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EXPLORING THE IMPACT OF ACADEMIC WRITING EXPERTISE ON SYNTACTIC COMPLEXITY: A CORPUS-BASED ANALYSIS

Imen AISSI
Laboratory: Etudes du genre, langues et diversités sociolinguistiques
Abdelhamid Ibn Badis University, Mostaganem Algeria
ORCID iD: 0009-0008-5999-8369
imen.aissi.etu@univ-mosta.dz
&
Mustapha BOUDJELAL
Abdelhamid Ibn Badis University, Mostaganem, Algeria
mustapha-boudjelal@hotmail.com

Abstract: Intense debates in foreign or second language learning evolve around English language academic writing as a bridge and a threshold for knowledge dissemination and uptake. A growing interest has consequently been in the way knowledge is constructed via linguistic features which contribute to accelerating the international research publication process. Syntactic complexity, in this sense, has been widely utilized as a multidimensional construct to gauge foreign or second language development in general and academic writing in particular. Despite the growing number of studies examining the interplay between topic, genre, language background and syntactic complexity, few have investigated the impact of academic writing expertise on L2/EFL syntactic and phrasal complexity production. To this end, the current study investigates the syntactic complexity holistically and phrasal complexity narrowly in a corpus of 20 research articles published by Algerian Ph.D. students and expert writers. Independent sample t-tests were performed to trace the statistically significant differences between the two sub-corpora in terms of fourteen syntactic complexity indices and nine noun phrase modifiers. Our findings indicated substantial variation across the sub-corpora in terms of six syntactic complexity measures and a set of nominal modification features including non-finite relative clauses, propositional phrases, appositive noun phrases and nouns as pre-modifiers as well as multiple prepositional phrases. These findings underline the significance of academic writing expertise as a factor for a deep conceptualization of syntactic complexity in EAP writing with useful implications for genre and EAP writing research and pedagogy.

Keywords: Syntactic complexity, phrasal complexity, academic writing expertise, corpus, research article.

L'IMPACT DE L'EXPERTISE EN REDACTION ACADEMIQUE SUR LA COMPLEXITE SYNTAXIQUE : ANALYSE DE CORPUS

Résumé : Des débats intenses sur l'apprentissage des langues étrangères ou secondes évoluent autour de la rédaction académique en anglais comme pont et seuil pour la diffusion et l'assimilation des connaissances. Un intérêt croissant a été porté donc sur la manière dont les connaissances sont construites via des éléments linguistiques qui contribuent à accélérer le processus de publication de la recherche internationale. La complexité syntaxique, dans ce sens, a été largement utilisée comme notion multidimensionnelle pour évaluer le développement d'une langue étrangère ou seconde en général et la rédaction académique en particulier. Malgré le nombre croissant d'études examinant la relation entre le sujet, le genre, le contexte linguistique et la complexité syntaxique, peu ont étudié l'impact de l'expertise en rédaction académique sur la production de complexité syntaxique et phrastique. À cette fin, la présente recherche

étudie la complexité syntaxique de manière holistique et la complexité phrastique de manière étroite dans un corpus de 20 articles de recherche publiés par des doctorants algériens et auteurs experts. Des tests t sur échantillons indépendants ont été réalisés pour retracer les différences statistiquement significatives entre les deux sous-corpus en termes de quatorze indices de complexité syntaxique et de neuf modifieurs de la phrase nominale. Nos résultats indiquent une variation substantielle entre les sous-corpus en termes de six mesures de complexité syntaxique et un ensemble de modifieurs nominaux, notamment des propositions relatives non-déterminantes, des phrases propositionnelles, des phrases nominales appositives et des noms comme pré-modifieurs ainsi que plusieurs phrases prépositionnelles. Ces résultats soulignent l'importance de l'expertise en rédaction académique comme facteur pour une conceptualisation approfondie de la complexité syntaxique dans la rédaction académique avec des implications utiles pour la recherche et la pédagogie en matière de rédaction académique.

Mots-clés: Complexité syntaxique, complexité phrastique , expertise en rédaction académique, corpus, article de recherche.

