noun phrases in their writing texts ($M=28.45$, $SD=13.56$). The relatively high frequency of appositive noun phrases deployed by EWs may confirm the growing recognition of these linguistic resources in academic prose (Biber & Gray, 2011; Biber & Gray, 2016; Biber et al. 1999). On the other hand, it may also run counter to Parkinson and Musgrave (2014) who reported that far more frequency of these structures in the MA writings compared to those in the EAP writings.

Findings showed that graduate students used both forms of appositive structures (i.e., enclosed in parentheses and by comma) although they employed, to a greater extent, parenthetical expressions to mark the appositive noun phrases as noun post-modifiers (i.e., occurring 29 out of 34 times). Therefore, this finding might lend support to Biber and Gray (2016) who report that appositives are generally parenthetically introduced. Closer consideration of these two forms further demonstrated that appositive structures were primarily used in GSs to provide further descriptive information, clarify statements, or

present statistical results in tables, charts, bar charts etc. given in the infographic tasks. These typical conventions of appositive structures could afford further evidence for the previous literature (Biber & Gray, 2016; Biber et al., 1999). Note the following text excerpts (7-9) (**bold italics**) utilized by the GSs in their data commentaries.

Text Excerpt 7(GS)

It is strange that numerical distance between sexes in Latin America is very low (***less than two percent***).....

Text Excerpt 8 (GS)

In this regard, the last country, ***which is south Asia***, has the highest rate of illiteracy of females.

Text Excerpt 9(GS)

The last time span (***2005 to 2010***) witnessed an insignificant climb for all the groups.

On the other hand, expert writers also incorporated the foregoing structures as well as the different types of appositive constructions performing varied functions. This variety of structures primarily served to restate the research questions, refer to further information given in the appendix, provide contrasting statements, introduce acronym or initialism, restate the items of questionnaire, express analytical results, explain statistical methods, refer to data provided in tables and figures, explain questionnaire scales, re-explain methodological procedures and variables, incorporate multiple appositives, itemize the members of a group or individual item(s) and give an example, among others. Note the following examples (13-19) where appositive structures (**bold**) are functionally varied:

Example 13

In order to answer the first research question (***i.e., What are the relationships between ESL learners' implicit theories of intelligence and their orientation to WCF?***),... (Restating the research question)

Example 14

The Korean lax versus tense plosive distinction is absent from English (**although phonetically it bears some resemblance to the initial aspiration contrast in English**),... (Providing contrasting statement)

Example 15

operation Span(**OSpan**), motivational self-talk (**MST**), goal-oriented monitoring and evaluating (**GME**), idea planning(**IP**), peer learning (**PL**), feedback handling (**FH**) (Introducing initialism or acronym)

Example 16

We examined several underlying factors among eight items from the motivation questionnaire (**4 for Ideal L2 Self, 4 for Ought-to L2 Self**) and 18 items from the emotion questionnaire (**10 for enjoyment, 8 for anxiety**). (Restating the items of questionnaire)

Example 17

...but these changes took place mostly within a range of 3 to 6 on a 9-point scale ranging from 1 (**difficult to understand**) to 9 (**easy to understand**). (Explaining questionnaire scales)

Example 18

No significant improvement was noted between Models 1 and 2 (**v2M1 – v2M2 = 4.95; dfM1 – dfM2 = 6, p = .11**); however, the indices of Model 3 improved significantly over those of Model 2 (**v2M1 – v2M2 = 31.51; dfM1 – dfM2 = 21, p = .001**) and Model 1 (**v2M1 – v2M2 = 36.47; dfM1 – dfM2 = 27, p = .001**). (Expressing result analysis)

Example 19

Furthermore, Level 2 used the MF significantly more than the previous level (**i.e., Level 1**), **X²(1, N = 593) = 50.8, p < .001, d = .61**, and the subsequent level (**i.e., Level 3**), **X²(1, N = 641) = 5.48, p = .019, d = .19**. (Multiple appositives incorporated)

Finally, yet importantly, PPs functioning as noun post-nominal modifiers used by GSs were found to be the second phrasal resources to yield the highest proportion of use ($M = 50.75$, $SD = 9.36$) among the six phrasal forms of modification while these linguistic elements were found to be the third phrasal devices to obtain the highest proportion of

use in EWs' writing texts ($M= 30.46$, $SD=10.19$). This suggests that post-modifying PPs were a favored construction for the graduate students but not for expert writers. However, a surprisingly low frequency of PPs functioning as noun post-nominal modifiers compared to that of graduate students cannot support the previous results reported in the literature (Biber & Gray, 2011; Biber & Gray, 2016; Gray, 2015; Parkinson & Musgrave, 2014; Staples et al., 2016). The following excerpts (10-13), extracted from GSs and EWs' writing texts, exemplify how prepositional phrases (shown in ***bold italics***) were deployed.

