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Grammatical Complexity in Research Articles: Iranian Local Journals and International Journals

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Abstract

Grammatical complexity acts as an indicator of writing quality by contributing to the production and comprehension of writing. This study aimed to investigate the grammatical complexity in research articles published in Iranian local journals and international journals based on Biber, Gray, Staples, and Egbert's (2020) linguistic description. The corpus of the study included 40 Applied Linguistics research articles, 20 published in Iranian local journals and 20 in international journals in 2019-2020. The research articles were selected through purposive sampling from two Iranian journals, namely the Journals of Research in Applied Linguistics and Teaching Language Skills, and two international journals, including the Journal of English for Specific Purposes and System Journal. The research articles were analyzed in terms of three dimensions of grammatical complexity, including the structural types, syntactic functions, and specific structural/syntactic features. Moreover, for intra-rater consistency, the researcher re-analyzed the corpus after one month to see whether the same results were found. According to the results, in terms of the first dimension (i.e., the structural types), the frequencies of structures indicating higher grammatical complexity (non-finite dependent clauses and dependent phrases) outnumbered the frequency of structures showing lower grammatical complexity (finite dependent clauses) in both local and international journals. Concerning the second dimension (i.e., syntactic function within the structural type), the frequencies of more complex syntactic functions were higher than those of simple functions in both sets of research articles. Concerning the third dimension (i.e., specific structural/syntactic features), both groups of writers preferred to use more complex specific structural/syntactic features than the simple ones. The results of the comparison of the two sets of research articles confirmed that research articles published in international journals were more grammatically complex in terms of the three studied dimensions. Hence, academic writing instructors need to consider and include the findings of this study in their syllabus writing.

Keywords: Applied linguistics, disciplinary study, local and international journals, grammatical complexity, research articles.

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INTRODUCTION

Academic writing genres have received considerable attention from researchers in the last decades because academic writing genres such as research articles are necessary for success in the academic context. Thus, learning to write research articles is considered a challenging task since it requires ample time to think about the topic and involves analysis and classification of knowledge (Ofte, 2014; Rassouli & Abbasvandi, 2013).

In general, academic writing consists of different dimensions, including fluency, accuracy, and complexity, directly affected by different factors such as vocabulary and grammatical knowledge (Snow, 2002). Writers may find writing too complex to cope with due to their low levels of vocabulary and grammatical knowledge. As Ma and Lin (2015) argue, the significance of vocabulary and grammatical knowledge in writing has been admitted over the years. Different scholars have put forth the same argument, among whom Abbasian and Yekani (2014), Hu and Nation (2000), Jalilifar and Shirali (2014), Mohammadi and Bayat Afshar (2016), Nation (2001), Schmitt (2000), Sidek and Rahim (2015), Stahl (2003), and Steinlen (2017) can be mentioned. In fact, in arguing for the significance of these types of writers' knowledge in writing, it suffices to say that writing quality is measured based on the levels of fluency, accuracy, and complexity. Literature is replete with studies (e.g., Aperocho, 2016; Brown, 1987; Crossley, Allen, & McNamara, 2011; Douglas & Miller, 2016; Eslami, 2014; Izadpanah & Shajeri, 2016) touching this issue.

However, the common trend taken in most of the studies is reliance on omnibus measures, merging the analysis of multiple structural and syntactic distinctions into a single quantitative variable. As instances of such measures, one can refer to the average t-units length and the average number of clauses per t-unit (Biber, Gray, Staples, & Egbert, 2020).

According to the argument by Biber et al. (2020), such measures are frequently used in research on writing due to their high predictive power and value. The importance of such measures stems from merging multiple structural and syntactic features into a single measure. Thus, such measures

help to understand writing development, totally different from measures that aim to predict proficiency levels (Biber et al., 2020).