Introduction

In the last few decades, there has been an ever-pressing need among students and academic researchers to disseminate their knowledge internationally via the English language (Hyland, 2018). A growing awareness of attaining a better command of English academic writing conventions, in particular, has emerged as a pivotal criterion for both the establishment of their professional careers and gaining internationally exchanged knowledge (Hyland, 2018). Analyzing academic discourse has consequently received considerable impetus over the past twenty years to explore how knowledge is shaped via language structures (Yin et al, 2023). In this line of inquiry, syntactic complexity as a multidimensional construct has emerged within the field of English for Academic Writing Purposes (EAP) as a tool to scrutinize and gauge L2 writers and academic researchers' language development (Elliott et al, 2021). Syntactic complexity, defined as elaboration and sophistication of features deployed in written productions, has received much of the second language (L2) researchers' attention (Ortega, 2015). In this line of syntactic complexity, Biber & Gray (2011) along with current studies in L2 writing research have asserted that noun modification features turned out to be a distinctive feature of modern academic prose. That is, heavy use of non-clausal and phrasal modification features has been pervasively marked in written academic writing. These findings are justified by the pressing need among academic researchers to pack information within relatively a slim volume of words (Halliday, 1993). There is a wealth of research in second language (L2) writing examining the construct of syntactic complexity in language output as a dependent variable that is exposed to influence via a range of independent factors. It has been argued that the increase in syntactic complexity contributes to ameliorating L2 writers' writing through using a variety of linguistic features that aim to achieve certain communicative purposes in discipline- specific contexts (Ortega, 2015). Numerous studies have targeted the interplay between the construct of syntactic complexity and a broadening range of factors such as genre, topic, writing proficiency, language background and writing quality among others (Staples & Reppen, 2016 ; Bulté & Housen, 2014). Broadly speaking, the findings of these studies enrich the line of syntactic complexity research vis-à-vis the conceptualization of the construct and its potential role in EAP writing pedagogy. Contrasting arguments, however, have been pinpointed by Hyland (2016) indicating the irrelevance of considering language background as a factor in academic writing analysis. Hyland further highlights the significance of shedding light on level of expertise as a crucial dimension in achieving academic publishing. Indeed, the analysis of novice and expert writers'

writings have been taken as a valid factor that can account for their syntactic complexity production in EAP writing research. Few limited studies in the Algerian context, however, have centred their attention on EFL trajectories of academic language development through conducting corpus-based comparisons of novice and expert writers. The range of the current research focused instead on exploring novice or EFL academic researchers' writings without referring to their expert counterparts. While current L2 syntactic complexity research has raised our awareness with respect to academic language development and proficiency, few limited studies have functionally investigated the linguistic resources and nominal modification features in particular needed for constructing effectively elaborated or compressed texts. In response to the aforementioned research gaps, the present study aims to investigate the effect of academic writing expertise on syntactic complexity broadly and phrasal complexity particularly. Specifically, this research aims to identify the syntactic and noun phrase complexity differences across Algerian Ph.D. students and expert writers in the field of English language teaching and learning. More importantly, this research aims to answer the following questions: does the difference in writing expertise have an effect on the syntactic complexity of research articles written by Algerian Ph.D. students and expert writers? If so, which syntactic complexity measures best characterize this effect? To what extent could the noun phrase modifiers discriminate among Ph.D. students and expert writers' research article writings? In an attempt to investigate the previously mentioned research questions, the current study sets the following hypotheses. First, the difference in writing expertise among Algerian Ph.D. candidates and expert writers might have an impact on the syntactic complexity of their research articles. Some measures which belong to different categories namely, length of production units, overall sentence complexity, subordination and phrasal complexity might effectively capture the differences between both group authors' writings. Second, the noun phrase modifiers that differentiate between Ph.D. students and expert authors' research articles might be the ones identified in the last stages of the developmental index proposed by Biber et al's (2011) study. These features might include non-finite relative clauses, pre-modifying nouns, appositive noun phrases and multiple prepositional phrases with different embeddings as post-modifiers.

