Variation in Academic Writing: A Corpus-Based Investigation on the Use of Syntactic Features by Advanced L2 Academic Writers

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ABSTRACT

Background: Writing means communication through words whereas academic writing means making careful use of words to communicate ideas to a range of readers and audiences. Therefore, academic writing reflects specificities related to audience, context/discipline and purpose of the use. These specificities result in ample differences in terms of language use.

Purpose: This study investigates disciplinary variation in the use of different syntactic (i.e., clausal, intermediate and phrasal) features in academic writing produced by the Pakistani advanced writers of English as an L2 specializing in different disciplines of arts and humanities, life sciences, physical sciences and social sciences.

Method: For the said purpose, the corpus has been developed from dissertation texts produced by the Pakistani doctoral candidates from 16 academic disciplines of four disciplinary divisions. The analysis has been performed using AntConc Software after tagging with Multidimensional Analysis, and TagAnt Taggers.

Results: The results reveal mixed findings. On the one hand, the results show variation in the use of syntactic features that is observed to be marked by the difference in the frequency of the different types of the said features across disciplines. On the other hand, the results show a similarity in the use of syntactic features that has been evidenced by the finding that the most and least frequently used features are identical across disciplines.

Conclusion: These results suggest both heterogeneity and homogeneity in the use of syntactic features by the Pakistani advanced L2 academic writers. The results of this study have implications for educators, policy makers, and syllabus designers to ensure discipline-specific instruction, and incorporation of the discipline-specific syntactic features into the academic curricula for supporting academic writing development skills in the students particularly at the advanced level of education.

KEYWORDS

academic disciplines, academic writing, advanced L2 academic writers, clausal features, disciplinary variations, intermediate features, phrasal features

INTRODUCTION

Syntactic complexity refers to "the range and degree of sophistication of syntactic structures" (Lu, 2014, p. 130), and equates with linguistic complexity and syntactic maturity (see Ortega, 2003). However, on a general level, syntactic complexity refers to the degree of elaboration, sophistication, and variation of the syntactic structures used in the discourse (Dong et al., 2023; Lu, 2017; Norris & Ortega, 2009; Ortega, 2015; Yin et al., 2021). It (syntactic complexity) has been the favorite subject of experts (Biber et al., 2011; Biber & Gray, 2016; Gray, 2015; Lan & Sun, 2018; Wang & Lowie, 2021) in the research on academic writing for

the last decade. Consequently, linguistic complexity studies, also called syntactic complexity studies (see Xue & Ge, 2021) yielded diverse and insightful understandings of the linguistic variation in academic writing using different variables like academic genre, academic discipline, functional and rhetorical move structures, language background, and writing proficiency (Dong et al., 2023).

For example, Biber et al. (2016) compared the use of syntactic features, that is, clausal, intermediate, and phrasal features in the less- and more-proficient writers of English as a first language (L1) and reported the frequent use of phrasal and clausal features by the more- and less-proficient writers respectively. Ansarifar et al. (2018) studied phrase structures in the academic writing produced by the Iranian master and doctoral-level writers of English as a second language (L2) by comparing the results to those of expert writers. Their findings showed significant and no variation in the use of phrase structures by the Master's and doctoral level writers, respectively, from the expert writers. A recent research (Yin et al., 2021) investigated variation in the academic writing produced by emerging and expert writers. Their analysis revealed significant variation in the use of 14 syntactic measures by emerging and expert writers.

Similarly, other variables were explored in different studies with interesting findings like academic genre (see Nasseri, 2021; Yoon & Polio, 2017), functional and rhetorical move structures (see Khamaiseh, 2023; Lu et al., 2020; Saricaoglu et al., 2021), language background (see Ahmad et al., 2023a; Lan et al., 2022; Lu & Ai, 2015), and academic discipline (see Biber & Gray, 2016; Gray, 2015; Staples et al., 2016). Among these variables, disciplinary variation in the use of syntactic features has been treated as a "notable strand of inquiry" (Dong et al., 2023), and the findings of some studies (Biber & Gray, 2016; Casal et al., 2021; Gray, 2015; Staples et al., 2016) revealed syntactic features displaying disciplinary variation in different texts of the academic discourse.

This study explores the under-representation of Pakistani L2-related dissertations in academic writing research, particularly in the context of syntactic variation in Pakistan. While there is ample research on academic writing in general, including research articles, essays, and textbooks, there is a lack of studies focusing specifically on dissertations. Similarly, while there is extensive research on academic writing in Pakistan, there is a notable gap in research on dissertations, which are crucial for studying disciplinary variation in L1 and L2 academic writing at advanced education levels (see Biber & Gray, 2016; Casal et al., 2021; Gray, 2015; Staples et al., 2016). In this context, the aim of this research is to address this gap and present compelling findings to encourage further exploration of dissertations across disciplines (Table 1).

Secondly, this research employs the methodology gap. The reason for this choice is that the past corpus-based research

(conducted in Pakistan and abroad) approached it mostly through multidimensional perspectives (see literature review section) utilizing subscription-based tools for corpus and data analyses. This research proposes that the syntactic features can be studied with the help of online available open-access tools like TagAnt, MAT Taggers, and the Ant-Conc software, and expects to introduce future researchers on academic writing towards the use of cost-effective tools for analyses. For this purpose, this research employs a list of formulaic patterns (see corpus analysis in the methodology section).