Text Excerpt 10 (GS)

The most conspicuous fact to be noticed is the difference ***between illiteracy rates in developed countries and the other five regions.***

Text Excerpt 11 (GS)

The chart reports various factors and their influence ***on two groups of workers.*** According to the information ***on the bar chart,*** these factors have different effects ***on each range of age.***

Text Excerpt 12 (EW)

However, one of the sites did report an effect ***on comprehension in relation to attending to a morphological versus a lexical form.***

Having identified the distributional patterns of PCFs in our datasets, we further drew a comparison between the writings of the two groups in terms of PCFs use. To this end, a series of independent samples *t*-tests were conducted to compare the writings of the groups in terms of the grammatical features of interest they produced. The results revealed statistically significant differences in generating PCFs of interest between the two groups except for N+N sequences and nominalizations.

Following this, to determine whether a significant difference existed in the graduate students use of different types of PCFs, a repeated measures ANOVA was conducted. The results revealed a significant difference in their use of different features, (*Wilks' lambda*= .02,

$f(5,24)= 205.16$, $p= .00$, $\eta^2= .97$). The pairwise comparisons indicated a significant difference between all linguistic features except for two, namely, attributive adjectives and PPs functioning as post-modifiers. The repeated measures ANOVA also indicated a significant difference in expert writers use of different types of PCFs (*Wilks' lambda*= .07, $f(5,20)= 48.34$, $p= .00$, $\eta^2= .92$). Likewise, the pairwise comparisons indicated a significant difference between all PCFs except in four comparisons, namely, features 2 and 4, features 3 and 4, features 3 and 6, features 4 and 6 (see Appendix A).

To sum up, of the six PCFs of interest, graduate students differ significantly from expert writers in generating four linguistic elements (i.e., attributive adjectives, appositive structures, *of*-genitives, and PPs as noun post-modifiers). They also approximate expert writers in terms of producing two linguistic features, namely, N+N structures and nominalizations. In general, GSs' language can be characterized by less variety, single/dual (pre)modification, a far less extensive range of noun-participle compounds functioning as nominal pre-modifiers, linguistically limited complex modifications, and minimally multifarious patterns of use associated with N+N formulations. On the other hand, further analysis divulged that expert writers' texts comprised varied presence of exceedingly complex patterns of pre-modification, triple/quadruple/quintuple (pre)modification, a hybrid of novel appositive structures, and multiword hyphenated adjectives as pre-modifiers. However, insufficient use of PPs as noun post-modifiers was noted which could be in contrast to the existing literature.

Discussion and Conclusion

In response to research question 1 (i.e., what PCFs characterize the data commentaries performed by graduate students and the results sections of the RAs written by expert writers in Applied Linguistics?), the results revealed that graduate students preponderantly relied upon attributive adjectives, PPs as noun post-modifiers, nominalizations, N+N formulations, *of*-genitives, and appositive structures, respectively to characterize the data visually presented in the infographic tasks. Notably, their writing texts stood out in terms of the relatively high

frequency of attributive adjectives and PPs as noun post-modifiers representing their L2 stylistic preference. This might be due to the fact that adjectives as noun pre-modifiers are said to be acquired at the earlier stages of syntactic developmental sequences propounded by Biber et al., (2011) compared to other phrasal linguistic features such as nominal pre-modifiers and post-modifying PPs (Biber et al., 2011). Therefore, the findings of the present study might highlight the key role that adjectives play in L2 students' academic prose and afford further evidence to show that they are the first most favored phrasal structures for conveying information and characterizing data commentaries.