1. Literature Review

1.1 Syntactic Complexity in EFL / L2 Academic Writing

As part of accuracy, fluency and complexity (CAF) triad, an intense debate on complexity has developed over the past thirty years that focuses on language proficiency and development, questioning the notion of L2 proficiency and its operationalization (Housen et al, 2012). Drawing on previous studies, L2 complexity has been conceptualized as the elaborate use of forms and structures as well as the degree of sophistication of those structures (Ellis, 2003). Among the sub-constructs of linguistic complexity namely, syntactic, morphological, lexical and phonological, syntactic complexity has been the most widely investigated in second language (L2) writing research. Syntactic complexity as a multidimensional concept stands for elaboration of language with regard to different production units. The construct of syntactic complexity has been measured differently in L2 writing studies with a view to quantifying the rich list of linguistic attributes that comprise the language structure (Rosmawati, 2022). Studies in this research area have displayed a wide range of syntactic complexity indices. These complexity measures, not valid and reliable as expected, haven't been effective in gauging L2 writers' writing development and proficiency due to the lack of awareness regarding the distinction between spoken discourse and its written counterpart (Kyle & Crossley, 2018). Over the last years, syntactic complexity in L2 corpus-based studies have featured prominently in the second language (L2) writing research. A large body of literature on syntactic complexity have examined the effect of a wide range of factors including writing development, topic, genre, writing proficiency, writing quality and language background on L2 syntactic complexity. The most prevalent study in this research area relates to the

investigation of the relationship between language development and syntactic complexity. Lu (2011) has examined a large-scale corpus of ESL writing to identify among the 14 syntactic complexity measures investigated the ones that serve as a yardstick benchmarking language learner development. These measures are developed under five categories, to wit, length of production units, subordination, coordination, phrasal complexity and overall sentence complexity. All the measures take the form of either ratios of distinct linguistic structures or a length measurement of production entities (Lu, 2010). This study offers valuable perspectives regarding the effectiveness of specific measures in gauging L2 language development. A study on the interplay between the effect of genre and writing quality on ESL writing syntactic complexity by Yang et al (2015) reports a strong correlation among the discussed variables. That is, ESL writers tended to achieve syntactic diversity across different topics using certain features which have been correlated with high-quality writing. In deliberately discussing the link between syntactic complexity and writing proficiency, it might be interesting to position our focus on a study conducted by Abbas & huhta (2019), which integrates the Common European Framework of Reference (CEFR) as a variable in their study to investigate syntactic complexity. The results reported in this research highlight a significant relationship between CEFR levels and the syntactic complexity production. English language background as a variable has also been extensively investigated in L2 syntactic complexity research. As such, Nasseri (2021) implemented a novel approach to revisit the language background theories with respect to syntactic complexification production. The collective sum of studies discussed above contribute to understanding the moderating forces of L2 writing syntactic complexity. Any of these studies, undoubtedly, served the purpose of enriching the research line devoted to conceptualizing and operationalizing the construct of syntactic complexity in second or foreign language writing research.

1.2 Noun Phrase Complexity in L2 English Academic Writing

Discourse characteristics have been analyzed and operationalized on all linguistic levels over the past decades with a view to scrutinizing changes in academic written prose. Noun phrase complexity, in this sense, has been extensively treated in academic writing literature. English academic writing, in fact has undergone an extensive change over the past centuries, touching the phrasal complexification area. That is, the use of structural compression and noun modification features has been more prevalent in modern academic prose (Biber et al, 2009). This historical shift has been mirrored by Biber and Clark (2002) in form of a continuum with two edges namely compressed (phrasal expression) and expanded (clausal expression). The phraseological dimension includes pre-modifiers and post-modifiers while its clausal counterpart comprises finite and non-finite relative clauses. Interestingly, an increase in the use of nominal modification features has been marked in the past decades, with a special focus on pre-modifiers and phrasal post-modifiers. The rational motives behind this linguistic change lie at the core of two aspects including 'information explosion' and word economy. That is, the urgent need to convey knowledge in an effective and economic way led to a dense use of complex noun phrases through which writers pack information (biber et al, 2011). According to Biber et al, (2009), nominal modification in English is shaped by pre-modification and post-modification features. Pre-modifiers are the nominal phrases that are placed before the head-noun, including attributive adjectives, participial adjectives, and nouns as pre-modifiers. Post modifiers, in contrast, are classified at the phrase and clause levels. Clausal post-modifiers encompass relative clauses including -ing/ed/to clauses whereas the post-modifiers at the clause level consist of prepositional phrases and appositive noun phrases (Biber et al, 2009). Research in noun modifiers has highlighted a higher use of attributive adjectives and nouns as pre-modifiers over the other pre-modifiers. As for the post-modifiers, prepositional phrases were the most common feature in academic writing followed by a moderate use of finite relative clauses (Biber et al, 2009).

