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Comparative Study of Thematic Choice and Progression on Text Written by Humans and AI Machine

Suharsono, Ashadi & Titik Sudartinah
suharsono.2021@student.uny.ac.id
Applied Linguistics Department, Yogyakarta State University, INDONESIA

Abstract

The development of AI technology has enabled machines to carry out tasks that previously could only be done by humans. Scientists of AI have recently launched a tool called ChatGPT. It is a tool that can do whatever is ordered by humans, including making academic writing like an abstract. Thus, this study aimed to compare thematic choice and thematic progression on the text of research abstracts of undergraduate students of Teacher College and those by ChatGPT (AI machine). To analyze the data, this study employed the thematic structure of Systemic Functional Linguistics developed by Halliday & Matthiessen and thematic progression developed by Bloor & Bloor. The thematic choice was analyzed by observing the variety of themes appearing in the two texts, as well as the level of complexity and diversity used. Thematic progression was evaluated by examining how the themes are arranged and developed along with the development of the texts. The results of this study show that AI machine has reached a level of proficiency allowing AI to rival humans. Even though there are fundamental differences in thematic progression patterns between texts written by undergraduate students and ChatGPT, this study concludes that the two are not significantly different. Therefore, the researchers suggest that further research in a similar field may explore issues such as quality, creativity, and originality. Afterwards, this study also suggests that English teachers use this thematic structuring knowledge and skills to improve students' writing skill. This study provides valuable insight into the capabilities and limitations of AI machine in imitating the human creative process of writing.

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Introduction

In Indonesia, writing skill plays an important role in the learning process, for instance, the task of making an essay, research report, writing a thesis/dissertation, and journal/article. However, many students still face many problems in writing. Studies conducted by Arif et al., (2020), Rind et al., (2020), and Nurkamto et al., (2022) showed

that many students still face problems in writing, especially in students' academic writing competence like grammatical structure, lack of ideas, vocabulary, and thinking; and the ability to create cohesive and coherent pieces of writing. It has been proven by several previous studies. First, Hasan & Marzuki (2017) examined cohesion and coherence in English letters written by students of non-English Department; likewise, Ariyanti & Fitriana, (2017) examined cohesion and coherence in English essays written by students of the English Department. Their findings indicated that both students of the non-English Department and students of the English Department still face cohesion and coherence problems in academic writing.

Furthermore, problems in applying the coherence aspect in writing abstracts are also faced by students (Rahmawati & Kurniawan, 2015). Most students fail to apply coherence in their abstract because of their inability to apply cohesive devices including references, conjunctions, and ellipses (Suwandi, 2016). In addition, a study on how to organize ideas has also been carried out by Rakhman (2013). The results of his study show that some students still need guidance to make good writing. As a result, organizing ideas and making cohesive and coherent text are the main problems faced by students.

To address these problems, Halliday & Matthiessen (2004; 2014) offer a linguistic element, namely thematic structure that is contained in the textual metafunction in Systemic Functional Linguistics (SFL) developed by Halliday. This is one of the language metafunctions introduced by Halliday. Others are ideational and interpersonal metafunctions. Textual metafunction is used to examine text coherence through the structure of theme and rheme. The theme is the core information in the text, while the rheme is additional information from the theme. Furthermore, (Hůlková et al., 2019) explained that when examining the structural arrangements that result in a sentence being structured as a meaningful message, we can observe that one important idea, the notion of theme, is utilized, with the clause being arranged into the bipolar configuration of Theme and Rheme.

The pattern of composing these themes is included in a system called thematic progression. Thematic progression offers some ideal ways to organize the flow of ideas/author's ideas. It means that this thematic progression allows the writer to develop a theme by taking meaning from the previous theme or rheme. The thematic progression developed by Bloor & Bloor (2004) has four patterns that are constant theme pattern (CTP), linear theme pattern (LTP), split theme pattern (STP), and derived theme pattern (DTP). Since around the past decade, particularly in East Asia, a lot of researchers (e.g. Wang, 2007; Yang, 2008; Li, 2009) have firmly embraced the notion that teaching thematic progression will enhance students' writing coherence (Hawes, 2015).

Several research have been conducted on the theme and rheme feature of SFL, for instance, a study conducted by Hawes in 2015. In his study, the use of thematic progression in essay writing by students enrolled in MA-level journalism, media, and communications courses is contrasted with the usage of such thematic progression in two well-known British newspapers. The results of this study show that journalism and media studies students should acquire familiarity with the spectrum deemed mainstream via texts from these two subgenres, tabloid and broadsheet, and develop an instinct for what is outside of it, whether excessively formal or outspoken. If students could develop the ability to balance academic explanation with other, more hortatory possibilities by selecting wisely from a variety of thematic progression types they have mastered, the highest potential learner empowerment would be attained. Of course, other academic writing students, like those studying medicine or engineering, may not benefit from using newspaper standards as guidance.

Suleiman Alyousef & Ahmed Alzahrani (2020) compare the similarities/differences in the use of themes in electrical engineering RA Introductions written by native English-speaking (NES) and non-native English-speaking (NNES) Saudi scholars. Their results demonstrate that the introduction of students, NES and NNES, overlap at a sentence level, but they start to diverge beyond the sentence.

Another study by Naderi & Koohestanian (2014) investigates thematic structures in conference papers of Persian postgraduate students in the engineering fields. They conclude that the Persian learners show a lack of knowledge regarding the grammatical choices they made in their thematic structure. Research by Fitriati & Gayatri (2021) investigates text coherence using case studies. The results of this investigation show that students still face difficulties in achieving coherence because they do not maximize the use of cohesive devices, especially conjunctions to connect sentences.