The findings of this study can reflect that the deployment of phrasal complexity features (notably attributive adjectives and PPs as noun post-nominal modifiers) may be growing in academic prose, thus making them important for novice research writers to acquire (Biber et al., 2011). Thus, they can be pedagogically introduced and targeted at EAP writing classrooms. Familiarizing student writers with the phrasal style of academic prose enables them to gain a better and fresher insight into navigating lexicogrammatical aspects of academic writing. Making students aware of common academic phrases and expressions is viewed as an effective strategy for boosting students' lexicogrammatical repertoire of phrases that they can utilize in their academic writing (Cortes, 2013; Swales & Feak, 2012).

As for the PCFs characterizing expert writers' writings, the results revealed that expert writers predominantly tended to have heavy reliance on attributive adjectives, nominalizations, PPs as noun post-modifiers, appositive structures, N+N formulations, and *of*-genitives, respectively to describe the results sections of RAs. Similar to graduate students' writing, the results indicated that adjectives functioning as noun pre-modifiers were the first dominant phrasal structures to characterize the results sections of RAs. This concurs with Gray (2015, p. 123) who reported that the use of adjectives as noun pre-modifiers is the most prevalent pattern found in all academic disciplines and registers (i.e., 60 to 75 times per 1,000 words). The greater preference for these phrasal resources could be ascribed to a leading part that they

play in text flow, cohesion, and unity in academic texts (Chafe, 1994; Hinkel, 2004).

A further conceivable explanation lies in the fact that adjectives are by far the most prevalent type of noun pre-modifiers in expository written prose due to their unequivocal identification of varied semantic categories such as extent, time, frequency, and affective evaluation (Biber et al., 1999). Additionally, a multiplicity of other patterns of use connected with attributive adjectives functioning as noun pre-modifiers were noted. These represented the sequence of multitudinous pre-modifiers in which two, three, four, or even five conjoined adjectives in pre-modifying positions co-occurred to pre-modify the head noun element. The sequences and orders into which these multiple pre-modifiers occur cannot be completely free at all in that the structural type of the pre-modifiers and the intended meaning can have a powerful influence on the order (Biber et al., 1999; Pastor-Gómez, 2010).

In response to research question 2 (i.e., how different/similar are PCFs employed by the graduate students from/to those of the writers of the results sections of RAs?), the results suggested that graduate students approximated the expert writers group in exploiting N+N formulations and nominalizations. The similarities may also display that graduate students are successful in emulating these essential aspects of present-day academic writing which can be exploited as highly effective writing techniques for condensing information concisely. Our findings can support the previous studies in which these linguistic devices were found to be relied on in academic prose (e.g., Ansarifard et al., 2018; Biber & Gray, 2010; Biber & Gray, 2011; Biber & Gray, 2016; Biber et al., 2011; Parkinson & Musgrave, 2014; Staples & Reppen, 2016; Taguchi et al., 2013).

Among the six phrasal forms of modification, attributive adjectives were the most common types of noun-modifying phrasal features to represent data description tasks and the results sections of RAs. Comparatively, the data description tasks that graduate students produced closely correspond to those of expert writers in terms of attributive adjectives. This prominent use of adjectives as noun pre-

modifiers may reveal the similarities between the L2 student writing and L1 professional prose in terms of producing certain forms of phrasal modification (Lan & Sun, 2019; Yang, 2015). Yet, the linguistic patterns of use by graduate students were not highly linguistically variegated and multiplex compared to expert writers' writing.

Expert writers also exploited tightly multiword hyphenated adjectives, epitomizing their academic writing phrasal style. However, these preferred patterns were noticeably absent from graduate students' writings. There are several reasons for this: firstly, producing such linguistically complex structures by graduate students might necessitate higher cognitive effort or resources to be verbalized as they were required to characterize the timed-impromptu task. Pastor-Gómez (2010) asserted that it is not common to apply more than four elements in pre-modifying position, because considerable nominal modification can give rise to a mental processing overload resulting in losing meaning and content. Secondly, it might reveal an invisible source of the learning difficulty connected with academic writing in general and PCFs in particular. Thirdly, it might reflect locally pedagogic insufficiency where their second language writing instruction can shed important light on the gaps. Fourth, considering the high incidence of attributive adjectives, Lan, Lucas, and Sun (2019) suggest the necessity of teaching the vocabulary of attributive adjectives for L2 students with low proficiency in EAP courses. Therefore, this area requires further attention and more treatment.