An outstanding study in L2 writing development has been proposed by Biber, Gray & Poonpon (2011) with the aim of assessing grammatical complexity in academic writing. This research investigated 28 grammatical structures including 11 noun modifiers across a corpus of research articles compared to spoken discourse. Drawing on the documented trajectories of learners' grammatical development, a developmental benchmark was suggested displaying their progress in different phases starting from oral proficiency till reaching academic writing proficiency. In order to measure grammatical complexity, the suggested developmental benchmark displayed five stages that typically start with finite dependent clauses as part of main clauses moving to the next stages which include non-finite dependent phrases and clauses at clausal levels. The last phase focuses on the intensive utilization of embedded phrasal structures within noun phrases. Other empirical studies have investigated the same developmental benchmark suggested by Biber, Gray & poporn (2011). As an illustration, Parkinson & Musgrave (2014) have investigated the use of nominal modification features set in the proposed index across writing proficiency levels. The results of this work have validated the progression index indicating that writers with higher proficiency counted heavily on the use of noun modifiers except for attributive adjectives that were highly frequent in less-proficient writers' writings. This study among other empirical studies have validated the progression index suggested by Biber, Gray & poporn (2011), highlighting its significance in EAP writing research.

1.3 Syntactic Complexity in L2 corpus-based studies: Variation by Academic writing Expertise

Drawing on seminal works in the field of English for Academic Purposes (EAP), academic writing has been documented as a typical register which is highly demanding and complex. Academic written discourse as a language approach to teaching has been deemed to include a myriad of factors including target language structures, discourse conventions and communicative functions of specific academic communities along with taking into account disciplinary difference and level of students (Hyland, 2018). The significance of academic writing has been accentuated in L2 writing, considering it as a field of study in English as a second or foreign language which is theoretically and empirically informed. Delving deep into this research area demands to turn our attention to the overriding need that urges doctoral students to develop their writing expertise level in their Ph.D. journey. From a structuralist perspective, learning academic writing or scholarly writing for publication aims to focus on improving the syntactic complexity area (Hyland, 2018). In this work, the idea of investigating academic writing expertise has been documented as a relevant factor in contrast to the nativeness status. Hyland (2018), in this sense rejected the nativeness claim highlighting the absence of what we call English native academic writing. Recent studies have begun to address academic writing expertise in their L2/EFL syntactic complexity research. In a diachronic examination of syntactic complexity in academic discourse among emerging and expert writers, Yin et al, (2023) conducted a corpus-based analysis of thirty research article introductions published across different time periods, with respect to rhetorical move steps. The findings of this study demonstrated statistically significant differences among the emerging and expert writers in terms of syntactic complexity as well as the timing period. More importantly, the analysis of this study incorporated a rhetorical perspective with regard to both syntactic complexity and the diachronic dimension. More to this objective, Esfandiari, R & Ahmadi, M (2023) included syntactic diversity and elaboration particularly in their syntactic complexity investigation. From a syntactic complexity perspective, the authors tended to assess second language (L2) writing proficiency among second language (L2) novice and expert writers. The authors found that global phrasal complexity measures were efficient in depicting L2 writers' writing proficiency with a focus on a measure gauging syntactic diversity. Extrapolating these findings into English for Academic Writing Purposes (EAP), one could highlight the predictive power of incorporating academic writing expertise as a variable in L2 syntactic complexity research.

2. Research Methodology

2.1 Research Method: Corpus Construction & description

The current research is underpinned by theories and practices of corpus linguistics. The study data includes two constructed corpora, each consisting of 10 published research articles in the field of English language teaching and learning. The first corpus of research articles is sampled from Algerian Class C journals, namely Academic Review of Social and Human Studies, Applied Linguistics, and ELWAHAT Journal for Research and Studies, and produced by Algerian Ph.D. students. For sampling procedures, the authors were checked for their Algerian names and affiliations with Algerian universities and have published less than two research articles. The second corpus, interestingly, is constructed from high-ranked and prestigious international journals including TESOL Quartley, Language Teaching research, and Journal of Second Language Writing. This corpus of RAs is written by expert writers who are defined as authors who published more than three RAs in high-impact established international journals. The two constructed corpora of Ras were published across the years 2015 and 2022 and written using the APA writing style. To ensure the comparability of both corpora, the selected RAs were mainly empirical investigations on different topics related to language teaching and learning. The methodological procedures implemented in this corpus-based analysis include the conversion of 20 RAs into text format and the removal of extraneous elements like journal titles, tables, figures, references, citations, numerical characters, and quotations. The texts were checked for accuracy and the folders were coded as a final stage of the pre-analysis process. Table 1 documents the full description of both corpora in terms of number of RAs, number of words and means.