Lastly, many studies (e.g., Ansarifar et al., 2018; Lan & Sun, 2018) explored disciplinary variation in L1 and L2 academic writings. The exploration of L2 academic writing, specifically in Pakistan, has been overlooked. This pioneering research endeavors to bridge this gap and sheds light on this crucial area.

LITERATURE REVIEW

Previous Research on Disciplinary Variation

Syntactic complexity in academic writing, which is caused by phrasal structures, varies "based on the discipline to which it belongs" (Elliott, 2019, p. 10). This variation has been the subject of a good number of previous studies. For example, Gray (2015) investigated more than 70 linguistic features in the academic writing corpus developed from 270 articles from six disciplines: applied linguistics, biology, history, philosophy, physics, and political science. Results obtained through the comprehensive analyses based on grammatical/lexical survey, structural complexity exploration, and the Multidimensional Analysis (MDA) showed variations in the use of linguistic features, including phrasal structures across disciplines. This study contributed to the methodological considerations for future corpus-based research on academic writing across disciplines by going beyond traditional methods of analysis and considering varied realizations of academic discourse both across and within disciplines. Biber and Gray (2016) investigated core grammatical and structural features in academic writing from a wide array of disciplines related to humanities, popular science, social science, and specialist science. Results obtained through the quantitative analyses revealed an increase in the diversification and specialization within the disciplines.

Staples et al. (2016) investigated syntactic complexity features in the academic texts produced by the university-level writers of English as an L1. They conducted analyses across academic levels, genres, and disciplines. Results relevant to this present study revealed the frequent use of phrasal features across disciplines (arts and humanities, life sciences, and physical sciences) with the exception of noun+ of phrases that were frequent in the social sciences. Furthermore, 'premodifying nouns' were found in frequent use in

life sciences and physical sciences, whereas nouns, nominalizations, and attributive adjectives were frequently found in social sciences. Similarly, prepositional phrases and of genitives were frequent in arts and humanities. These findings aligned with, Biber and Gray's (2016), and Gray's (2015) findings, which demonstrated that academic writing heavily relies on phrasal complexity features. The extent of this reliance varied across disciplines: science disciplines relied on phrasal complexity features to the greatest extent, followed by the social sciences and then the arts and humanities. Jalilifar et al. (2017) explored nominalization structures in the academic texts from hard (physics) and soft science (applied linguistics) disciplines. Their results revealed marked variations in the use of the said structures. For example, academic texts from hard sciences contained nominals with both pre-and post-modifications, whereas the academic texts from soft sciences contained nominals with relative clauses as post-modifiers. Another study (Elliott, 2019) examined the use of noun phrase structures across 16 disciplines from four academic divisions. The findings demonstrated that advanced-level students' academic writing varied in how they used the said structures across disciplines. These findings were in line with the findings of the previous studies (Biber & Gray, 2016; Gray, 2015; Jalilifar et al., 2017; Staples et al., 2016).

Some of the most recent studies also investigated the same variables in academic writing. For example, Casal et al. (2021) investigated eight syntactic complexity measures in academic writing from three disciplines (i.e., applied linguistics, economics, and psychology) of social sciences. The findings revealed that academic writing from applied linguistics had the most complex structures, while academic writing from economics had the least complex structures. In detail, noun phrase per clause was frequent in applied linguistics, non-finite subordination and phrasal coordination were common in psychology, and finite clausal subordination was frequent in economics. The disciplinary variations are clearly evident in these results. Lu et al. (2021) investigated disciplinary variations in the relationship between the syntactic complexity structures and rhetorical move steps of the introduction sections in research articles. The corpus for this research comprised the texts of 400 research articles from core disciplines of two disciplinary divisions, that is, engineering (chemical engineering and electrical engineering) and social sciences (anthropology and sociology). The results revealed significant variations in terms of the syntactic complexity measures across disciplines. Another recent study (Ziaeian & Golparvar, 2022) used fine-grained clausal and phrasal indices to investigate syntactic complexity in the discussion sections of research articles from three academic disciplines (i.e., applied linguistics, chemistry, and economics). The results showed significant variations in the use of the said structures across disciplines. For example, clausal indices were frequently observed in applied linguistics and economics, whereas phrasal features were frequently observed in chemistry. Saricaoglu and Atak (2022) explored variation

in terms of lexical and syntactic complexity markers in the academic writing produced by Turkish students. The results obtained through manual and automated analyses revealed ample variations in the use of complement clauses, passives, and the words placed before the main verbs. These findings helped them explain the relationship between L2 writing proficiency levels and linguistic features. A recent study (Tian & Zhang, 2023) investigated nominalizations in the academic writing produced by writers from linguistics, shipbuilding, and oceanography engineering disciplines. The results of this study also showed significant variations in the use of the nominalizations across disciplines. Another most recent study (Dong et al., 2023) investigated the disciplinary variations of the syntactic complexity structures in academic writing across 31 disciplines from four disciplinary divisions. The corpus for this research was obtained from a British Academic Written English (BAWE) source and analysed through an automatic process. The results revealed significant variations in coordination, length, sophistication, subordination, and sentence complexity across disciplines and disciplinary divisions. This study differed from the above-reviewed studies in the sense that it not only covered a broad array of academic disciplines but also discussed the results from a form-functional perspective. The studies (reviewed in this section) sufficiently confirm the existence of variation in the use of lexical and syntactic structures in the academic discourse across genres, educational levels, language backgrounds (L1 and L2), and disciplines.