Another linguistic feature in which graduate students and expert writers were found to produce differently was appositive structures. These linguistic features were the least used by graduate students, representing a post-modifier construction of which graduate students are apparently unaware (although typical conventions of appositive constructions, i.e., adding further descriptive information, clarifying statements, and presenting statistical results in tables/figures, were observed in their writings). In effect, the marked difference lies where expert writers incorporated a number of novel appositive constructions having a varied manifestation and performing multifarious functions.

This was non-typical in graduate students' writings. Pilgreen (2010) argues that language learners may fail to notice the parenthetical expressions, which may lead to losing information that could be used to obtain meaning from the context.

In general, there could be several possible explanations for these findings. The first possible explanation might be the participants' ignorance of such functional, effective and supportive tools in present-day academic writing. A further explanation is that appositives are placed in the most advanced developmental stages for L2 writers (Biber et al., 2011; Lan & Sun, 2019; Parkinson & Musgrave, 2014). Accordingly, graduate students may derive considerable benefit from being clearly taught in academic writing classes how and when to exploit these linguistic devices appropriately in academic writing.

The next linguistic feature in which graduate students and expert writers were found to produce PCFs significantly different was *of*-genitives. The constructions were not highly favored in expert writers' writing probably owing to the interchangeability of this construction with another structural genitive construction, *s*-genitive (Biber, Egbert, Gray, Opplinger, & Szmrecsanyi, 2016). Another explanation is that pre-modifying nouns is currently superseding *of*-genitives and '*s*-genitive in academic prose (Biber & Gray, 2016; Biber et al. 2016). However, Hinrichs and Szmrecsanyi (2007, p. 469) contend that "genitive choice is dependent upon a complex mechanics of interlocking factors, no single one of which can be held solely responsible for the observable variation".

Last but not least, the results revealed that PPs occurring as noun post-nominal modifiers were strongly favored in graduate students' academic writings but far less frequent in expert writers' writing. This finding is somewhat unexpected given that increase in PPs occurring as noun post-nominal modifiers is predominantly connected with professional academic writing (Biber et al., 2011). Our findings seem to contradict the previous studies in which these linguistic devices were found to be heavily relied on (e.g., Ansarifard et al., 2018; Biber & Gray, 2016; Parkinson & Musgrave, 2014; Taguchi et al., 2013). Therefore,

this finding might overturn the common stereotype about the prevalence of PPs functioning as noun post-nominal modifiers in academic prose, yet a larger corpus of expert writing is needed to draw firm conclusions.

Overall, the findings can give fresh insights into the needs of the L2 student writers in developing an academic text. Graduate students might gain benefits from an explicit language-focused classroom instruction and effective pedagogical classroom practices revolving around these phrasal structures of particular interest, as they are not expressly taught in academic writing courses and seem to be marginalized in pedagogy (Biber et al., 2016; Lan & Sun, 2019; Lan et al, 2019; Parkinson & Musgrave, 2014). Thus, the present study could suggest that academic writing pedagogy may gain maximum benefits from classroom language work on phrasal modifiers because they are deemed distinctive discourse features of advanced academic prose (Biber et al., 2011).

As with any research, the current study has several limitations, some of which can be taken into consideration in future studies. Chief among the limitations of the current study is a limited dataset compared to other empirical research in the discipline of applied linguistics. This limitation was mainly posed by the painstaking and time-consuming nature of analysis. Thus, it might be difficult to make valid generalizations about the findings to other contexts. Second among the limitations of the current study is the inaccessibility to a computer software program for automatically annotating the corpus texts and identifying PCFs, as noted above. Due to a number of advantages that the automated tools possess, future research can benefit the field of academic writing more deeply by employing computer programs to identify the linguistic features of interest.

References

- Ansarifar, A., Shahriari, H., & Pishghadam, R. (2018). Phrasal complexity in academic writing: A comparison of abstracts written by graduate students and expert writers in applied linguistics. *Journal of English for Academic Purposes*, 31, 58-71.

