

## Analysis of Rhetorical Appeals to Logos, Ethos and Pathos in ENL and ESL Research Abstracts

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### ABSTRACT

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Based on [Connor's \(1996\)](#) Contrastive Theory of Rhetoric, this study investigated the degree of the rhetorical appeals and their rhetorical devices in the English as a Native Language (ENL) and English as a Second Language (ESL) research abstract (RAs) from indexed journals. A mapping and selection table of rhetorical devices was introduced based on Aristotelian three elements in rhetoric to produce an effective discourse: i) three rhetorical appeals, ii) *topoi*, and iii) arrangement of text ([Aristotle & Kennedy, 1991](#)). The rhetorical model is also integrated with LIWC2015 psycholinguistic dimensions ([Pennebaker, et al., 2015](#)) and Compositionality Model ([Bulté & Housen, 2018](#)). The first Aristotelian element refers to three rhetorical appeals to *logos*, *ethos*, and *pathos* which were measured by three LIWC2015 summary variables of analytical thinking, clout and emotional tone respectively. Three rhetorical devices were identified at lexical-phrasal, sentential, and textual level for each rhetorical appeal which fulfilled the other two Aristotelian elements. In total, three summary domains with nine rhetorical devices were analysed in 480 RAs with LIWC2015 software and Readable.com online application. It was found that there are significant correlations among three rhetorical devices identified for each rhetorical appeal to *logos*, *ethos*, and *pathos*. Contrastive analysis revealed that ESL RAs were more rhetorically appealing to *logos* and *pathos* than ENL RAs. However, both groups of RAs did not show any significant difference in terms of their appeal to *ethos*. Finally, research implications and future research directions are also discussed.

**Contribution/Originality:** This study contributes to the existing literature by examining the application of nine rhetorical devices (RDs) identified based on an integrated framework of Aristotelian rhetoric and LIWC's psycholinguistic dimensions. In addition, it systematically analysed the RDs with a combination of two rhetorical analysis tools at the varying syntactic levels.

## 1. Introduction

Persuasive academic writing is a rhetorical type of written communication with the persuasive aim to build arguments and provide an explanation about the key message to the readers. Some persuasive academic writing examples include argumentative essays, promotional texts, executive summaries, book blurbs, website articles. In the field of academic research, the instances include research grants, research cover letters, and research abstracts. These written discourses become more appealing, and page-turning due to the presence of relevant persuasive linguistic resources. According to [Aristotle and Kennedy, \(1991\)](#), written discourses can be appealing to the logical, ethical, or emotional minds of the writers and readers. There have been many evaluation devices used to study these three modes of persuasion. Some of the devices include evaluation tool of specific mode of *logos*, *ethos*, and *pathos* by [Connors \(1990\)](#) and [Kinneavy \(1971\)](#), persuasive adaptive scale by [Delia, Kline, and Burleson \(1979\)](#), a measurement tool of persuasive rational, credibility, and affective appeals by [Lauer, Montague, Lunsford, and Emig \(1985\)](#), and analytic scoring scheme for written compositions by [Purves, Takala, and Gorman \(1986\)](#).

One modern theory which has a particular interest in the rhetoric of academic writing is Modern Contrastive Theory of Rhetoric introduced by [Connors \(1996\)](#). It is built from the field of contrastive analyses of ESL discourses which involve comparative studies between two languages or sub-languages spoken by two or more different groups in both written and spoken discourses. According to [Connors \(1996\)](#), the theory focuses on identifying the similarities and differences of linguistic elements which can be a source of learning more about the challenges faced by second language users. The challenges can also be resolved by employing the rhetorical strategies identified from the contrastive studies. [Connor \(1996\)](#) and [Atkinson \(1999\)](#) maintain that various factors form the challenges which entail the language users' first language, their educational background, different cultures, and the genres or types of texts of their interest.

### 1.1. Problem Statement

Academic writing per se poses challenges to many ESL academic writers. One reason is the non-native English students' rhetorical and writing styles that tend to be influenced by the cultural elements of their first language ([Kaplan, 1966](#); [Connor, 1996](#)). The lack of consideration for the appeals to *logos*, *ethos*, and *pathos* is the rhetorical reason for their challenges in producing effective academic composition. [Myllylä \(2019\)](#) also posits that an excessive presence of one mode over the modes of persuasion may render the academic writing illogical, unethical, or overemotional. Numerous rhetorical devices can be used to measure the relevant rhetorical appeals used in academic writing and many previous studies have ventured into this research enterprise ([Durst, Laine, Schultz & Vilter, 1990](#); [Don & Srinivass, 2017](#); [Chanyoo, 2018](#); [Saud, 2018](#)). However, one common arising research concern about these studies was their broad conclusion about more than one type of academic writing as they studied rhetorical devices in a mixture of persuasive academic texts of writing such as argumentative, opinionated, and persuasive essays written by several regional groups of writers - ESL Malaysian, Indonesian, and Thai writers.

This paper aimed to study the rhetorical devices (i.e., linguistic devices with rhetorical effects) used to achieve the relevant rhetorical appeals to *logos*, *ethos*, and *pathos* in the specific genre of the persuasive academic texts of ENL and ESL research abstracts. The

rhetorical devices were selected based on a proposed mapping and selection table drawn on an integrated framework of three conceptual models: three Aristotelian elements of a discourse (Aristotle & Kennedy, 1991), three LIWC2015 psycholinguistic domains (Pennebaker et al., 2015) and Compositionality model (Bulté & Housen, 2018). It would aid in discovering about the differential presence of these appeals along with its relevant rhetorical devices formed at different compositional levels between the two groups of RAs in the field of academic research.

## 1.2. Objectives of the Study

The aim of the present study is to investigate the representativeness of lexical chunks in online business letters. To do this, frequency analysis of lexical chunks from this domain to find the most frequent types and their contexts of occurrence, and comparative analysis between lexical chunks in online business letters and Business Letter Corpus (BLC) were conducted.