Research in the thematic structure is also carried out in various genres, for instance, argumentative essay (Bi, 2023; Sari & Agustina, 2022), descriptive text (Purba & Pasaribu, 2021), research article introduction (Suleiman Alyousef & Ahmed Alzahrani, 2020), research article (Hůlková et al., 2019), exposition text (Babaii et al., 2016; Okta Feri et al., 2023) essay (Park & Nam, 2015), abstract (Septarica et al., 2021), introduction of proposal (Nurdianti et al., 2022), and short story (Dashela, 2021). Most of these studies exclusively provide descriptive analysis of the use of theme and thematic progression in students' texts. All of these studies also explore how effective students are in writing cohesively and coherently through thematic structure, as well as what difficulties are encountered in writing texts.

Several studies have highlighted the thematic choice and progression in research abstracts. For example, Alyousef (2021) investigated the thematic choice and progression in research abstracts across seven dentistry subdisciplines: oral sciences, periodontics, endodontics, operative dentistry, prosthodontics, oral and maxillofacial surgery, and orthodontics. He found that there are linguistic features characterizing the subdisciplines. Nugraha & Mbato (2020) analyzed the rhetorical moves and thematic progression patterns in research abstracts written by undergraduate students of the English and Indonesian Departments. They concluded that research abstracts at the undergraduate level require careful consideration of both rhetoric moves and thematic progression patterns as underlying frameworks. These findings indicate that the educational background of students contributes to the thematic choice and progression in their writing. Furthermore, Yuned et al., (2015) conducted a study of thematic choice and progression in English abstracts TEFLIN in applied linguistics written by Indonesian speakers. They categorized the English abstracts of TEFLIN in applied linguistics as good quality based on their coherence. It means that the thematic progression also contributes to the coherence of students' writing. All these studies show that the study of thematic choice and progression in research abstract written by AI machine has never been conducted. Therefore, the present study seeks to fill the gap.

In line with the rapid development of artificial intelligence technologies in the modern digital era, it presents new potential and problems for the education industry (Zhou & Li, 2023). Technological developments and digitalization have also had enormous impacts on students' writing skills. There are positive and negative impacts as a consequence of technological advancement including Artificial Intelligence. Thus, the presence of tools, such as writing assistance, is important to explore as information related to this technology in academic writing can compare how humans and machines can organize texts.

Recently, a software called ChatGPT has been launched by scientists of Artificial Intelligence (AI). ChatGPT is designed to process and produce a text that is similar to the way humans speak, so that it can be used in various topics or problems, including in writing an abstract. Applications of AI have also been employed in education to improve assistance for academics and administrative functions (Lo, 2023). By offering students individualized learning support and instructional services, this tool can increase their learning motivation and success (Zhou & Li, 2023).

The notion of machines taking the place of humans in the workplace seems stale in academic literature (Zirar et al., 2023). As AI focuses on increasing human ability, skills, and competencies to allow efficient workplace cooperation (e.g Dos Santos, 2023; Firaina & Sulisworo, 2023; Jeblick et al., 2022; Susnjak,

2022), human employees have raised the value chain (Dwivedi, 2019).

Related to the explanations above, researchers are interested in conducting a comparative study of the thematic choice and progression of text written by humans and ChatGPT. This study is a response to rapid advances in technology. This kind of study is becoming increasingly relevant amidst the changing landscape of communication and creativity in the digital era, where artificial intelligence is increasingly permeating various aspects of human life, including in the field of writing.

The present study on the comparison of thematic choice and progression in abstract texts written by humans and AI machines is an attempt to understand the essential differences between the creative approaches of humans and AI algorithms in creating text. The main focus of this study was to explore the extent to which AI can imitate or achieve a level of similarity in the selection of diverse themes and the development of a cohesive and coherent text flow.

This study investigates several research questions. They are:

1. What are the most dominant thematic choices employed by students and ChatGPT in writing abstracts?
2. What are the most dominant thematic progression employed by students and ChatGPT in writing abstracts?
3. What are the differences in thematic choice and progression between abstracts written by students and ChatGPT?

Methodology

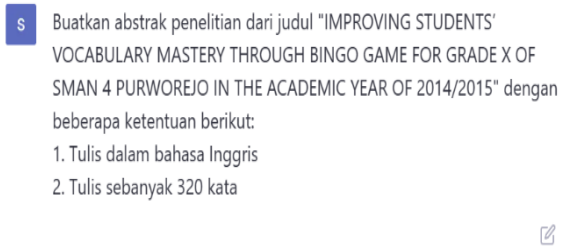
This study employed a content analysis design with a focus on thematic structure as it was expressed at the clause (theme-rheme) and paragraph (thematic progression) levels in the abstract of the students and ChatGPT. Content analysis is one of the research techniques widely used in qualitative research techniques (Hsieh & Shannon, 2005). It aims to analyze documents to comprehend their meaning and content (Krippendorf, 2004). As a conclusion, content analysis is a research technique seeking to draw reliable conclusions from data content.

This study aimed to find out the types of theme and thematic progression patterns used in abstracts written by students and ChatGPT. This study used a descriptive-qualitative approach with quantitative data. Descriptive qualitative research aims to investigate detailed descriptions of people, places, or events in a setting with a qualitative approach (Creswell, 2009). It means that this research does not intend to seek new theories by seeking new evidence through the truth of certain theories.

Data Collection

The data used in the present research were the research abstracts written by undergraduate students and AI. The research abstracts written by undergraduate students were taken from the digital library of the state teacher college. Due to the large number of research abstracts available, a purposive sampling technique was used involving each of the ten research abstracts written by students. The data chosen were research abstracts written by students of the English Department over the span of the last eight years to obtain the latest data and were written in English because theme-rheme analysis was commonly applied in English texts (Bloor & Bloor, 2004). They were written in no less than 200 words and a maximum of 350 words and they have been published. Meanwhile, the abstracts written by the AI machines were taken in https://chat.openai.com by giving certain commands (prompts). These prompts were made relating to the title of the students' thesis and the number of abstract words written by students as the following figure.

