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Investigating Lexico-grammaticality in Academic Abstracts and Their Full Research Papers from a Diachronic Perspective

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Abstract

Development of science and academic knowledge has led to changes in academic language and transfer of information and knowledge. In this regard, the present study is an attempt to investigate lexico-grammaticality in academic abstracts and their full research papers in Linguistics, Chemistry and Electrical engineering papers published during 1991-2015 in academic journals from a diachronic perspective through quantitative research design. The focus of this paper is on transitivity, mood and theme analysis in the corpus according to Halliday's (1994) systemic functional linguistics model. So, all the attempts are to find the changes in abstracts and research papers of these disciplines and how they are to be positioned in different linguistic contexts over time. The results revealed that research papers employ the spectrum of possible lexical realization quite differently as compared to general English, especially concerning the use of specific lexical items. Also, the results of chi-squares of each discipline showed that there are significant differences between papers over time at .05 level of significance (.000< .05) with regard to the transitivity, mood, and theme.

***Keywords*:** lexico-grammaticality, academic papers, metafunctions, systemic functional linguistics.

Introduction

With the recognition of the role English plays in the world language, researchers need to read and write English academic research papers to exchange academic information. Nowadays, in academic writing, a great emphasis is put on academic communication which signifies the role that a text plays to bridge the gap between the intended reader's knowledge and the writer. The texts, which cannot make the intended relationship within a specific discourse community, will not be able to engage the readers as insiders and cannot be comprehensible enough within that specific genre. However, this aim is achieved by recognizing the textual variations within specific genres and to see how texts resemble or vary in accordance with their discourse organizations and the linguistic features applied.

Academic writing is different from other instances of language use because of its characteristics, defined by Bloomfield (1939) as:

The use of language in science is specialized and peculiar. In a brief speech to the scientist manages to say things which in ordinary language would require a vast amount of talk...the scientist use of language is strangely effective and powerful...it is this peculiar use of language which distinguishes science from non-academic behavior. (p. 1)

According to Swales (2004), the development of technology has made differences between the academic writing and the general writing between the late 1980s and the first years of the new millennium. Specifically, in the intervening years, there has been a continuing and accelerating interest in centralizing the concept of genre in specialized language teaching and in the development of professional communication skills. Swales characterizes the genre-as-standard metaphor in terms of “conventional expectations” (p. 68). He argues that the apparent form and language of a discourse help identify its genre.

The theory behind this study is Systemic Functional Linguistics (SFL) which is an approach to linguistics that considers language as a social semiotic system. It was developed by Michael Halliday, who took the notion of the system from his professor, J. R. Firth. “Functional linguistics are fundamentally concerned with showing how the organization of language to relate to its use” (Martin, 1997, p. 4). SFL's principal unit of analysis is an “entire text” rather than a sentence. While also providing an account of the sentential structure,

SFL seeks to uncover how the various elements of coherence and cohesion are distributed across sentences and throughout texts in ways that are characteristic of particular genres. Early definitions of genre describe it as fixed, immutable and homogenous. However, according to Connor (1996) and Swales (2004)recent definitions of genre view it as more dynamic and this new definition of the genre, which is influenced by the theories of Bakhtin (1993, as cited in IŞIK TAŞ, 2008)is put forward by Connor as follows: Genres are not static, stylistically homogenous texts.

To describe Lexico-grammatical patterns, Halliday and Hassan (1989) state that the clause within a systemic functional framework is divided into three simultaneous strands of the organization. These are the systems of transitivity, mood, and theme (Halliday & Hasan, 1989, Halliday, 1994). The transitivity system is made up of three components: the process, or type of ideational meaning; the participants involved in the process; and the circumstances associated with the process (Halliday, 1994). The mood system encodes interpersonal relations within a text. That is, it refers to sets of related options such as indicative, imperative, declarative and interrogative constructions and modality (Halliday, 1985, 1994). The theme system encodes the clause-level textual organization of the text in the sense that it presents "the starting point for the message"; that is, "what the clause is going to be about" (Halliday 1985, p. 39).