Table 1
Description of the corpus

	Number of RAs	Number of words	Mean
Ph.D. writers' corpus	10	39129	3912,9
Expert writers' corpus	10	74452	7445,2

2.2 Syntactic Complexity: Instrumentation & Measurement

In an attempt to analyze syntactic complexity in both corpora, the research instrument used in this study is L2 Syntactic Complexity Analyzer, L2SCA (Lu, 2010), which is a computational analysis software designed for measuring syntactic complexity in L2 writing and accessible for free. The L2SCA includes 14 measures of syntactic complexity covering five dimensions namely length of production unit, amount of subordination, amount of coordination, overall sentence complexity, and phrasal sophistication. The measures used in L2SCA are designed to automate either the length or ratios of various language structures. As a textual sample analyzed by L2SCA, this software seeks to identify the number of occurrences of different language items and structures as well as provide the numerical data obtained from the 14 metrics of syntactic complexity (Lu, 2010). Despite the different views discussed in previous research on redundancy of some of the 14 measures, the present study seeks to include all the 14 measures due to the variable type investigated in this research which is typically new. The syntactic complexity indices generated by L2SCA are presented thoroughly in Table 2.

Table 2
Syntactic complexity measures proposed by (Lu, 2010)

Measure	Code	Definition
Length of production unit		
Mean length of sentence	MLS	N of words / N of sentences
Mean length of T-unit	MLT	N of words / N of T-units
Mean length of clause	MLC	N of words / N of clauses
Amount of subordination		
Clauses per T-unit	C/T	N of clauses / N of T-unit
Complex T-unit ratio	CT/T	N of complex T-units / N of T-units
Dependent clauses per clause	DC/C	N of dependent clauses / N of clauses
Dependent clauses per T-unit	DC/T	N of dependent t clauses / N of T-units
Amount of coordination		
Coordinate phrases per clause	CP/C	N of coordinate phrases / N of clauses
Coordinate phrases per T-unit	CP/T	N of coordinate phrases / N of T-units
T-unit per sentence	T/S	N of T-units/ N of sentences
Phrasal complexity		
Complex nominals per clause	CN/C	N of complex nominals / N of clauses
Complex nominals per T-unit	CN/T	N of complex nominals / N of T-units
Verb phrases per T-unit	VP/T	N of verb phrases / N of T-units
Overall sentence complexity		
Clauses per sentence	C/S	N of clauses / N of sentences

2.3 Coding of Nominal Modification Features

The procedure of identifying nominal modification features has been undertaken through conducting a manual analysis rather than an automatic analysis due to the shortcomings identified in corpus-based studies using software programs. Regardless of the significance of automatic language tools in analyzing large collections of texts, NLP tools have received criticism for accuracy results. That is, automatic softwares have often failed to distinguish between different grammatical structures such as prepositional phrases as postmodifiers and appositive noun phrases. Hence, this research has implemented a manual coding of the nominal modification features proposed in Biber et al's (2011) and Biber et al's (2020). The qualitative approach adopted in this study encompasses different phases including identifying the noun phrase modification features and then counting the frequency of each feature. This research process has been undertaken by doctors and Ph.D. students in didactics and applied linguistics. The research team had in-depth discussions about the identification of the different nominal modification features. Table 3 clearly provides a full description of the corpora analysed in terms of nominal modification features. A pilot study of 4 research articles was conducted first to check agreement among doctors and Ph.D. researchers. A percentage of 80% was achieved with differences and discussions among some cases. The linguistic model implemented in this study includes both clausal and phrasal nominal modification features. As for the clausal level, it encompasses To clauses, Finite relative clauses, and Non-finite relative clauses. The phrasal level, on the other hand, encompasses attributive adjectives, nouns as pre-modifiers, attributive adjectives + nouns as pre-modifiers, prepositional phrases, appositive noun phrases and multiple prepositional phrases as post-modifiers. Table 4 below clearly illustrates the classification of noun phrase modification elements investigated in this study. This research opted for manual analysis of phrasal complexity only due to the role it significantly plays in professional academic prose in contrast to clausal complexity.
Table 3

