Revealing the rhetorical moves and linguistic patterns in discipline-related undergraduate thesis

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ARTICLE INFO	ABSTRACT
	Previous studies have provided exciting findings for language variations in theses and dissertations. However, not many studies have revealed the rhetorical analysis of the undergraduate abstracts. This study investigated the rhetorical structure of undergraduate thesis abstracts to reveal the constructions of the genre by novice writers. It further explored the variations between two groups of writers, students with the native language of English and Indonesian students writing in English. The aim was to present the commonalities and differences within the genre and finally conclude the genre's conventions. The corpus for this study consisted of 180 undergraduate thesis abstracts from 12 universities in the United States, New Zealand, and Indonesia from Computer Science. The findings of this study revealed certain conventions consisting of rhetorical moves and rhetorical strategies used to perform the rhetorical moves. Differences between native writers of English and non-native writers of English included the use of lexical items and lexico-grammatical constructions in presenting arguments and evidence. The study concluded that socio-cultural factors, such as institutional guidelines for thesis writing and students' first language, may contribute to the genre's variations.

Research in university has been regarded as gatekeeper for quality in universities (Hyland, 2012). For students, this is translated as writing research based final papers, or theses. A good thesis would then gain acknowledgment from its readers and becomes a reference for further research. In a thesis the persuasive effect appears as early as in its abstract. An abstract of a research paper has been studied for its structures and functions. Abstract as a genre consists of certain macrostructure and microstructure (Santos, 1996; Nwogu,

1997; Hyland, 2000; Kanoksilapatham, 2013; Arsyad, 2014; Atanassova, Bertin, & Lariviere, 2016; Amnuai, 2019). An abstract also has certain rhetorical moves (Halliday & Hasan, 1989, 2013; Swales, 1990), comparatively different from other parts of a thesis.

A thesis abstract appearing at the beginning of a thesis covers major or critical issues. When accessible through e-repositories, an abstract would usually be the only text people read from a thesis. As a result, large numbers of research fidelity available in the library will eventually be left unnoticed. An abstract effectively captures the essence of research (Bhatia, 1993; O'Connor, 2009; Koltay, 2010). A good abstract can depict the significant contributions of the study and persuade people to continue reading the thesis (O'Connor, 2009).

The macrostructure of an abstract consists of the research topic, motivation, or reason to conduct the research, the method in conducting the research, results of the investigation, and conclusion. On the other hand, the microstructure of an abstract is an amalgamation of various linguistic devices used to accomplish the communication purposes of each rhetorical move. Generally, an abstract may consist of 3 to 5 rhetorical moves (Halliday & Hasan, 1989, 2013; Swales, 1990). Typically, an abstract begins with introducing the issue to be researched, then presents the problem to be investigated/the purpose/motivation of the research, methods used in the research, results/products of the research, and finally ends with the conclusion of the research.

A model of the rhetorical structure of an abstract proposed by Hyland (2000) based on 800 abstracts in eight disciplines reveals an abstract with five moves. The rhetorical move structure consists of I-P-M-Pr-C (Introduction-Purpose-Method-Product-Conclusion). An abstract is also noted for using Past Tense in Method rhetorical moves, whereas Introduction and Purpose moves generally use Present Tense (Amnuai, 2019). Furthermore, studies have also shown specific language devices to create a stance by using hedges, boosters, and attitude markers. The language devices can also increase persuasiveness/engagement (Hyland and Jiang, 2017) in abstracts. However, no study was conducted to comprehensively identify the use of specific linguistic devices concerning the use of the rhetorical move. Knowing whether a rhetorical move requires certain words, phrases, and sentence construction is essential.