Previous Research on Pakistani Academic Writing

A number of previous researchers investigated Pakistani academic writing and reported interesting findings. For example, Aziz et al. (2016) investigated linguistic variation in Pakistani academic writing across two disciplines (i.e., biological and health sciences and physical sciences). They prepared the corpus from doctoral dissertations and analyzed it through MDA. Their findings reported significant variations at the dimensions 1-3 and similarities at the dimensions 4-5. Similarly, Azher et al. (2019) investigated register variation in Pakistani academic writing across humanities, sciences, and social sciences disciplines employing MDA. The results revealed significant variations in Pakistani academic writing in terms of different dimensions that underlined discipline-and register-specific pedagogies with reference to Pakistani English. Another MDA-based study (Rashid & Mahmood, 2019) investigated linguistic variation in Pakistani academic writing, preparing a corpus from research articles across humanities, sciences, and social sciences disciplines. The analysis revealed interesting findings related to the variations across disciplines. For example, the academic writing from social sciences was observed to be more informational, impersonal, non-narrative, and non-personal compared to the academic writing from sciences and humanities disciplines.

In addition to exploring linguistic and register variation, structural variation has also been examined in Pakistani academic writing. For instance, Qasim et al. (2017) investigated structural variations specifically within this context. For this purpose, they developed the corpus from the texts of conclusion sections of Master's theses from humanities and social sciences, and science and technology disciplines. Their results highlighted variations in the structures of the conclusion sections written by Pakistani Master's level thesis writers. This study was presented as useful material for the students' familiarization with the structural features of the conclusion sections of Master's theses. Abid et al. (2022) conducted a cross-cultural MDA of the academic writing produced by Chinese and Pakistani academic writers and reported interesting results on cross-cultural variations in academic writing. This study is unique in that it reports the uniqueness of Pakistani academic writing compared to that of Chinese academic writing. Recently, Fatima et al. (2023, p. 50) investigated linguistic variations in the dissertation abstracts written by Pakistani doctoral-level academic writers across 16 disciplines employing MDA. The results showed distinct variations across disciplines and supported the idea of Pakistani English being "a separate linguistic entity with unique characteristics." Another recent study (Pervez et al.,2024) investigated linguistic variation in the discussion sections of Pakistani English research articles and reported interesting results related to the linguistic variations according to the different dimensions proposed in Biber (1988). Thus, the results of the MDA-based studies (Abid et al., 2022; Azher et al., 2019; Aziz et al., 2016; Fatima et al., 2023; Pervez et al., 2024; Qasim et al., 2017; Rashid & Mahmood, 2019) conducted in Pakistani context show that Pakistani academic writing depicts variations.

However, recent non-MDA-based studies reported different results. For example, Ahmad et al. (2022) conducted a corpus-based study to explore disciplinary variations in phrasal features in Pakistani academic writing produced by doctoral students from arts and humanities, and life sciences disciplines. Results revealed the frequent use of nouns in Pakistani academic writing across the said disciplines. These results concluded that Pakistani academic writing does not reflect disciplinary variation, which is the salient feature of academic writing. Another recent study (Ahmad et al., 2023b) investigated the salient features characterizing Pakistani academic writing across hard and soft sciences disciplines. The results revealed that Pakistani academic writing from social sciences relies on phrasal features more than academic writing from hard sciences. This study explored a wide array of linguistic features in Pakistani academic writing. However, its scope was limited to the four sub-disciplines, that is biology, physics (hard sciences), and history and linguistics (soft sciences). Considering this limitation, Ahmad et al. (2023c) conducted another corpus-based study on variation in Pakistani academic writing across four disciplinary divisions:

arts and humanities, life sciences, physical sciences, and social sciences. The results revealed homogenous as well as heterogeneous use of the syntactic features. The heterogeneity was observed in relation to the frequency of different types of syntactic features, whereas the homogeneity was reported in relation to the highest and lowest used features; that is, the highest and the lowest used features were the same across the four disciplinary divisions. These results concluded that Pakistani academic writing does not reflect disciplinary variation. This practice was reported being contrary to the expert convention. Therefore, Pakistani academic writers were suggested to appropriately use the syntactic features in accordance with the expert convention in the relevant discipline.

Thus, the results of studies (Ahmad et al., 2022, 2023b, 2023c) differ from those of MDA-based studies (Azher et al., 2019; Aziz et al., 2016; Fatima et al., 2023; Pervez et al., 2024; Qasim et al., 2017; Rashid & Mahmood, 2019). This suggests the need for further confirmation of these differences in Pakistani academic writing by exploring variations across a wide array of academic disciplines (Table 1).

METHOD

Research Design

This is a corpus-based descriptive study which presents an investigation of the syntactic features to report variation in the L2 academic writing. The details of materials and methods employed in this study are described below.

Research Corpus

The corpus for this study was developed from dissertation texts written by Pakistani doctoral candidates across different academic disciplines. The list of disciplines employed in this study was chosen from Nesi and Gardner (2012). The choice for the list of disciplines proposed by Nesi and Gardner (2012) was made because it provided a wide range of academic disciplines representing four broad disciplinary divisions (see Table 1 for the details regarding disciplines, disciplinary divisions, and corpus distribution) compared to the other divisions (e.g., Becher' 1981; Biglan, 1973).