Figure 1. Prompts of AI machine



To ensure the process of meaning with all participants in this study, each stage has considered the issue of trust. First, the university was first selected for research sampling and at the same time tied the cases so that the study focused on a limited context (research abstract written by undergraduate degree of English Department with the span of ten years). After the research objects were collected, the researchers consulted with the experts for feedback and validation (member check).

Data Analysis

Data analysis was carried out in several stages. First, the researchers divided paragraphs into clauses to make it easier for the researcher to identify the thematic structure of the abstract written by students and ChatGPT. Secondly, the researchers identified, classified, and mapped the thematic choice and progression. We used the following table to assist in classifying the theme of each clause.

Table 1. Classified Theme and Rheme

Clause	Textual Theme	Interpersonal Theme	Topical Theme		Rheme
			Unmarked	Marked	
Paragraph 1					
1					
2					
Paragraph 2					
1					
2					

Thirdly, the researchers calculated each of the thematic choices and thematic progression patterns of ChatGPT and Students' abstract. The formula of this study was:

$$X = \frac{F}{N}\ x\ 100\%$$

X = The percentage of the obtained items
F = Frequency
N = The total number of items

The last one presented the findings by making interpretations and conclusions from the results of data analysis.

Instrument

The instrument of this study was the researchers themselves. To analyze the thematic choice, the researchers employed the theory of Systemic Functional Grammar (SFG) developed by Halliday & Matthiessen (2004) which divided into three types of themes. They are topical theme (unmarked and marked topical theme), interpersonal theme, and textual theme. Meanwhile, to analyze the thematic progression, the researchers employed the theory of SFG developed by (Bloor et al, 2004). According to Bloor and Bloor (2004), four thematic progression patterns are constant theme pattern (CTP), linear theme pattern (LTP), split theme pattern (STP), and derived theme pattern. However, qualitative study makes it difficult for the researchers to avoid bias or subjectivity. Thus, to ensure the validity of the analytical instruments used in this study, the researchers employed inter-researcher triangulation to ensure the validity of the instrument of analysis. The researchers asked for help from experts who had a background in assessing the results of the data analysis that had been carried out by the researchers. Expert judgment was used to measure the trustworthiness of the data. Two experts were asked to assess the validity and reliability of the researchers' analysis of the theme organization. The flowchart of the present study can be seen in the appendix.

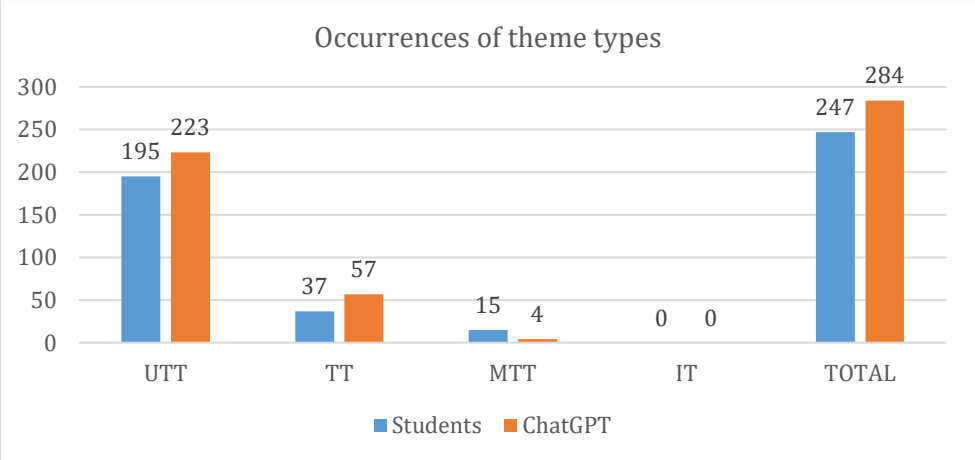
Results and Discussion

This study aimed to find out the types of theme and thematic progression patterns used in abstracts written by students and AI machines. The results of the data analysis are presented below.

Thematic Choice

In this section, each clause in the student abstract was analyzed by theme and rheme analysis to find out what themes are used by students and ChatGPT in writing research abstracts. Based on data analysis, the findings in this study are as follows

Figure 2. Occurrences of these types



The findings show that there are 247 themes used by students and 284 themes used by the tool in writing research abstracts. The results of the analysis indicate that all types of themes are used by students and AI machine in writing research abstracts. These themes are unmarked topical theme (UTT), textual theme (TT), marked topical theme (MTT), and interpersonal theme (IT). The most dominant theme used in the research abstracts written by students and ChatGPT is the unmarked topical theme which is 195 (78.95%) in students' abstracts while 223 (78.52%) in abstracts of ChatGPT. Similarly, the studies were conducted by Naderi & Koohestanian (2014); Hanh (2021); (Okta Feri et al., 2023), and (Qomariah, 2021).

The unmarked topical theme is the theme most commonly used by writers in making a clause because it can assist writers in developing ideas and expressing the chronological order of procedures Naderi & Koohestanian, 2014; Halliday & Matthiessen, 2004). Therefore, both students and AI machine use unmarked topical themes to make it easier for them to develop their ideas. An unmarked topical theme appears when the theme blends with the mood structure constituents which usually appear in the first position in the clause (Hanafiah et al., 2018). An example of an unmarked topical theme is as follows.

Datum 1 of the student's abstract

It	*was done in <u>two cycles,</u> from 20th of October to 29th of November 2014.*
UTT	**Rheme**

Datum 2 of ChatGPT's abstract

The study	*employed a classroom action research design in which two cycles of teaching and learning process were conducted.*
UTT	**Rheme**

The example which is presented above illustrates the arrangement of themes in a clause. In datum 1, the clause uses the pronoun 'It' as the theme while in datum 2, the clause uses a noun phrase. In SFL, pronouns and noun phrases are included in the nominal group type that is categorized as an unmarked topical theme (Halliday & Matthiessen, 2004; Halliday & Matthiessen, 2014; Bloor et al., 2004). Afterwards, other types of themes were also found in student research abstracts and the tool, namely textual themes, marked topical themes, and interpersonal themes. In student

abstracts, textual themes were found 37 (14.98%) in students' abstracts while 57 (20.07%) in abstracts written by AI machine. Textual theme is a type of theme that shows information about how the text is organized. Textual themes are also often, but not always used to connect between the writings/discussions that are written before and previous writings/discussions (Halliday & Matthiessen, 2004). The results of this study indicate that ChatGPT uses more textual themes than students in writing research abstracts. The example of a textual theme is as follows.