In a view of this, Biber et al. (2020) put forth the argument that uncovering the properties of student writing at different developmental stages requires a comprehensive linguistic (grammatical/syntactic) description, which works based on the linguistic system of complex characteristics such as the classification of the complexity features, their syntactic functions, and their variation patterns across registers to recognize variation as the core aspect of any linguistic system.

Having the significance of grammatical complexity in writing on board, this study aims to investigate grammatical complexity based on Biber et al.'s (2020) linguistic description in research articles published in Iranian local journals and international journals.

LITERATURE REVIEW

Grammatical complexity is frequently regarded as a linguistic subdomain or subsystem related to the concept of linguistic complexity (Szmrecsanyi & Kortmann, 2012) and has applications in the analysis of linguistic performance, proficiency, and development in the first and second language acquisition research. It is often linked to the studies that describe or analyze Complexity, Accuracy, and Fluency (CAF measures) as initially proposed by Skehan (1989) and continued in the works of Wolfe-Quintero, Inagaki and Kim (1998), Wigglesworth and Storch (2009), Norris and Ortega (2009), and Tavakoli and Rezazadeh (2014).

In the second language research, grammatical complexity measures are taken as variables to investigate the roles of task complexity, writing ability, genre, and teaching methods across different proficiency levels, age groups, and developmental periods (Wu & Ortega, 2013). They also have been used to examine the impact of the pedagogical intervention on the development of linguistic features (Ortega, 2003).

As mentioned by Larsen-Freeman (1978), grammatical complexity measures are suggested for use in L2 development bands as placement criteria and can be good indicators of the overall development in the second

language (Lu, 2010), proficiency levels (Wolfe-Quintero, Inagaki, & Kim, 1998), and specifically writing ability (Rafoth, 1983). Therefore, grammatical complexity is an ongoing concern in the field of language learning development, receiving considerable attention from researchers (e.g., Beers & Nagy, 2011; Lu, 2010; Ortega, 2003).

Long and Tabuki (2013) investigated possible differences in grammatical complexity of monologues and dialogues among EFL learners. As the results of data analysis revealed, dialogues were more complex grammatically, leading to the conclusion that monologues and dialogues were significantly different in terms of grammatical complexity.

Eslami (2014) studied the effect of grammatical simplicity and complexity on text readability through the selection and grammatical manipulation of some standard reading comprehension passages. This modification resulted in three versions of the same text, including reduced, original, and expanded. The results indicated that grammatical complexity had a significant impact on text readability for mid- and low-proficient students, but this was not the case for high-proficient students.

Gala and Ziegler (2016) investigated the effect of grammatical complexity on reading speed and reading errors among children. Accordingly, the two groups received the original and simplified versions of texts. According to the results, the simplification group outperformed the original group, confirming that grammatical complexity affected reading speed and reading errors significantly.

A study by Aperocho (2016) identified the lexical and grammatical features of male and female freshman college students, focusing on the effect of gender on lexical and grammatical features. The results of textual analysis indicated that males produced more complex argumentative essays compared to their female counterparts. More particularly, males used more words, morphemes, coordinators, and subordinators in their text, while females used fewer words in arguing about the topic.

Yazdani (2018) explored the use of grammatical complexity in English written and spoken discourse among Iranian learners. She utilized a quantitative-qualitative approach. Participants of the study included forty-

five female Iranian students selected from 3 branches of a language institute in Mashhad. To collect the data, the essays written by the participants were examined manually for the T-units according to the classification used by the experts. The participants were supposed to attend an interview on the same topic of their writings to evaluate their speaking in terms of T-units. The findings showed that the clause was the most frequent macro-level element in both writing and speaking. Moreover, there was a significant difference between the participants' speaking and writing regarding the micro-level elements.

Kuiken and Vedder (2008) considered the impacts of task complication on written execution in two distinctive capability levels. They examined the written production of 91 Dutch students of Italian and 76 students of French through the proportions of grammatical complexity, lexical variety, and accuracy. Outcomes demonstrated a significant increase in the accuracy in the complication task, whereas there were no distinctions in both grammatical complexity and lexical variety between the tasks. Besides, the outcomes demonstrated no important contrasts in the aftereffects of both capability levels as similar outcomes were obtained in both skilled groups.