The corpus development process involved procedural steps. First of all, the dissertations were retrieved in portable document format (PDF) from the Pakistan Research Repository (PRR). PRR is an online database hosted by the Higher Education Commission of Pakistan. PRR contains dissertations written by the Master's and doctoral candidates at Pakistani universities and provides free online access to the researchers beyond borders. Secondly, the PDFs were converted into MS Word format using the freely online available software

iLovePDF[1]. Thirdly, the converted files were cleansed. In this process, the preliminary pages, headings, tables, figures, references, headers, footers, equations, and formulas were removed. Finally, the remaining texts were saved in Notepad files. Data compiled in the Notepad files formed the corpus that was ready to be processed by the corpus software for analysis purposes.

The dissertation was considered in this study for several reasons: it is an important genre of academic writing (see Hyland, 2004) at the graduation level due to demonstrating students' ability and expertise to contribute to their disciplines, and it has its own conventions, purposes and structures that distinguish it from other types of academic writing. In addition, the dissertation is vital for sharing discipline-specific knowledge of the writers (Housseine & Oifaa, 2020; Parry, 1998) particularly for characterizing the knowledge of the disciplinary community that is constructed using diverse linguistic features which are important to study in order to find how these features contribute to the disciplinary context in Pakistani academic writing (Azher et al., 2019).

Secondly, Pakistani academic writing was considered in this study for the reasons that: the study of different genres of Pakistani academic writing is essential to portray the comprehensive picture of the Pakistani academic writing (Rashid & Mahmood, 2019); Pakistani academic writing is an important form of Pakistani English (Fatima et al., 2023; Kachru et al., 2006; Mahboob, 2008; Mahmood, 2009; Pervez et al., 2024; Rahman, 1990; Talaat, 1993) which is a legitimate variety of World Englishes, and according to Azher et al. (2019), Pakistani academic writing is a form which invites the interest of the linguists as well as researchers for the further strengthening of the Pakistani English.

Syntactic Features

A list of syntactic features (Tables 2-5) was adapted from Staples et al. (2016). The reason for this choice was based on

Table 1

Corpus Distribution across Disciplinary Divisions and Respective Disciplines

Disciplinary Division	Discipline	Number of Texts	Number of Words
Arts and Humanities	Philosophy	10	48576
	English Literature	10	572299
	History	10	27753
	Linguistics	10	489827
Total		*40*	*1138455*
Social Sciences	Politics	10	344893
	Sociology	10	316658
	Law	10	498929
	Economics	10	87492
Total		*40*	*1247972*
Physical Sciences	Mathematics	10	48010
	Physics	10	109361
	Engineering	10	143281
	Computer Science	10	157668
Total		*40*	*458320*
Life Sciences	Psychology	10	103623
	Food Sciences	10	172120
	Biology	10	179080
	Agriculture	10	313620
Total		*40*	*768443*
Grand Total		*160*	*3613190*

Note. Ahmad (2022)

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[1]   iLovePDF. https://www.ilovepdf.com/word_to_pdf

the notion that the said features are the latest development in academic writing research and have been empirically tested for the study of syntactic complexity, disciplinary as well as generic variation, level of academic writing development, and so on. This study considered the said features to report disciplinary variation in the academic writing produced by advanced academic writers across disciplines (Table 1).

Corpus Analysis

Corpus analysis was also completed in a number of procedural steps. First of all, the corpus was tagged through MAT (Multidimensional Analysis Tagger) and TagAnt Taggers. Both of these taggers are available online for free access and are used for the tagging of a large number of corpora, whereas MAT facilitates analyses to discover variations in the corpora. In the second step, the tagged corpus was processed in the AntConc, another freely available software, for analysis. In this regard, different formulas (as used in Ahmad, 2022, p. 87-90) were applied. For example, attributive adjectives were searched through four formulas based on four descriptors: bracketed with the relevant formula, i.e., *_DT *_JJ *_NN (Determiner + Adjective + Noun); *_DT *_JJ *_JJ*_NN (Determiner + Adjective + Adjective + Noun); *_DT *_JJ *_NOMZ (Determiner +Adjective + Nominalization); and *_DT *_JJ *_NN *_NN (Determiner + Adjective + Noun+ Noun). This process provided the frequencies/examples of the said features. In the third step, the frequencies were separately extracted in MS Excel sheets for presentation as results (Tables 2-5) of the study.

RESULTS AND DISCUSSION

Syntactic Variation across Disciplines in Arts and Humanities

This study examined syntactic features in various disciplines (i.e., English literature, linguistics, history, and philosophy) of arts and humanities,focusing particularly onvariationinthe use of clausal, intermediate, and phrasal features. The results revealed notable differences in usingthe said features across the selected disciplines (Table 2). In English literature and linguistics, the frequency of clausal features was 2,340 and 2,091, respectively. Intermediate features were used 12,155 times in English literature and 11,854 times in linguistics, while phrasal features were observed 251,075 and 249,650 times, respectively. Conversely, history and philosophy showed considerably lower frequencies: history used 100 clausal features, 391 intermediate features, and 15,098 phrasal features; philosophy used 147 clausal features, 851 intermediate features, and 22,846 phrasal features.