- Basturkmen, H. (2009). Commenting on results in published research articles and masters dissertations in language teaching. *Journal of English for Academic Purposes* 8, 241–251.
- Biber, D. (1988). *Variation across speech and writing*. Cambridge: Cambridge University Press.
- Biber, D., Egbert, J., Gray, B., Oppliger, R., & Szmrecsanyi, B. (2016). Variation versus text-linguistic approaches to grammatical change in English: Nominal modifiers of head nouns. In M. Kyto & P. Pahta (Eds.), *Handbook of English Historical Linguistics* (pp. 351-375). Cambridge: Cambridge University Press.
- Biber, D., & Gray, B. (2010). Challenging stereotypes about academic writing: Complexity, elaboration, explicitness. *Journal of English for Academic Purposes*, 9 (1), 2-20.
- Biber, D., & Gray, B. (2011). Grammar emerging in the noun phrase: The influence of written language use. *English Language and Linguistics*, 15, 223-250.
- Biber, D., & Gray, B. (2016). *Grammatical complexity in academic English: Linguistic change in writing*. Cambridge: Cambridge University Press.
- Biber, D., Gray, B., & Poonpon, K. (2011). Should we use characteristics of conversation to measure grammatical complexity in L2 writing development? *TESOL Quarterly*, 45(1), 5-35.
- Biber, D., Grieve, J., & Iberri-Shea, G. (2009). Noun phrase modification. In *One language, two grammars?: Differences between British and American English* (pp. 182-193). Cambridge University Press.
- Biber, D., Johansson, S., Leech, G., Conrad, S., & Finegan, E. (1999). *Longman grammar of spoken and written English*. London: Longman.
- Chafe, W. (1994). *Discourse, consciousness, and time*. Chicago: University of Chicago Press.
- Cortes, V. (2013). The purpose of this study is to: Connecting lexical bundles and moves in research article introductions. *Journal of English for Academic Purposes*, 12, 33-43.

- Cullen, P., French, A., & Jakeman, V. (2014). *The official Cambridge guide to IELTS: For academic and general training: student's book with answers*. Cambridge: Cambridge University Press.
- Gray, B. (2015). *Linguistic variation in research articles: When discipline tells only part of the story*. Amsterdam: John Benjamins Publishing Company.
- Hanauer, D., & Englander, K. (2013). *Scientific writing in a second language*. Anderson, South Carolina: Parlor Press.
- Hinkel, E. (2004). *Teaching academic ESL writing*. Mahwah, NJ: Lawrence Erlbaum Associates Inc.
- Hinrichs, L., & Szmrecsanyi, B. (2007). Recent changes in the function and frequency of standard English genitive constructions: A multivariate analysis of tagged corpora. *English Language and Linguistics*, 11(3), 437-474.
- Holmes, R. (1997). Genre analysis and the social sciences: An investigation of the structure of RAs discussion sections in three disciplines. *English for Specific Purposes*, 16(4), 321-337.
- Huang, H-T. D., Hung, S-T. A., & Plakans, L. (2018). Topical knowledge in L2 speaking assessment: Comparing independent and integrated speaking test tasks. *Language Testing*, 35(1), 27-49.
- Hutter, J. A. (2015). *A corpus based analysis of noun modification in empirical research articles in applied linguistics* (Master's thesis). *Dissertations and Theses*, Paper 2211. Retrieved from http://pdxscholar.library.pdx.edu/open_access_etds.
- Hyland, K. (2009a). *Academic discourse: English in a global context*. London: Bloomsbury.
- IELTS (2017). IELTS website. Retrieved from: <https://www.ielts.org>.
- Jalilifar, A., Saleh, E., & Don, A. (2017). Exploring nominalization in the introduction and method sections of applied linguistics research articles: A qualitative approach. *Romanian Journal of English Studies*, 14(1), 64-80.
- Kwan, B. (2010). An investigation of instruction in research publishing offered in doctoral programs: The Hong Kong case. *Higher Education*, 59(1), 55-68.