Salimi, Dadaspour, and Asadollahfam (2011) investigated the written production of 29 Persian female students with a Turkish L1 through the proportions of precision, grammatical and lexical complexity, and fluency. The task they utilized was decision-making controlled by the ±few components and ±reasoning requests factors. Their results demonstrated significant differences in both complexity and fluency with the complicated task without any differences in their accuracy.

Arya, Hiebert, and Pearson (2011) investigated the effect of grammatical and lexical complexity on the comprehension of science texts among third-grade students using a Latin-square design. Students were supposed to respond to a post-test comprehension measure after reading each text. External measures of reading achievement and prior vocabulary knowledge were control variables. According to the results, while lexical

complexity had a significant effect on reading comprehension, such an effect was not evident for grammatical complexity.

To quantify the effect of grammatical complexity on the perception of discussion, Levy, Hoover, Beradino, and Sardberg (2012) contrasted people with Aphasia (PWA) with healthy people. The results of their examination indicated that the grammatically complex sentences were hard for PWA to comprehend, as they gave better and progressively exact responses to the inquiries requiring grammatically simple sentences.

A study by Shirzadi (2014) examined the effect of grammatical and lexical simplification on listening comprehension. To this aim, the original and simplified versions of a passage were prepared at a high language proficiency level. Then, a native English teacher read and recorded the passages on a CD. Next, the CD was played, while the students listened and answered some multiple-choice questions. The results demonstrated that grammatical and lexical simplification affected listening comprehension significantly.

Douglas and Miller (2016) investigated the relationship between lexical and grammatical complexity of student reading materials and their writing. To achieve this aim, the researchers identified the most frequently-read sources of the participants. Besides, text samples from sources and students' writings were analyzed using the Lexile framework. According to findings, lexical and grammatical complexity of student reading materials and students' writing were strongly correlated.

A study by Safari and Mohaghegh Montazeri (2017) explored the influence of reducing the lexical and grammatical complexity of texts on the reading comprehension of EFL learners. The sample of the study consisted of sixty intermediate EFL female learners from three intact classes at Tabarestan Language Institute in Tehran. The results of this quasi-experimental study showed that the reading comprehension of the three groups was significantly different, in favor of the lexical-grammatical simplification group. Hence, lexical-grammatical simplification showed a significant effect on EFL learners' reading comprehension.

Long (2018) concentrated on the fluency and grammatical and lexical complexity to check whether there were significant differences between male and female writers. The findings showed significant differences in the discourse of males and females concerning talking rates and the number of words. However, there were no significant differences between the two groups in terms of lexical and grammatical complexity.

Azadnia, Lotfi, and Biria (2019) compared the level of grammatical complexity in texts written by Iranian TEFL university students and those written by English native students. In so doing, the researchers benefited from an application, namely Coh-Metrix, to analyze the corpus of 10 doctoral dissertations written by Iranian students and 10 dissertations written by English native students. According to the results, dissertations written by English students were richer concerning the use of indices of syntactic complexity compared to those written by Iranian writers.

According to the literature review, earlier studies mainly focused on finding the possible relationship between grammatical complexity and language skills such as writing (e.g., Douglas & Miller, 2016; Kuiken & Vedder, 2008; Shirzadi, 2014). The contributions of these studies were limited to the predictions of the possible relationship or the effect of grammatical complexity on writings and could not practically benefit the fields of teaching and testing writing. Thus, there was a gap due to the lack of studies that helped understand the characteristics of writings by the focus on grammatical complexity. In line with Biber et al. (2020), this study intends to fully describe the grammatical complexity characters of the academic research articles published in Iranian local journals and international journals. The findings of this study could contribute to teaching writing academic research articles.

