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RHETORICAL STRATEGIES FOR APPEAL TO *LOGOS* IN RESEARCH ABSTRACTS: AN ANALYSIS OF RHETORIC

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Abstract

This study examined the use of two rhetorical strategies - nominal-numerical types of supporting data and lengthy complex types of sentences due to their rhetorical appeal to Aristotelian *logos* in the writing of research abstracts. A total of 480 research abstracts sampled from English as a Native (ENL) and English as a Second Language (ESL) were analysed with LIWC2015 software application and Readable.com online applications. Guided by the Connor's (1996)⁵ Contrastive Theory of Rhetoric with the integration of relevant conceptual models of the LIWC Model of Psycholinguistic Domains (Pennebaker et al., 2015)³, Aristotelian Rhetoric (Aristotle & Kennedy, 1991)² and Compositionality (Bulté & Housen, 2018)¹⁴, it was found that both rhetorical strategies were used frequently in both types of ENL and ESL research abstracts to reflect the appeal to logical mind of the writers. Contrastive analyses revealed that ESL demonstrate more frequencies of lexical and sentential units than the ENL research abstracts. However, ENL research abstracts were found to have more frequencies of nominal-numerical types of supporting details and lengthy complex sentences than the ESL research abstracts which may most likely point towards their lack of near-nativeness rhetoric in these two rhetorical strategies. In terms of the linguistic item which demonstrates the ESL near-nativeness rhetoric is the use of coordination as the rhetorical strategy as both groups of ENL and ESL research abstracts did not show any significant differences. This shows that ESL writers can still strive towards the rhetorical level of nativeness in the choice of their linguistic strategies in the writing of research articles. Future research recommendations are also shown at the end of the research.

Keywords: Contrastive Rhetoric, Rhetorical Appeal to *Logos*, Numerical-Nominal Data, Subordination, Coordination.



Introduction

Academic research writing is a high-level type of academic writing compared to the general academic type of essays in which the content of the academic research writing is composed for specific purposes with due diligence and care based on the purpose, the plan, and the outcome of the research. It is a highly structured type of writing involving the appropriate choice of words and sentences with an aim to successfully deliver the main ideas of the research (Mohamad, 2022)¹. The act of writing with the purpose to appeal to *logos* or the logical minds of the other writers requires certain level of rhetoric that can be explored from the perspective of Aristotelian rhetoric for an effective discourse (Aristotle & Kennedy, 1991)². It is important for writers to ascertain that a logically written and analytically structured content is manifested through a well-thought-out presentation of lexical choice and sentential constructions in connecting the relevant ideas. Pennebaker et al. (2015)³ maintain that analytical thinking shown in a person's writing can be measured through the lexical choice and phrases used by writers in which writers with a high level of analytical thinking composes their texts with complex but clear and concise choice of words. It reflects the writers' cognitive process that can further explain their thinking style.

Writing research abstracts requires a high-level type of academic writing skills and the demonstration of the rhetorical appeals to logical domain. It is also most common to be demonstrated with writers' ethical and emotional domains. The appropriate rhetorical strategies with the appeal to *logos*, *ethos* and *pathos* can collaboratively be used by writers in the composition of their abstracts so that their academic texts of compositions are naturally appealing to the academic research readers to read the full versions of the research articles. Ansarifar, Shahriari, and Pishghadam (2018)⁶ found the use of logical appeal in the writing of research abstracts. According to Mohamad (2022)¹, aside from the rhetorical strategies with the appeal to *logos*, the composition of research abstracts in applied language and linguistics was also holistically appealing by using the rhetorical strategies related to the *ethos*, and *pathos* at different levels of frequencies and varying levels of English nativeness.

Compositional Styles of Writing for Native English (ENL), Non-native English as a Second Language (ESL) and Near-native English Language (NNEL)

According to Kaplan (1966)⁴ and Connors (1996)⁵, there are differences in the way and the lexical extent native and non-native English writers express their ideas in their academic writing. Ansarifar, Shahriari and Pishghadam (2018)⁶, and Mohamad (2022)¹ found in their studies of the writing of research abstracts that non-native English writer had a higher level of lexical density compared to their native writers of English. However, some writers are not clearly placed either in the group of native and non-native English writers in terms of their use of lexical strategies. This is because of their attainment level of near-nativeness in the writing of academic English. This argument is exemplified by Lei and Yang (2020)⁷ who found that a group of ESL PhD candidate

writers showed a higher level of lexical richness in their writing than the other native student writers of English, but they also demonstrated a slightly lower level in the same rhetorical component than the native expert-level native writers of English in their academic writing. There are many English writers and speakers who have attained this near-native level of English rhetoric even though they were brought and educated in non-native English education system and learning environment (Motschenbacher, 2019; Velasco, 2020)^{8,9}.