## 1.3. Research Questions of the Study

In view of the above, three main research questions were formulated as follows:

- i. What are the average lexical, sentential, and textual levels of density of ENL and Malaysian ESL groups of research abstracts?
- ii. Are there any differences between ENL and Malaysian ESL groups of RAs in terms of their rhetorical appeal to *Logos* (analytical thinking domain), *Ethos* (Clout domain), and *Pathos* (Emotional Tone domain)?
- iii. Are there any correlations among all three rhetorical devices identified respectively for each of the three LIWC domains of *Logos*, *Ethos*, and *Pathos*?

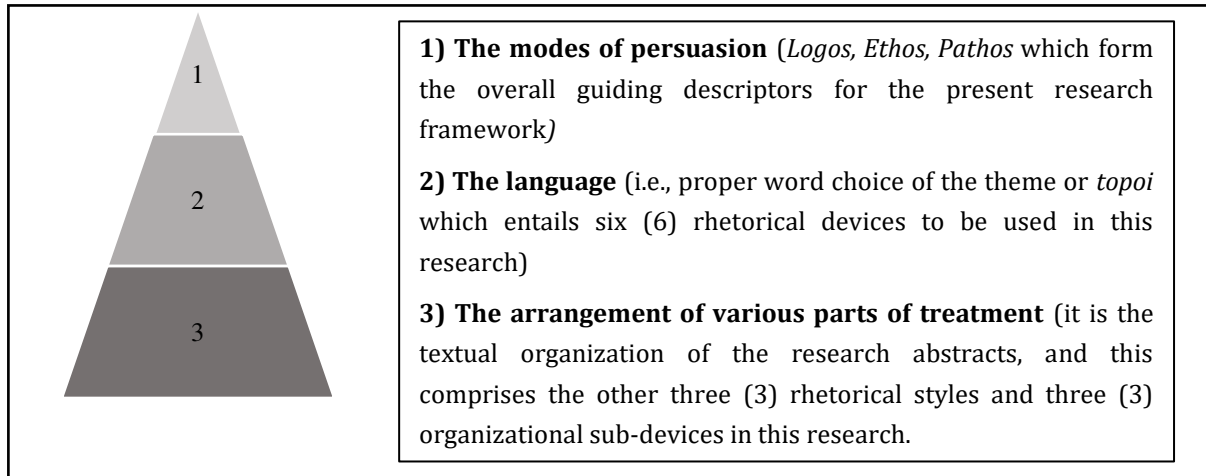
## 1.4. Significance of the Study

This study is significant in the context of academic research writing and contrastive analysis between ENL and ESL research abstracts in terms of their rhetoric of writing. The study applied a triangulation method involving the use of application software and a web-based online tool in identifying the frequency presence of rhetorical devices used in both groups of RAs while shedding light on their rhetorical similarities and differences. By this means, the ESL writers may be able to learn the best rhetorical strategies demonstrated in ENL research abstracts in the writing of their academic research papers.

## 2. Literature Review

Biber and Conrad (2009) highlighted the importance of rhetoric by outlining five (5) important elements for a written discourse in their multidimensional framework: (1) organisational structure and constituent parts; (2) parts of speech (e.g., adjectives, nouns, pronouns, verbs, and adverbials); (3) choice of tenses, voice, and modality; (4) syntactic features; and finally (5) lexical use and patterning. The framework is also inspired by Aristotelian work on three important elements of a discourse to achieve its rhetorical impact. As shown in Figure 1, there are three important elements shown by Aristotle and Kennedy (1991) are revisited by Barnes (1984) structured as follows:

Figure 1: Three (3) Aristotelian Rhetorical Components of Discourse



Source: [Aristotle & Kennedy \(1991\)](#)

Based on [Figure 1](#), the first element refers to the three means of appeals: *Logos, Ethos* and *Pathos*. The three appeals serve as the overall guiding descriptors based on the rhetorical description and aims. The second element is the language which refers to carefully constructed choice of words according to the appropriate themes (*topoi*) and this element aids in identifying six (6) rhetorical devices for the present study. The third element is the arrangement of various parts of treatment. It is claimed that a text should be well-organized into three parts: 1) introduction, 2) body part, and 3) conclusion. This element aids in identifying the other three (3) more rhetorical devices termed under the textual writing styles. In total, nine (9) rhetorical devices were considered in the light of these three elements with the support of the previous studies. These modes of persuasions are discovered to be in line with [Pennebaker's et al. \(2015\)](#) psycholinguistic dimensions. It is then followed by the rhetorical devices associated with the element of the word choice (i.e., *topoi*) and finally the rhetorical devices associated with the element of the arrangement of various parts of textual treatment. The last two elements are aligned with the compositionality model introduced by [Bulté and Housen \(2018\)](#).

### 2.1. Aristotelian Logos and LIWC2015 Analytical Thinking Domain

Essentially, an appeal to *logos* is an appeal to the logical mind. In linguistics, it covers theoretical and abstract, complex use of language, historical and literal analogies, definitive terms, classifications, facts, statistics, testimonials, citations and quotations from experts or credible authorities ([Aristotle & Kennedy, 1991](#)). It is also demonstrated in the form of supporting data, facts and figures to substantiate the topics presented by the speakers. According to [Myllylä \(2019\)](#), in rhetorical linguistics, *logos* is made up of presentations of reliable facts, valid quotations and citations. Logical reasoning is demonstrated to be persuasive when the writer introduces certain logical or analytical facts to the audience. Certain conclusive claims, generalisations or assumptions are derived from those facts. [Weida and Stolley \(1995\)](#) explain further that the reasoning behind the appeal to *logos* is based on reasonability and credibility of the facts. The appeal is used to induce cognitive responses and rational thinking in the audience.