Datum 3 of the student's abstract

In addition,	*to make the data trustworthy or reliable,*	*two kinds of triangulation (time triangulation and investigator triangulation) were used in this research.*
TT	**MTT**	**Rheme**

Datum 4 of ChatGPT's abstract

and	*(students)*	*have control over their learning.*
TT	**UTT**	**Rheme**

The example above shows that there are two themes in one clause, namely textual themes and topical themes which is called a complex theme. Textual theme consists of two types, namely continuity adjunct and conjunction. The example presented in datum 3 above is an example of a clause connected to the previous clause using a continuity adjunct, while datum 4 is an example of a clause using a conjunction. In SFG, conjunction is divided into two, namely hypotactic and paratactic (Halliday & Matthiessen, 2004; 2014; Bloor & Bloor, 2004). In a clause, the writer can link each phrase/clause paratactically or hypotactically (Halliday & Matthiessen, 2004). Furthermore, Halliday & Matthiessen (2014) explained that when phrases/clauses are connected paratactically, these phrases/clauses are considered equivalent. Whereas when phrases/clauses are connected hypotactically, these phrases/clauses are considered unequal. For example, *'the writer **and** the speaker'*, the conjunction *'**and**'* is used to connect two nominally equivalent groups, while *'they don't finish their task **because** it is hard for them'* is an example of a clause that is connected practically. The conjunction '***because***' connects the dependent clause and the independent clause.

Afterwards, marked topical themes are also found with an occurrence of 15 (6.07%) in student abstracts and 4 (1.41%) in the ChatGPT abstract. This type of theme is unusual and not commonly found. As Eggins (2004) said when writers/speakers prefer to use marked topical themes, they indicate that something in the text requires an unusual meaning to be made. An example of a marked topical theme is as follows.

Datum 5 of the student's abstract

To validate the appropriateness of the book,	*the developed materials book was judged by the expert.*
MTT	**Rheme**

Datum 6 of ChatGPT's abstract

Based on the result,	*writing materials using a genre-based approach were developed.*
MTT	**Rheme**

The last one is interpersonal theme. Findings show that there is no interpersonal theme realized by students and AI machine in writing research abstracts. Interpersonal theme in a clause explains the author's assessment or attitude toward a message (Bloor et al, 2004; Eggins, 2004). Thus, the low use of interpersonal themes indicates a high level of impersonality and emphasizes objectivity, open-mindedness, and factual presentation of ideas. It also indicates the characteristics of academic texts that avoid subjectivity (Gunawan & Aziza, 2017). This is required in academic writing.

The Differences of Thematic Choice Units of ChatGPT and Students' Abstract

At this stage, the researcher compared the thematic choice units in the abstracts written by humans and AI machine to map the differences and characteristics of the abstracts written by both of them.

Unmarked topical theme

Results of the analysis show that there are several unmarked topical theme units used by students and ChatGPT, which are as follows:

Table 2. Occurrences of Units Realizing the Unmarked Topical Theme of Abstracts of Students and ChatGPT

Types Clause	Units	Occurrences	
		Students	**ChatGPT**
Declarative	Noun Phrase	144 (73.85%)	170 (79.81%)
	Pronoun/Noun	23 (11.80%)	21 (9.86%)
	Group or Phrase Complex	11 (5.64%)	11 (5.16%)
	Relatives	7 (3.59%)	6 (2.82%)
	Existential "There"	4 (2.05%)	2 (0.94%)
	Existential "It"	4 (2.05%)	2 (0.94%)
	Embedded Non-Finite	1 (0.51%)	1 (0.47)
	Embedded That	1 (0.51%)	-
	Embedded WH	-	-
Indicative	Predicator	-	-
TOTAL		**195 (100%)**	**213 (100%)**

The unmarked topical theme is the first phrase that has several functions in the clause structure, namely participant, state, or process (Halliday & Matthiessen, 2014). The findings presented above indicate that Noun Phrase is the unmarked topical theme unit commonly used by students and ChatGPT in writing research abstracts. These findings are supported by what Halliday & Matthiessen (2014: 91) said that the most commonly used type of theme is participant, which is realized by nominal groups. Unmarked topical theme units that were most dominantly used by students and ChatGPT were noun phrases and pronouns/nouns. Noun phrases as participants were realized as much 144 (73.85%) occurrences in students' abstracts and 170 (79.81%) in ChatGPT. Meanwhile, pronouns/nouns were realized as much as 23 (11.80%) in student abstracts and 21 (9.86%) in ChatGPT. As stated before, both noun phrases and pronouns/nouns are categorized as nominal groups in SFL. Thus, students and ChatGPT tend to use nominal groups as

participants in writing research abstracts. This makes it easier for them to develop ideas and maintain cohesion and coherence between clauses in a paragraph. In addition, the findings show that there is no state/process in a clause that functions as a theme. This indicates that students and this tool only use declarative sentences in writing research abstracts.