One reason for such tendency among ESL writers is their high level of exposure to the academic English written by the native English writers worldwide. According to Mohamad (2022)¹, the exposure results from the supremacy of scholarly research work publications in English accessible in this age of internet. Although native English is an established ‘linguistic ruler of the day’, there are a great number of ESL research scholar writers who published their scholarly work in English more than the native English writers (Swales, 2014)¹⁰. According to Motschenbacher (2019)⁸, the ESL writers tend to write with an aim towards the near-native adherence of the linguistic ruler in their writing style to be accepted into the native English space of writing.

Statement of the Problem

General academic writing can be challenging to many ESL writers. One of the contributing factors is their difficulty with language transfer skill from their first language to the second language of English (Connor, 1996; Hui, Ariffin & Ma’rof, 2018)^{5,11}. Connor (1996)⁵ maintains that L1 writers have the tendency to replicate their L1 style of writing in their ESL academic writing. The differences in the rhetoric of their writing may be even more apparently demonstrated in their writing of academic research as this higher-level type of academic text requires a differently greater level of rhetoric and writing competence. However, Kaplan (1966)⁴ and Connor (1996)⁵ hold that the differences are not necessarily an erroneous style of writing, instead it can be viewed as their unique features of the L1 writing. Mohamad (2022)¹ points out that categorical differences in their rhetorical resources allow opportunities for the ESL writers’ improvement of their rhetoric in which their efforts and attention can be directed towards the specific devices to strive towards the near-native rhetorical skills in academic research writing.

Guided by the Contrastive Theory of Rhetoric, Connor’s (1996)⁵ argues that the differences shown by non-native and native English writers in terms of their rhetorical strategies should be able to signify their different levels of non-nativeness and nativeness in English rhetoric. Meanwhile, the insignificant differences between the same two groups may point towards their near-nativeness level of rhetoric in academic writing (Connor, 1996; Lei and Yang, 2020; Mohamad, 2022)^{5,7,1}.

Research Questions of the Study

Based on the literature and direction of the previous studies, the present research would seek to examine the demonstration of the ENL and ESL writers’ logical and analytical thinking in terms of the use of two rhetorical strategies – the numerical-nominal types of supporting data formed at the lexical level and lengthy complex types of sentences formed at the sentential level in the writing of research abstracts. Thus, two research questions were identified based on the operational levels

of lexical and sentential constructions for their appeal to *logos* (or logical domain) and the questions are formulated as follows.

1. What are the frequency scores of the lexical and sentential levels of density in ENL and ESL research abstracts?
2. Do ENL and Malaysian ESL research abstracts show significant differences in terms of their frequency scores of the lexical-level rhetorical strategy of numerical-nominal supporting data?
3. Do ENL and Malaysian ESL research abstracts show significant differences in terms of their frequency scores of the sentential-level rhetorical strategy of lengthy and complex sentences?

Review of Literature

Two of the three elements in the Aristotelian rhetoric include the sources of persuasion and *topoi* (or lexical choice) (Aristotle & Kennedy, 1991)². The first element is further defined by three types of appeals and one of the types of appeal being also the main Aristotelian source of persuasion is appeal to *logos*. This appeal refers to the appeal to the logical thinking dimension that needs to be shown in the users' (*rhetors*) rhetoric of language. It can be manifested through facts, numbers, special lexical phrases of proper nouns and technical jargons which can reflect the rhetor's analytical thinking appeal. In the academic research writing of linguistics, these items can be presented through the presentation of factual, numerical, and nominal linguistic choices of the writing. Myllylä (2019)¹² affirms the importance of valid facts, reliable quotations, and citations to support the elaboration of main ideas which serve as persuasive analytical strategies to come across as convincing writers. Aristotle and Kennedy (1991)² conclude that the appeal to *logos* has the rhetorical aim of evoking logical reasoning towards the language users. Mohamad (2022)¹ conducted a content analysis of 450 research abstracts from 90 indexed journals of English language and linguistics with the LIWC2015 software application to examine the use of rhetorical devices in academic research abstracts. It was found that the Language Inquiry and Word Count (LIWC) analytical domain was a significant measure for the appeal to *logos* based on its functional aim of logical rhetoric in the writing of academic research abstracts in English linguistics. This is also concurred by Smith-Keiling and Hyun (2019)¹³ based on their content analysis to study the demonstration of analytical thinking lexical elements in academic writing by using the same LIWC theoretical model on all research sections in 20 international scientific papers written by the native and non-native writers of English. It was found that lexical items related analytical thinking dimension of the LIWC model was a significant descriptor of measurement for the demonstration of a writer's logical and analytical appeal in the writing of STEM education research papers.