Various studies have highlighted the lexico-grammatical variations. Lexico-grammatical analysis of Pakistani job letters done by Qurrat-ul-Ain, Mahmood, Qasim (2015) reveals interesting results. Precisely, these analyses expose that the Pakistani correspondence still follows the old patterns with courtly expressions, uses less creative language and lacks coherence.

Valle (1999) states that “other important aspects of academic writing to note are intertextuality and intratextuality. Intertextual and intratextual references were not very common in earlier writings” (p. 104-147). In a study in this era, Bazerman (1994, as cited in Holtz, 2011) investigated the textual development of research papers in the Physical Review over the last century. The results of his study show how research article properties, for example, the length of articles, references, syntactic and lexical features, and the organization have changed over time. Atkinson (1992, as cited in Holtz, 2011), who worked

on research papers diachronically, discusses the evolution of medical writing based on changing the language and rhetoric of medical research reporting published in the oldest continuing medical journal in English.

Hartley (1999) discusses structured abstracts in comparison to traditional ones. The analysis shows that the structured abstracts were significantly more readable, longer, and more informative than the traditional ones. Moreover, the contents of the structured abstracts are more quickly and with less difficulty than the traditional ones.

In a study, Bloor (2004) reports on research into the variation of texts across disciplines and considers the implications of this work for the teaching of writing. According to the results of her study, it appears that there is a strong case for using cluster models and clines in studying text variation. Shokri (2016) studied on thematic analysis of applied linguistics articles. The analysis revealed that different types of themes were exploited in both samples, and their frequencies were fairly similar.

Martinez (2001) examines objectivity in research articles with SFL application and proposes objectivity in the presentation of the text. He finds SFL Mood analysis more objective than the transitivity analysis done by Martinez. Mood analysis provides a framework for the study to analyze language through its structural and functional dimensions.

Whittaker (1995) analyzes the textual and the ideational Themes in eight academic articles with a purpose of finding data to shed some light on teaching non-native students to write academic papers. Two major conclusions of this study are: firstly, differences are found between the amount of textual and interpersonal Themes in two different genres, academic articles can thus be expected to have few interpersonal Themes. “Textual Themes are twice as frequent, and that this type of writing depends heavily on relational processes” (p. 124); secondly, it is confirmed by the percentage of Theme type that writers of different genres adopt different strategies “to influence readers, generally without appearing to do so” while writing (p. 124).

The significance of this study primarily lies in the fact that although there is a considerable literature on academic discourse, there is not any text analysis study focusing on all three metafunctions focusing on transitivity, mood, and theme of research papers from different disciplines. Given such a gap, an awareness of the typical features in the papers of different fields of study can be

beneficial for the academic writing purposes, so that the paper writers can have a picture of how to organize their writing in order to sound more academic. The results can have good implications for the members of this discourse community, such as university professors and students as well as researchers.

The purpose of the study is to investigate lexico-grammaticality in academic abstracts and research papers from a diachronic perspective by following Systemic Functional Linguist theory and to find how the linguistic characteristics of these texts developed and changed within a span of time. To that end, this research paper aims to systematically explore observable linguistic features at both lexical and grammatical levels, and evaluate them quantitatively to answer the following research questions.

1. Is there any lexico-grammatical variation between Linguistics academic abstracts and their full papers diachronically?
2. Is there any lexico-grammatical variation between Chemistry academic abstracts and their full papers diachronically?
3. Is there any lexico-grammatical variation between Electricity academic abstracts and their full papers diachronically?
4. Is there any relationship between lexico-grammatical variations in writing academic research papers and different disciplines over time?

Method

Corpus

The corpus comprised 150 English academic research papers (50 papers for each discipline consisted of 25 papers published in 1991 and 25 published papers in 2016 in the journals with related scopes to each selected discipline (i.e., linguistics, chemistry, and electricity).

The reason for deciding to work only with these three disciplines was twofold. Specific differences of lexico-grammaticality of the selected papers were expected. Such differences were more distinctive among the chosen disciplines that were expected not to be very similar to each other. Additionally, the three chosen disciplines represented one discipline of the humanities (*linguistics*), one of the basic sciences (*chemistry)* and one from engineering (*electrical engineering*).