These findings indicate the syntactic complexity of English literature and linguistics, reflecting their rhetorical and an-

alytical requirements. The high frequency of clausal and phrasal features in these disciplines suggests a preference for complex as well as elaborated sentence structures, which is consistent with the requirements for nuanced argumentation and comprehensive analysis (Biber & Gray, 2016; Casal et al., 2021; Dong et al., 2023; Elliott, 2019; Gray, 2015; Jalilifar et al., 2017; Lu et al., 2021; Saricaoglu & Atak, 2022; Staples et al., 2016; Tian & Zhang, 2023; Ziaeian & Golparvar, 2022).

In contrast, the lower usage of these features in history and philosophy indicates a different approach to academic writing, potentially due to the narrative and abstract nature of these fields, which may not necessitate complex syntactic constructions. This observation aligns with previous research indicating discipline-specific variations in syntactic complexity (Elliott, 2019; Staples et al., 2016).

However, these results (Table 2) reveal a divergence from certain expert norms, particularly in the lower use of clausal features in history and philosophy compared to what is observed in the practices of experts in arts and humanities. This discrepancy may be attributed to the differences in educational practices, the influence of the writers' first language, or varying familiarity with international academic standards. Such variations challenge the results of recent studies (Ahmad et al., 2022, 2023b, 2023c), which reported less disciplinary variation in Pakistani academic writing. Thus, the results of this studyi ndicate that significant variation does exist in Pakistani academic writing, though it may not fully align with the expert trends.

Syntactic Variation across Disciplines in Social Sciences

This study examines syntactic variation in Pakistani advanced L2 academic writing within the social sciences, focusing on law, politics, sociology, and economics. The results reveal significant differences in the use of clausal, phrasal, and intermediate features across these disciplines, reflecting their unique rhetorical and communicative demands.

The results (Table 3) indicate notable variations in the frequency of syntactic features. Specifically, the frequency of clausal features was highest in law, with 1,852 instances, followed by politics, with 1,226; sociology, with 822; and economics, with 164. Phrasal features were also unevenly distributed, with law leading at 224,319 instances, followed by politics at 177,164, sociology at 159,891, and economics at 48,005. Intermediate features showed a similar pattern, with the law again at the lead with 10,987 instances, followed by politics with 8,508, sociology with 4,726, and economics with 1,750. Overall, Pakistani social sciences writers used 4,064 clausal, 609,379 phrasal, and 25,971 intermediate features. This distribution indicates a predominant reliance on phrasal features across all disciplines, with clausal features being

Table 2

Use of Syntactic Features across Disciplines in Arts and Humanities

FEATURES	FREQUENCIES IN DIFFERENT DISCIPLINES				TOTAL
Clausal Features	**Philosophy**	**English Literature**	**History**	**Linguistics**	
Finite adverbial clauses	22	588	6	402	1018
WH complement clauses	0	49	0	45	94
Verb + that-clauses	4	60	0	66	130
Clausal coordinating conjunctions	121	1643	94	1578	3436
Total	*147*	*2340*	*100*	*2091*	*4678*
Intermediate Features					
Adverbs	73	1042	54	1035	2204
Linking adverbials	251	3025	129	3287	6692
Extraposed Adjective + that clauses	1	32	0	26	59
Noun + that-clauses	30	607	10	526	1173
WH relative clauses	18	283	5	199	505
That relative clauses	119	2282	48	1966	4415
Verb + to-clauses	80	1223	10	1337	2650
Desire verb + to-clauses	0	0	0	0	0
Raising structures and extraposed adjective + to- clauses	0	4	1	3	8
Noun + to-clauses	190	2589	87	2419	5285
Verb + ing-clauses	9	210	3	146	368
Passive voice verbs	0	19	1	12	32
Passive nonfinite relative clauses	80	839	43	898	1860
Total	*851*	*12155*	*391*	*11854*	*25251*
Phrasal Features					
Nouns	13469	158977	9045	156660	338151
Attributive adjectives	2737	28769	1696	28058	61260
Premodifying nouns	2078	22726	1732	21860	48396
Nominalizations	2961	21434	1230	24158	49783
of genitives	895	9825	688	9811	21219
Prepositional phrases	706	9344	707	9103	19860
Total	*22846*	*251075*	*15098*	*249650*	*538669*

Note: Ahmad (2022)

the least frequently used. The varying frequencies across disciplines highlight clear disciplinary variation in syntactic preferences.

The syntactic variation (observed in this study) corresponds with the expert research on academic writing, indicating that different disciplines have distinct syntactic conventions. For instance, the high frequency of clausal and phrasal features in law corresponds with the disciplinary requirement for complex argumentative structures. This finding is consistent with Biber and Gray (2016), Casal et al. (2021), Dong et al. (2023), Elliott (2019), Gray (2015), Jalilifar et al. (2017), Lu et al. (2021), Saricaoglu and Atak (2022), Staples et al. (2016), Szczygłowska (2022, 2023), Tian and Zhang (2023), Ziaeian and Golparvar (2022), who documented that disciplines with intricate argumentative demands, like law, employ more so-

phisticated syntactic constructions. Conversely, the lower use of these features in economics aligns with Elliott (2019) and Staples et al. (2016), who observed that disciplines focused on quantitative analysis, such as economics, prefer simpler and more straightforward syntactic structures to maintain clarity and precision.