Next, the second element of the Aristotelian rhetoric is the language rhetoric and the lexical choice (Aristotle & Kennedy, 1991)². This element is also found to be represented by the operational levels of textual writing according to model of compositionality (Bulté & Housen, 2018)¹⁴. In corroboration of the function of appeal to *logos*, Pennebaker (2015)³ and Mohamad (2022)¹ expound that analytical thinking domain based on the LIWC model aids in identifying the numerical and nominal linguistic items at the lexical phrase level which are associated with the logical and formal process of the writers' cognitive thinking in their written text. As for the sentence-based linguistic items, lengthy complex sentences which are constructed through the

application of coordination and subordination is associated with the appeal to *logos* (Readable; Mohamad, 2022)^{15, 1}.

According to Mohamad (2022)¹, the rhetorical devices of supporting data can be measured at the lexical level for linguistic items related to figures, numbers, statistical calculations, percentages, ratios as well as the linguistic items related to nominalisations, authorial citations, proper nouns, scientific jargons, and technical terms in the writing of research abstracts. According to Başçı and Hassan (2020)¹⁷, the subjectivity of the linguistic phenomenon requires the use of numbers as the ‘magically appealing’ device to support the information. It is always more convenient and meaningful to measure the presented information of our academic events by reducing them to the representation of significant values of numbers. Stadler-Altman and Keiner (2010)¹⁸ support the idea of using numerical data as the supporting evidence to be used in scholarly publications because the rhetorical strategy is academically and significantly convincing. Referring to a study of 50 argumentative essays to find out the use of rhetorical appeals between male and female writers, Bacang, Rillo and Alieto (2019)¹⁹ found that academic work written by both writers was concluded to be naturally persuasive for their presentation of quantitative data, frequency, descriptive and inferential statistics as these linguistic features were dominantly applied in their reporting of research findings. It is also importantly evident that supporting data in the form of numerical and nominal phrases are reflected as one of the main descriptors for Toulmin’s (1985)²⁰ measurement scale of argumentative essays through the demonstration of figures, facts, technical words, and cited phrases. According to Higgins and Walker (2012)²¹, it is one of the effective methods used as the substantiating rhetorical strategy for the Aristotelian logical appeal, thus fulfilling the persuasive rhetorical aim of a written discourse.

As for the use of nominalisations in academic writing, Kim (2021)¹⁶ concludes from his analysis of 120 research abstracts sampled from multiple disciplines to examine the varying uses of rhetorical items in academic research writing that academic phrases of proper nominalisations reflect the technical characteristics of academic writing based on the use of academic terms to appeal to the readers’ and other writers’ logical thinking. Some academic terms and nominalisations can only be found in specific disciplines of the research. Thus, different disciplines may demonstrate different forms of academic nominal phrases (Mohamad, 2022)¹. This is substantiated by Oakey (2020)²² who maintains that special and technical coinage of terminologies can be found to explain the relevant concepts used in academic writing essays. Kaplan et al. (1994)⁴ also conducted a study on the frequency of use of several rhetorical items in composing 294 research abstracts. It was found that the writing of research abstracts was frequently demonstrated with technical phrases in the writing of science-related articles. These technical phrases formed the proper technical nominalisations used to explain the scientific concepts. It is concluded from the study that the inability of the ESL writers to use these phrases demonstrates their lack of competence in the writing of research abstracts in scientific fields. Similarly, Wu, Mauranen and Lei (2020)²³ also recommend the optimal application of complex nominalisations and technical phrases in the writing of research articles. Mohamad (2022)¹ also highlights the importance of equipping academic writers with adequate knowledge of proper academic words, nouns, and technical phrases as a rhetorical mechanism to explicate their ideas and polish their academic writing of research articles.