PURPOSE OF THE STUDY

The scarcity of research on grammatical complexity using linguistic description measures (i.e., Finite Dependent Clauses, Non-finite Dependent Clauses, and Dependent (non-clausal) Phrases) encouraged the researcher to investigate these measures in research articles published in the Iranian local

journals and international journals. The following questions were formulated to achieve the research objectives:

1. What are the frequencies of three dimensions of grammatical complexity, including structural types, syntactic functions, and specific structural/syntactic features, in research articles published in the Iranian local journals (RAs in ILJs)?
2. What are the frequencies of the three dimensions of the aforementioned grammatical complexity features in research articles published in international journals (RAs in IJs)?
3. Is there a significant difference between the frequencies of these three dimensions of grammatical complexity features in RAs in ILJs and RAs in IJs?

METHOD

Design

This study used a corpus-based comparative design to achieve the stated objectives. More particularly, it compared two corpora of research articles (one published in Iranian local journals and the other in international journals) concerning the grammatical complexity features proposed by Biber et al. (2020).

Corpus

The corpus of the study included 40 applied linguistics research articles, 20 published in Iranian and 20 in international journals in 2019-2020, selected through purposive sampling. The mentioned research articles were selected from two Iranian journals, including the journals of Research in Applied Linguistics (published by Shahid Chamran University of Ahvaz Press) and Teaching Language Skills (published by Shiraz university Press), and two international journals, including the Journal of English for Specific Purposes and System Journal (published by Elsevier). The rationale behind selecting

these journals was that Iranian journals were indexed by the ministry of higher education and international journals were published by one of the prestigious publishers. In the end, a sample of 245853 words was reached in the Journal of Research in Applied Linguistics (59405 words), Journal of Language Teaching Skills (52768 words), Journal of English for Specific Purposes (61046 words), and System Journal (72634 words).

Analytical Framework

The linguistic descriptions of grammatical complexity by Biber et al. (2020) were used to analyze the collected corpora of research articles. In this framework, Biber et al. (2020) classified grammatical complexity into three dimensions. The first dimension includes the structural type (i.e., finite dependent clauses, non-finite dependent clauses, and dependent phrases). The second one consists of syntactic functions within the structural type. Finally, the third dimension focuses on the specific structural/syntactic features. Table 1 presents the details of the framework and examples from the data.

Table 1: The framework of grammatical complexity based on Biber et al. (2020)

Structural Type	Syntactic Function within structural type	Specific structural/syntactic features	Examples
Finite Dependent Clause	1. Finite adverbial clause	Causative clauses: because + clause	It was particularly unsettling to the audience because they saw it as an attack on the very institution of marriage. (Written in RAs in ILJs)
		Conditional clauses: if + clause	If evil is part and parcel of this universe, then how one may blame the violence of manifest destiny. (Written in RAs in ILJs)
		Concessive clauses: although + clause	Although her debt to Krogstad made her miserable, she was the one who steered the family in the time of crisis. (Written in RAs in ILJs)
	2. Finite complement clauses	Verb controlled that-clause	It would imply that dissertations have standard and conventional formats. (Written in RAs in IJs) (With ZERO complementizer): I think the notion can be improved in some way. (Written in RAs in ILJs)
		Verb controlled	Negation in a language occurs when the absence