Instrument

WordSmith 0.7software was used for the corpus analysis. WordSmith Tools are an integrated suite of programs for looking at how words behave in texts. The tools have been used by Oxford University Press for their own lexicographic work in preparing dictionaries, by language teachers and students, and by researchers investigating language patterns in lots of different languages in many countries worldwide.

For calculating the statistical analysis in the present study, SPSS computer software, version 22 was used.

Procedure

To answer the research questions of the present study, the data have been collected from the following journals:

Linguistics and Education journal is an international peer-reviewed journal that is concerned with theories and methodologies from all traditions of linguistics and language study to explore any aspect of education. The first publication of this journal dates back to 1988. http://www.journals.elsevier.com/linguistics-and-education

Analytical Biochemistry journal emphasizes methods in the biological and biochemical sciences. The first publication of this journal dates back to 1960. http://www.journals.elsevier.com/analytical-biochemistry-methods-in-the-biological-sciences

The Electricity Journal is the leading journal in electric power policy. The first publication of this journal dates back to 1988. http://www.journals.elsevier.com/the-electricity-journal

To reduce the variations resulted from the different stylistic tendencies of miscellaneous journals, the researchers chose 150 English academic research papers from 3 publications, as the corpus for this study. In this sense, the patterns and metafunction features were more representative and accurate.

In order to ensure the reliability of the results as well as to eliminate the writers' biases, the data collection should strictly follow the academic method of sampling. The principles suggested by Nwogu (1997, as cited in Zhen-ye, 2008) as to the selection of journal were adopted in the study—*representative samples* which show the coverage of the topic areas and its reliability to represent the expected discourse community that for this study is the linguistics, chemistry, and electrical engineering genres, *reputation* which refers to the

importance and acceptance of the journal within the discourse community, and *accessibility* which concerns the availability of the journal to the researcher.

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Results

Lexical Features Analysis

The analysis of the lexical features included the analysis of lexical density, the most frequent lexical items, and keywords.

Lexical Density Analysis

Lexical density measures the density of information in a text, "according to how tightly the lexical items have been packed into the grammatical structure" (Halliday 1993, p. 76). Among the different methods for measuring lexical density, the method used in this research was the one suggested by Halliday (1989). He considers the number of lexical words in a clause as lexical density. According to Halliday, texts even become difficult to read if the values for lexical density are higher than 10. The results of the lexical density analysis of the abstracts are presented in Table1 and Figure 1.

Table 1
Lexical Density of the Abstracts

Abstracts of 1991			Abstracts of 2015		
Linguistics	chemistry	Electrical engineering	Linguistics	chemistry	Electrical engineering
83.7	64.6	0.4	80.7	74.5	75.5
60.6	82.4	48.7	71.7	73.8	76.5
78.7	82.7	41.2	72	82.1	76.8
82.1	88.2	42.9	75.2	67.7	65.4
82.1	82	34	70.2	74.1	88.9
93.3	76.9	36.6	60.8	77.6	75.7
91.5	83.3	43.7	63.2	77.6	76.6
84.4	77.2	44.7	64.3	77.2	81.4
74	89.7	41.6	82.6	82.5	62
85.7	85.4	50.2	72.3	83.3	63.7
90.9	82.9	47.8	69.3	71.4	64.8
92.1	83.3	42.4	65.9	83	77
94.7	91.4	48.2	77.1	76.7	84.9
94.6	94.4	32.6	65.7	86.5	70.4
86.5	72.2	52.9	72.9	65.3	83.1
77.6	92.9	56.6	62.8	76.8	69.1
71.8	86.7	47	76.2	73.3	78.5
85.1	91.3	46.4	62.8	85.4	78.5
90.9	81.3	39.9	64.6	69.4	89.7
75.9	86.6	40.1	76.3	83.7	81.6
85.5	94.4	69.7	65.9	71.9	71.8
88.2	82.1	32.1	69.4	82.8	75.4
75.5	82.1	35.9	58	75.9	73.2
83.5	81	56	71	83.8	64.1
85.8	86.3	37.4	72.1	81.7	74

