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HYLAND'S RHETORICAL MOVES AND HALLIDAY'S TRANSITIVITY SYSTEM IN ANALYSING ABSTRACTS

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Abstract

Writing academically is substantially important for transmitting reliable knowledge to readers, and the abstract represents a fundamental section in revealing the basic content of the study. Verbs, known as ''processes'' in Functional Grammar, are also essential in academic writing in general and abstracts in specific. Therefore, this study aims to analyse the rhetorical structural moves and ''processes'' used in each move. The qualitative approach was employed, and the data were selected from the Scientific Journal Ranking website; eighty research articles were chosen purposively following two theories in analysing the data, namely IPMPC by Hyland (2000) and SFL by Halliday (1985). The findings revealed varied uses of the rhetorical use of moves in different academic disciplines. As for the 'processes' used, their percentages were as follows: Material processes (564), Verbal processes (142), Relational processes (108), Mental processes (18), Existential ones (11), and Behavioural processes (1). These findings demonstrate varieties in the structural moves used in the two domains and the use of 'processes' in each rhetorical move. Such findings could be employed pedagogically by novice writers who are not familiar enough with how to write abstracts academically and expertly.

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1. Introduction

According to Saboori and Hashemi (2013), members of each academic community adhere to particular rhetorical genres that are unique to each academic genre and are mostly represented by research articles (RA). Hyland (2000) asserts that research articles have two main purposes: first, they disseminate knowledge to the members of the academic community, and second, they persuade readers to believe claims and statements. Thus, the abstract, which is a significant part of a research article (RA), has grown in popularity among academics and has attracted the interest of several studies (AlKhasawneh, 2017; Behnam & Golpour, 2014; Çandarlı, 2012).

In addition, according to Gholipour and Saeedi (2019), the abstract serves multiple purposes, such as sharing information with others, convincing certain readers in a

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community, and persuading editors to accept rather than reject submitted papers (Lores, 2004). Furthermore, Çandarlı (2012) argues that abstracts are important parts of research articles since readers will possibly read them first and decide either to read the whole research article based on the content of the abstract or stop reading it. As a result, producing pertinent research articles from specific domains for the global discourse community requires the ability to write an effective abstract. Another factor is that a high percentage of manuscripts submitted to scholarly publications are rejected because of their weak abstracts. For this reason, creating a strong abstract is crucial but difficult at the same time (Jalalian, 2012). However, AlKhasawneh (2012) noted that the majority of non-native English speakers appear to be unfamiliar with the common conventions of academic writing. Consequently, a need arises to assist non-native English speakers in learning academic writing patterns and conventions by teaching them how to read and write research abstracts. In light of this discussion, this study intends to address two primary research objectives:

1. To explore the rhetorical moves of abstracts in articles of disciplines in the hard and soft domains.

2. To identify the kinds of processes 'verbs' employed in both hard and soft domain abstracts.

Numerous studies have examined linguistic traits and rhetorical features of distinct academic genres produced in different languages by writers with different cultural backgrounds (AlKhasawneh, 2017; Hyland, 1999, 2005, Jomaa & Bidin, 2016, 2017, 2019a, 2019b; Swales, 1990, 2014). This analysis reveals the influence of cultural factors, characteristics of a particular discourse community, and traits of a nation's intellectual tradition on both the macrostructure and rhetorical organization of a genre (Duszak, 1997; Yakhontova, 2006). The significant role of both research articles (RA) and conference abstracts has attracted the interest of many studies. In their study, Melander et al. (1997) found that the size and field of the discourse community influence the rhetorical and linguistic features of abstracts.

According to Lorés (2004), the majority of abstracts adhere to the IMRD format: IPMPC (Introduction) (Purpose) (Method) (Product) (Conclusion) (Hyland, 2000). Other abstracts follow CARS (Create a Research Space) structure, whereas other abstracts follow both models. In another study, Samraj (2005) illustrated explicit discipline- and genre-dependent effects on the rhetorical structure of these texts in two genres (RA abstracts and introductions) across two disciplines. Additionally, Povolná (2016) examined the rhetorical structure employed in writing conference abstracts (CA) to

recognize cross-cultural differences between native English speakers and Slavonic-language speakers, including the Czech Republic, Ukraine, Poland, and Slovakia. In writing CA, her research uncovered cross-cultural differences.