Textual Theme

The results of the analysis show that there are several textual theme units used by students and ChatGPT, which are as follows:

Table 3. Occurrences of Units Realizing the Textual Theme

Units	Students	ChatGPT
Conjunctive adjunct	20 (54.05%)	20 (35.09%)
Relatives	9 (24.32%)	20 (35.09%)
Structural conjunction	8 (21.65%)	17 (29.82%)
TOTAL	**37 (100%)**	**57 (100%)**

Findings presented before show that the textual theme is the second theme that is mostly used by students and AI machine. The table above shows that there are three units of textual theme, namely conjunctive adjunct, relative, and structural conjunction. The unit that is commonly used by students and this tool is the conjunctive adjunct as much as 20 (54.05%) in the student abstract and 20 (35.09%) in the ChatGPT abstract. The second is the relative as 9 (24.32%) in student abstracts and 20 (35.09%) in the ChatGPT abstract. The last unit is the structural conjunction as much 8 (21.65%) in student abstracts and 17 (29.82%) in ChatGPT abstracts. Belows are examples of textual theme units:

Datum 7 of ChatGPT's Abstract

In conclusion,	*the use of cue cards*	*is an effective technique to improve students' speaking skill.*
Conjunctive Adjunct	**UTT**	**Rheme**

Datum 8 of ChatGPT's Abstract

Which	*in turn*	*improved their fluency and accuracy.*
Relatives	**MTT**	**Rheme**

Datum 9 of Student's Abstract

and	*the post-test*	*was given after the treatment.*
Structural Conjunction	**UTT**	**Rheme**

In the example above, all the textual theme units function to connect ideas into a clause or between clauses. Structural conjunctions and relatives function to connect ideas in complex clauses (Okta Feri et al., 2023), both of which create semantical and grammatical relationships between clauses. Meanwhile, the conjunctive adjunct also functions to connect ideas into a clause but only creates a connection semantically (Halliday & Matthiessen, 2004; Halliday & Matthiessen, 2014; Bloor et al., 2004).

Furthermore, according to Halliday & Matthiessen (2014), textual themes are connections that define how a clause relates to the surrounding text and context. Thus, the relatively large use of textual themes in student abstracts and ChatGPT contributes to the cohesion and coherence of texts in these abstracts. As stated by Mccabe (1999) the emergence of high textual themes in academic texts contributes greatly to higher text cohesion and coherence and contributes significantly to the quality of academic texts.

Marked Topical Theme

Analysis shows several textual theme units used by students and ChatGPT, which are as follows:

Table 4. Occurrences of Units Realizing the Marked Topical Theme

Units	Students	ChatGPT
Prepositional Phrase	9 (64.29%)	3 (75%)
Adverbial Group	3 (21.43%)	1 (25%)
Subordinate Clause	2 (14.29%)	-
TOTAL	**14 (100%)**	**4 (100%)**

The findings show that the most dominant marked topical theme units used by students and the tool are prepositional phrases as much as 10 (66.67%) in student abstracts and 3 (75%) in ChatGPT abstracts. The second is adverbial groups as much as 3 (20%) in student abstracts and 1 (25%) in ChatGPT abstracts. The last one is the subordinate clause which is not found in ChatGPT abstracts, while in student abstracts, there are 2 (13.33%) occurrences. The following is an example of using marked topical theme units:

Datum 10 of Students' Abstract

In reference to the actions conducted in two cycles,	*the use of the PWIM improved the students' writing ability as justified in the following result.*
Prepositional Phrase	**Rheme**

Datum 11 of ChatGPT' Abstract

Which	*in turn*	*improved their fluency and accuracy.*
TT	**Adverbial Group**	**Rheme**

Datum 12 of Students' Abstract

After the data were tested and found to be homogeneous and normal,	*the hypothesis was tested using ANCOVA (Analysis of Covariance).*
Subordinate Clause	**Rheme**

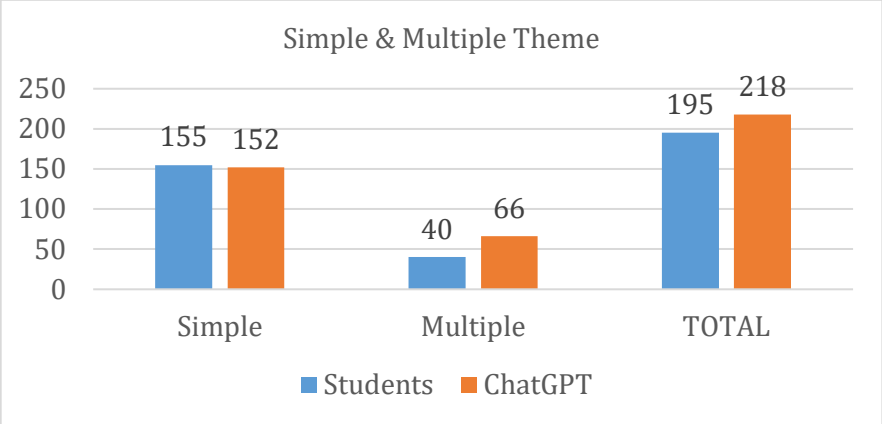
According to (But et al., 1998), to avoid using monotonous subjects in a text and emphasizing certain points, marked topical themes can be used. The use of marked topical themes in student abstracts and ChatGPT also shows that this type of theme helps them to

move topics. It is supported by what (Martin et al., 2010) and (Emilia et al., 2018) stated that marked topical themes have an important role in guiding readers in switching topics in a text from one phase to the next.

Simple & Multiple Theme

Based on our analysis, we found several simple & multiple themes realized by students and AI machine in writing research abstracts, which are as follows:

Figure 3. Occurrences of Simple & Multiple Theme



In simple theme, topical themes can be divided into two which are marked topical themes and unmarked topical themes. A simple marked theme refers to when a topical element is selected for the foreground, while a simple unmarked theme refers to the most common elements. Overall, findings present 155 simple themes and 40 multiple themes in the abstracts written by English Education students, while 152 simple themes and 66 multiple themes were found in the abstract written by ChatGPT. The following is an example of simple and multiple themes in student abstracts and the tool.