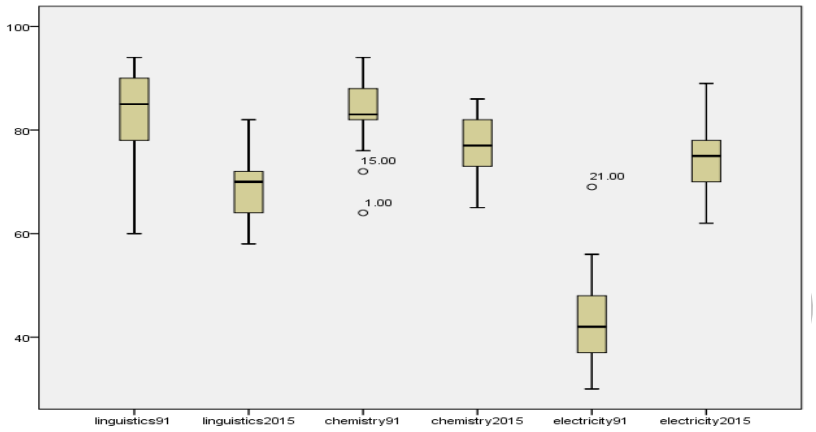

Figure 2. Lexical density across the three disciplines in the full papers

As Figure 1 and Table 1 show, the abstracts published in 1991 indicate a minimum lexical density of 30.4, 1st quartile (X^L) of 48.2, median (X^M) of 81.3, mean of 70.6, 3rd quartile (X^U) of 86.3, and a maximum lexical density of 94.7. Similarly, the abstracts of 2015 show the following summary values: minimum lexical density of 58, 1st quartile (X^L) of 69.3, median (X^M) of 74.5, mean of 74.128, 3rd quartile (X^U) of 78.5, and a maximum lexical density of 89.7.

To indicate if the lexical density data of the abstracts were normally distributed the Shapiro-Wilk for testing the normality of the distributions (Table 2).

Table 2

Tests of Normality of the Abstracts

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	*df*	*Sig.*	Statistic	*df*	*Sig.*
linguistics91	.000	25	.000*	.000	25	.000
linguistics2015	.000	25	.000*	.000	25	.000
chemistry91	.000	25	.068	.000	25	.000
chemistry2015	.000	25	.082	.000	25	.000
electricity91	.098	25	.000*	.000	25	.000
electricity2015	.000	25	.000*	.000	25	.000

* This is a lower bound of the true significance.

* Lilliefors Significance Correction

The results of the normality tests in Table 2 showed that the distributions of the values for lexical density in the abstracts of the three disciplines in 1991 and in 2015 at the lower bound were significance, W = .000, p-value = .000 < .05. The results of the lexical density analysis of the full papers are presented in Table 3 and Figure 2.

Table 3
Lexical Density of the full Papers

Article1991			Article2015		
Linguistics	Chemistry	Electrical engineering	linguistics	chemistry	Electrical engineering
44.8	53.7	43	50.7	43.9	30.4
52	41.8	35.8	35.1	47	48.7
40.2	35.9	58.2	37.5	**59.7**	41.2
53.3	34.9	39.2	43.2	47.7	42.9
46.2	56.8	59.1	33.3	52.2	34
46.2	33.4	**76.4**	28.7	50.1	36.6
48.8	42.2	39.2	31.8	49.4	43.7
47.4	57.4	49.7	37.8	46.6	44.7
53.6	40.2	63.1	37.8	49.1	41.6
46.6	**71**	49.8	34	48.9	50.2
49.1	**71**	34.3	29.8	50.6	47.8
42.1	34.2	74.8	30.7	46.4	42.4
64	58.8	31.5	47.5	52.3	48.2
48.3	57.4	54	36.5	43	32.6
48.3	51.3	52.5	36.2	38.8	52.9
27.5	42.3	36.7	29.6	43.4	56.6
38.5	56.6	45	39.5	49	46.4
44.1	65.1	45.5	33.9	47.2	39.9
54.5	45.5	39.2	59	47.6	40.1
34.1	54.8	42.9	37.1	50.6	69.7
35.5	52.3	39.9	48.8	44.3	32.1
85.5	50.7	46.4	37.1	44.5	35.9
56.9	52.4	41.3	47.7	46.8	56
55.3	47.8	62.8	37.8	41.6	37.4
48.8	61.7	37.6	38.7	45.4	47