Another rhetorical strategy to appeal to the logical mind of the other writers is the use of complex sentences in the writing of academic writing. Bulté and Housen’s (2018)¹⁴ identified four important features of a syntactic structure of a text which include 1) sentential lengths, 2)

compositional components of a sentence in simple, compound, and complex forms, 3) linking phrases and clauses in the form of dependant and coordinating clauses, and 4) the complexity levels of the phrases and sentences. They also underline the composition of complex sentences through various forms of coordinating phrases. In their attempt to explore the frequency in the presence of selected rhetorical devices in composing 294 research abstracts, Kaplan et al. (1994)⁴ concluded from their findings that the cohesion of academic writing was mostly exhibited with complex sentences that contained subordinate and coordinate linking phrases. It is also underlined by Connor (1990)²⁴ that the use of *that*-clauses, and subordinate clauses reflected in the form of causal and conditional types of sentences factor in the complexity structure of sentences and evaluated as part of the holistic assessment feature of rhetorical strategies used to measure the persuasiveness of students' essays. Thus, it can be concluded that subordination and coordination are the useful lexico-grammatical cohesive strategies in the persuasive rhetoric.

As highlighted earlier, writers can apply coordination and subordination to construct complex sentences properly in academic writing. The function of these rhetorical strategies in academic writing is mentioned by many previous studies in ESL academic writing (Don & Srinivass, 2017)²⁵. From their corpus analysis of 120 research articles taken from SciELF corpus and Corpus of Contemporary American English (COCA), Wu, Mauranen and Lei (2020)²³ stated that the rhetorical functions of coordination and subordination in the development of dense and complex sentences were known as parataxis for coordination and hypotaxis for subordination. It was found by Wu, Mauranen and Lei (2020)²³ in their study of the English research articles that subordination is demonstrated by experienced research writers in their writing more often than writers with less experience in academic research writing. It was also revealed by Ansarifar, Shahriari and Pishghadam (2018)⁶ that non-native student writers from postgraduate studies showed a lower level of sentential density and complexity than the expert native English writers. However, these findings contradict the findings shown by Wu, Mauranen and Lei (2020)²³ who found that non-native English writers demonstrated the use of coordinated and longer sentences more often than their native English American counterparts as their rhetorical method to appeal to the other writers and readers. Wu, Mauranen and Lei (2020)²³ reported a more neutral finding from the writing of research abstracts in which expert-level English writers and non-expert level English writers were found to demonstrate an almost similarly high level of syntactic complexity in their sentential structures despite their differences in the experience in academic writing publications and the nativeness of academic rhetoric. The lack of differences is due to their similar level of realisation of the standard levels of sentences used in the academic writing of research abstracts.

Methodology of Research

The present research adopted quantitative content analysis of research design. Descriptive and inferential statistics were then used to report and derive conclusions from the analysed data. First and foremost, the research constructed a tabular guideline in choosing the rhetorical strategies to be analysed in this study as shown in Table 1. It is known as Selection and Mapping Table for Two Rhetorical Strategies Based on The Integration of Three conceptual models: Aristotelian Elements of Rhetoric, The LIWC2015 Psycholinguistic Dimensions and Compositionality Model. As shown in the table, the two Aristotelian elements of rhetoric (Aristotle & Kennedy, 1991)² were also supported and aligned by other two conceptual models. The first element (*logos* mode of persuasion) was elaborated and measured by the LIWC psycholinguistic dimension of analytical thinking (Pennebaker et al., 2015)³, and the second element was elaborated and measured by the

compositionality model (Bulté & Housen, 2018)¹⁴ which refers to two operational levels of texts – lexical and sentential levels in the present research. Based on these guiding descriptors, the lexical-level rhetorical strategy of numerical-nominal data and the sentential-level rhetorical strategy of lengthy complex sentences were selected and mapped accordingly with several examples for reference.

Table 1:

Selection and Mapping Table for Two Rhetorical Strategies Based on The Integration of Aristotelian Elements of Rhetoric with The LIWC2015 Psycholinguistic Dimensions and Compositionality Model

Aristotelian Two Main Components of Rhetorical Discourse (Aristotle & Kennedy, 1991)²		1) MODE OF PERSUASION: APPEAL TO ARISTOTELIAN LOGIC (<i>Logos</i>)	
		CHARACTERISTICS	
		Theoretical, abstract language, systematic organisation, definitions, complex ideas, factual data and statistics, quotations, references from the relevant experts, informed opinions, research findings	
		RHETORICAL EFFECT	
		Evokes a cognitive, rationale response	
2) <i>Topoi</i> (choice of words/ language) Compositionality Model (Bulté & Housen, 2018)¹⁴		MAPPING OF LIWC2015 PSYHOLINGUISTICS DOMAIN (Pennebaker et al., 2015)³ & TWO RHETORICAL STRATEGIES	
		THE LIWC ANALYTICAL THINKING DOMAIN (ANALYTIC)	
		Lexical level	<u>Rhetorical Strategy 1 (RS1):</u> Numerical and Nominal Supporting Data (Numbers, Percentages, and Proper Nouns, Technical Phrases) (e.g., more than 90% ..., The study was conducted in 6 schools, involving 17 teachers..., TESL, EAP, etc.)
		Sentential level	<u>Rhetorical Strategy 2 (RS2):</u> Lengthy and Complex Sentences (e.g., subordination such as ‘after...’, <i>because ...</i> , ‘in which...’; coordination conjunctions <i>such as ‘but...’</i>)