In relation to psycholinguistic domains proposed by Language Inquiry of Word Count (LIWC) model, it is manifested by Analytical Thinking domain. It is because it captures all linguistic resources which are indicative of formal, logical, and hierarchical thinking

patterns used by writers when they write (Pennebaker et al., 2015). According to the LIWC model, writers who portray their high level of analytical thinking domain tend to show words which reflect cognitive processes, complex and impersonal explanations that are expressed in a non-narrative and impersonal manner. Smith-Keiling and Hyun (2019) found their study on analytical thinking domain as shown by international student native and non-native writers that words related to analytical thinking domain can be a significant descriptor in the writing of scientific research writing articles. Further examination revealed that analytical thinking performance increases over time. However, the study did not contrastively examine the difference and similarities between the two groups. In relation to the previous literature and the present study, three rhetorical devices identified to reflect analytical thinking domain and evoke the logical appeal of the writers as well as the readers include the use of the rhetorical devices of supporting data (Connor, 1990; Toulmin, 1985; Başçı & Hassan, 2020) in the form of numerical or non-numerical linguistic items, the use of complex and lengthy sentences in the expression of ideas (Lahuerta Martínez, 2018; Yin, Gao, & Lu, 2021), and formality level of the textual writing style (Larsson & Kaatari, 2020) of the text under consideration.

## 2.2. Aristotelian Ethos and LIWC2015 Clout Domain

*Ethos* is literally defined as “habit, custom” or “accustomed place”. According to Aristotle and Kennedy (1991), it is derived from the word, *ethikos* which denotes moral character or high level of moral character (p. 1). From the modern perspective, ethos refers to the ‘inner state or source of being, the soul or the mind or essence which is manifested by the prowess and power of an animal or a person (Aristotle & Kennedy, 1991, p. 2). Psychologically, it relates to the appeal to the authority, dynamic character, social power, credibility and honesty of the speakers or writers. In terms of linguistic denotation, it emphasises the writer’s enthusiasm in presenting information in an engaging manner that will result in resonating the rhetorical impact in the minds of their audience (Myllylä, 2019). Language used by the writers should be appropriately accorded to the segments of the audience, which is portrayed in the form of a restrained, sincere, fair presentation, direct engagement, inclusiveness attempts and future mindedness with consideration for appropriate vocabulary and grammatical accuracy. The function of ethos is to aid the writers in demonstrating their reliability, credibility, competence, and respect towards the audience’s values and beliefs (Aristotle & Kennedy, 1991).

In relation to the psycholinguistic domain of the LIWC model, the appeal to *ethos* can be represented and measured by the LIWC model’s Clout domain. According to Pennebaker et al. (2015), it is defined by ethic and authority related linguistic features which demonstrate their relativity of social status, confidence level, credibility, and leadership. Based on laymen definition, clout is known as the power of a writer’s or speaker’s influence, characterisation, and expertise in their specific discourses. The domain captures the linguistic items which reflect the authenticity, social strata, confidence, writer’s orientation, and position as well as leadership control. According to Smith-Keiling and Hyun (2019), clout domain was found to be a useful descriptor for psychosocial research studies, demonstrating the above-mentioned features, but it is not a significant descriptor for such features in scientific research writing. In relation to the previous literature and the present study, three rhetorical devices identified to reflect clout domain and evoke the ethical appeal of the writers include the demonstration of rhetorical devices of pronouns items in the form of personal and impersonal pronouns

(Choi, 2021; Li, 2021; Wang, Tseng, & Johanson, 2021), the orientation of future tense in the expression of ideas (Myllylä, 2019; Kongpetch & Thienthong, 2021), and personalism level of the textual writing style Li and Xu (2020) of the text under consideration.

### 2.3. Aristotelian Pathos and LIWC2015 Emotional Tone Domain

The third Aristotelian mode of persuasion in rhetoric is an appeal to *pathos*. Aristotle and Kennedy (1991) maintain that *pathos* is meant to appeal to the emotions of the writers and readers. Generally, appeal to emotions can be attained by using story-telling methods, metaphors, hyperboles, emotion-induced linguistic items manifested through the general passion shown in the way the information is delivered (Aristotle & Kennedy, 1991). In turn, it affects the judgement made by the audience which is influenced by their emotions. Myllylä (2019) holds that this mode of persuasion can be a powerful tool in academic writing, but it cannot be demonstrated as a stand-alone method of appeal. In fact, it becomes effective if the writers can connect with the underlying values and principles held by the readers. From the linguistic perspective, descriptive forms of language, connotative and emotive words and phrases, and emotionally loaded language, narrativity and indirectness in the method of delivery, and figurative use of examples which appeal to the emotional experiences reflect the presence of appeal to *pathos*. The role of *pathos* is eventually to demonstrate emotions and evoke an emotional reaction (Aristotle & Kennedy, 1991).

In relation to the LIWC model, *pathos* can be reflected and measured by the emotional tone domain. According to Pennebaker et al. (2015), this domain is determined by emotion related linguistic features used in the form of positive and negative words, and any phrases which reflect the affective process of the writers. Borchert (2018) further affirms that one of the ways to express and represent the attitude of the writers is achieved by the presentation of syntactic structure and word of choice. As supported by this argument, thus the use of emotive words should be able to reflect this domain well (Pennebaker et al., 2015). Furthermore, in relation to the previous literature and the present study, three rhetorical devices identified to reflect emotional tone domain served to evoke the emotional appeal of the writers include the demonstration of rhetorical devices of emotive items in the form of descriptive, negative, and positive words (Pérez-García & Sánchez, 2019; Cao, Lei & Wen, 2020), the passive voice constructions in the expression of ideas (Marquez, 2016; Amnuai, Kotuta & Duangprasertchai, 2020), and sentiment level of the textual writing style (Cao, Lei & Wen, 2020) of the text under consideration.