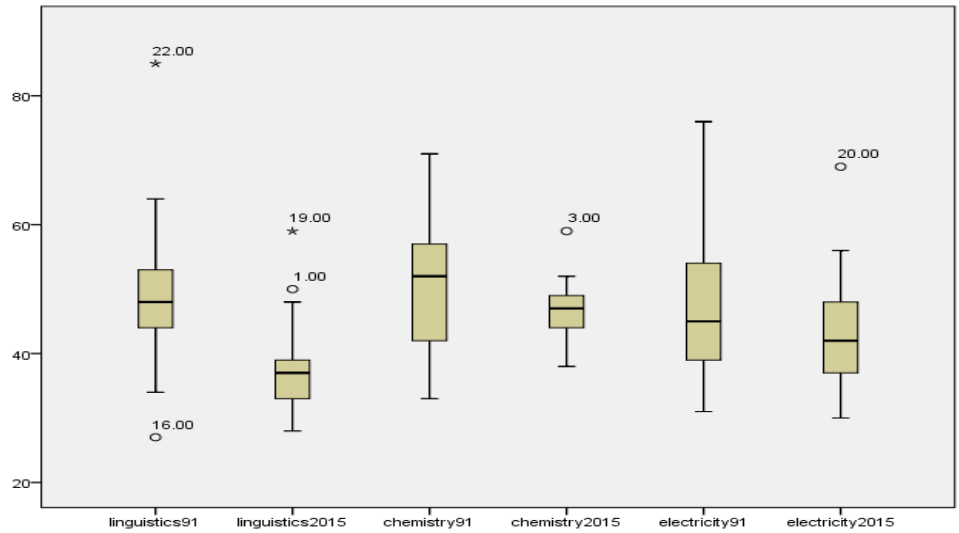

Figure 2. Lexical density across the three disciplines in the full papers

As illustrated in Figure 2 and Table 3, the papers of 1991 show a minimum lexical density of 27.5, 1st quartile (X^L) of 40.2, median (X^M) of 48.3, mean of 49.049, 3rd quartile (X^U) of 55.3, and a maximum lexical density of 85.5. Similarly, the papers of 2015 show a minimum lexical density of 28.7, 1st quartile (X^L) of 37.1, median (X^M) of 43.7, mean of 43.000, 3rd quartile (X^U) of 48.7, and a maximum lexical density of 69.7.Table 4 shows the results of the tests of normality for the full papers.

Table 4

Tests of Normality of the full Papers

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	*df*	*Sig.*	Statistic	*df*	*Sig.*
linguistics91	.000	25	.000	.000	25	.011
linguistics2015	.000	25	.005	.000	25	.019
chemistry91	.000	25	.000*	.000	25	.000
chemistry2015	.000	25	.000*	.000	25	.000
electricity91	.000	25	.000	.000	25	.035
electricity2015	.098	25	.000*	.000	25	.000

*This is a lower bound of the true significance.

*Lilliefors Significance Correction

As the results of Shapiro-Wilk test reveal, the distribution of the values for the lexical density in the papers of the three disciplines in 1991 and in 2015 from normality at the lower bound were significance, W = .000, p-value = .037 < .05.

The Most Frequent Lexical Items

The identification of the most frequent lexical items was based on PoS-tags and was performed using WordSmith Tools. The most frequent lexical items of the three disciplines were nouns, adjectives, adverbs, and verbs for the abstracts and their full research papers in the corpus were presented as follows.

The most frequent noun in the linguistics abstracts of 1991 was *English*. This indicated that the main issue addressed in the abstracts was probably an analysis about the English language. While the most frequent noun in the linguistics abstracts belonged to 2015 was *language*. It showed that *English* played a less important role and the more focus was on languages rather than only English. For nouns in the chemistry abstracts of 1991, the most frequency belonged to *Alkaline* (0.4458%) and in abstracts of 2015 was *Acid* (0.4103%). The most frequent noun in electrics abstracts of 1991was *Film* (0.6648%) and of 2015 it was *System* (0.9024%).