As shown in Table 1, two rhetorical strategies which are numerical-nominal types of supporting data and lengthy-complex types of sentences were vertically mapped according to their Aristotelian rhetorical descriptions and rhetorical aims in line with their targeted psycholinguistic dimension. The same rhetorical strategies were also aligned and mapped according to their Aristotelian element of *topoi* (language) and operational levels of composition.

The first rhetorical strategy is numerical and nominal supporting types of data which fulfils the rhetorical aim of *logos*, and the rhetorical strategy is constructed at the lexical level of texts. It is manifested in the forms of numbers, ratios, frequency, percentages, and other similar forms of

the numerical type of supporting data, whereas the nominal strategy is manifested in the forms of proper nouns, technical phrases, jargons, and other similar forms of the nominal type of supporting data. For example, the numerical figure of “90%” is used as the numerical form of supporting data in “... more than 90% of students...” and the numerical figure of ‘6’, and ‘17’ are used as the numerical forms of supporting type of data in “The study was conducted in 6 schools, involving 17 teachers...”. As for nominal types of words or phrases, it is exemplified in the form of TESL as the abbreviation for Teaching English as a second language and EAL for English for Academic purposes in which these are forms of proper noun phrases. Thus, the similar forms of lexical phrases would also be identified and analysed as nominal forms of supporting data.

Meanwhile, the second rhetorical strategy is lengthy and complex types of sentences which also cater to the rhetorical aim of *logos*, and the rhetorical strategy is constructed at the sentential level of texts. Lengthy and complex sentences are formed by two linguistic resources – coordination and subordination. Coordination involves the linking devices such as ‘for’, ‘and’, ‘but’, ‘or’, ‘nor’, ‘yet’, and ‘so’. These seven items are also abbreviated as FANBOYS in academic writing in which they are used to join two sentences to make complex sentences. As for subordination, it is demonstrated through linking words or phrases such as ‘after’, ‘because’, ‘in which’ and the likes. Thus, the similar forms of phrases to form sentential structures would be identified and analysed as lengthy and complex types of sentences.

The present research investigated 480 research abstracts in 2013 to 2018 extracted from 90 indexed research journals from ENL and ESL contexts. The research abstracts were related to linguistics, education, Teaching English as a Second Language (TESL) and the similarly related fields. Then, the research abstracts were imported into two applications – the LIWC software application and Readable.com online application which were purchased for full access through their websites. Both applications were quantitative software auto-analysis tools in which the first application was used to analyse the lexical-level rhetorical strategy of numerical-nominal supporting data. The second application was used by the researcher to analyse the sentence-level rhetorical strategy of lengthy complex sentences. The data generated in average percentages respectively against the total number of words and sentences were further analysed with independent sample t-test as it involved data from two groups of research abstracts in ENL and ESL.

Results of the Research

All three research questions were addressed in the form of related specific topics. It starts with the basic level question on the lexical and sentential levels of density, and then followed by the topics on the scores of the lexical-level rhetorical strategy of nominal-numerical data and the sentential-level rhetorical strategy of lengthy complex sentences.

Lexical and Sentential Levels of Density Between ENL and ESL research abstracts

Table 2:

The difference scores of independent sample t-test of lexical and sentential levels of densities between research abstracts in ENL and research abstracts in ESL

Types of Densities		Mean	Std. Deviation	<i>t</i>	<i>df</i>	<i>p</i>	Cohen's <i>d</i>
Average percentages of lexical density in research abstracts	ENL	185.88	35.47	2.44	478	.015	.223
	ESL	195.11	46.60				
Average percentages of sentential density in research abstracts	ENL	6.83	1.97	7.51	478	.000	.686
	ESL	8.25	2.15				

Table 2 shows an independent sample t-test analysis of lexical and sentential scores of densities of 480 research abstracts in ENL and ESL. It was found that 240 research abstracts from ESL ($M = 195.11$, $SD = 46.60$) contained a significantly higher level of lexical density than the 240 research abstracts from ENL ($M = 185.88$, $SD = 35.47$), $t(478) = 2.44$, $p = .015$. The effect size of the t-test value ($d = .223$) is found to be small. Due to the significant difference, it can still be concluded that research abstracts written in English as a second language (ESL) have more lexical words than the research abstracts written in English as a native language (ENL).