As observed in this study, the frequent use of linking adverbials and to-clauses in law supports the notion that such features are critical for articulating complex legal arguments. This finding reflects the emphasis on clarity and logical coherence in legal writing, highlighted by Gray (2015) and Jalilifar et al. (2017). On the other hand, the less frequent use of these features in sociology may be attributed to its focus on thematic exploration and narrative style, where complex syntactic structures are less focused.

These results (Table 3) contrast with some recent non-MDA-based research (Ahmad et al., 2022, 2023b, 2023c) in Pakistan, suggesting moderate disciplinary variation in advanced L2 academic writing. The results of this present study reveal that significant variation does exist, potentially due to thein-depth analysis and the inclusion of a wider range of disciplines.

The results (Table 3) highlight the importance of recognizing and teaching discipline-specific syntactic conventions in Pakistani academic writing. Improved instruction that addresses the unique syntactic needs of each field could improve writing effectiveness and alignment with the expert standards. For example, law students might benefit from training in complex clausal structures and phrasal features, while economics students could focus on achieving clarity through simpler syntax.

Syntactic Variation across Disciplines in Physical Sciences

The analysis of syntactic features in the advanced L2 academic writing of Pakistani students within the physical sciences reveals notable variations across different disciplines. The frequency (Table 4) of clausal features varied: engineering exhibited the highest frequency (407 instances), followed by computer science (311), physics (289), and mathematics (191). In contrast, phrasal features were predominant, with computer science leading at 73,184 instances, followed closely by physics (70,365), engineering (65,588), and mathematics (57,899). The distribution of intermediate features varied as well, with computer science showing the highest frequency (2,828 instances), followed by physics (2,494), engineering (2,253), and mathematics (1,757).

Overall, Pakistani academic writers in the physical sciences used 1,198, 267,036, and 9,332 clausal, phrasal, and intermediate features (Table 4). This distribution indicates a clear preference for phrasal features, with clausal features being the least frequently used across all disciplines. The variation in the frequency of different syntactic features indicates the presence of disciplinary variation, reflecting the specific rhetorical and communicative needs of each discipline.

The syntactic variation observed in the physical sciences (Table 4) aligns with the expert research practices, confirming that disciplinary demands shape academic writing. The higher frequency of phrasal features across all disciplines supports findings from Biber and Gray (2016), Dong et al. (2023), Elliott (2019), Gray (2015), Jalilifar et al. (2017), Saricaoglu and Atak (2022), Staples et al. (2016), Tian and Zhang (2023), Ziaeian and Golparvar (2022), who observed that academic writing relies on dense noun phrases to convey complex information efficiently. The predominance of phrasal features in disciplines like computer science and physics reflects the practical nature of these disciplines, where precise and concise communication is essential.

The lower use of clausal features in mathematics, as observed in this study (Table 4), is consistent with Staples et al. (2016) and Dong et al. (2023), who noted that mathematical writing prioritizes brevity and clarity, avoiding complex clausal structures that might obscure the logical flow of arguments. Similarly, the varied use of intermediate features, such as linking adverbials and finite adverbial clauses, across disciplines illustrates the differing needs for explicit logical connections in disciplines like engineering and computer science. These structures help clarify the relationships between technical processes and outcomes.

These results (Table 4) are also consistent with Casal et al. (2021) and Lu et al. (2021), who emphasized that syntactic choices in academic writing are closely tied to the epistemological and communicative practices of each discipline. The variation in the use of clausal and phrasal features across physical science disciplines confirms that advanced L2 academic writing is discipline-specific and varies within broader disciplinary categories.

The results (Table 4) have significant implications for academic writing pedagogy in the physical sciences. The observed syntactic variation suggests that discipline-specific instruction could enhance writing effectiveness. For example, computer science students might benefit from focusing on mastering phrasal structures that support technical descriptions, while mathematics students could be guided toward using concise and clear syntactic forms that align with mathematical writing conventions.

Syntactic Variation across Disciplines in Life Sciences

Table 3

Use of Syntactic Features across Disciplines in Social Sciences

FEATURES	FREQUENCIES IN DIFFERENT DISCIPLINES				TOTAL
Clausal Features	**Politics**	**Sociology**	**Law**	**Economics**	
Finite adverbial clauses	120	90	248	13	471
WH complement clauses	21	9	26	8	64
Verb + that-clauses	54	51	94	15	214
Clausal coordinating conjunctions	1031	672	1484	128	3315
Total	*1226*	*822*	*1852*	*164*	*4064*
Intermediate Features					
Adverbs	715	531	867	110	2223
Linking adverbials	1903	1392	3060	709	7064
Extraposed Adjective + that clauses	6	8	36	2	52
Noun + that-clauses	208	103	386	25	722
WH relative clauses	87	75	206	15	383
That relative clauses	923	562	1461	171	3117
Verb + to-clauses	452	233	757	102	1544
Desire verb + to-clauses	0	0	0	0	0
Raising structures and extraposed adjective + to-clauses	1	0	1	0	2
Noun + to-clauses	2756	1067	2756	347	6926
Verb + ing-clauses	95	88	95	66	344
Passive voice verbs	41	18	41	3	103
Passive nonfinite relative clauses	1321	649	1321	200	3491
Total	*8508*	*4726*	*10987*	*1750*	*25971*
Phrasal Features					
Nouns	109199	98777	135561	28532	372069
Attributive adjectives	17303	16769	21112	5292	60476
Premodifying nouns	18705	16052	20098	5416	60271
Nominalizations	16884	15761	28966	4842	66453
of genitives	8882	6808	9437	2259	27386
Prepositional phrases	6191	5724	9145	1664	22724
Total	*177164*	*159891*	*224319*	*48005*	*609379*

Note: Ahmad (2022)

This study examined syntactic variation in the academic writing of Pakistani PhD students in life science disciplines, including agriculture, biology, food sciences, and psychology. The results reveal notable differences in using clausal, phrasal, and intermediate features.