		wh-clause		of something is noted. (Written in RAs in ILJs)
		Adjective controlled that-clause		It is clear that the speaker is taking responsibility for obliging John. (Written in RAs in IJs)
		Noun controlled that-clause		The finding that 60% of PhD dissertations fit within the qualitative category indicates a considerable shift. (Written in RAs in IJs)
	3. Finite noun modifier clause	Relative clause with that		But the factor that made the critical departure from European culture, (Written in RAs in ILJs)
		Relative clause with wh-relativizer		The implicit question in many contexts where these terms are used is … (Written in RAs in ILJs)
Non-finite Dependent Clauses	4. Non-finite adverbial clause	to-clause indicating 'purpose'		To further understand the communicative purposes associated with N1 and N2 constructions, we also analyze the rhetorical functions. (Written in RAs in IJs)
	5. Non-finite complement clause	Verb-controlled to-clause		Qualitative approaches compete to publish their work … (written in RAs in IJs)
		Verb-controlled ing-clause		Five interviews talked about the need to avoid appearing arrogant. (Written in RAs in IJs)
		Adjective controlled to-clause		It appeared useful to reveal this potential function of the construction to learners. (Written in RAs in IJs)
		Noun-controlled to-clause		The growth has resulted in additional need to further understand contemporary doctoral research … (written in RAs in IJs)
	6. Non-finite noun modifying clause	Noun + ing-clause (non-finite relative clause)		Students majoring in English write their theses in English. (Written in RAs in IJs)
		Noun + ed-clause (non-finite passive relative clause)		We will address *Blood Meridian* with regard to ideas and notions already discussed. (Written in RAs in ILJs)
Dependent phrases (non-clausal)	7. Adverbial phrase (i.e., a phrase modifying a clause)	Adverb phrase as adverbial		The New Western History, indeed, "turns the story from a celebration of democracy and progress brought about by white males," … (written in RAs in ILJs)
		Prepositional phrase as adverbial		In this study, we are concerned with literary stylistic analysis. (Written in RAs in ILJs)
	8. Phrasal modifier (i.e., a phrase modifying another phrase)	Modifier of a noun phrase	Attributive adjectives as noun pre-modifier	it invites women to take part in the arena of social life. (Written in RAs in ILJs)
			Nouns as noun pre-modifier	civil rights movement (written in RAs in ILJs)

		Prepositional phrases as noun post-modifier	But there are other critics like Templeton (2016) who believes … (written in RAs in ILJs)
		Appositive noun phrases as noun post-modifier	The kid, McCarthy's protagonist, enters a universe … (written in RAs in ILJs)
	Modifier of an adjective phrase	Adverb phrase as adjective modifier	All of these terms have an elusive quality and in many cases are simply vague. (Written in RAs in ILJs)
		Adverb phrase as adverb modifier	Such a thing is instinctive and taken for granted to be already there. (Written in RAs in ILJs)

Data Collection Procedure

To collect the data, 40 applied linguistics research articles, 20 published in Iranian local and 20 in international journals in 2019-2020, were selected. Then, the researchers read the papers meticulously line by line to investigate them in terms of three dimensions of grammatical complexity, including structural type, syntactic function, and specific structural/syntactic features. Moreover, for intra- and inter-rater consistency, the researchers re-analyzed the corpus after one month to see whether the same results were found, indicating the intra-rater reliability of .90. Finally, the results were presented and discussed.

Data Analysis

The present study, the data were analyzed both qualitatively and quantitatively. At the qualitative level, the content of the selected papers was analyzed based on Biber et al.'s (2020) argument to identify description measures used. At the quantitative level, frequencies of the identified description measures were calculated using descriptive statistics. Furthermore, a Chi-square test was run to see whether there was a significant difference between the frequencies of linguistic description measures in RAs in ILJs and RAs in IJs.

RESULTS

The data were first analyzed descriptively to answer the first and the second research questions. Table 1 shows the descriptive statistics of three dimensions of grammatical complexity, including structural type, syntactic function, and specific structural/syntactic features in the research articles.