Writers in the soft domain have a unique way of engaging their audience (Hyland, 2001; Jomaa & Alia, 2019). Psychology, sociology, linguistics, and political sciences are examples of the soft domain. The hard domain, on the other hand, includes disciplines like physics, chemistry, and biology. Differences in knowledge production between the hard and soft domains exist (Hyland, 2005). More specifically, authors of the soft domain tend to be more subjective compared with those of the hard domain. As a result, the hard domain has an impersonal voice, whereas the soft domain has a personalized stance (Hyalnd, 2005; Martin, 2003).

In analysing academic genres, researchers usually depend on varied theories, such as Functional Grammar (FG), Systemic Functional Linguistics (SFL), ESP (English for Specific Purposes), Discourse Analysis (DA), and Critical Discourse Analysis (CDA) (Jomaa, 2019). According to Swales (1990), ESP is where a genre analysis originally emerged, and earlier research has shown that several factors have influenced the genre analysis. According to Swales (1990), a genre is a class of communication events that all have a similar set of communicative objectives. According to this definition, a genre is grouped according to its intended audience. A genre, according to Swales and Feak (2009), is a category of texts or speech that is organized to achieve a certain set of communicative objectives. The most major similarities between texts of the same genre and the most significant differences between them are these communicative goals, which are reflected in various structural patterns. The explanation of the rhetorical structures used by the genre movement is crucial to the genre analysis.

As for Systemic Functional Linguistics (SFL) (Halliday, 1985), it has gained popularity since the 1950s because of its impact on the process of evaluating, analysing, and writing texts. The main focus of SFL is on using language to create or develop knowledge (Garcia Montes, 2014). To illustrate, if words do not address specific cultural or contextual challenges, people will not succeed in having a discourse. Because of this, a language is referred to as a dynamic tool for humans to transmit meaning, yet this meaning cannot be achieved from the simple act of speaking words, whereby the context plays a significant role in this comprehension. As a result, there is a rule that states, "Anyone cannot comprehend the concept of what someone says or writes unless you know something about the context in which it is embedded" (Martin, 1984). This presumption is crucial because it raises important issues regarding how educators contribute to a student's learning. To comprehend how language reaches its

communicative objectives, students must experience it in a variety of cultural and contextual settings. Students must also be taught that every situation entails a variety of language possibilities depending on the context and goals of the discourse. In this regard, SFL examines language more specifically in terms of field, tenor, and mode (Halliday, 1985; Halliday & Matthiessen, 2014). The phrase "field" always refers to the conversational subject. What individuals are doing and what is happening in the text are two questions it answers. According to Martin (1984), some examples of disciplines are farming, tennis, opera, linguistics, gastronomy, and architectural design. Tenor, on the other hand, refers to the relationships and social standing of the main characters. It focuses on examining where people fit into the world in terms of knowledge, studies, careers, and a variety of other things.

Tenor, according to Halliday and Hasan (1989), is the character of the contributors, their statuses, roles, and the kinds of role interactions that occur among them. It relates to the idea of a communication channel in terms of mode. It is possible to converse orally and in writing. Nowadays, people can access a variety of platforms, such as social media, websites, Skype, email, phones, cell phones, movies, and more. The function of the language in a context and what the participants hope a language will accomplish for them are referred to as the symbolic organization of the discourse according to Halliday and Hasan (1989). Figure 1 depicts the transitivity system for "field" developed by Halliday in 1985.