The frequency (Table 5) of clausal features varied among disciplines: agriculture (191 instances), biology (293), food sciences (168), and psychology (226). Phrasal features were predominant across all life sciences disciplines, with biology leading (81,215 instances), followed by food sciences (61,581), agriculture (57,899), and psychology (55,042). Intermediate features were observed in the following frequencies: biology (1,951), psychology (1,891), agriculture (1,757), and food sciences (1,479).

Table 4

Use of Syntactic Features across Disciplines in Physical Sciences

FEATURES	FREQUENCIES IN DIFFERENT DISCIPLINES				TOTAL
Clausal Features	**Mathematics**	**Computer Science**	**Physics**	**Engineering**	
Finite adverbial clauses	18	34	34	46	132
WH complement clauses	8	16	10	9	43
Verb + that-clauses	20	9	29	2	60
Clausal coordinating conjunctions	145	252	216	350	963
Total	*191*	*311*	*289*	*407*	*1198*
Intermediate Features					
Adverbs	120	176	177	277	750
Linking adverbials	589	871	1027	641	3128
Extraposed Adjective + that clauses	6	3	9	3	21
Noun + that-clauses	27	82	60	62	231
WH relative clauses	26	32	49	56	163
That relative clauses	219	393	234	175	1021
Verb + to-clauses	59	254	146	143	602
Desire verb + to-clauses	0	0	0	0	0
Raising structures and extraposed adjective + to-clauses	0	0	0	0	0
Noun + to-clauses	394	549	359	460	1762
Verb + ing-clauses	77	151	60	123	411
Passive voice verbs	4	2	2	7	15
Passive nonfinite relative clauses	236	315	371	306	1228
Total	*1757*	*2828*	*2494*	*2253*	*9332*
Phrasal Features					
Nouns	35315	44825	42277	39672	162089
Attributive adjectives	5791	7593	8696	7153	29233
Premodifying nouns	6717	7521	7763	7816	29817
Nominalizations	5681	8179	6587	6969	27416
of genitives	2629	2692	2576	1871	9768
Prepositional phrases	1766	2374	2466	2107	8713
Total	*57899*	*73184*	*70365*	*65588*	*267036*

Note: Ahmad (2022)

In total, the use of clausal, phrasal, and intermediate features across life sciences disciplines was 878, 255,737, and 7,078, respectively (Table 5). Consistent with the findings in the physical sciences, phrasal features were predominant, while clausal features were the least frequently used. This variation across disciplines indicates the presence of disciplinary differences in syntactic preferences.

The observed syntactic variation in life sciences aligns with the established research practices, reinforcing the idea that academic writing characterizes the specific needs of each discipline. The dominance of phrasal features in life sciences supports the findings of Biber and Gray (2016) and Gray (2015), who emphasized that academic writing relies on dense noun phrases to convey detailed information efficiently. The preference for phrasal structures in disciplines

such as biology and food sciences can be attributed to the need for precise and comprehensive communication.

The lower frequency of clausal features in disciplines like agriculture and food sciences is consistent with Dong et al. (2023) and Staples et al. (2016), who found that certain scientific disciplines prioritize clarity and conciseness, avoiding complex clausal structures that could obscure the presentation of information. The variation in intermediate features, such as linking adverbials, reflects the different needs for explicit logical connections in academic writing.

These findings are also consistent with Casal et al. (2021) and Lu et al. (2021), who highlighted that syntactic choices are closely linked to the epistemological and communicative practices of each discipline. The variation in clausal and phrasal features across life sciences confirms that advanced academic writing is not only discipline-specific but also varies within broader disciplinary categories.

These findings suggest that academic writing instruction in the physical and life sciences would benefit from a focus on discipline-specific syntactic conventions. A change in instruction could improve writing effectiveness by addressing the unique syntactic needs of each field. For example, students in biology might benefit from focused instruction on mastering phrasal structures to support detailed technical descriptions, while those in agriculture could be guided toward using concise syntactic forms that align with the conventions of their field.