Table 2: Descriptive Statistics of the Description Measures in RAs in ILJs and RAs in IJs (per 1000 Words)

Structural Type	English	Persian	Syntactic Function within structural type	English	Persian	Specific structural/syntactic features	English	Persian
Finite Dependent Clause	2015 (15.1)	2546 (22.7)	1. Finite adverbial clause	293 (2.2)	430 (3.8)	Causative clauses: because + clause	146 (1.1)	170 (1.5)
						Conditional clauses: if + clause	51 (0.4)	175 (1.6)
						Concessive clauses: although + clause	96 (0.7)	85 (0.75)
			2. Finite complement clauses	758 (5.7)	1121 (10)	Verb controlled that-clause	471 (3.5)	866 (7.7)
						Verb controlled wh-clause	121 (0.9)	90 (0.8)
						Adjective controlled that-clause	38 (0.3)	30 (0.3)
						Noun controlled that-clause	128 (1)	135 (1.2)
			3. Finite noun modifier clause	964 (7.2)	995 (8.9)	Relative clause with that	380 (2.8)	525 (4.7)
						Relative clause with wh-relativizer	584 (4.4)	470 (4.2)
Non-finite Dependent Clauses	2731 (20.4)	2255 (19)	4. Non-finite adverbial clause	488 (3.7)	295 (2.6)	to-clause indicating 'purpose'	488 (3.4)	295 (2.6)
			5. Non-finite complement clause	1072 (8)	1175 (10.5)	Verb-controlled to-clause	542 (4.1)	655 (5.8)
						Verb-controlled ing-clause	102 (0.8)	75 (0.7)
						Adjective controlled to-clause	176 (1.3)	175 (1.7)

					Noun-controlled to-clause		252 (1.9)	270 (2.4)
		6. Non-finite noun modifying clause	1171 (8.8)	785 (7)	Noun + ing-clause (non-finite relative clause)		513 (3.8)	290 (2.6)
					Noun + ed-clause (non-finite passive relative clause)		658 (4.9)	495 (4.4)
Dependent phrases (non-clausal)		7. Adverbial phrase (i.e., a phrase modifying a clause)	5400 (40.4)	5330 (47.5)	Adverb phrase as adverbial		2077 (15.5)	2055 (18.3)
					Prepositional phrase as adverbial		3323 (24.9)	3275 (29.2)
	24368 (182.3)	8. Phrasal modifier (i.e., a phrase modifying another phrase)	18968 (141.9)	14889 (132.7)	Modifier of a noun phrase	Attributive adjectives as noun pre-modifier	12146 (92.9)	9830 (87.6)
						Nouns as noun pre-modifier	4430 (33.1)	2940 (26.2)
						Prepositional phrases as noun post-modifier	644 (4.8)	515 (5.6)
						Appositive noun phrases as noun post-modifier	318 (2.4)	364 (3.2)
					Modifier of an adjective phrase	Adverb phrase as adjective modifier	1109 (8.3)	970 (8.6)
						Adverb phrase as adverb modifier	321 (2.4)	270 (2.4)

As depicted in Table 1, in terms of the structural type, the researchers used 2015 finite dependent clauses, 2731 non-finite dependent clauses, and

24368 dependent phrases in international journals. The frequencies of structures indicating higher grammatical complexity (i.e., non-finite dependent clauses and dependent phrases) outnumbered the frequency of structures showing lower grammatical complexity (i.e., finite dependent clauses).

Concerning the syntactic function within the structural type, 293 finite adverbial clauses, 758 finite complement clauses, 964 finite noun modifier clauses, 488 Non-finite adverbial clauses, 1072 Non-finite complement clauses, 1171 Non-finite noun modifying clauses, 5400 Adverbial phrases, and 18968 Phrasal modifiers were used in English international research articles. The frequencies of more complex syntactic functions were higher than those of simple ones.

Regarding the third dimension, including specific structural/syntactic features, writers of research articles in international journals used 146 causative clauses, 51 conditional clauses, 96 concessive clauses, 471 verb controlled that-clauses, 121 verb-controlled wh-clauses, 38 adjective-controlled that-clauses, 128 noun-controlled that-clauses, 380 relative clauses with that, 584 relative clauses with wh-relativizer, 488 to-clauses indicating 'purpose', 542 verb-controlled to-clauses, 102 verb-controlled ing-clauses, 176 adjective controlled to-clauses, 252 noun-controlled to-clauses, 513 noun + ing-clauses, 658 noun + ed-clauses, 2077 adverb phrases as adverbial, 3323 prepositional phrases as adverbial, 12146 attributive adjectives as noun pre-modifier, 4430 nouns as noun pre-modifier, 644 prepositional phrases as noun post-modifier, 318 appositive noun phrases as noun post-modifier, 1109 adverb phrases as adjective modifiers, and 321 adverb phrases as adverb modifier. There were more complex specific structural/syntactic features than simple ones in international research articles.