Datum 13 of students' abstract

It	*was done in <u>two cycles,</u> from 20th of October to 29th of November 2014.*
Theme	**Rheme**

Datum 14 of ChatGPT's abstract

and	*(students)*	*have control over their own learning.*
Theme	**Theme**	**Rheme**

The example in datum 15 is the simple theme, in which the clause has only one theme. Halliday & Matthiessen (2004) stated that in a sentence/clause, there is at least one clause and the most commonly used theme is the topical theme (marked or unmarked theme) which is realized as a participant in the clause structure. Meanwhile, the example in datum 16 illustrates the structure of multiple themes, in which the clause has two themes. In addition, findings also show that there are several theme-rheme patterns realized by students and AI machine in writing research abstracts, namely as follows:

Table 5. Theme-Rheme Structure of Students' Abstracts

Types of Theme	Structure of Theme + Rheme	
	Students	**ChatGPT**
Simple	1. Unmarked + Rheme 2. Marked + Rheme	1. Unmarked + Rheme 2. Marked + Rheme
Multiple	1. Textual + Unmarked + Rheme 2. Textual + Marked + Rheme	1. Textual + Unmarked + Rheme 2. Textual + Marked + Rheme

The tables above show that theme-rheme patterns realized by students and ChatGPT in writing research abstracts are not different. Afterward, findings also show that there are no significant differences between abstracts written by humans and AI machine.

Thematic Progression

In this section, each clause in the student and ChatGPT abstracts was analyzed by theme and rheme analysis to find out what thematic progression patterns were employed by students and AI machine in writing research abstracts. Based on data analysis, the findings are as follows:

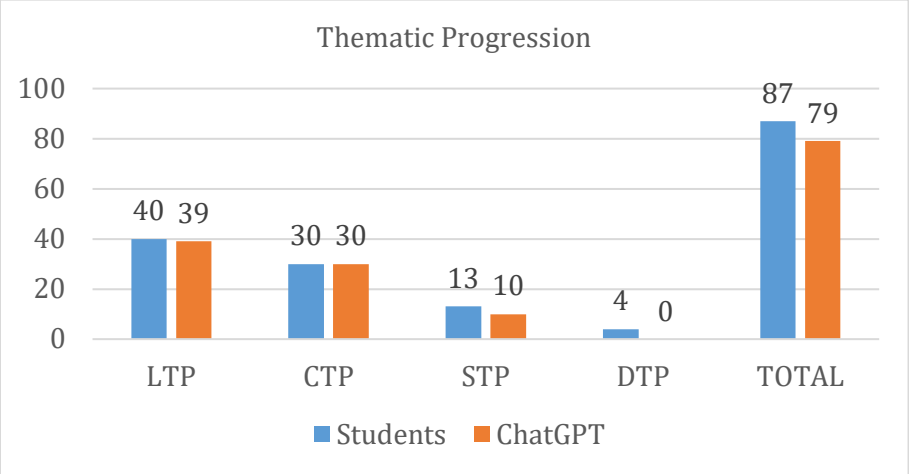
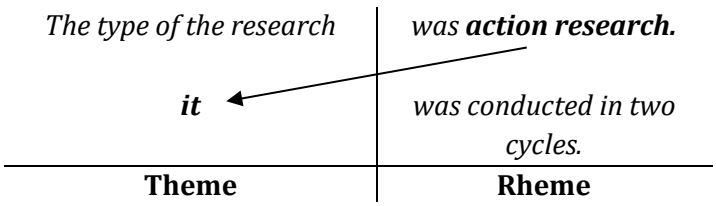


Figure 4. Occurrences of Thematic Progression of Abstracts of Students and ChatGPT

The figure above shows that there are 87 occurrences of thematic progression patterns found in the abstracts of students. These patterns are constant theme pattern (CTP), linear theme pattern (LTP), split theme pattern (STP), and derived theme pattern (DTP). Meanwhile, there are 79 thematic progression patterns found in the abstract written by ChatGPT. These patterns are constant theme pattern (CTP), linear theme pattern (LTP), and split theme pattern. Thus, English Language Education Students used all types of TP in writing research abstracts, whereas in the abstract written by ChatGPT, there was no derived theme pattern (DTP) which is found. It indicates that humans can write using several variations of thematic progression patterns to maintain coherence in their writing.

In addition, the findings show that linear theme pattern (LTP) is the most dominant thematic progression pattern used by students which is 40 (45.98%) occurrences and 39 (49.37%) in the abstract of ChatGPT. The second is constant theme pattern (CTP) which is 30 (34.48%) in students' abstracts and 30 (37.97%) in ChatGPT abstracts. According to (Okta Feri et al., 2023), these patterns are the basic techniques used to maintain cohesion and coherence in writing. Here is an example of a linear theme pattern.

Datum 15 of Students' Abstract



The datum presented above illustrates the linear theme pattern (LTP) in which the rheme in the first clause '*action research*' is used as the theme in the next clause "*it*". Linear patterns are the most basic type of thematic progression (Bloor et al., 2004). This pattern

creates cohesiveness in a text by constructing new information in previous rhemes and offers the text cumulative development (Eggins, 2004).

These findings support the results of research conducted by Feri et al., (2023) which compared essay writing by students who scored low and high scores on the IELTS test. They also found LTP is dominant in the students' texts. According to Mccabe (1999), by this pattern, writers can ensure that readers continually interact with the theme about the starting point so elaborating on the concept in a way that allows the readers to build an optimal conceptual framework. Moreover, this study noted that students and ChatGPT tend to employ STP. It indicates that as stated by Jalilifar & Alipour (2017), the texts have a more dynamic effect on the readers because the rheme is developed further and the texts tend to expand on the information in the rheme. According to Wang (2007), this helps the readers understand the direction and origin of the information and fosters coherence in the texts.