For adjectives, it can be observed that they have an important function in the abstracts. Adjectives clarify the uniqueness of a given research. They emphasize what is different and new in a given research in comparison to others since the most frequent adjectives in the linguistics abstracts of 1991 were *critical*, *clear*, and *second* (0.2735%) while the adjectives *significant* (0.2596%), *random*, and *foreign* (0.2396%) were the most frequent ones in the linguistics abstracts of 2015.

The adjective *High* (0.4012%) in chemistry abstracts of 1991and the adjective *Fatty* (0 .3138%) of 2015 were the most frequent ones. In the Electrical engineering abstracts of 1991 *Thermal* (0.5475%) and in those of 2015 *High* (0.3384%) showed the highest frequency among all others.

To address the aspects of similarity and contrast seems to be the main intended purpose for the use of adverbs in the abstracts and their full papers. The most frequent adverbs in the abstracts of 1991 were *Later* (0.1215%). However, contrastive aspects seemed to play an important role since the most frequent adverb in the abstracts belonged to 2015 was *Randomly* (0.1398%), occurring almost three times more. *Well* (0.1783%) was the most frequent

adverb in the chemistry abstracts of 1991and *Respectively* (0.1690%) the most frequent adverb in those of 2015. In the Electrical engineering abstracts, the most frequent adverb was *Finally* (0.1173%) in the abstracts of 1991 and *also* (0.1128%) in those of 2015.

Finally, undoubtedly the most frequent verbs in the linguistics abstracts of 1991 were *Teach* (0.1823%), *Opposed*, and *Appeared* (0.0912%) while in the linguistics abstracts of 2015 were *Used* (0.3195), *Revealed* (0.2796%), and *Found* (0.1997%) . In the chemistry abstracts of 1991, the most frequent verb was *Purified* (0.2675%), while in those of 2015, the verb *Used* (0.3621%) was the most frequent one. About verbs in the Electrical engineering abstracts of 1991, *Used* (0.2738%) and in those belong to 2015 again the verb *Used*, but with a higher frequency of (0.5076%), were the most frequent verbs.

The analysis of the most frequent lexical items in the full papers revealed that the most frequent nouns in the linguistics papers in both 1991and 2015 were *language* with the frequency of (0.3705%) in 1991 and with the frequency of (0.7261%) in 2015, and *students* with the frequency of (0.3475%) in 1991 and the frequency of (0.6724%) in 2015. This indicated that the main issue addressed in the papers was probably an analysis about *languages* and *students, but* as time passes, the more focus has been on these two nouns. For nouns in the chemistry papers in 1991, the highest frequency belonged to *Enzyme* (0.2800%) and in the papers of 2015 was *Process* (0.2993%). The most frequent noun in the electrical engineering papers in 1991 was *Figure* (0.4768%) and in those of 2015 was *Power* (0.4304%).

The most frequent adjectives in the linguistics papers of 1991 were *cultural (0.1288%), second* (0.1278%),*and different* (0.1238%), while the adjectives *different* (0.1584%), *linguistics (0.1558%*), and *significant* (0.1342%) were the most frequent ones in the linguistics papers in 2015. The adjective *High* (0.1242%) in the chemistry papers in 1991 and the adjective *mass* (0.1857%) in those of 2015 were the most frequent ones. In the electrical engineering papers in 1991, *Thermal* (0.2218%) and in the electrical engineering papers in 2015, *current* (0.1677%) showed the highest frequency among all others.

The most frequent adverbs in the linguistics papers in 1991 were *well* (0.1049%), and the most frequent adverb in the papers of 2015 was *only* (0.1080%), occurring almost three times more. *Respectively* (0.0828%) was the

most frequent adverb in the chemistry papers in 1991and *Respectively* (0.0892%) was the most frequent one in the papers of 2015. In the electrical engineering papers, the most frequent adverb was *also* (0.1479%) in the papers of 1991 and in those of 2015 *only* (0.0846%) was the most frequent one.