Variations in rhetorical moves are identified in abstracts, covering 3 to 5 rhetorical moves in abstracts. These variations are affected by the conventions of the disciplines, such as Applied Linguistics (Tseng, 2011; Suntara & Usaha, 2013; Pho, 2014; Can, Karabacak, & Qin, 2016), Biology (Samraj, 2005), Educational Technology (Pho, 2014), Linguistics (Suntara & Usaha, 2013), Psychology (Samraj, 2005); Tourism (Iaorr & Jarunthawatchai,

2014), and Sociology (Sanz, 2014). Variations in rhetorical moves and linguistic devices could apply the convention of a discipline or field. Abstracts in Social Sciences, for example, focus more on presenting the issues (Santos, 1996; Nwogu, 1997) and on identifying gaps in previous studies (Swales & Feak, 1994, 2009) and a manner of invitation (Pho, 2008). Meanwhile, Pure/Natural sciences abstracts usually focus more on the problem/motivation for research and the method/procedure in finding solutions to the problem (Samraj, 2005; Apple, 2014). Computer Science is a newly emerging and vastly developing discipline (Hyland, 2012) and uses a five-move rhetorical structure of I-P-M-Pr-C (Introduction-Purpose-Method-Product-Conclusion) (Hyland, 2000; Hyland & Tse, 2005, 2007). Five rhetorical moves are typical of social sciences, unlike four rhetorical moves (without I rhetorical move) in pure sciences.

Also, variations emerge from the language backgrounds of the students as writers, such as Arabic (Fallatah, 2016); Indonesian (Basthomi, 2006; Arsyad and Arono, 2018), Japanese (Apple, 2014); Spanish (Sanz, 2014), Thai (Amnuai, 2019), Turkish (Ozmen, 2016), and Vietnamese, (Zhang, Thuc, & Pramoolsook, 2012). In countries where English is taught as a foreign language, difficulties are identified in presenting convincing arguments and making propositions. Students are determined to overuse boosters to convince the degree of arguments (Hyland and Jiang, 2017) and underuse hedges to present objective and factual statements.

The more rudimentary issue falls on students' limited abilities to write confidently in their discipline community (Hyland, 2006; Apple, 2014; Ozmen, 2016; Hyland and Jiang, 2017; Amnuai, 2019). There has been a general take such differences from typical native English writers would be linked to underperformance. Such perceptions have also been supported by findings in studies from several countries around the world, such as Saudi Arabia, Vietnam, Japan, Turkey, and Indonesia (Fallatah, 2016; Zhang, Thuc, & Pramoolsook, 2012; Apple, 2012; Ozmen, 2016; Cahyono, 2001). All of these studies have shown similar conclusions, in which problems faced by students in writing abstracts were linked to low scores or weak performance in English courses. There are no further investigations on whether other contributing factors rather than the low scores in English contribute significantly to English writing performance. The previous studies suggest that, in general, academic writing still becomes the biggest challenge for scholars.

Different studies also consider the challenges in writing as due to the challenge of studying other structures in a language foreign to learners (Flowerdew, 2012, 2013; Adnan, 2009; Arsyad, Purwo, Sukamto, & Adnan, 2019). Student writers may be unfamiliar with the thesis structure, including the abstract (Swales and Feak, 1994; Chang, 2016), and may not be familiar with the rhetorical moves required in an abstract. However, no studies have

identified the possible factors related to the differences in the process and used students' perspectives in revealing the socio-cultural factors regarding variations in thesis writing. While several studies have been done on the writing of abstracts by Indonesian learners (Safnil, 2006; Arsyad & Arono, 2018), none focuses on undergraduate students' research abstracts.

With such a gap, this study aims to explore the standard conventions and possible variations in undergraduate thesis abstracts in Computer Science and find the explanations for the variations (if any). This study is to answer the main questions below:

(1)   What similarities and differences in the use of rhetorical moves could be identified in Computer Science abstracts from native speakers and Indonesian students' undergraduate thesis written in English?

(2)   What similarities and differences in the use of linguistic devices could be identified in Computer Science abstracts from native speakers and Indonesian students' undergraduate thesis written in English?

METHOD
The Corpus

This study's corpus comprised 180 undergraduate students' thesis abstracts in Computer Science. Ninety abstracts were from students in Indonesian universities (henceforth ISA) and English-native universities (henceforth NISA). All abstracts were obtained from university websites. The Indonesian corpus consisted of 90 abstracts from 6 universities. Table 1 below shows the universities included in ISA:

Table 1. Abstracts from ISA and NISA

Name of Universities	Number of Abstracts (N=90)	Category of Abstracts
Universitas Bina Nusantara	15	ISA
Institut Pertanian Bogor	15	ISA
Institut Teknologi Surabaya	15	ISA
Universitas Indonesia	15	ISA
Universitas Muhammadiyah Surakarta	15	ISA
Universitas Andalas	15	ISA
Harvard University	15	NISA
Georgia Institute of Technology	15	NISA
Cornell University	15	NISA
University of Michigan	15	NISA
University of Colorado	15	NISA
University of Tasmania	15	NISA
	180	

Corpus Tools

AntConc 3.5.9 (2020) was used to generate data from the corpus. The instrument generates data for wordlist, concordance, and the keyword in context.