Furthermore, the findings of this study are also different from the findings of research conducted by Rahmawati & Kurniawan (2015) who investigated thematic progression in the undergraduate thesis; Rahman & Arsyad Arrafi' (2017) in the abstract journal; Herdiawan, (2017) in the background of study; Jalilifar & Alipour (2017) in the introduction section of research article; and Suherman (2018) in the Introduction paragraph. They found that the most widely used thematic progression pattern was the constant theme pattern. According to Jalilifar & Alipour (2017), the reader will find it simpler to decipher the information in the texts because of the increased frequency of CTP. Moreover, CTP, according to Fries (1983: 124), "tends to relate a sequence of events happening in the stories and involve a common character or set of characters, or has, as the point of departure, a setting of time or place." The following is an example of the constant theme pattern.

Datum 16 of ChatGPT's Abstract

The use of the PWIM ↓	*can improve the eighth-grade students' ability to write narrative texts.*
The PWIM model ↓	*can help students construct meaning from the pictures and words presented, and use this meaning to generate their ideas and write their narrative texts.*
The PWIM model ↓	*is also effective in promoting students' engagement and motivation in the writing process.*
The use of the PWIM ↓	*can improve the eighth-grade students' ability to write narrative texts.*
model	*is effective in helping students generate ideas and construct meaning*
The model	*from the pictures and words presented.*
Theme	**Rheme**

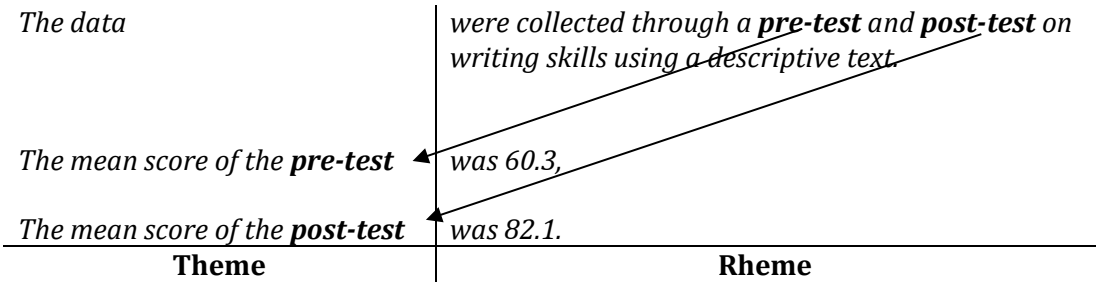
The example above illustrates the constant theme pattern (CTP) in which the theme in the first clause is reused as the theme in the following clauses. This pattern allows the writer or speaker to focus specifically on certain participants (Feri et al., 2023). Therefore, the types of descriptive and narrative texts are types of text that often use this thematic progression pattern (Bloor et al., 2004: 88). Thus, the use of these thematic patterns, LTP and CTP, is the simplest way used by students and ChatGPT in organizing their ideas into a text. In this study, this method is widely used because of the characteristics of research abstracts which are only written in a limited number of words, which is around 200 – 450 words. The abstract text structure is a crucial factor in influencing the frequent use of linear theme patterns in student writing and ChatGPT. As stated by Ebrahimi & Ebrahimi (2014) the structure/genre of the text is one of the factors

that influence the use of thematic progression patterns in writing. Furthermore, Bloor et al., (2004) explained that argumentative texts are more dominant using linear theme patterns. In contrast to narrative and descriptive texts, it is more dominant to use constant theme patterns because this type of text places more emphasis on certain participants. Thus, the findings of this study that are different from previous studies are not surprising because the research abstract is a brief argument of the researcher from a study.

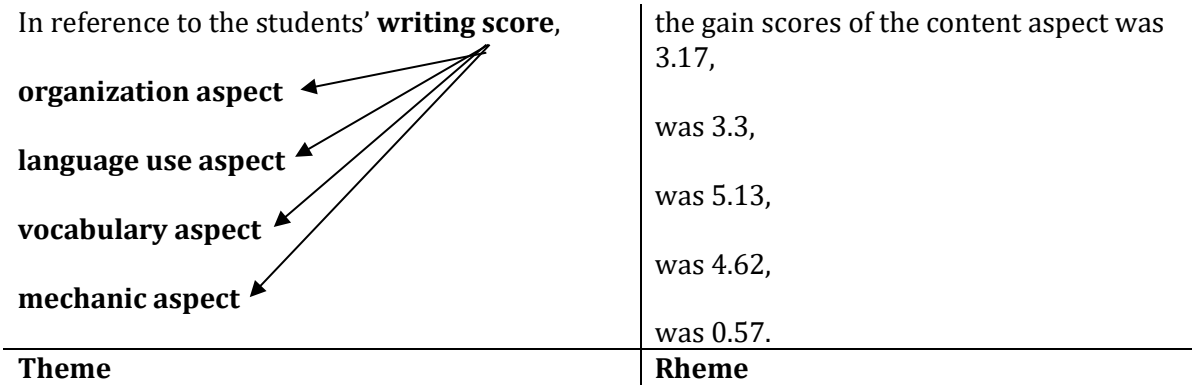
Considering the constant and linear theme patterns that are commonly found in the students' research abstracts, it is because creating new themes by using old information into new information linearly and constantly commonly used to connect ideas is a simple strategy that students can use to maintain coherence in their research abstract. It also occurred in the abstracts written by AI machine. It cannot develop its ideas by using various patterns. It means that the AI machine has a linear and constant structure in writing research abstracts.

Apart from the use of the linear theme pattern and constant theme pattern which are dominantly used in research abstracts written by students and AI machine, the use of split theme patterns and derived theme patterns are two interesting things in this research, both of which are relatively little used by students and the tool. These findings support the research conducted by (Okta Feri et al., 2023). The total occurrence of the split theme pattern was 13 (14.94%) in student abstracts and 10 (12.66%) in the ChatGPT abstract. Meanwhile, derived theme pattern is found as much 4 (5%) in student abstracts and it is not found in the ChatGPT abstract. The following is an example of a split theme pattern and a derived theme pattern.