Thus, this study attempted to explore the rhetorical devices (i.e., linguistic features with rhetorical impact) used in English as a Native Language (ENL) and English as Second Language (ESL) research abstracts. In addition, the study aimed to explore the possibility of deriving a conclusion based on contrastive theory of rhetoric if similarities may suggest near-nativeness, whereas the groups' differences suggest lack of near-nativeness (Connor, 1996). According to Velasco (2020) that English nativeness and non-nativeness should not be overgeneralised to the overall competency of the ESL users, instead it should objectively be determined based on the skills in linguistic devices for their specific rhetorical appeals as shown by the users. Li (2020) also concurs that ESL writers can attain English native-like level of acquisition if they are exposed to intensive endeavours and experientially immersive learning experience in writing. Hyland (2006) agrees with this based on evidence that there has been a

dramatic increase in the number of ESL academicians who can write many native-like English publications of research reviews, research articles, academic lectures, master-level and doctoral theses and dissertations, or academic books owing to their high level of proficiency in the English academic writing skill.

### 3. Methodology

A quantitative method, descriptive and inferential statistics were adopted in studying 480 research abstracts from a total of 30 linguistics and education related indexed journals in terms of lexical, phrasal, sentential and textual density as well as the frequencies of lexico-grammatical rhetorical features. It is guided by integrated theoretical models from various existing theories and literatures.

#### 3.1. Research Design

Based on content analysis research design, the study sought to find out the frequency percentages of linguistic features with rhetorical effects in ENL and Malaysian ESL RAs. Two variables were identified which include modes of persuasion (i.e., *logos*, *ethos*, and *pathos* as rhetorical appeals) and the nativeness levels of research abstracts (i.e., ENL versus ESL groups). Nine rhetorical devices (RDs) were identified, justified, and mapped with each rhetorical appeal to *logos*, *ethos*, and *pathos*.

#### 3.2. Sampling

The study sampled 480 research abstracts (RAs) taken from various referred journals and university repositories since it is a content analysis study without direct involvement of the RAs writers. The sampling was based on a criterion sampling method detailed out as follows.

- I. The research abstracts (RAs) were published from 2013 – 2018 (6 years' period).
- II. 40 ENL and 40 Malaysian ESL RAs proportionately sampled per year (80 RAs X 6 years with a total of 480 RAs). The sample size is double the sample size of RAs used by [Kaplan, Cantor, Hagstrom, Kamhi-Stein, Shiotani and Zimmerman \(1994\)](#) on their study of 294 research abstracts.
- III. Information in the RA such as the writers' names, university or institutional affiliations and the country of the institutions (i.e., place of publications where English is the de facto official first language namely, USA, UK, and Australia) is used in the sampling process of ENL RAs. As for Malaysian ESL RAs, similar details were used as the identifying features (with Malaysia as the place and country of publications where English as the de facto official second language). The same method of criterion sampling was applied by [Li and Xu \(2020\)](#) in their contrastive study on native and non-native English research articles sampled from various journals of social sciences.
- IV. The number of words for each selected RA were within 100–250-word range with an average of 200 words per RA. By practice, [Camara \(2019\)](#) maintains that 250-word long research abstracts were identified to be the most common length for the writing of any research abstract in most journals.
- V. Topics of the research abstracts include English language, linguistics, English education, users' proficiency skills in writing, reading, listening, and speaking. The topics were the common topics to the ESL academicians, postgraduates, and researchers.

### 3.3. Materials and Procedure

The method to collect the data was based on the formulated Researcher’s Selection and Mapping Table of Rhetorical Devices as the guiding instrumentation in the data collection process (Refer to [Table 1](#)).

Table 1: The Researcher’s Selection and Mapping Table of Rhetorical Devices

		1) THREE (3) MODES OF PERSUASION		
		APPEALS TO LOGIC <i>(Logos)</i>	APPEALS TO ETHICS <i>(Ethos)</i>	APPEALS TO EMOTIONS <i>(Pathos)</i>
		CHARACTERISTICS/ DESCRIPTORS		
Aristotelian Three (3) Rhetorical Components of Discourse <a href="#">(Aristotle &amp; Kennedy, 1991)</a>		Theoretical, abstract language, systematic organisation, definitions, factual data and statistics, quotations, citations from experts and authorities, informed opinions	Language appropriate to audience, appropriate, sincere, fair, and future minded presentation, appropriate vocabulary, correct grammar, focus on dynamism, direct involvement in action in future matters	Descriptive, emotive language, connotative and descriptive meanings, narrative descriptions, emotional tone, and figurative language, indirectness, and carefulness in language
		RHETORICAL EFFECTS		
		Evokes a cognitive, rationale response	Demonstrates the author's credibility, competence, vigour, and respect.)	Evokes an emotional response
		MAPPING OF THREE (3) LIWC2015 PSYCHOLINGUISTIC DOMAINS <a href="#">(Pennebaker, et al., 2015)</a> & NINE (9) RHETORICAL DEVICES (RDs)		
		ANALYTICAL THINKING (ANALYTIC)	CLOUT (CLOUT)	EMOTIONAL TONE (TONE)
2) <i>Topoi</i> (choice of words/ language) Compositionality of Writing Model <a href="#">(Bulté &amp; Housen, 2018)</a>	Lexical- phrasal level	RD1: Numerical- Nominal Data (Numbers, Percentage - Proper Academic or Technical Phrases) (e.g., more than 90% ..., The study was conducted in 6 schools, involving 17 teachers..., TESL, EAP)	RD1: Pronouns <i>(Personal versus impersonal)</i> (e.g., ‘I’, ‘my’, ‘we’, ‘our’, ‘they’, ‘theirs’ as opposed to ‘it’, ‘its’, ‘those’, ‘these’)	RD1: Emotive Phrases 1) Positive and negative nouns (e.g., opportunities, achievement, success, challenges, problems,) 2) Positive and negative adjectives (e.g., useful, effective, important, lacking, limited)
	Sentential level	RD2: Lengthy-Complex Sentences (e.g., subordination such as ‘after...’, ‘because ...’, ‘in which...’; coordinating conjunctions such as ‘but...’)	RD2: Future Tense (e.g., The study will contribute..., In the future, the findings can help...)	RD2: Passive Voice (e.g., It was found..., the implications are highlighted..., the method has been applied in different settings...)
3) Arrangement of Text	Textual Style	RD3: Formality: Formal <i>(from Informal- formal continuum)</i>	RD3: Personalism: Impersonal/Writer-oriented <i>(to Personal/Reader-oriented)</i>	RD3: Sentiment: Positive/ Negative <i>(Negative-Neutral-Positive Language)</i>