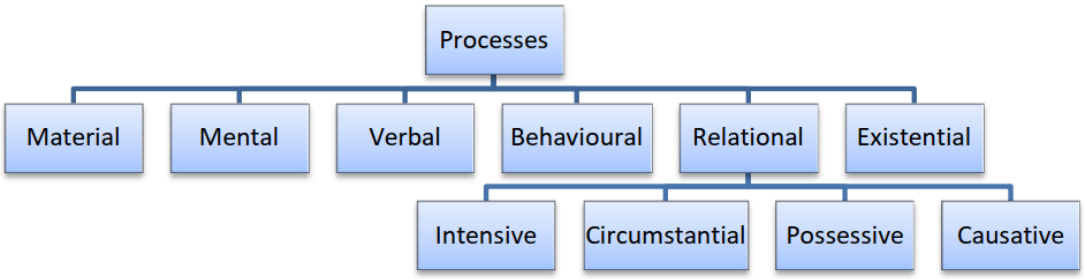

Figure 1. *Transitivity system (Halliday, 1985)*

In a study, Tseng (2011) examined verb tenses and abstract moves. In most linguistic journal abstracts, four-model moves were used. Additionally, several verb tenses were employed. Similarly, Anakib (2020) explored the verb tenses and move structure utilized in composing abstracts. The information was derived from an analysis of ten (10) students' theses using Swales' taxonomy. The results demonstrated that the student writers employed a four-move framework. According to Tullu (2019), certain

journals adhere to the standard format (IMRAD) for the study structure, which consists of an introduction, a purpose, a methodology, a set of results, and a conclusion. On the other hand, some journals put limits on the number of the vocabulary used; therefore, authors include only the basic moves (a purpose, a method, and results).

Al- Khasawneh (2017) also examined 20 abstracts from applied linguistics papers that were produced by native and non-native English speakers. International journals were chosen for the data selection. To better understand the variations between native and non-native writers in the structure of abstracts, the study followed Hyland's (2000) taxonomy of the genre analysis. The results demonstrated that both native and non-native writers employed the purpose, method, and conclusion (PMC) rhetorical framework. As for the processes 'verbs' used, varied studies have focused on using them in several academic genres. For instance, Jomaa and Bidin (2019b) analysed processes in the citations of 20 Ph.D. theses by EFL Arab postgraduates. The findings showed varied uses that reflected the random use and students' unawareness of the implicit evaluation of such verbs (Jomaa & Bidin, 2019c). Reviewing these studies reveals that authors did not adhere to the rhetorical framework of writing the abstracts or the use of processes in their research articles and theses; rather, they employed these processes randomly. Therefore, the purpose of this study is to first analyze the abstract moves and then identify the different verbs 'processes' that are used in each abstract move.

2. Methodology

2.1 Research Design

Data were carefully chosen from journals listed on the Scientific Journal Ranking which were published during the period from 2010 to 2020. Eighty research articles were separated into two groups of 40 research articles for each domain: soft and hard domains, which made up the overall data. To achieve its goals, this qualitative study used a genre analysis of verb 'processes' and abstract moves following two linguistic theories: Systemic Functional Linguistics (Halliday, 1985) and IPMPC (Hyland, 2000).

Hyland's (2000) taxonomy is predicated on five significant structure movements, as seen in Figure 2. These elements are central since they can be viewed in the ESP frame. The study's background and some general details are covered in the introduction move, whilst the precise purpose is revealed in the second move, namely the purpose move. A broad range of research techniques and elements, including participants, surveys, hypotheses, data used in the research, etc., are included in the methodological

move. Fourth, the research's results are explained in the findings move. The conclusion also suggests further information, such as comments, recommendations, and a complete revision of the findings, and it is usually included in the final move.

The Systemic Functional Linguistics is also discussed in the conceptual framework. Figure 2 depicts the six "process" verbs in the SFL. The different verb categories can be categorized as follows: material verbs are verbs with activities and a dynamic process inherent in them. Verbal verbs imply speaking nature and include verbs like (*reveal, demonstrate, illustrate, argue, explain*, etc.). Mental verbs are related to abstract actions (thinking, imagining, dreaming). Between the mental and material verbs are certain categories, including the behavioral verbs (observe and notice). When employed as main verbs, relational verbs are used. The existential verbs are limited to (there is/are). The conceptual framework employed in this study is explained in Figure 2 below.