Concerning RAs in ILJs, as seen in Table 1, writers used 2546 finite dependent clauses, 2255 non-finite dependent clauses, and 20219 dependent phrases regarding the first dimension. The frequencies of structures indicating higher grammatical complexity (i.e., non-finite dependent clauses

and dependent phrases) were higher than those showing lower grammatical complexity (i.e., finite dependent clauses).

As far as the second dimension, including syntactic function within the structural type, is concerned, 430 finite adverbial clauses, 1121 finite complement clauses, 995 finite noun modifier clauses, 295 non-finite adverbial clauses, 1175 non-finite complement clauses, 785 non-finite noun modifying clauses, 5330 adverbial phrases, and 14889 phrasal modifiers were used in RAs in ILJs. More complex syntactic functions were more frequent than simple functions.

On the third dimension, including specific structural/syntactic features, Persian writers used 170 causative clauses, 175 conditional clauses, 85 concessive clauses, 866 verb-controlled that-clauses, 90 verb-controlled wh-clauses, 30 adjective-controlled that-clauses, 135 noun-controlled that-clauses, 525 relative clauses with that, 470 relative clauses with wh-relativizer, 295 to-clauses indicating 'purpose', 655 verb-controlled to-clauses, 75 verb-controlled ing-clauses, 175 adjective controlled to-clauses, 270 noun-controlled to-clauses, 290 noun + ing-clauses, 495 noun + ed-clauses, 2055 adverb phrases as adverbial, 3275 prepositional phrases as adverbial, 9830 attributive adjectives as noun pre-modifier, 2940 nouns as noun pre-modifier, 515 prepositional phrases as noun post-modifier, 364 appositive noun phrases as noun post-modifier, 970 adverb phrases as adjective modifiers, and 270 adverb phrases as adverb modifiers. Hence, more complex specific structural/syntactic features were used than simple features in RAs in ILJs.

According to the comparison of the two corpora in terms of the first dimension, while the frequency of finite dependent clauses was 2015 in RAs in IJs, there were 2546 finite dependent clauses in RAs in ILJs. Moreover, although the frequency of Non-finite Dependent Clauses was 2731 in IJs, it was 2255 in ILJs. In addition, although the frequency of dependent phrases was 24368 in RAs in IJs, it was 20219 in RAs in ILJs, indicating that RAs in IJs were more grammatically complex than RAs in ILJs in terms of structural type. A Chi-square test was run to check the significance of this

difference, in an attempt to answer the third research question, leading to the following results:

Table 3: Results of Chi-square Test for the First Dimension of Complexity

	Iranian & Foreign
Pearson Chi-Square	61.44
Asymp. Sig. (2-sided)	.000

Table 3 shows that the chi-square test for goodness of fit is significant (χ^2= 61.44, P<.05). Therefore, there is a significant difference between RAs in ILJs and RAs IJs in terms of structural type.

A comparison of the two corpora concerning the second dimension shows that RAs in IJs benefited from more complex syntactic functions compared to their Iranian local counterparts. Checking the significance of this difference required running a second Chi-square test with the following results:

Table 4: Results of Chi-square Test for the Second Dimension of Complexity

	Iranian & Foreign
Pearson Chi-Square	141.09
Asymp. Sig. (2-sided)	.015

Table 4 shows that the chi-square test for goodness of fit is significant (χ^2= 141.09, P<.05). Therefore, there is a significant difference between RAs in ILJs and IJs in terms of syntactic functions.