In addition, Table 2 also shows that research abstracts written in ESL ($M = 8.25$, $SD = 2.15$) also contained a significantly higher level of sentential density than research abstracts written in ENL ($M = 6.83$, $SD = 1.97$), $t(478) = 7.51$, $p < .001$. The effect size of the t-test value ($d = .686$) is found to be medium. Based on these findings, it can be concluded that research abstracts in ESL tend to have more sentences than the research abstracts in ENL.

Differences of the Lexical-level Rhetorical Strategy of Numerical-Nominal Supporting Data Between ENL and ESL

Table 3:

The difference scores of independent sample t-test of the rhetorical strategy of numerical-nominal supporting data between research abstracts in ENL and ESL

Rhetorical Appeal to Logos	Mean	Std. Deviation	<i>t</i>	<i>df</i>	<i>p</i>	Cohen's <i>d</i>
ENL	6.96	4.55	4.18	478	.000	.382

Numerical-Nominal Supporting Data	ESL	5.48	3.03
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According to Table 3, it shows the findings on the difference scores of independent sample t-test of the lexical-level rhetorical strategy of numerical-nominal supporting data used in ENL and ESL research abstracts. It was discovered that the ENL research abstracts ($M = 6.96, SD = 4.55$) showed more uses of nominal-numerical supporting data compared to the ESL research abstracts ($M = 5.48, SD = 3.03$) in which the difference between them is significant, $t(478) = 4.18, p < .001$. The effect size of the t-test value ($d = .382$) is found to be small. Due to the significant difference, it can be concluded that research abstracts written in ENL demonstrate a significantly greater use of the lexical-level rhetorical strategy of numerical-nominal data as their supporting evidence of their explanation of their research abstract content than those research abstracts written in ESL.

To further investigate if each group differs in terms of the use of either numerical or nominal types of supporting data, the following analysis was done to this sub-category of this rhetorical strategy.

Table 4:

The difference scores of independent sample t-test of the sub-rhetorical strategy of numerical versus nominal types of supporting data between research abstracts in ENL and ESL

Rhetorical Appeal to Logos		Mean	Std. Deviation	t	df	p	Cohen's d
Numerical Type of Supporting Data	ENL	4.10	2.45	2.78	478	.006	.267
	ESL	3.50	2.02				
Nominal Type of Supporting Data	ENL	2.85	2.95	4.01	478	.000	.379
	ESL	1.94	1.86				

Table 4 shows the findings on independent sample t-test of the rhetorical strategy of numerical versus nominal types of supporting data in research abstracts in ENL and ESL. Similar to the previous analysis, it was found that research abstracts written in ENL ($M = 4.10, SD = 2.45$) showed more uses of *numerical* type of supporting data compared to the ESL research abstracts ($M = 3.50, SD = 2.02$) in which the difference between them is significant, $t(478) = 2.78, p = 0.006$. The effect size of the t-test value ($d = .267$) is found to be small. Due to their significant difference, it can be concluded that research abstracts written in ENL demonstrate a significantly greater use of the lexical-level rhetorical strategy of *numerical* type of supporting data as their supporting evidence of their explanation of their research abstract content than those research abstracts written in ESL.

As for the nominal type of supporting data, it was similarly found that research abstracts written in ENL ($M = 2.85, SD = 2.95$) showed more uses of *numerical* type of supporting data

compared to the ESL research abstracts ($M = 1.94$, $SD = 1.86$) in which the difference between them is significant, $t(478) = 4.01$, $p < .001$. The effect size of the t-test value ($d = .369$) is found to be small. Due to their significant difference, it can be concluded that research abstracts written in ENL demonstrate a significantly greater use of the lexical-level rhetorical strategy of *nominal* type (non-numerical) of supporting data as their supporting evidence of their explanation of their research abstract content than those research abstracts written in ESL. It can also be suggested from the same findings that numerical type of supporting data is more frequently used in both groups compared to nominal type of supporting data in the writing of research abstracts.