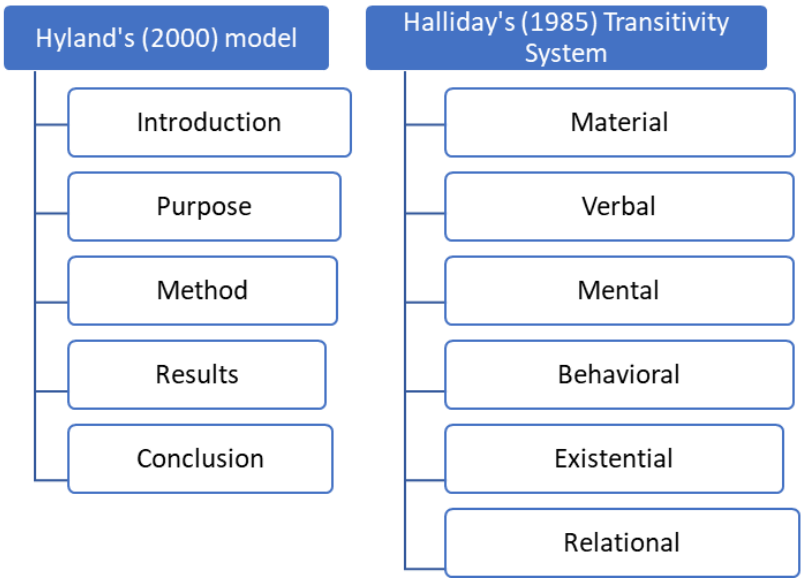

Figure 2. *Conceptual framework*

2.2 Population (Sampling)

In this study, a qualitative research approach was mainly used in analysing the data. A purposeful sampling was followed in choosing 80 research articles that belong to the two domains: hard and soft domains. These articles were published in open-access Scopus-indexed journals. In the soft domain, disciplines of applied linguistics, business, management, and social sciences are included, whereas the hard domain includes disciplines of biology, chemistry, computer sciences, and engineering. 10 abstracts of ten research articles that belong to eight disciplines were analysed: forty abstracts are from the hard domain, and the other forty (40) abstracts are from the soft

domain. All articles were downloaded from the Scientific Journal Ranking which were published during the period from 2010 to 2020.

2.3 Data Collection

The data analysed were chosen from articles of journals that were listed on the Scientific Journal Ranking. The researchers started by searching for articles in the soft and hard domains. The second step was to select articles released between 2010 and 2020. The researchers' final stage involved creating tables to address the study's research objectives:

- To identify the moves employed in composing abstracts in articles of the soft and hard domains.
- To examine the different verb types utilised in the abstract moves in articles of the soft domain and the hard one.

The data were purposefully collected for the current investigation. The data were chosen from articles published during the period from 2010 to 2020, and were classified into two groups; each group has four fields. The soft domain makes up the first group, whereas the hard domain makes up the second one.

Table 3. *Data of journals in the soft domain*

Disciplines	**NO**
AL. Applied Linguistics abstracts	10 abstracts
BU. Business Study abstracts	10 abstracts
MA. Management abstracts	10 abstracts
SS. Social Sciences abstracts	10 abstracts

Table 4. *Data of journals in the hard domain*

Disciplines	**NO**
BI. Biology abstracts	10 abstracts
CH. Chemistry abstracts	10 abstracts
CO. Computer abstracts	10 abstracts
EN. Engineering abstracts	10 abstracts

2.4 Data Analysis Technique

The researchers developed a clear understanding and a thorough classification of verbs 'processes' and rhetorical moves utilised in composing abstracts. The process of analysing the data is described as follows:

1- Choosing journals from the Scientific Journal Ranking list that were published during the period from 2010 to 2020 in the soft and hard domains.

2. Examining the abstracts selected and listing the verbs 'processes' and rhetorical moves employed.

3- Identifying rhetorical moves employed in composing abstracts following Hyland's (2000) model.

4- Using Halliday's (1985) Transitivity System to categorise all verbs 'processes' in the abstracts.

To code and document the examples extracted from the articles analysed, Table 5 represents the symbols used for coding the examples.