The most frequent verbs in the linguistics papers in 1991 were from all types: material (prefaced, applied, used, work, provide, found), mental (consider), verbal (said), and behavioral type (talk), while the verbs in the linguistics papers of 2015 were mostly material type (use, play, found …), rational (related, showed, revealed), and behavioral (communicate). The most frequent verbs in the chemistry papers of 1991 were mostly material type (used, obtained …) and the rest were rational (observed, reported), in the chemistry papers of 2015, the number of the material and rational types of verbs were equal, and no other type of verbs could be seen. In the electrical engineering papers of 1991, most verbs were of material type (used, obtained, calculated …) and two verbs of rational type (determined, observed) and the verbs belong to those of 2015 were of material type (used, compared…) except two verbs which are of the rational type (presented, showed) and one mental type (proposed).

Keywords

Frequencies of occurrence of words in the corpora per se do not give any information, whether high frequencies of a given word are to be interpreted as particularly characteristic of the particular corpora under study or whether such a high frequency would conform to the expectations for general English. In order to make such inferences, a comparison of the results obtained for the corpus under study with a reference corpus of general English is needed. Through a comparison, it can be noticed that the frequency of occurrence of some words in the corpus under study is unexpectedly high in comparison to the frequency of occurrence of the same word in the reference corpus. Such words are called keywords. A formal definition is given by Scott (2011, p. 165): "Keywords are those whose frequency is unusually high in comparison with some norm". The corresponding quantitative evaluation of keywords is called *keyness*. It "relates to the frequency of particular lexical items within a text as compared with their frequency in a reference corpus" (Scott, 2001, p. 109).

In the present study, an analysis of keywords was performed with the help of the WordSmith Tools (Scott, 2016). First, a comparison of a word list with a word list of a reference corpus of texts, BNC (The British National Corpus), was performed. Then, the tool examined each word-form and compared its frequency as a percentage of the text with the frequency of the same word-form in the reference. Some of the words were outstandingly more frequent in the corpus under study and were therefore marked as keywords. Keywords typically showed characteristics of aboutness and style of the corpus under study.

The keyness values of *students* were 8،588.63 for the linguistics papers of 1991 and 6،874.55 for those of 2015. Both p-values were significant since they were smaller than 0.05. The keyness values for *students* in the papers of 1991 showed 1714.08 occurrences more than those of 2015 as in the BNC.

By comparing the keywords of the chemistry papers, the keywords were completely different. The keyness value was 763.87 for the Chemistry papers in 1991while in the papers of 2015 *fig* couldn't be found in the wordlist of keywords and *maring* was the most frequent keyword with the keyness value of 161،530/70. Both p-values were significant since they were smaller than 0.05.

The keyness value of the electrical engineering papers in 1991 was 1468.77 and it was 1757.23 for those of 2015. This showed that *figure* was a much more relevant topic in the papers published in 1991 than those in 2015 but only .02 in BNC represented general English. The keyness values for *figure* in the papers in 1991 showed 288.46 occurrences less than those of 2015 as in the BNC. Both p-values were significant since they were smaller than 0.05.

Such results supported the interpretation of the data of the most frequent lexical items as an indication of domain specificity. This is what was meant by keyness being an indication of the "aboutness" of texts.

The lexical features presented here, although exploratory, revealed quantitative differences between three disciplines research papers as well as between each of these corpora and the reference corpus of general English. Research papers employ the spectrum of possible lexical realization quite differently as compared to general English, especially concerning the use of domain specific lexical items.

Grammatical Features Analysis

Tables 5 and 6 show the results of calculating chi-square for three metafunctions grammatical features consisted of transitivity analysis (Processes, Participants, and Circumstances), mood analysis (subject, finite, and adjunct), and theme analysis (continuatives, conjunctions, conjunctive adjuncts, and wh- relatives) across the three disciplines, the abstracts and the full papers, separately.

Table 5

The Chi-square of the Abstract of the Three Disciplines 1991- 2015

		Linguistics	chemistry	electrical eng.
Transitivity	Chi-square	21.7415	5.4654	54.8087
	p-value	.000226 < .05	.242791 > .05	.00001 < .05
Mood	Chi-square	14.6527	1.4309	1.7495
	p-value	.000658 < .05	488964 > .05	.416969 > .05
Theme	Chi-square	15.7774	2.9374	2.0604
	p-value	.00126 < .05	.401371 > .05	.559957 > .05

Table 6

The Chi-square of the full Papers of the Three Disciplines 1991- 2015

		Linguistics	chemistry	electric engineering
Transitivity	Chi-square	6106.7102	1450.7787	425.0387
	p-value	.00001< .05	.00001 < .05	.00001 <.05
Mood	Chi-square	1333.6834	130.9157	260.2235
	p-value	.00001 < .05	.00001 < .05	.00001 < .05
Theme	Chi-square	161.8049	39.3147	34.0982
	p-value	.00001 < .05	.00001 < .05	.00001 < .05

*p < .05

*p < .05

The results of chi-squares of each discipline in Tables 5 and 6 showed that there were significant differences between the abstracts and the full papers over time at .05 level of significance (.00001< .05) due to the transitivity, mood, and theme.