Differences of the Sentential-level Rhetorical Strategy of Lengthy Complex Sentences Between ENL and ESL

Table 5:

The difference scores of independent sample t-test of the sub-rhetorical strategy of lengthy complex sentences between research abstracts in ENL and ESL

Rhetorical Appeal to Logos		Mean	Std. Deviation	<i>t</i>	<i>df</i>	<i>p</i>	Cohen's <i>d</i>
Lengthy-Complex Sentences	ENL	87.27	19.04	6.60	478	.000	.603
	ESL	75.96	18.43				

According to Table 3, it shows the findings on the difference scores of independent sample t-test of the sentential-level rhetorical strategy of lengthy complex sentences used in ENL and ESL research abstracts. It was discovered that the ENL research abstracts ($M = 87.27$, $SD = 19.04$) showed more uses of lengthy complex sentences compared to the ESL research abstracts ($M = 75.96$, $SD = 18.43$) in which the difference between them is significant, $t(478) = 6.60$, $p < .001$. The effect size of the t-test value ($d = .603$) is found to be a medium size. Thus, it can be concluded that research abstracts written in ENL demonstrate a significantly greater use of the sentential-level rhetorical strategy of lengthy complex sentences as their supporting evidence of their explanation of their research abstract content than those research abstracts written in ESL.

To further investigate if each group differs in terms of the use of sub-rhetorical strategy of lengthy complex sentences, the following analysis was done to the sub-categories of coordination and subordination which make up the construction of complex sentences.

Table 6:

The difference scores of independent sample t-test of the sub-rhetorical strategy of lengthy complex sentences (Coordination and Subordination) between research abstracts in ENL and ESL

Rhetorical Appeal to Logos		Mean	Std. Deviation	<i>t</i>	<i>df</i>	<i>p</i>	Cohen's <i>d</i>
Coordination	ENL	41.10	16.48	1.52	478	.128	.139

	ESL	43.52	18.21				
Subordination	ENL	46.17	28.06	5.41	478	.000	.494
	ESL	32.44	27.49				

Table 6 shows the findings on independent sample t-test of the rhetorical strategy of coordination versus subordination in research abstracts in ENL and ESL. Contrary to the previous analysis, it was found that research abstracts written in ENL ($M = 41.10$, $SD = 16.48$) did not show any significant difference in terms of the use of coordination from the ESL research abstracts ($M = 43.52$, $SD = 18.21$) in which the t value between them is insignificant, $t(478) = 1.52$, $p = .128$. The effect size of the t-test value ($d = .139$) is found to fall lower than the lowest small range of effect size, thus validating the findings on the insignificant difference. Due to their insignificant difference, it can be concluded that research abstracts written in both ENL, and ESL demonstrate a nearly similar level of use of the sentential-level rhetorical strategy of coordination in the construction of sentences in their research abstracts.

As for the subordination, it was however found that research abstracts written in ENL ($M = 46.17$, $SD = 28.06$) showed more uses of subordination in their complex sentences compared to the ESL research abstracts ($M = 32.44$, $SD = 27.49$) in which the difference between them is significant, $t(478) = 5.41$, $p < 0.001$. The effect size of the t-test value ($d = .494$) is found to be small but still bordering the medium size. Due to their significant difference, it can be concluded that research abstracts written in ENL demonstrate a significantly greater use of the sentential-level rhetorical strategy of subordination in their construction of sentences to explain the research abstract content than those research abstracts written in ESL. It can also be suggested from the same findings that subordination is more frequently used in both groups compared to coordination in the writing of research abstracts.

Discussion and Conclusion

Based on this study, it is concluded that academic writing of research abstracts is composed of several sub-classes of compositionality and two of them are lexical and sentential levels of compositional structures. Despite being a simplified and compact section of research articles, it still shows the vital application of these two operational levels of composition which underscores the concept of compositionality in academic writing (Bulté and Housen's (2018)¹⁴. It is also concluded that the lexical and sentential levels of density are demonstrated differently in the writing of the ENL and ESL research abstracts. The ESL research abstracts demonstrate a higher level of lexical-phrasal density compared to the ENL research abstracts. The findings corroborate with findings on abstracts of research articles in linguistics found by Mohamad (2022)¹ in which the non-native English writers appear to show more lexical-phrasal number of words frequently used in the academic research writing than native English writers. However, Ansarifar, Shahriari and Pishghadam (2018)⁶ elaborated that the words and phrases used by these ESL writers were repetitive in nature. The ESL research abstracts were also found to have a significantly higher level of sentential structures than the ENL research abstracts. This finding is not substantiated in the studies of research articles done by Ansarifar, Shahriari and Pishghadam (2018)⁶ which is found otherwise.