Table 5. *Coding of data*

Coding
A.L. for Applied Linguistics
B.U. for Business Studies
MA. for Management
SS. for Social Sciences
BIO. for Biology
CH. for Chemistry
CO. for Computer
EN. for Engineering

3. Findings

3.1 Rhetorical Moves in Abstracts

This section includes two parts. The first part addresses the first research objective and presents an analysis of the rhetorical moves used in writing the abstracts in 80 abstracts that belong to two domains (hard and soft). In this part, the researchers discuss how they used Hyland's (2000) model to analyze the abstracts of research articles in the soft domain represented by Applied Linguistics, Business, Management, and Social sciences. The number and percentage of rhetorical moves used in the abstracts are displayed in tables to show similarities and differences and make generalisations of the findings within the study itself.

Table 6. *Introduction rhetorical move in the abstracts of the soft domain*

NO	Discipline	Frequency	Percentage
1	AL	10	40%
2	BU	0	0
3	MA	8	32%
4	SS	7	28%

Based on Table 6, the current study revealed that writers in Applied Linguistics used the introduction move in the soft domain with a percentage of 40% compared with other disciplines. It is the highest percentage that was used most frequently when writing abstracts. This finding highlights that the introduction move is a crucial one when writing abstracts. In contrast, in other abstracts, the authors did not include the introduction move and started directly with the purpose of the study. In the management discipline, the writers utilised the introductory move with 32%, and 28% in the social sciences. The absence of using the first move in writing abstracts may reveal writers' lack of guidelines on how to write abstracts or the limited number of words imposed by the journal instructions.

"*Child peer interaction in English as a foreign language (EFL) settings has recently received increasing attention with respect to age, instruction type, and first language (L1) use, but longitudinal studies remain scarce, and the effects of proficiency pairing and language choice on meaning negotiation strategies are still rather unexplored* (P.4/ AL)."

Table 7. *Purpose move in abstracts of the soft domain*

NO	Discipline	Frequency	Percentage
1	AL	10	25 %
2	BU	10	25 %
3	MA	10	25 %
4	SS	10	25 %

According to Table 7, all articles were written using the Purpose move because it is one of the crucial moves utilised while writing articles with empirical findings. This shows that these authors are aware of the significance of this rhetorical move; therefore, all abstracts included it.

"To address these calls, we conducted a mixed-methods study that examined mobile application users' coping strategies after highly negative incidents". (P.6/ MA)"

Thirdly, Table 8. shows the use of the Method move in writing the abstracts (AL, BU, MA, and SS) and includes the number and percentage of the Method move.

Table 8. *Method move in abstracts of the soft domain*

NO	Discipline	Frequency	Percentage
1	AL	10	25 %
2	BU	10	25 %
3	MA	10	25 %
4	SS	10	25 %

Similar to the purpose move, the Method move was used in all abstracts of the articles as evident in Table 8. This shows the high importance of these two moves as well as the familiarity of the authors in these disciplines with the significance of including these moves in writing the abstracts.

"The participants were 61 fourth-grade students in the United States, comprising 24 monolingual English-speaking (ME) students and 37 English-as-a-second-language (L2) students; each group was also divided into strong and emergent readers in English. Participants were asked to read aloud paragraphs containing words unfamiliar to them in two different contextual conditions (i.e., explicit and implicit conditions), to guess the unfamiliar word meanings, and to tell a teacher how they arrived at the inferred meanings (P.7/ AL)"

The Results move is also one of the most significant moves in writing the abstracts. Table 9. shows the use of the Results move in the soft domain.

Table 9. *Results move in abstracts of the soft domain*

NO	Discipline	Frequency	Percentage
1	AL	10	25 %
2	BU	10	25 %
3	MA	10	25 %
4	SS	10	25 %

The percentages of using the results move are similar to the results of both the Purpose and Method moves. According to Table 9, the authors used the Results move in all 40 articles of the soft domain, with 100%. This result also emphasises that the results move

is another essential element of writing abstracts for research articles with empirical findings.

"The findings show the necessity of best practices diffused between different types of e-services and present an opportunity to widely spread research findings between different e-service sectors (P.1/ SS)".