Finally, another Chi-square test was used to see whether ILJs and IJs acted differently regarding the third dimension of complexity (Table 5). Hence, more complex specific structural/syntactic features were observed in RAs in IJs compared to RAs in ILJs.

Table 5: Results of Chi-square Test for the Third Dimension of Complexity

	Iranian & Foreign
Pearson Chi-Square	201.33
Asymp. Sig. (2-sided)	.000

As shown in Table 5**,** the chi-square test for goodness of fit is significant (χ^2= 201.33, P<.05). Accordingly, the RAs in ILJs and RAs in IJs were significantly different in terms of specific structural/syntactic features.

In sum, the results confirmed that RAs in IJs were of more grammatical complexity in terms of the three dimensions of Biber et al.'s (2020) model.

DISCUSSION AND CONCLUSION

The collected data were analyzed to explore three dimensions of grammatical complexity, including structural types, syntactic functions, and specific structural/syntactic features in research articles published in Iranian local journals and international journals. According to the results, papers published in Iranian local journals and international journals were different in terms of three dimensions of grammatical complexity, which was statistically significant based on the results of Chi-square tests. According to the findings, research articles published in international journals were more complex than those published in Iranian local journals in terms of three dimensions of grammatical complexity.

The findings may be justifiable according to the development stages proposed by Biber et al. (2020) in the sense that writers of RAs in IJs, as expected, were more developed than those of RAs in ILJs since contrary to Iran, in many foreign countries, English is not considered a foreign language, leading to the exposure of many foreign writers to the English language from their childhood. The results may also be attributed to cultural differences between foreign and Iranian researchers. Another justification for the findings can be the personality differences between foreign and Iranian writers. The authors' proficiency in dealing with academic discourse can be another potential justification for the findings. Besides, the social and behavioral stances of researchers may have affected the results. The last justification can be the authors' command of the topic under investigation in the study.

Consistent with this study, Azadnia, Lotfi, and Biria (2019) found that the writings of native speakers were more syntactically complex than

those written by Iranian students. Another study whose results support those of this study is the one by Qi (2014), indicating that grammatical complexity is more prominent in native speakers' writings compared to non-native speakers' written productions. Other studies came to the same findings, including those by Lu and Ai (2013) and Hinkel (2003).

According to the results, more effective writing instructions should be presented in writing courses in the context of Iran to provide students with more complex structures in their writings. Moreover, EFL learners should use possible methods and techniques to improve their grammatical and syntactic knowledge and benefit from more complexity in the academic writing realm. Last but not least, curriculum planners should plan writing curricula so that more complex attempts on the part of students are required in the writing courses. The findings of this study could be helpful by providing a detailed description of what is meant by grammatical complexity and the types of structures leading to grammatical complexity.

The findings have some implications for different groups of stakeholders, including EFL learners and teachers, curriculum planners, and researchers. EFL learners become aware of the ways they can use different dimensions of grammatical complexity in their academic writing. Since higher education is currently a consistent goal for many EFL learners and academic writing constitutes a major part of higher education, the findings of this study can lead to an increase in the quality of EFL learners' academic writing.

EFL teachers can take advantage of the findings by trying to help their students enhance their knowledge of dimensions of grammatical complexity, using different teaching methods, techniques, and strategies in line with the stated objective. This can improve the quality of Iranian EFL learners' writing, which can, in turn, remove the observed differences between research articles published in Iranian local journals and international journals in terms of the level of grammatical complexity.

Curriculum planners take useful insights from the findings and apply them in planning future EFL curricula, at least as far as writing courses, especially in post-graduate studies, are concerned. Last but not least,

researchers in the field can replicate this study by removing the limitations and reaching more comprehensive and valid results.

The findings presented in this study could reflect the need for further studies. As pointed out by Biber et al. (2020), grammatical complexity should be presented in a way that gives writers a clear understanding of how to create a grammatically complex text. Thus, further studies focused on other academic written genres seem necessary.

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