Discussion

The analysis of the abstracts of the three disciplines showed significantly higher frequency of all the features in comparison to their full research papers

over time. The results of lexical density were above the level of significance. Thus, the abstracts and research papers were statistically different due to time passage. The results also showed that the abstracts and their full research papers were very distinctive types of texts. The abstracts showed significantly higher frequencies of occurrences of features which are very typical indicators of expository texts, such as nouns, lexical density, and sentence length. In contrast, the lower frequency of these same and also other features in their full research papers, such as modals and adverbs, can be interpreted as indicative of properties typical of argumentative texts.

The data showed significant differences across the different fields of study, consisting of linguistics, chemistry, and electrical engineering, not only within abstracts but also within the research papers for the selected linguistic features. In particular, the analysis of linguistic features revealed statistically significant differences between the abstracts and their full research papers at both lexical and grammatical levels over time as well as a significant difference across the different disciplines.

The results confirmed what Biber and Conrad (2009) stated: "although research papers changed immensely through history, becoming more narrowly defined in terms of textual and structural conventions, it preserved its original goal of conveying the results of the academic investigation" (Biber & Conrad 2009, p. 166). The results showed that the sentence length and the lexical density of the texts were higher in the abstracts and research papers of 1990 while they were lower in those of 2015. The results of modality were also lower in the abstracts and papers of 2015 which showed that the writers had avoided the use of many modal verb operators in order not to be too subjective and authoritative as well as explicit but still factual and frank. Therefore, few modalized clauses reinforced the validity of the writers' propositions across the texts. The analysis of the process types revealed that material process was the highest process occurred in the corpus, but its frequency was much higher in electrical engineering full research papers than others. It clearly showed that the number of variables to be studied in the papers and how the writers indicated their purposes to find the relationships between variables. This was consistent with the language features examined and explained by Butt et al. (2003) and Arnancon (2013).

The finding revealed that all papers published in 2015 were characterized by only declarative mood and this manifests the nature of the academic genre which is generally intended to give disseminate information on research objectives while in the papers of 1990, there were both declarative and imperative moods.

The results of theme analysis showed that in papers of 2015 conjunctions were used more frequently than those of 1990. This might reflect the highly coherent nature of them in the papers as well as the preferences in presenting the information in an unambiguous way using a variety of conjunctions as explicit markers of semantic and grammatical relations between sentences and paragraphs while in the papers of 1990 mostly conjunctive adjuncts were used, which showed the semantic not grammatical relations between the sentences and paragraphs. Also the analysis revealed that the most frequently used marker types were in chemistry papers and that only few changes occurred in the abstracts and papers in 2015.

As all studies, this paper had its own limitations too. The focus of this paper was on only three disciplines, with one field in each discipline, and the research design was quantitative. In addition, the reference corpus used in this study was BNC general English; other studies using a different reference corpus might lead to different results.

The implementation of text analysis in writing classes is with no doubt an endeavor, which will modify students' vision and perception of a text. Building awareness among the students about different discourse communities and their needs may turn out to be helpful for future practitioners, especially in the fields English for special purposes and English as a foreign language.

Writing a research article is not an easy task for novice researchers, who begin their study as outsiders in the academic community. This process might be particularly difficult for non-English-speaking scholars since they must deal with both "apprenticeship as novices in their fields of academic research" and the challenge of a new genre" (Gosden, et al. 1995, as cited in IŞIK, 2008, p. 145). The findings of this study might have implications for novice writers who would like to publish their research in academic journals and also for the students of the English language to help them more effectively respond to the expectations of their discourse community.

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Biodata

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