The final rhetorical move that is usually followed in writing the abstract is the conclusion move. However, the abstracts in the 40 articles in the soft domain did not employ the Conclusion move. The writers' unfamiliarity with academic writing or the vocabulary limit in each abstract may be the reason for excluding this move.

In this subsection, the rhetorical moves used in writing the abstracts of 40 articles of the hard domain were analysed including (Biology, Chemistry, Computer, and Engineering). A variation exists in using this move. Table 10 includes the frequency and percentage of the Introduction move used in writing the abstracts in articles that belong to the hard domain.

Table 10 *Introduction move in abstracts of the hard domain*

NO	Discipline	Frequency	Percentage
1	BIO	10	30.30 %
2	CH	10	30.30 %
3	CO	8	24.25 %
4	EN	5	15.15 %

Table 10 shows varied uses in employing the introduction move in the abstracts of the hard domain. Both abstracts of Biology and Chemistry included the introduction move, whereas abstracts of Computer and Engineering had lower percentages. Not all abstracts in these latter disciplines included the Introduction move. This could reveal three possible reasons. First, authors in these fields are not familiar with the rhetorical moves used in the academic writing of the abstracts. Second, the length of the abstract and the number of words allowed in writing the abstract could impose deleting unnecessary elements. Third, authors may find that including such a move is not important and it is better to start with the Purpose move.

"Drug stability is closely related to drug safety and needs to be considered in the process of drug production, package and storage. (P.4/ CH)."

The next move that was analysed was the Purpose move. The frequency and percentages of the purpose move in Biology, Chemistry, Computer Science, and Engineering are shown in Table 11.

Table 11. *Purpose move in abstracts of the hard domain*

NO	Discipline	Frequency	Percentage
1	BIO	10	27. 2 %
2	CH	9	24. 32 %
3	CO	10	27. 2%
4	EN	8	21. 64 %

According to the results in Table 11, the Purpose move was utilized in almost all abstracts of the hard domain excluding one abstract in Chemistry and two abstracts in Engineering. Though the Purpose Move is essential in writing abstracts, a few abstracts did not include this move. This might reveal the authors' unfamiliarity with the rhetorical strategies.

"To fulfil the semi-active control of the MR gel in the mechanical application, a highly effective model needs to be proposed to predict the nonlinear hysteresis behaviour of MR gel accurately (P.2/ EN)"

The Method move is also one of the important moves in academic writing of the abstracts of theses, research articles, and conference papers. Like the results related to the Purpose move, approximately all abstracts of the articles in the hard domain included the Method move excluding only two abstracts: one in Biology and the other one in Computer. Table 12 shows the frequency and percentage of the Method move in the abstracts of the hard domain.

Table 12. *Method move in abstracts of the hard domain*

NO	Discipline	Frequency	Percentage
1	BIO	9	24.32%
2	CH	10	27.2%
3	CO	8	21.64%
4	EN	10	27.2%

"*Here, we demonstrate how to use the R-INLA package for R to analyses N-mixture models, and compare the performance of R-INLA to two other common approaches: JAGS (via the run jags package for R), which uses Markov chain Monte Carlo and allows Bayesian inference, and*

the unmarked package for R, which uses maximum likelihood and allows frequentist inference (P.5/ CO)".

One of the fundamental steps in the academic writing of abstracts (thesis, research, and article) is the Results move. The number and percentage of the Results move in abstracts are displayed in Table 13 below.

Table 13 *Results move in abstracts of the hard domain*

NO	Discipline	Frequency	Percentage
1	BIO	3	9.37%
2	CH	9	28.13%
3	CO	10	31.25%
4	EN	10	31.25%

As evident in Table 13, though the Results move represents an essential part of writing abstracts, some abstracts lacked it, especially in the Biology discipline, but abstracts in Computer and Engineering included the results move, and only one abstract in the Chemistry discipline did not include this move. This shows that authors of some disciplines either lack the necessary guidelines for writing abstracts or are not aware of the basic moves that should be included in the abstracts.