The table was designed from an integrated framework of three linguistic models which entailed:

- I. Three Aristotelian Rhetorical Components of Discourse by [Aristotle and Kennedy \(1991\)](#),
- II. Psycholinguistic Model of Linguistic Inquiry and Word Count (LIWC2015) by [Pennebaker et al. \(2015\)](#) and
- III. Writing Compositionality Model by [Bulté and Housen \(2018\)](#)

Based on [Table 1](#), it shows that three rhetorical devices (RDs) were mapped accordingly based on the three integrated models. It was first based on the description of the RDs which matches the description of their appeal to logos, ethos, or pathos with their rhetorical effects as introduced by [Aristotle and Kennedy \(1991\)](#), being the first component of the model, which is integrated and accorded with LIWC three domains (i.e., analytical thinking, clout/ authority, emotional tone). In addition, [Aristotle and Kennedy \(1991\)](#) prescribes the second Aristotelian component (*topoi* or choice of language based on themes) and the third Aristotelian component (i.e, arrangement of text) as the last components of an effective discourse, which are also integrated and accorded with compositionality of writing model introduced by [Bulté and Housen \(2018\)](#). Thus, while tabulating the same RDs into the researcher's selection and mapping table based on the first integrated component, the same RDs must also conform to the requirements of the remaining integrated components.

The purpose of the present study was to find out if the accorded RDs which had been selected based on these guiding components sufficiently represented each appeal to *logos*, *ethos*, and *pathos* accordingly. Three RDs were mapped to be represented by appeal to *logos* include numerical-nominal supporting data at lexical-phrasal level (RD1), lengthy complex sentences at sentential level (RD2), and degree of formality at textual writing level (RD3) accompanied by examples in the table. Next, three RDs were mapped to be represented by appeal to *ethos* include Pronouns at lexical-phrasal level (RD1), future tense orientations at sentential level (RD2), and degree of personalism at textual writing level (RD3) also with examples provided in the table. Finally, three RDs were also mapped to be represented by appeal to pathos include emotive phrases at lexical-phrasal level (RD1), passive voice constructions at sentential level (RD2), and degree of sentiment at textual writing level (RD3) with examples provided in the same table. In total, nine RDs were mapped in [Table 1](#) for validation of their rhetorical functions.

The selection and mapping table serves to direct and guide the researcher for the analysis of the broad domains and sub-analyses of the rhetorical devices. The mapping is based on scholarly studies and references of previous literature on each of the nine (9) rhetorical devices as elucidated in [Table 2](#).

Table 2: Summary of Nine Rhetorical Devices (RDs) and Guiding References for Mapping

No.	RDs ( <i>Logos</i> )	Logical Appeal – LIWC2015 Analytical Dimension
1.	Data-related Supporting Phrases (lexical-phrasal)	Data related phrases function as supporting details which can be the determining characteristics of rational appeal due to its a persuasive form of logical linguistic resources ( <a href="#">Toulmin, 1985</a> ; <a href="#">Higgins &amp; Walker, 2012</a> ).
2.	Lengthy Complex	Analytically complex sentences are demonstrated in the form of extended or lengthy sentences ( <a href="#">Don &amp; Srinivass, 2017</a> ; <a href="#">Chanyoo,</a>

	Sentences (Sentential)	2018; Saud, 2018).
3.	Formality (textual)	Smith-Keiling and Hyun (2019) concludes from their study that degree of formality is a salient descriptor for the ENL and ESL scientific writing.
No.	RDs ( <i>Ethos</i> )	Ethical Appeal – LIWC2015 Clout Dimension
1.	Pronoun Phrases (lexical-phrasal)	Pronouns are the linguistic resources for authorial voice that can demonstrate the visibility level of the writers (Choi, 2021; Li, 2021; Wang, Tseng, & Johanson, 2021), satisfying the rhetorical aim to <i>ethos</i> (Aristotle & Kennedy, 1991).
2.	Future Tense Sentences (Sentential)	Dynamic element is entrenched in the form of future tense, meant to communicate as well as emphasize future efforts (Khelifi & Bouri, 2018; Myllylä, 2019).
3.	Personalism (textual)	Overapplication of impersonal, and reader-responsible form of writing puts the onus of responsibility on the readers to extract any implied ideas from a text, thus reducing their understanding ability (Rillo & Alieto, 2020).
No.	RDs ( <i>Pathos</i> )	Pathetical Appeal – LIWC2015 Emotional Tone Dimension
1.	Emotive Phrases (lexical-phrasal)	Emotive words include emotionally appealing words which can evoke feelings from the writers and readers (Lench & Bench, 2012; Pennebaker et al., 2015; Pérez-García & Sánchez, 2019; Cao, Lei & Wen, 2020).
2.	Passive Voice Sentences (Sentential)	Rhetorical appeal to <i>pathos</i> is shown by psychological effect of passivity (Myllylä, 2019) and indirectly but vividly shown through carefulness in language, circumlocution, voice passiveness (Aristotle & Kennedy, 1991).
3.	Sentiment (textual)	Sentiment is demonstrated through positive or negative types of language to convey an emotion-laden message (Pérez-García & Sánchez, 2019).

### 3.4. Data Collection and Analysis

In the data collection process, a checklist based on the criterion sampling method was ticked if each criterion in collecting the research abstracts was fulfilled to be part of the final samples. The collected 480 RAs satisfied a minimum of 80 percent of all the criteria before the data were analysed.

Based on Table 3, 4.5 from 5 criteria were fulfilled which is equal to 90.00 percent fulfilment of all the criteria. 10 percent is missing due to lack of the proportionate selection of RAs according to the listed topics. This is because all topics were lumped under the broad category of common topics on English and Linguistics. However, due to the criteria fulfilment of more than 80 percent, all 480 RAs were still validated to be used for data analysis. Thereafter, the data were simply imported into two data analysis tools which can automatically analyse and generate the frequency percentages for various types of linguistic devices, including the nine rhetorical devices mapped in the Researcher's Selection and Mapping Table of Rhetorical Devices based on three integrated models earlier (Refer back to Table 1).