- Lan, G., & Sun, Y. (2019). A corpus-based investigation of noun phrase complexity in the L2 writings of a first-year composition course. *Journal of English for Academic Purposes*, 38, 14-24.
- Lan, G., Lucas, K., & Sun, Y. (2019). Does L2 writing proficiency influence noun phrase complexity? A case analysis of argumentative essays written by Chinese students in a first-year composition course. *System*, 85, 102-116.
- Lim, J. M. H. (2010). Commenting on research results in applied linguistics and education: A comparative genre-based investigation. *Journal of English for Academic Purposes*, 9(4), 280-294.
- Lim, J. M. H. (2011b). Paving the way for research findings: Writers' rhetorical choices in education and applied linguistics. *Discourse Studies*, 13(6), 725-749.
- Lougheed, L. (2016). *Writing for the IELTS*. Barron's Educational Series, Inc. New York.
- Moore, T., & Morton, J. (1999). Authenticity in the IELTS academic module writing test: A comparative study of task 2 items and university assignments. In R. Tulloh (Ed.), *International English language testing system (IELTS) research reports*, (Vol. 2, pp. 197-248). Canberra: IELTS Australia.
- Nordrum, L., & Eriksson, A. (2015). Using a small, specialized corpus for formative self-assessment practices. In M. Callies & S. Götz (Eds.). *Learner corpora in language testing and assessment. Studies in corpus linguistics*, (Vol. 70, pp. 59-84). Amsterdam: John Benjamins Publishing Company.
- Parkinson, J. (2011). The Discussion section as argument: The language used to prove knowledge claims. *English for Specific Purposes*, 30, 164-175.
- Parkinson, J., & Musgrave, J. (2014). Development of noun phrase complexity in the writing of English for academic purposes students. *Journal of English for Academic Purposes*, 14, 48-59.
- Pastor-Gómez, I. (2010). *Nominal modifiers in noun phrase structure: Evidence from contemporary English*. Santiago: University of Santiago.

- Pilgreen, J. L. (2010). *English learners and the secret language of school: Unlocking the mysteries of content-area texts*. Portsmouth, NH: Heinemann.
- Ruiying, Y., & Allison, D. (2003). Research articles in applied linguistics: Moving from results to conclusions. *English for Specific Purposes*, 22(4), 365-385.
- Ruiying, Y., & Allison, D. (2004). Research articles in applied linguistics: Structures from a functional perspective. *English for Specific Purposes*, 23(3), 264-279.
- Sancho Guinda, C. (2012a). Proximal Positioning in Students' Graph Commentaries. In K. Hyland & C. Sancho Guinda (Eds.), *Stance and voice in written academic genres* (pp.166-183). Basingstoke, UK: Palgrave Macmillan.
- Staples, S., Egbert, J., Gray, B., & Biber, D. (2016). Academic writing development at the university level: Phrasal and clausal complexity across level of study, discipline, and genre. *Written Communication*, 33(2), 149-183.
- Staples, S., & Reppen, R. (2016). Understanding first-year L2 writing: A lexicogrammatical analysis across L1s, genres, and language ratings. *Journal of Second Language Writing*, 32, 17-35.
- Swales, J. (2004). *Research genre: Explorations and applications*. Cambridge: Cambridge University Press.
- Swales, J. M., & Feak, C. B. (2012). *Academic writing for graduate students*. Ann Arbor: University of Michigan Press.
- Taguchi, N., Crawford, W., & Wetzel, D. Z. (2013). What linguistic features are indicative of writing quality? A case of argumentative essays in a college composition program. *TESOL Quarterly*, 47, 420-430.
- Tashakkori, A., & Teddlie, C. (2003). *Handbook of mixed methods in social and behavioral research*. Thousand Oaks, Calif: Sage Publications.
- Williams., A. (2011). *Writing for IELTS*. London. Harper Collins Publishers Limited.
- Yang, G. (2015). *Grammatical features of structural elaboration and compression common in advanced ESL academic writing* (Master's thesis,

Brigham Young University). Retrieved from http://pdxscholar.library.pdx.edu/open_access_etds.

Yang, W. (2013). Response to Biber, Gray, & Poonpon (2011). *TESOL Quarterly*, 47, 187–191.

Appendix A Multivariate Tests

GSs vs. EWs		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power ^b
Students	Pillai's trace	.977	205.168 ^a	5.000	24.000	.000	.977	1025.842	1.000
	Wilks' lambda	.023	205.168 ^a	5.000	24.000	.000	.977	1025.842	1.000
	Hotelling's trace	42.743	205.168 ^a	5.000	24.000	.000	.977	1025.842	1.000
	Roy's largest root	42.743	205.168 ^a	5.000	24.000	.000	.977	1025.842	1.000
Experts	Pillai's trace	.924	48.345 ^a	5.000	20.000	.000	.924	241.725	1.000
	Wilks' lambda	.076	48.345 ^a	5.000	20.000	.000	.924	241.725	1.000
	Hotelling's trace	12.086	48.345 ^a	5.000	20.000	.000	.924	241.725	1.000
	Roy's largest root	12.086	48.345 ^a	5.000	20.000	.000	.924	241.725	1.000

Each F tests the multivariate effect of Time. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

b. Computed using alpha = .05