Description of the sub-corpora

	Number of RAs	Number of words
Ph.D. writers' corpus	13	49920
Expert writers' corpus	7	49606

Table 4
Nominal modification features Investigated

At clausal level	At phrasal level
To clauses Finite relative clauses Non-finite relative clauses	Attributive adjectives Nouns as pre-modifiers Attributive adjectives, nouns as pre-modifiers Prepositional phrases Appositive noun phrases Multiple prepositional phrases as post-modifiers

2.4. Statistical Procedures for Data Analysis

For the process of examining the impact of academic writing expertise on the production of syntactic complexity generally and the use of complex nominals particularly in research articles, independent simple t-tests were run to spot the differences between both sub-corpora. The use of t-tests was followed by calculating the effect size proposed by Cohen's d. Cohen's d effect size stands for a qualitative measure that addresses the differences between means of different groups and presents the magnitude of the impact investigated (Plonsky, 2015). The statistical procedures undertaken in this research were performed using SPSS 26.

3. Results

In order to examine the potential of academic writing expertise as a factor influencing the syntactic complexity production in research articles, two-independent sample t-tests were performed for a set of fourteen measures of syntactic complexity. To gauge the differences between Algerian Ph.D. students' RAs and expert writers' RAs across the fourteen measures of syntactic complexity, the analysis was followed by the use of Bonferroni adjustment as well as calculating Cohen's d effect size. The findings of the independent sample tests revealed significant differences across both groups in terms of six syntactic complexity measures namely MLC, C/T, DC/C, DC/T, CN/T, CN/C. In terms of length of production units and degree of phrasal sophistication, the findings revealed that expert writers produced more complex production units (MLC) and complex phrasal structures (CN/T), (CN/C) than the Algerian Ph.D. writers. This is confirmed by Cohen's d effect size values which reached 1.099, 0.393, 0.923 respectively that are considered as large and small effect sizes. As for the use of subordination clauses, the results indicate that Algerian Ph.D. writers exhibited higher levels of subordination clauses(C/T), (DC/C), (DC/T) in contrast to their expert counterparts. The values counted by Cohen's d demonstrate that the effect sizes are deemed as moderate and large. The results discussed previously aren't consistent with the overall sentence complexity measure (C/S) in which Algerian doctoral students demonstrated higher values than expert writers. Table 5 clearly illustrates the findings stated above.

Table 5
Syntactic complexity measures across Algerian Ph.D. writers and Expert writers' RAs

	Algerian Ph.D. writers' corpus	Expert writers' corpus	
	Mean (Sd)	Mean (Sd)	Sig
MLS	25.1022 (3.25873)	27.4119 (2.45027)	-
MLT	23.0594 (2.26572)	25.0387(2.62944)	-
MLC	12.6210 (0.96573)	15.1889 (2.21825)	*
C/S	1.9937 (0.25288)	1.8281 (0.22517)	-
VP/T	2.6677 (0.76903)	2.4043(0.16398)	-
C/T	1.8283 (0.13496)	1.6618 (0.15043)	*
DC/C	0.4275(0.03384)	0.3877(0.03663)	*
DC/T	0.7853 (0.12132)	0.6487 (0.11563)	*
T/S	1.0875 (0.07276)	0.9978 (0.27453)	-
CT/T	0.5018 (0.05911)	0.4601 (0.5461)	-
CP/T	0.7648 (014002.)	0.7176 (0.21247)	-
CP/C	0.4171 (0.5529)	0.0.4390(0.15544)	-
CN/T	3.0798(0.40072)	3.8463 (00.51127)	*
CN/C	1.6874 (0.21007)	2.3363(0.39730)	*