There were two analysis tools used to analyse the broad domains and the nine rhetorical devices. These tools were LIWC2015 application software (Pennebaker et al., 2015) and Readable.com online application (Readable, 2021) which were subscribed with one-month access for the purposes of the present study. Both are quantitative analysis tools which can auto-analyse and generate the frequency scores in percentages (Frequency occurrence of RDs against the total number of words and sentences).

Table 3: Checklist on Fulfilment of Criteria in the Collection of Research Abstracts

No.	Criteria	Remarks	Yes (✓)/ No (✗)
1.	Were RAs published within 6 years?	i.e., 2013 – 2018	✓
2.	Was each year from 2013 - 2018 proportionately represented?	i.e., 40 ENL and 40 Malaysian ESL RAs per year with a total of 480 RAs	✓
3.	Were RAs identified based on the author's names, institutional or university affiliations, and the country?	i.e., Both ENL and ESL	✓
4.	Was each selected RA within the 100–250-word range?	i.e., An average of 200 words/ RA	✓
5.	Do ENL and ESL groups entail general topics?	i.e., English language, linguistics, education, proficiency skills; reading, writing, speaking, and listening	✓*
	i) Number of words identified for each sub-topic in criteria no. 5.	i.e., selection of RAs proportionately done according to topics.	✗

Note: ✓\* English Literature also included.

As an artificial intelligence scoring engine, LIWC2015 software provides a quantitative method for analysing texts individually such as written speeches, blog contents, articles, and various types of texts by assessing the lexical items used for the intended psycholinguistics components which include various emotional, cognitive, social, and structural elements against the total number of words in a text (Pennebaker et al., 2015). It is built upon several important elements in any discourses, also known as summary variables or summary domains. Three domain variables are Analytical Thinking, Clout and Emotional Tone. This application was used to analyse the three broad domains (analytical thinking, clout, and emotional tone) along with all rhetorical devices at lexical-phrasal levels. These included numerical nominal supporting data for appeal to *logos*, pronouns for appeal to *ethos*, and emotive words for appeal to *pathos*. Every occurrence of rhetorical devices at lexical-phrasal level was computed and divided against the total number of words in a research abstract to produce the frequency scores in percentages.

Meanwhile, Readable.com online application is another quantitative analysis tool which aids in automatically analysing a writer's text complexity and difficulty levels based on the textual typography, familiarity, legibility, and complexity levels of the uploaded text (Readable, 2021). A set of criteria computed from factors such as number of words, sentence length, parts of speech, technical, or non-technical lexical familiarity, density of syllables and words were used as the determining elements. This application was used to analyse the rhetorical devices at sentential and textual levels. Respectively, these included lengthy complex sentences and degree of formality for appeal to *logos*, future tense orientation and degree of personalism for appeal to *ethos*, and passive voice constructions and degree of sentiment for appeal to *pathos*. Every occurrence of rhetorical devices at sentential levels was computed and divided against the total number of sentences in a research abstract to generate the frequency scores in percentages.

As for the degree of textual writing style, formality analysis provides the extent of a text to be either concluded on an informal, conversational, or formal continuum based on the exhibited parts of speech and the relevant linguistic items. One of the criteria says that a text falls under conversational category on this continuum when it utilises less frequencies of prepositions and more demonstrations of pronouns compared to a text that falls under the formal type which should thus exhibit more prepositions and less presence of pronouns (Readable, 2021). A scale of measurement for formality based on a score range of 0 to 20 points (i.e., from informal, conversational to formal range) generated by Readable.com indicates under which the category a text should fall. Personalism measures whether a text is written and focused on the reader (personal) than the writer (impersonal). A textual score increases its level of Personalism for exhibiting words such as 'you' and 'your' as opposed to words such as 'we' or 'our' in which the former group of words is more reader-oriented (or personal) while the latter group of words is more writer-oriented (or impersonal). A textual score which falls within 0 – 49 percent is categorised as impersonal, 50 percent as neutral, and 51 - 100 percent as personal. The final textual writing style is the degree of sentiment in which a sentiment analysis shows whether a given text is demonstrated by mostly positive, negative, or neutral types of language. The way a text is computed is by dividing and analysing the RA into three parts; the beginning, middle and end which is then averaged out to generate the overall sentiment score from 1.00-45.00 percent for negative type of language, 46.00-54.00 percent for neutral type of language and 55.00-100.00 percent for positive types of language (Readable, 2021).

Finally, all the data analysed and generated from the LIWC2015 software application and Readable.com online application were exported into excel files for data cleansing (taking scores for the RDs under this research consideration) and then run with SPSS for frequency scores, percentages, independent sample t-tests and multiple regressions.

## 4. Results

### 4.1. What are the average lexical, sentential, and textual levels of density in both ESL and Malaysian ESL research abstracts?

Table 4 shows an independent sample t-tests on average lexical, sentential, and textual levels of densities per research abstract (RAs). It was found that 240 RAs from ESL group ( $M = 195.11$ ,  $SD = 46.60$ ) demonstrated a significantly higher average number of words per research abstract than ENL group of RAs ( $M = 185.88$ ,  $SD = 35.47$ ),  $t(478) = 2.44$ ,  $p = .015$ . Cohen's (1988) convention maintains that the ranges of effect size include 'very small effect' ( $d = .18$ ), 'small effect' ( $d = .20$ ), 'medium effect' ( $d = .50$ ) or 'large effect' ( $d = .80$ ). The effect size ( $d = .223$ ) for the difference at lexical level fell within the small range of effect size. This suggests that RAs from the ESL group exhibited an overall greater number of words compared to the RAs from ENL group. Thus, in the writing of RAs, it can be alternatively concluded that ENL groups of RAs apply less words in expressing their research ideas than their ENL counterpart.