Instruments

This present study used two instruments to identify rhetorical moves and linguistic devices. The first instrument was communicative functions (Hyland, 2000). This instrument was used to identify functions of communicative purposes in the rhetorical moves. The second instrument was Interactive and Interactional Metadiscourse (Hyland, 2005). The second instrument was used as the Wordlist in AntConc 3.5.9 (2020). Using this instrument, AntConc was able to generate linguistic devices in the corpus.

Table 2. Communicative functions in abstracts (Hyland, 2000)

Rhetorical moves		Rhetorical Move Function
Introduction	(1)	establishes the context of the paper
	(2)	motivates the research or discussion
Purpose	(1)	indicates purpose
	(2)	indicates thesis or hypothesis
	(3)	outlines the intention behind the paper.
Method	(1)	Provides information on design
	(2)	Provides information on procedures
	(3)	Provides information on assumption
	(4)	Provides information on the approach
	(5)	Provides information on data
Product	(1)	States main findings or results
	(2)	states the argument
	(3)	states what was accomplished
Conclusion	(1)	interprets or extends results beyond the scope of the paper
	(2)	draws inferences
	(3)	points to applications
	(4)	points to wider implications

Data Analysis Procedures

Analysis of the data was done first in the macrostructure of abstracts. The analysis used Halliday's five rhetorical moves (I-P-M-Pr-C). Rhetorical moves were categorized based on the functions of the sentences, as seen in Table 2. The location of the sentences in the abstracts also decided the function of the sentence. Another instrument used was the classification of Obligatory (Halliday & Hasan, 1989), Dominant (Kanoksilapatham, 2013), and Optional rhetorical moves (Kanoksilapatham, 2013). An Obligatory rhetorical move is when a rhetorical move occurs 100% in all abstracts. A Dominant rhetorical move is when a rhetorical move occurs >90% in the

abstracts, and an Optional rhetorical move is when the rhetorical move occurs only <60% in abstracts.

Analysis was done on the microstructure of abstracts. Microstructure categories used were Kanoksilapatham's (2013). Interactive and interactional metadiscourse markers were identified, following the categories used by Hyland (2000), and listed using the keyword feature in AntConc. Further analysis was done using concordances in AntConc to provide contexts for using the metadiscourse markers. A second rater was used to identify the microstructure identification with a similarity result of 97%.

RESULTS

Results showed Computer Science abstracts from native speakers, and Indonesian students' undergraduate thesis have similarities and differences. Results also showed the discourse conventions in Computer Science undergraduate thesis abstract. The results showed similarities in the rhetorical styles between NISA and ISA. First, there was a similarity in the type of abstracts. Both NISA and ISA used the informative kind of abstract (58.89% and 83.33%, respectively). This type of abstract provides information on what has been written in the full research paper. However, NISA used a higher frequency of indicative abstracts (27.78%) compared to ISA (6.67%). An indicative abstract offers a promise of what will be discussed in the paper. This finding aligns with a previous study (Apple, 2014) in which Japanese senkoka (Engineering) students used informative (also called reporting) style in writing their abstracts.

Similarities and Differences in Computer Science Undergraduate Thesis Abstracts

There were similarities in the use of rhetorical moves, as in (1) the use of P (Purpose) as the obligatory rhetorical move, and (2) the C (Conclusion) rhetorical move as the least used rhetorical move. NISA and ISA used the P (Purpose) rhetorical move as obligatory. P (Purpose) rhetorical move occurred in 100% of the abstracts. The table below shows the comparison between NISA and ISA in the occurrence of rhetorical moves:

Table 3. The occurrence of rhetorical moves in NISA and ISA

Rhetorical Moves	NISA (N=90)	ISA (N=90)
I	91.11%	90.67%
P	100%	100%
M	82.22%	97.67%
Pr	77.78%	96.50%
C	50.00%	55.50%

It can be seen from Table 3 that both NISA and ISA showed P (Purpose) move to be present in every abstract (100%). The data showed the P (Purpose) move to be the only obligatory rhetorical move in Computer Science undergraduate thesis abstracts.