"Our analyses revealed that the top nine hits might serve as potential anti- SARS-CoV-2 lead molecules for further optimization and drug development process to combat COVID-19 (P.10/ CH)"

In this section, the researcher explains the Conclusion move in the hard domain (Biology, Chemistry, Computer, and Engineering) which had the lowest percentage because of the limitation of vocabulary or the writers may not be familiar with academic writing and the basic moves that should be included. Table 14 shows the number and percentage of the Conclusion move in the abstracts of the articles classified under the hard domain.

Table 14. *Conclusion move in abstracts of the hard domain*

NO	Discipline	Frequency	Percentage
1	BIO	6	100 %
2	CH	0	0 %
3	CO	0	0 %
4	EN	0	0 %

"*Dispensable genes usually belong to young and recently expanded gene families enriched in survival functions, which might be the key to explain the resilience and invasiveness of this species* (P.7/ BIO)"

The findings indicate that the introduction move is utilized frequently in the hard domain more than the soft domain. Although the soft domain used the Purpose move more frequently than the hard domain, there were not many distinctions between the two domains. Additionally, the soft domain used the Methods move at a higher rate than the hard domain. Similarly, the findings showed that the use of the Result move in the soft domain is more than the hard domain. In contrast, the analysis reveals that writers in the hard domain employ the Conclusion move more frequently than writers in the soft domain. These variations in using rhetorical moves can reveal several issues, such as limitations on the number of words in each abstract, lacking enough guidelines on writing the abstract genre, and trying to include only the basic rhetorical moves.

3.2 Using Processes ''Verbs'' in the Rhetorical Moves

The second part of the results presents an analysis of the use of processes 'verbs' in the abstract moves in 80 articles of the hard and soft domains.

The verbs utilised in writing the abstracts using Halliday's (1985) model were examined in this study. The data were qualitatively analysed and quantified to make generalisations within the findings of the study. Based on the findings displayed in Table 15, Applied Linguistics authors tended to prefer using material processes more than other types of processes. More specifically, the current study revealed that 10 abstracts were written using material processes with a percentage of 29.31%. The researchers also observed that the writers predominately used material processes in the abstract's introductory move.

Table 15 *Material processes in abstracts of the soft domain*

NO	Discipline	Frequency	Percentage
1	AL	90	29.31%
2	BU	72	23.45%
3	MA	71	23.12%
4	SS	74	24.12%

"*The other 33 articles **use** GTM to develop models and rich descriptions of new phenomena as their theoretical contribution.* (P.10/ MA)"

*"The data of 365 questionnaires were **analyzed** using the Spearman correlation to determine the relationship between the model components. (P.1/ SS)"*

Mental processes

Mental processes were also employed to describe thinking, experiencing, and perceiving realisations. Table 16 displays the Mental processes used in writing the abstracts in the soft domain.

Table 16 *Mental verbs 'processes' in Abstracts of the soft domain*

NO	Discipline	Frequency	Percentage
1	AL	4	25 %
2	BU	5	31.25%
3	MA	4	25%
4	SS	3	18.75%

It was found that the writers of articles in the soft domain used Mental processes in the abstract, but the percentage was low.

*"they **perceive** that the assessment system is not arbitrary, i.e., that this HR practice is being applied consistently* (P.2/ BU)"

The highest percentage was used in Business articles with 31.25%, whereas the lowest percentage was found in social sciences, which was 18.75% in this field.

Verbal processes

According to the results shown in Table 17, it was found that the writers in the soft domain used verbal processes, with 27.38 % in the abstracts of Applied Linguistics. This result is considered the highest percentage in the soft domain.

"The study shows that teachers with a higher formal qualification tend to assess their L2 proficiency higher and claim to use the L2 more often in the primary EFL classroom. (P. 9/ AL)"

In Management, the writers used verbal processes with 25.9% in writing their abstracts more, which is considered more than Business articles. However, the differences between them are small.

"*we **demonstrate** the multilevel and recursive nature of digitally-driven growth in physical product platforms.*(P. 5/ MA) "

The findings in Table 17 explain the numbers and percentage of verbal processes used in writing the abstracts of the soft domain.