An independent t-test analysis of the difference for sentential level also found that the ENL group of RAs ( $M = 6.83$ ,  $SD = 1.97$ ) from were found to demonstrate significantly lower average number of the sentences per research abstract than the ESL group ( $M = 8.25$ ,  $SD = 2.15$ ),  $t(478) = 7.51$ ,  $p < .001$ . According to Cohen's (1988) guidelines, the effect size ( $d = .686$ ) was found to fall within the medium range. Therefore, the ENL

group of research abstracts tend to apply fewer sentences compared to the ESL group of RAs.

Table 4: Independent Sample t-Tests on Average Scores of Linguistic Items at Lexical, Sentential, and Textual Densities of ENL and Malaysian ESL Research Abstracts

Types of Densities		Mean	Std. Deviation	<i>t</i>	<i>df</i>	<i>Sig. (p)</i>	Cohen's <i>d</i>
Average Words per RA	ENL	185.88	35.47	2.44	478	.015	.223
	ESL	195.11	46.60				
Average Sentences per RA	ENL	6.83	1.97	7.51	478	.000	.686
	ESL	8.25	2.15				
Average paragraphs per RA	ENL	1.06	0.48	0.00	478	1.00	.000
	ESL	1.06	0.39				

*t* = independent sample t-test

However, it was found that the ENL group of RAs ( $M = 1.06$ ,  $SD = 0.48$ ) *did not show any significant difference* than the ESL group ( $M = 1.06$ ,  $SD = 0.39$ ) in terms of the average number of paragraphs per RA,  $t(478) = 0.00$ ,  $p = 1.00$ . To further validate the finding, the effect size ( $d = .000$ ) was also found to fall below any of the lowest ranges of the effect size as well. Therefore, both ENL and ESL RAs were found to demonstrate a relatively similar number of paragraphs in which overall, their RAs do not have any paragraphs. If there is any, the RAs showed minor differences. It can be concluded that most RAs tend to exhibit nearly a similar number of paragraphs.

#### 4.2. Are there any differences between ENL and Malaysian groups of ESL RAs in terms of the demonstration of their rhetorical appeal to Logos (analytical thinking domain), Ethos (Clout domain) and Pathos (Emotional Tone domain)?

Table 5 shows the independent sample t-tests on rhetorical appeals (*logos*, *ethos*, *pathos*) based on LIWC broad domains (Analytical Thinking, Clout and Emotional Tone) between 240 ENL and 240 ESL groups of research abstracts. The ENL group ( $M = 95.95$ ,  $SD = 3.87$ ) showed a significantly lower appeal to analytical thinking domain than ESL group ( $M = 96.95$ ,  $SD = 2.74$ ), thus indicating their lower demonstration of appeal to *logos*,  $t(478) = 3.25$ ,  $p = .001$ . The effect size ( $d = .298$ ) fell within the small range of Cohen's *d* effect size. Similarly, the ENL group ( $M = 46.46$ ,  $SD = 23.74$ ) was also found to show a significantly lower appeal to *pathos* (i.e., the occurrence of emotional tone domain) than the ESL group ( $M = 52.45$ ,  $SD = 25.75$ ),  $t(478) = 2.57$ ,  $p = .01$ . The effect size ( $d = .24187$ ) fell within the small range. Nonetheless, both ENL ( $M = 66.49$ ,  $SD = 12.52$ ) and ESL group of RAs ( $M = 67.20$ ,  $SD = 11.88$ ) did not show any significant difference in their appeal to *ethos* (i.e., the demonstration of clout domain),  $t(478) = 0.62$ ,  $p = .529$ . The effect size ( $d = .059$ ) is also confirmed to fall below the minimum range of effect size, thus verifying its insignificant finding. Therefore, it can be concluded that ENL group of RAs were less rhetorically appealing than ESL group in terms of their rhetorical appeals to *logos* (analytical thinking domain) and *pathos* (emotional tone domain). However, both groups of ENL and ESL RAs were nearly similar in terms of the tendency to exhibit their

rhetorical appeal to *ethos* (clout or authority related domain) due to their insignificant difference.

Table 5: Independent Sample t-Tests on Rhetorical Appeals (Logos, Ethos, Pathos) Based on LIWC Broad Domains (Analytical Thinking, Clout and Emotional Tone) Between ENL and ESL Research Abstracts

Rhetorical Appeals (LIWC Broad Domain)		Mean	Std. Deviation	<i>t</i>	<i>df</i>	Sig. ( <i>p</i> )	Cohen's <i>d</i>
<i>Logos</i> (Analytic)	ENL	95.95	3.87	3.25	478	.001	.298
	ESL	96.95	2.74				
<i>Ethos</i> (Clout)	ENL	66.49	12.52	0.62	478	.529	.059
	ESL	67.20	11.88				
<i>Pathos</i> (Emotional)	ENL	46.46	23.74	2.57	478	.010	.241
	ESL	52.45	25.75				

*t* = independent sample t-test

**4.3. Are there any correlations among all three rhetorical devices identified respectively for each of the three LIWC domains of Logos, Ethos and Pathos?**

Table 6 shows multiple regression analysis of rhetorical appeals (*logos, ethos, pathos* based on LIWC broad domains - analytical thinking, clout and emotional tone) and the nine rhetorical devices. The purpose was to see if all the three rhetorical devices are correlated with each other and with the LIWC broad domain. The data for the broad domains and lexical-phasal level rhetorical device were analysed by LIWC2015 software application meanwhile the data for sentential- and textual- level rhetorical devices were analysed by Readable.com online application.