This finding was in line with the previous studies (Halliday & Hasan, 1989, 2013; Swales, 1990), and all studies showed the purpose of the research as identifiable in abstracts. The finding also showed that the Purpose rhetorical move was written in a sentence or was written as part of other rhetorical moves, such as I (Introduction), M (Method), and Pr (Product). An example from University of Colorado shows an embedded Purpose rhetorical move. The excerpt reads:

(1) **< *I* >** While previous work on this topic has resulted in approximations to this problem with an unquantifiable amount error, **< *P* >** I present a novel method that provides a confidence interval around the true probability which scales much better than exact calculations.

(Sentence 5, University of Colorado_8)

In this sample, sentence 5 consists of the purpose of presenting a novel method as a continuation of the introductory remark on the previous works.

The second similarity between NISA and ISA was the absence of a C (Conclusion) rhetorical move. This move was the least used rhetorical move, and NISA used C rhetorical move for 50% of all abstracts. Meanwhile, ISA used C in 55.50% of the abstracts. The result is in line with the previous studies, in which students usually did not include C in their abstracts (Ozmen, 2016; Crosthwaite, Cheung, Jiang 2017; Zhong, 2017). This present study also showed both NISA and ISA did not always present further implications of the research, which is in C.

This present study also found several differences. As seen in Table 3, ISA used the M (97.67%), and Pr (96.50%) rhetorical moves more often as compared to NISA (82.22% and77.78%respectively). On the other hand, NISA used more the I rhetorical move than ISA (91.11% compared to 90.67%). ISA used more rhetorical moves in general, except in the rhetorical move where an introduction to the issue or research problem was stated.

The second difference found in the corpus was in the recycling of rhetorical moves. NISA also frequently recycled, or repeated, rhetorical move P (recycled ten times). ISA, however, recycled the M rhetorical move the most (recycled 11 times).

The similarity between NISA and ISA appeared using linear sequence to organize the abstracts. A linear five-move structure (I>P>M>Pr>C) was mainly used. In all 180 abstracts in the corpus, there were 39 sequence types identified in NISA and 50 types specified in ISA.

An example of the sequence can be seen below:

(2) <I>Synchronous interfaces provide a new input modality for wearable devices requiring minimal user learning and calibration. <P>We present SeeSaw, a synchronous gesture interface for commodity smartwatches to support rapid, one-handed input with no additional hardware. <M> Our algorithm introduces methods for minimizing false-trigger events while facilitating fast and expressive input. <Pr> Results from a live evaluation of the system as a onehanded notification response gesture show comparable speed and accuracy to two-handed touch-based interfaces on smartwatches. The SeeSaw input interaction is also evaluated as an input interface for smartwatches and head-worn display systems, showing that the interface enables rapid and accurate interaction. <C> Thus, we find that the SeeSaw synchronous gesture offers a compelling alternative to existing input methods on wearable computers. Finally, a suite of demo applications are presented to show SeeSaw's support of binary, multi-target, and activation input.

<div align="right">(Synchronous Interfaces for Wearable Computers, Gatech_12)</div>

NISA showed difference in the sequencing of the rhetorical move. In NISA, the M (Method) rhetorical move appeared to be used in the opening or closing sections of the abstract. Inverted sequences found were I>P and C>C. In ISA, M (Method) rhetorical move only appeared in the middle section of the abstract. Such appearance is in line with the previous study, which denotes the method rhetorical move does not introduce the topic of research (Lim, 2006). Instead, the method rhetorical move needs to only explain the procedures in research (ibid.).

Similarities and Differences in The Use of Linguistic Devices

The use of linguistic devices was found to be significantly different between NISA and ISA. First, ISA used more interactive markers in arranging ideas and in helping readers to follow the information in abstracts. The use of frame markers (eg., this study, the method, the result) was very frequent in ISA to identify the transition from one rhetorical move to another. NISA, on the other hand, preferred to use transition markers (also, thus, furthermore) in marking the transitions.