The analysis of noun phrase modification features in both sub-corpora revealed distinctive features that differ between Algerian and expert writers at phrasal and clausal levels. The first part of the analysis comprises of counting the normalized frequency of the noun phrase modification features per 1000 words. Mean and standard deviations were then compared through performing t-tests to highlight the significant differences across both groups followed by the use of Cohen's d to investigate the effect size of the differences spotted. At a clausal level, no statistically significant differences were reported between both groups with respect to 'To clauses' as a post-modifier. Expert writers (NF= 8.39, M(Sd)= 64.40(8.04984)), however, tended to use higher frequency of to-clauses than Algerian writers (NF=8.19, M(Sd)= 60.40(14.38054)). The analysis of the second feature namely relative clauses as noun-post modifier hasn't signalled a substantial variation among the two sub-corpora indicating that Algerian writers (NF=6.32; M(Sd)= 44.60(13.94)) tended to use higher amount of finite relative clauses than expert writers (NF=5.71; M(Sd)= 44.00(16.64)). The third clausal feature, non-finite relative clauses, turned out to be a distinctive feature among the two-corpora in which expert writers (NF=5.98; M(Sd)= 41.00(13.94)) produced more non-finite relative clauses than their Algerian counterparts (NF= 4.47; M(Sd)= 37.40(6.31)).

At a phrasal level, the use of attributive adjectives as pre-modifiers hasn't been reported as significantly distinguishing among both groups. On average, Algerian writers (NF= 45.66; M(Sd)= 360.000(29.04)) tended to include more attributive adjectives in their research articles than expert writers (NF=41.99; M(Sd)= 332.400(51.59)). In contrast, the use of noun modifiers as pre-modifiers has been marked as making a significant difference between both sub-corpora. Expert writers (NF=26.09; M(Sd)= 220.80(58.47)), in this sense, showed a greater use of nouns as pre-modifiers in their research article writings as compared to the Algerian writers (NF=19.21; M(Sd)= 139(41.27593). Interestingly, the use of prepositional phrases as noun post-modifier was reported as a feature creating a difference which was statistically significant across both writers. Algerian doctoral students tended to rely more on the use of prepositional phrases (NF= 49.14; M(Sd)= 375.80(101.97402)) as compared to their expert counterparts (NF= 29.82; M(Sd)= 230 (72.37)). Concerning the use of adj,noun as pre-modifiers, no statistically-significant differences have been captured among Expert writers (NF=4.61; M(Sd)= 44.68 (10.03)) and Algerian writers (NF=3.82; M(Sd)= 31.08 (8.42)). As for appositive noun phrases use, the group differences were statistically

significant since expert writers (NF=1.66; M(Sd)=11.80(3.55)) showed a heavy reliance on appositive noun phrases contrary to Algerian writers (NF=1.25; M(Sd)= 8.20(5.21)). The last distinctive feature investigated in this analysis, multiple prepositional phrases with different embeddings, has been marked as a feature varying significantly across groups. The results demonstrated that the use of multiple prepositional phrases was reported more in expert writers' RAs (NF= 12.17; M(Sd)= 85.56(28.25)) than in Algerian Ph.D. students' research articles (NF=8.64; M(Sd)= 55.16(12.06)).