Based on the previous literature (Bacang, Rillo & Alieto, 2019; Başı & Hassan, 2020; Mohamad)^{19, 17, 1}, it can be concluded that appeal to Aristotelian *logos* can generally be demonstrated through supporting data in the form of nominal-numerical lexical phrases. Based on the findings reported in the present study, the academic writings of research abstracts from ENL and ESL writers tend to reflect the use of such rhetorical strategies to appeal to the logical mind of the other writers and the target readers. This is line with Toulmin (1985)²⁰ work that supporting evidence substantiates the writers' argumentation in numerical and nominal forms of supporting data due to their appeal to the analytical minds of the writers. It is concluded that writers in ESL research abstracts demonstrate a lesser application of nominal-numerical types of data to support their explanation compared to the native English writers. This finding may point towards a greater emphasis shown by native English writers on the use of supporting evidence in both forms than the non-native writers of research abstracts. Furthermore, the greater importance on the use of numbers, figures, statistics to support the reporting of the results and conclusions is proven by Bacang, Rillo, and Alieto (2019)¹⁹ in the writing of the non-native English argumentative essays. Native English writers use their logical appeal through numerical forms of supporting evidence in substantiating their points of argumentative academic essays. However, these studies did not make any contrastive analysis between groups of writers which is addressed in the present research. The writers from ENL research abstracts in linguistics and English appear to exhibit more uses of the numerical type of data as their supporting evidence compared to the ESL research abstracts. This form of rhetoric is explained to be the subtle form of nativeness rhetoric used by the English native writers which make their non-native English RAs more intuitively appealing compared to the non-application of such use of rhetorical strategy (Stadler-Altmann & Keiner, 2010)¹⁸. As for the use of nominal phrases, ENL research abstracts showed a significantly higher application of proper nominalisations such as the use of citations, proper nouns, and technical jargons than the ESL research abstracts in the present study. However, the finding is inconsistent with Wu, Mauranen and Lei (2020)²³ who concluded from their study that the non-native English research papers showed the usage of more nominal phrases compared to American English research papers written by native English writers.

Furthermore, it can also be concluded that appeal to Aristotelian *logos* can generally be demonstrated through lengthy complex sentences as evidenced in the previous literature. The present study concludes that ENL research abstracts tend to be written with lengthy complex sentences compared to the ESL research abstracts. This finding is found to be consistent with the study done by Mohamad (2022)¹ who found that ESL writers tend to write short sentences and non-complex form of sentential structures in their writing of research articles. It may be due to the simplified section of research abstracts which could be perceived to be written with simple forms of sentences as opposed to complex forms of sentences. ENL research abstracts are also concluded to be written with more significant features of subordination than the ESL research abstracts. Wu, Mauranen and Lei (2020)²³ concluded that expert level native writers tend to apply subordination in their sentences more frequent than the non-native writers. This finding aids in pointing towards the likeliness of higher level of cohesiveness of the native English texts due to the use of subordination which is a rhetorical strategy emphasised in the native English texts (Mohamad, 2022)¹. As for the use of coordination, both groups of the ENL and ESL research abstracts are concluded to use a nearly similar level of coordination due to their insignificant difference in this rhetorical item. Don and Srinivass (2017)²⁵ found that ESL Malaysian, Indonesian and Thai writers use linking devices of coordination as one of their main rhetorical devices in the writing of argumentative, opinionated, and persuasive essays. Similarly, this is reflected in the study done by Mohamad (2022)¹ in which both groups of Malaysian ESL and ESL research abstracts do not show

any significant difference in the use of coordination in coordinating their sentences through conjunctions. These findings underscore the important function of this linguistic item to make the rhetorical appeal to the readers and other writers of research writing.

From the perspective of near-nativeness rhetoric, it can be concluded based on Connor (1996)⁵ modern contrastive theory of rhetoric that writers of the ENL research abstracts from the selected indexed journals in this research have yet to achieve near-nativeness in their use of nominal-numerical types of supporting data and lengthy complex sentences, especially the use of subordination. However, categorical analysis shows that ESL writers of ESL research abstracts have demonstrated a near-nativeness use of coordination due to their a nearly similar level of rhetoric in the use of coordination as manifested in the form of coordinating devices to connect simple sentences in the writing of research abstracts. Thus, future research consideration were pointed towards the frequency use of these rhetorical strategies and their nativeness rhetoric in other sections of research articles.

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