Second, NISA, in general, used more types and higher frequency of interactional metadiscourse compared to ISA:

Table 4. Metadiscourse used in abstracts

Rhetorical Moves	NISA		ISA	
	Types	**Frequency**	**Types**	**Frequency**
Hedges	38	146	25	67
Boosters	25	114	16	54
Attitude Markers	14	47	10	44
Engagement markers	48	460	46	282
Self-Mentions	5	208	2	11
Total	130	958	99	458

As can be seen from the table, both NISA and ISA were similar in the use of more hedges and fewer boosters. This finding is not in line with the previous studies, which states that learner or novice writers are distinctive in the use of more boosters (presenting promise or offering certainty) and less use of hedges (mitigating claims) (Hyland, 1998; Hyland and Tse, 2004).

Third, NISA used more engagement markers compared to ISA. NISA also used more self-mentions compared to ISA. ISA never used "I" as self-mention and only used to types of self-mentions: "the author" (used 7 times), and "we" (used 4 times) and prefer to use passive voice. NISA used five types of self-mentions: "I" (31 times), "my" (7 times), "our" (exclusive) (48 times), "us" (exclusive) (3 times), "we" (exclusive) (118 times). The findings are in line with the previous study, which identifies novice/student writers to be more impersonal than professional/expert writers (Kafes, 2009).

Both ISA and NISA were similar in the use of tenses in I, P, M, and Pr rhetorical moves. However, ISA used past tense in C (Conclusion) rhetorical move whereas NISA never used past tense in C (Conclusion) but only used the Future tense.

Also, both ISA and NISA used Passive/Active voices in all rhetorical moves. However, ISA appeared to use more Passive voice compared to NISA, especially in the I (Introduction) rhetorical move.

Table 5. Voice and tense used in NISA and ISA

Rhetorical Move	NISA		ISA	
	Voice	**Tense**	**Voice**	**Tense**
I	Active/Passive	Simple Past/Simple Present/Present Perfect	Active/Passive	Simple Past/Simple Present/Present Perfect
P	Active/Passive	Simple Past/ Simple Present/ Simple Future/Present Perfect	Active/Passive	Simple Past/ Simple Present/ Simple Future/Present Perfect
M	Active/Passive	Simple Past/ Simple Present/	Active/Passive	Simple Past/ Simple Present/ Simple

Rhetorical Move	NISA		ISA	
	Voice	Tense	Voice	Tense
		Simple Future/Present Perfect		Future/Present Perfect
Pr	Active/Passive	Simple Past/ Simple Present/ Simple Future/Present Perfect	Active/Passive	Simple Past/Simple Present/ Simple Future/Present Perfect
C	Active/Passive	Simple Present/Simple Future/Present Perfect	Active/Passive	Simple Past/Simple Present/Simple Future/Present Perfect

DISCUSSION

The results showed the rhetorical moves and linguistic devices used in students' abstracts. The comparison was initially made based on the previous studies indicating problems or clear contrasts between students with native English background and students with non-native English backgrounds. Previous studies indicated students without exposure to English or being non-native speakers of English would find difficulties in writing academic English.

Also, there seemed to be conventions in Computer Science undergraduate thesis abstract. From the results, it is apparent that differences reoccur as common practice. To this point, it is important to further analyze the possible reasons resulted in the difference from the perspectives of academic culture and language backgrounds of Indonesian students. Guidelines in thesis writing from Indonesian universities described abstracts as summaries of the thesis. An example of the guideline provided through the university is as follows:

(29)   *Abstrak ditulis dengan paragraph tunggal dan memuat uraian singkat mengenai masalah dan tujuan penelitian, metode yang digunakan, dan hasil. Abstrak harus menggambarkan rangkuman penelitian secara lugas yang ditulis dalam bahasa Indonesia dan Bahasa Inggris. Panjang abstrak yang baik adalah 150 sampai dengan 300 kata. Abstrak diketik menggunakan font Times New Roman dengan ukuran 12. Abstrak sangat penting di era internet karena akan diindeks secara online dan akan sering dibaca. (Pedoman Penulisan Naskah Publikasi, Universitas Muhammadiyah Surakarta)*

(The abstract is written in a single paragraph and contains a short description of the problem and purpose of the research, methods used, and the results. An abstract should summarize the research in a straightforward manner, written in Indonesian and English. The good

length for an abstract is from 150 up to 300 words. An abstract is typed using Times New Roman font in 12 points. An abstract is very important in the Internet era because it will be indexed online and will be read frequently). (Publication Guideline, Muhammadiyah Surakarta University)

As can be seen from the guideline, one factor affecting the rhetorical structure and style of Indonesian students as the conventions set by the university's guidelines.