The results presented in Tables 2, 3, 4, and 5 reveal variations in the use of clausal, phrasal, and intermediate features by the Pakistani advanced L2 academic writers from arts and humanities, social sciences, life sciences, and physical sciences. These results seem to conform to the notion that variation is the characteristic feature of academic writing at the advanced level of education. However, this variation is at the level of frequency only. When we see the overall use of the said features it becomes evident (see Tables 2-5)

Table 5
Use of Syntactic Features across Disciplines in Life Sciences

FEATURES	FREQUENCIES IN DIFFERENT DISCIPLINES				TOTAL
Clausal Features	**Psychology**	**Food Sciences**	**Biology**	**Agriculture**	
Finite adverbial clauses	57	17	24	18	116
WH complement clauses	10	2	7	8	27
Verb + that-clauses	32	13	14	20	79
Clausal coordinating conjunctions	127	136	248	145	656
Total	*226*	*168*	*293*	*191*	*878*
Intermediate Features					
Adverbs	135	94	162	120	511
Linking adverbials	650	523	634	589	2396
Extraposed Adjective + that clauses	0	3	2	6	11
Noun + that-clauses	49	25	41	27	142
WH relative clauses	22	9	28	26	85
That relative clauses	304	145	258	219	926
Verb + to-clauses	200	47	93	59	399
Desire verb + to-clauses	0	0	0	0	0
Raising structures and extraposed adjective+ to-clauses	0	0	0	0	0
Noun + to-clauses	329	246	302	394	1271
Verb + ing-clauses	29	68	66	77	240
Passive voice verbs	2	5	1	4	12
Passive nonfinite relative clauses	171	314	364	236	1085
Total	*1891*	*1479*	*1951*	*1757*	*7078*

FEATURES	FREQUENCIES IN DIFFERENT DISCIPLINES				TOTAL
Clausal Features	Psychology	Food Sciences	Biology	Agriculture	
Phrasal Features					
Nouns	36388	38485	50941	35315	161129
Attributive adjectives	5927	6196	8560	5791	26474
Premodifying nouns	4201	7838	10365	6717	29121
Nominalizations	5036	4837	5931	5681	21485
of genitives	2114	2712	3277	2629	10732
Prepositional phrases	1376	1513	2141	1766	6796
Total	*55042*	*61581*	*81215*	*57899*	*255737*

Note: Ahmad (2022)

that phrasal features are in the highest use across the four academic disciplinary divisions. This shows that Pakistani academic writing is not influenced by disciplinary variation. Thus, these results corroborate with the results presented in Ahmad et al. (2022). Furthermore, these results corroborate with the results discussed in Ahmad et al. (2023c) on the account that these results show the heterogynous and homogenous use of the syntactic features. The heterogeneity is marked by the difference in the use of the syntactic features, whereas the homogeneity is evidenced by the similarity in using the highest and lowest used features.

Syntactic variation is a characteristic feature that is reflected in the academic writing produced by the advanced level academic writers across disciplines (Ahmad et al., 2022, 2023b, 2023c; Biber & Gray, 2016; Casal et al., 2021; Dong et al., 2023; Gray, 2015; Jalilifar et al., 2017; Lu et al., 2021; Saricaoglu & Atak, 2022; Staples et al., 2016; Szczygłowska, 2022, 2023; Tian & Zhang, 2023). In fact, "Writing is discipline-specific, and writing talent is a function of the relationship between the individual and the domain. "The term "domain" refers to the discipline or field of writing. Every domain involves a group of individuals sharing "the same domain knowledge" and ideas that "emanate from these individuals" (Olthouse, 2013, p. 260). These ideas are shared in academic writing using different linguistic and syntactic devices and the use of these devices varies from discipline to discipline. That is why syntactic variation is essential in academic writing produced by writers specializing in different disciplines. Therefore, this study suggests that Pakistani advanced-level academic writers follow this practice to produce expert-like academic writing. This can be achieved by mastering the use of linguistic devices (Ahmad et al., 2019).

CONCLUSION

This study investigated variation in the use of syntactic features, that is, clausal, intermediate, and phrasal features in the academic writing produced by the Pakistani advanced L2 academic writers across four disciplinary divisions. The results revealed mixed findings. On one hand, the results showed variation in the use of the said features. This variation was marked by the difference infrequencies of the different types of phrasal, clausal, and intermediate features. On the other hand, the results demonstrated a similarity in the use of the said features, with the highest and lowest frequently used features being the most similar across disciplines. For example, phrasal features were identified as the most prevalent across all disciplines, while clausal features were identified as the least frequent. These results indicated the absence of variation that is the salient feature of advanced academic writing.

These results highlight the need for educators to integrate discipline-specific instruction into their teaching practices of the syntactic features. Such as, educators should change their pedagogical approaches to address the syntactic demands of different disciplines. By focusing on the specific syntactic features prevalent in each field, educators can better support students in developing advanced academic writing skills that align with disciplinary expectations.

For policymakers and syllabus designers, these results highlight the importance of incorporating discipline-specific syntactic features into academic curricula. This approach is supported by the notion, which emphasize that curricula should reflect the syntactic demands of various academic disciplines to better prepare students for their respective disciplines.

This study paves the way for further research into syntactic practices across disciplines. Future studies could explore additional aspects (e.g., genre, register, and level of education) of syntactic variation and its implications for academic writing. Thus, further research could provide deeper insights into how syntactic practices influence academic communication across different disciplines, contributing to more effective and impactful scholarly writing.

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None declared

AUTHOR CONTRIBUTION

Muhammad Ahmad: conceptualization; writing– original draft; formal analysis; writing– review and editing; visualization.

Muhammad Asim Mahmood: supervision; review and editing.

Ali Raza Siddique: methodology; writing– review and editing; visualization.

Muhammad Imran: resources-provision of study materials; review and editing.

Norah Almusharraf: writing– review and editing.

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