Table 6: Multiple Regressions of Rhetorical Appeals (Logos, Ethos, Pathos based on LIWC Broad Domains: Analytical Thinking, Clout and Emotional Tone) and Nine Rhetorical Devices

Rhetorical Appeals (LIWC Broad Domains)		Mean Square	<i>df</i>	<i>F</i>	Sig. ( <i>p</i> )	<i>R</i>	<i>R</i> <sup>2</sup>
<i>Logos</i> (Analytical thinking) with Numerical-Nominal, Lengthy Complex Sentences and Degree of Formality	Regression	578.09	3	72.691	.000	.561	.314
	Residual	7.953	476				
<i>Ethos</i> (Clout) with Pronouns, Future Tenses, Sentences, and Degree of Personalism	Regression	1546.45	3	11.04	.000	.255	.065
	Residual	140.03	476				
<i>Pathos</i> (Emotional) with Emotive Phrases, Passive Sentences, Degree of Sentiment	Regression	21944.96	3	45.11	.000	.471	.221
	Residual	486.38	476				

*F* = multiple regression test

The analysis revealed that the three rhetorical devices of numerical-nominal data from lexical-phrasal level, lengthy complex sentences from sentential level and formality degree from textual level statistically predicted the analytical domain (measuring the rhetorical appeal to *logos*),  $F(3, 476) = 72.691$ ,  $p < .0001$ ,  $R^2 = .314$ . All three variables were also found to add significantly to the prediction of the domain as well,  $p < .05$ . As for the clout domain, the analysis showed that the three rhetorical devices of pronouns from lexical level, future tense orientation from sentential level and degree of personalism degree from textual level statistically predicted the clout domain, measuring the rhetorical appeal to *ethos*,  $F(3, 476) = 11.043$ ,  $p < .0001$ ,  $R^2 = .065$ . However, not all three rhetorical devices added significantly to the prediction of the domain,  $p < .05$ , except for RD of pronouns. Finally, the analysis of *pathos* revealed that the rhetorical devices of emotive phrases from lexical-phrasal level, passive voice constructions from sentential level and sentiment degree from textual level statistically predicted emotional tone dimension, measuring the appeal to *pathos*,  $F(3, 476) = 45.119$ ,  $p < .0001$ ,  $R^2 = .221$ . All three variables added significantly to the prediction of the domain,  $p < .05$ .

## 5. Discussion

Connor' (1996) Modern Contrastive Theory of Rhetoric aided the study in investigating the manifestation of three components of Aristotelian Rhetoric for an effective discourse (Aristotle & Kennedy, 1991). The three major components entail i) the modes of persuasion (rhetorical appeals to *logos*, *ethos*, and *pathos*), ii) *topoi* or choice of words/ language, and iii) arrangement of text. These components served as the main backbone of the theoretical guide in the mapping and selection of nine (9) rhetorical devices demonstrated in the writing of ENL and ESL groups of research abstracts.

From the findings, it is sufficient to conclude that ESL writing of research abstracts write greater numbers of lexical-phrasal words and greater number of sentences than the ENL writing of research abstracts. This may suggest the ESL group's lack of near-nativeness in these two operational levels. Due to their insignificant difference (nearly similar level of demonstration), both groups show almost similar levels of densities in their paragraphing of research abstract writing. This can be indicative of ESL level of near-nativeness competence in which they know that research abstracts do not apply paragraphing as shown by the lack of paragraphing pattern of ENL research abstracts. This finding is validated by Hyland (2006) who agrees there has been a dramatic increase in the number of ESL academicians who could write as good as the native writers due to their direct emulation of the ENL writing pattern.

In terms of their appeals to the broad psycholinguistic domains, it can be concluded that ESL writing of research abstracts demonstrated significantly higher rhetorical aims to logical (*logos*), and emotional domains (*pathos*) compared to the ENL writing of research abstracts. This can suggest that they are yet to achieve the level of near-native competence in the skills of writing with the aims of these two rhetorical appeals to the writer's analytical thinking and emotional domains. However, the ESL writing of research abstracts presented a near-nativeness level of competence in the rhetorical appeal to clout or authority domain based on their almost similar level of demonstration of the appeal to *ethos* (e.g., language credibility and respect) with the ENL writing. Velasco (2020) argues in support of this linguistic capability that near-native level of competence is attainable based on specific categories of linguistic skills, and in this case is the manifestation of rhetorical skills in the language credibility of the ESL writing with

specific rhetorical aim to the ethical appeal. Finally, all three rhetorical devices identified based on their rhetorical appeals and aims were found to correlate well with their respective appeals (Aristotle & Kennedy, 1991), which further validated the selection and mapping table of the RDs guided by the integrated models based on previous scholarly references and literature.

## 6. Conclusion

In conclusion, the study conducted quantitative data analyses of the first Aristotelian component - rhetorical appeals to *logos*, *ethos* and *pathos* (which had been integrated with Pennebaker et al. (2015) LIWC2015 three domains - Analytic, Clout and Emotional Tone). Then, it conducted quantitative analyses of frequency percentages of the occurrence of rhetorical devices for each domain to fulfil the second and third Aristotelian components (which had been integrated with compositionality model by Bulté and Housen (2018)).

The study sought to be comprehensive in its systematic attempt and approach of quantitative analyses by trying to cover all operational levels of a written text. The study concludes that the ESL group of research abstracts differ from ENL groups with their higher level of demonstration in the number of words, sentences, and appeal to logical and emotional appeal in the writing of research abstracts. However, the ESL group presented a near-native level of competence in terms of the demonstration of skill in applying the levels of paragraphing in research abstract and appeal to the ethical domain. This finding is concurred by Li (2020) who maintain that ESL writers can acquire a native-like level of English if they are exposed to the right amount of intensive and immersive writing experience. The implication of the study helps shed light on the applicability of analytical tools used for evaluating the effective demonstration of rhetorical devices for three Aristotelian rhetorical appeals used in academic writing and research writing. This study contributes to the existing literature by examining the application of nine rhetorical devices (RDs) identified based on an integrated framework of Aristotelian rhetoric and LIWC's psycholinguistic dimensions. In addition, it systematically analysed the RDs with a combination of two rhetorical analysis tools at the varying syntactic levels. Future research endeavours can further explore the applicability of these tools and the presence of the identified rhetorical strategies used in the other sections of research articles.

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## Conflict of Interests

The authors declare no conflict of interest in this study.

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