The results showed that there was a different style of writing in ISA. The reason for this was due to the translation process. ISA was the product of translation from the original Indonesian abstracts. Linguistic devices used by the Indonesian students were typical of Indonesian academic writing style, as can be seen from most frequently used expressions in P (Purpose) rhetorical move:

- English abstract : The purpose of this research is/was…
  Indonesian abstract : (Tujuan dari penulisan ini adalah…)
- English abstract : This final project…
  Indonesian abstract : (Tugas akhir ini…)
- English abstract : This research is…
  Indonesian abstract : (Penelitian ini …)
- English abstract : This study aims to…
  Indonesian abstract : (Penelitian ini bertujuan untuk…)

Such expressions were successfully transferred into English and found equivalence in the target language. The translation process as carried out in relevance to English lexico-grammatical constructions. Meanwhile, some expressions, using the Indonesian lexico-grammatical construction, were translated word-to-word into English. This translation strategy resulted in grammatical errors in English, such as:

- English abstract: *In this final project will contain…
  Indonesian abstract : (Dalam tugas akhir ini terdapat..)
- English abstract: *Based on the problems * made a desktop-based food ordering application
  Indonesian abstract :(Berdasakan permasalahan pembuatan aplikasi pemesanan makanan berbasis desktop yang ada…)

These seem to have not found the equivalence in English, resulting in word-to-word translation rather than using idioms or other semantically-founded above-the-word level strategies. As a result, the hedges "terdapat" and "berdasarkan" in Indonesian were not transferred successfully into English. Another example of the influence of the Indonesian language background was the use of modal "will" rather than "would" to present the epistemic quality.

Another possible factor in the style students used for research genre was the lack of confidence. Students may be lacking in confidence and resorted in distancing themselves from their readers and on the contrary from the inclusive voice found in Computer Science discourse, used of passive voice or "the author" to refer to themselves as authors.

CONCLUSION

Some conclusions can be drawn from the findings: First, undergraduate student abstracts have certain rhetorical moves. In the study, all abstracts appeared to follow the linear sequence of I>P>M>Pr>C. However, the most frequently used rhetorical moves were I-P-M-Pr, in which sometimes I replaced P. Second, intercultural factors were influencing the use of rhetorical moves. Several factors found to influence the variations in abstracts were: different academic cultures and conventions in universities' guidelines, different socio-cultural backgrounds, and different perceptions of self as insiders in the field.

There are some pedagogical implications from this study: first, it is important to provide more specifically discipline-oriented knowledge to familiarize students with how people write in Computer Science through exposure or acculturation. Besides, it is important to raise awareness of the differences in rhetorical styles between Indonesian and English to prepare students to write more effectively. Finally, lecturers need to embrace the functions of facilitating rather than error-correcting. Lecturers' key role would be to provide some alternatives and explanations on the communicative purposes as the students make linguistic decisions.

This study is limited to textual analysis, using the final version of abstracts provided by authors in open access repositories. In the future, it is recommended that the following findings from this research, experimental study would also be conducted to reveal the process of the writing. Such investigation would also be important to reveal the negotiating issues pertinent to the lexical items used by students to reveal meaning and functions. Another importance is to identify certain strategies undertaken by student authors in order to achieve the functions and meanings. on the use of the specific rhetorical structure or linguistic devices. An example would be in writing a C (Conclusion) rhetorical move, which requires a pre-writing activity (of reading the research article/paper and other related references), process-writing (of collaborating and re-writing), and post-writing (or evaluating peer-reviewing, and editing). Another important agenda in doing further research by way of the experiment is to reveal students' attitudes and perceptions of self (Sugiharto, 2012) prior, during, and after the writing. It is expected that such an in-depth qualitative study would reveal more realities

in the learning process in Higher Education level, especially for specific academic purposes.

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