Discussion

Employing a corpus-based approach, the current study sought to examine the effect of academic writing expertise on the production of syntactic complexity. This research has also explored the use of nominal modification features in research articles written by Algerian Ph.D. students and expert writers in the field of English language teaching and learning. With respect to the first research question, the syntactic complexity analysis of both sub-corpora has reported the effectiveness of six syntactic complexity measures in capturing the differences in the writing of both groups. In terms of syntactic complexity, Algerian writers tended to employ more subordination in their writing as compared to their expert counterparts. These findings corroborate Nasseri's (2020) study, stating that subordination is the distinctive feature of EFL writing. This view is also supported in Lu & Ai's (2015) research, highlighting the less-proficient Tswana group as the one using more subordination in contrast to the native speaker group. In accordance with Biber & Gray (2010), writers' use of subordination can be justified by the purpose of achieving structural elaboration. The subordination clauses, in fact, seek to add a detailed explanation to the nouns they modify. As for the length of production units as well as overall sentence complexity, Algerian EFL writers tended to use longer sentences than the expert group, which resulted in boosting the overall sentence complexity. The employment of longer production units like sentences was justified in Biber & Cornard's (2009) study as a structural device used to achieve a set of communicative goals in whole and part-genre research articles. Regarding phrasal complexity, expert writers tended to produce more complex nominals in their writing than their Algerian counterparts, based on the complexity measures investigated (CN/T, CN/C). This is consistent with the findings reported in Jiang et al'.s (2019) study. In this sense, the authors highlighted a positive correlation between the production of noun phrases and higher proficiency via using the CN/C measure. These findings coincide with much of the scholarship on phrasal complexity and writing proficiency, as most previous research highlight the intersection between noun phrase complexity and writing development and proficiency. Delving deep into the use of complex noun phrases in writing, a shift to the analysis of noun phrase modification features in Ph.D. students and expert writers' writings has signalled some distinctive features as patterns making difference between both group writers. To start with, the results obtained demonstrate that non-finite relative clauses have been heavily used by expert writers in comparison to Algerian writers. These findings are in line with the results reported in Ansarifar et al's (2018) study, stating that the employment of -ed and -ing participles as post modifiers has been observed as a distinctive feature among the Master's and expert writers' group. These findings support Biber et al'.s (2011) developmental progression since non-finite relative clauses are noticed in advanced developmental stages. At the phrasal level, noun modifiers as pre-modifiers have been labelled as a feature significantly differentiating between both group writers. This aligns with Staples & Reppen's (2016) findings, highlighting this feature as substantially marking a variation across language backgrounds and genres. In fact, a tendency to use pre-modifying nouns has been tied to modern academic discourse (Biber et al, 2011).With respect to the post-modifying features, the use of prepositional phrases has been extensively used by Algerian writers. This is contrasted with Casal and Lee's (2019) study, highlighting those top-quality compositions as including more prepositional phrases than moderate and low-rated writings. An outstanding work presented by Biber & Gray (2011),

however, delignate a diachronic change in the use of prepositional phrases as post-modifiers over the past decades. Appositive noun phrases, extensively employed by expert writers, tally with Biber's (2011) developmental index in which this feature is viewed in the last developmental stage. Similarly, the use of multiple prepositional phrases follows the same line of thought. Expert writers were inclined to use more multiple prepositional phrases as compared to their Ph.d. writers' counterparts. These findings completely align with Ansarifar et al'.s (2018) results in which the authors reported that the expert writers heavily employed multiple prepositional phrases in their writings as compared to both the master's and Ph.D. writer groups.

Conclusion

Overall, the current research examined syntactic complexity in academic writing as mediated by writing expertise boundaries. Most significantly, this study aimed to elucidate the differences between Ph.D. students and expert writers' writings in terms of syntactic complexity globally and nominal modification features particularly. Interestingly, only six syntactic complexity measures covering length of production units, subordination, and phrasal sophistication dimensions were effective in capturing the differences between Ph.D. students and expert writers' research articles. Moreover, variation in the use of complex nominals has been attributed to the writers' use of non-finite relative clauses, pre-modifying nouns, post-modifying prepositional phrases, appositive noun phrases, and multiple prepositional phrases as post-modifiers. The findings obtained in this study lead to the provision of interesting implications for EAP writing and pedagogy and enrich the line of research in genre studies. Studies on syntactic complexity have responded to the urgent need of systematically investigating modern academic discourse. The most notable line of research accentuated the use of complex noun phrases as a generic feature of academic writing. The findings of this research would help EAP writing teachers and students differentiate between structural elaboration and compression. Most significantly, it would provide insights into how modern academic writing is complex. That is, the complexity of academic writing is shaped by many factors including writing expertise, text-intrinsic features like the sub-genres, disciplinary expectations and other text-extrinsic features. Portraying a profile of how academic writing is complex would contribute to make a groundwork for developing effective teaching and learning materials as well as enhancing students' decision-making skills in writing. These implications would provide EAP writers with a guide on what to consider as sophisticated syntactic structures and how to use them depending on the communicative functions set by the research articles. The present research, however, has a set of limitations that should be noted. First, the research sample size wasn't large which may affect the generalizability of the findings obtained. Therefore, future studies can involve larger sub-corpora for both the quantitative and qualitative analyses to ensure the generalization of the results. Second, the inclusion of other research disciplines would help researchers gain a better understanding of the academic writing of different disciplinary contexts. Finally, the study hasn't covered a large list of nominal modification features while examining the use of complex nominals. Thus, future studies can expand their research via including a broader set of noun phrase features in the qualitative analysis.

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