Datum 17 of ChatGPT's Abstract



Datum 18 of Students' Abstract



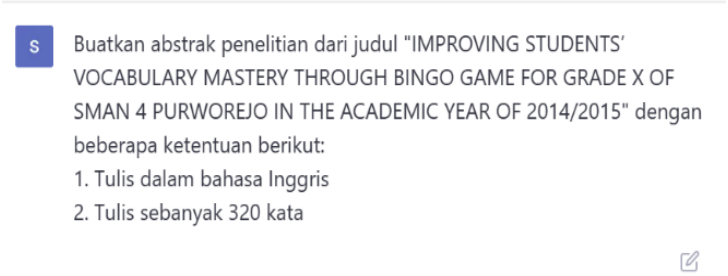
The example which is presented in datum 19 illustrates the split theme pattern (STP). Part of the rheme in the first clause is employed as the theme in the next two clauses. The part of clause 1, '*pre-test*', is employed as the theme in clause 2 and the other part of the clause, '*post-test*', is used as the theme in clause 3. Meanwhile, the example which is presented in datum 20 illustrates the derived theme pattern. The theme in the first clause, '*writing*

score', is passed down to become the theme in the following clauses. This pattern is different from the constant theme pattern. The example in the constant theme pattern shows that the theme in the clause which is used as the theme in subsequent clauses has a grammatical and semantical relationship, whereas in the derived theme pattern, it has no grammatical relationship, but only has a semantical relationship (Okta Feri et al., 2023) as in the example in datum 20 above.

Regarding the derived theme pattern, the use of this pattern is different from the linear theme pattern and the constant theme pattern based on the type of text. This pattern is related to the length of a text and the skill level of the writer. Bloor et al (2004) state that this type of pattern is more commonly found in the text of academic books. Thus, the findings that show the absence of a derived theme pattern in the ChatGPT abstract indicates that the level of proficiency in ChatGPT is still at the intermediate level, while English Education students can realize the derived theme pattern in writing abstracts even though this type of text is relatively short. It means that students' creativity is somewhat better than the tool in realizing the thematic progression patterns in writing abstracts.

In addition, the prompt is the factor that most influences ChatGPT in writing. As said by (Setiawan & Luthfiyani, 2023) that effective prompt will produce better texts from this tool, in which this prompt must be clear, focused, and relevant. So, it must be avoided to use unclear prompts and also overload information, and not include clear instructions (Akin, 2023). The following is an example of the prompt used in this study.

Figure 5. Prompts of ChatGPT



The prompt in Figure 6 relates to the title of the student's thesis and the number of abstract words written by students. This prompt plays an important role in directing language models and helping to produce relevant responses that relate to the purpose of the user. The results of this study indicate that with the use of proper, detailed, and clear prompts, users can get a better response from this tool because the prompts help provide context to the system so that ChatGPT can better understand what users request and produce more relevant responses (Akin, 2023). Furthermore, Akin (2023) explained that this context is also important to avoid misunderstanding and improve the quality of communication.

Considering the findings, the ability of AI machine to produce texts is almost equivalent to the ability of students. This result indicates that this tool can revolutionize AI-based learning. This result is also supported by (Faiz & Kurniawaty, 2023; Lund & Wang, 2023; Firat, 2023). Faiz & Kurniawaty (2023) stated that ChatGPT can be a very useful tool in education if managed properly. Lund & Wang (2023) explained that the ability of ChatGPT to provide supervision about the quality of written work can be useful in the field of education, potentially helping, and providing feedback about students' tasks. Furthermore, Firat (2023) clarified that learners can use this tool to describe their progress and learning, as well as to quickly pinpoint any areas that might need further assistance or direction. Thus, this tool has considerable and interesting power to advance academics if put to correct use. But it is important to remember that this tool is still a relatively new technology, especially in teaching writing, more studies are needed to understand its potential and restrictions correctly and wisely. Overall, it is important to carefully consider the concerns and needs

when it comes to using in education (Zhai, 2022).

Conclusion

Findings show that the unmarked topical theme was commonly realized by students and AI machine in their research abstract. It was followed by textual theme and marked topical theme came after the textual theme. Meanwhile, there was no interpersonal theme found in the research abstract written by students or ChatGPT. In terms of thematic progression patterns, findings showed that the linear theme pattern was commonly applied by students and ChatGPT in their research abstract and followed by the constant theme pattern and split theme pattern. Meanwhile, the derived theme pattern was rarely employed by students and not found in the research abstract written by ChatGPT. These findings show that students could apply all thematic progression patterns.

Artificial Intelligence (AI) encompasses the capacity of machines to emulate and perform tasks typically requiring human intelligence. While AI, specifically ChatGPT, has undergone rapid advancements in generating improved written texts, this study's findings indicate that both undergraduate students and ChatGPT possess comparable abilities in selecting themes within a text. Both can produce texts with relevant and contextual thematic choices. However, this tool still faces limitations in effectively managing natural patterns of thematic progression. Its performance relies heavily on the data available in its knowledge base, and it tends to adhere to pre-programmed patterns, resulting in less diverse and creative outputs.

These findings demonstrate that AI machines have achieved a level of proficiency that enables them to rival humans. Despite the fundamental differences in thematic progression patterns between undergraduate students and ChatGPT, this study concludes that the two are not significantly distinguishable. This study provides deep insight into how humans and AI machine choose the themes in their research abstract. The conclusions of this study also provide valuable insight into the capabilities and limitations of AI machine in imitating the human creative process of writing.

Nevertheless, it is important to note that these conclusions are specific to thematic choice and progression, and they are based on current research findings. AI capabilities continue to evolve. Therefore, it is recommended that future researchers undertake further investigations in similar fields to explore aspects such as quality, creativity, and originality. Additionally, this study suggests that English teachers incorporate thematic structure into writing instruction to enhance students' writing skills. And also they can use this tool as one of the creative learning media. However, it is important to be careful to consider increasing ethics using AI in education and to apply the right steps to overcome any problems.

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Appendix. Flowchart of the study