Table 17. *Verbal verbs 'processes' in abstracts of the soft domain*

NO	Discipline	Frequency	Percentage
1	AL	27	27.38%
2	BU	22	23.68%
3	MA	25	25.9%
4	SS	20	22.9%

Behavioural processes

Based on the findings, the writers in the soft domain did not use Behavioural processes. The possible effect of the common use of behavioral processes is that all chosen articles are based on scientific experiments and numbers, so there was no need to use behavioral processes.

Relational processes

Relational processes include several subcategories. Table 18 clarifies the percentage and number of Relational processes in the abstracts (AL, BU, MA, and SS).

Table 18. *Relational verbs 'processes' in abstracts of the soft domain*

NO	Discipline	Frequency	Percentage
1	AL	19	40%
2	BU	17	30%
3	MA	6	10%
4	SS	11	20%

In Applied linguistics, the writers used relational processes with 40% in writing the abstracts in general.

"*Research into the potential of collaborative writing* ***is*** *relatively new* (P 6/ AL)"

In this example, the writer used an intensive process that includes the verb to be (is, am, are).

"*The analysis* ***included*** *conversational adjustments, self-and other-repetition and positive and negative feedback in the learners' L1 and second language (L2)* (P.4/ AL/)"

In this example, the writer used possessive processes.

In Business studies, based on the findings in Table 20, the writers used relational processes with 30% in writing abstracts.

"*Available slack* ***has*** *a consistent and positive effect on economic profitability in the short term"* (P.9/ BU).

In this example, the researcher found that the writer used possessive processes (has).

Existential processes

Existential processes are usually associated with a specific structure, namely: there is, there are, there was, there were. Only a few examples of existential processes were used in the abstracts of articles in the hard and soft domains.

Table 19 shows the number and percentage of existential processes in the abstracts.

Table 19 *Existential verbs 'processes' in abstracts of the soft domain*

NO	Discipline	Frequency	Percentage
1	AL	1	20%
2	BU	3	50%
3	MA	0	0%
4	SS	2	30%

In Table 19, the researchers found that the writers of the soft domain rarely used Existential processes representing only 20% of processes in writing abstracts of 10 articles in Applied linguistics.

"In contrast, ***there is*** *the danger of teachers overusing the L1 and thus disadvantaging their learners by providing less L2 input and fewer learning opportunities (Turnbull, 2001)* (P.9/ AL)"

In the following subsection, the researchers describe the hard domain using the Transitivity System under Systemic Functional Linguistics (SFL) theory. Each discipline (Biology, Chemistry, Computer, and Engineering) has 10 articles, with a total of 40 articles. The frequency and percentage of material processes utilised to write abstracts in the hard domain (BO, CH, CO, and EN) are shown in Table 20.

Table 20 *Material processes in abstracts of the hard domain*

NO	Discipline	Frequency	Percentage
1	BIO	63	24.10%
2	CH	71	29%
3	CO	68	26.76%
4	EN	55	20.14%

Material processes

Based on the analysis of the data, it was found that the writers used Material processes in a high percentage in writing their abstracts. The writers used the Material processes in writing abstracts in 10 articles of Biology with 24.10%. Though it is high, it is the lowest percentage used in the hard domain. On the other hand, the writers used the Material processes in Chemistry with the highest percentage reaching 29%. Using Material processes with a high percentage could be attributed to the dependence of hard domains on experiments and tests; therefore, for such disciplines, research procedures are highly significant to achieve accurate results.

"*We* ***investigated*** *the feature map inside deep neural networks (DNNs) by tracking the transport map* (P.1/ CO). The last section explains the material processes in Engineering."

Mental processes

Unlike Material processes, Mental processes occupied a low number of uses in writing abstracts of articles in the hard domain.

Table 21 *Mental verbs 'processes' in abstracts of the hard domain*

NO	Discipline	Frequency	Percentage
1	BIO	0	0
2	CH	0	0
3	CO	1	50 %
4	EN	1	50 %

"*We* ***expect*** *that further investigations on these questions lead to the development of an interpretable and principled alternatives to DNNs"* (P.2/ CO).

Disciplines of the hard domain are based on facts rather than beliefs; consequently, using Verbal processes like 'think', 'believe', and 'feel' are not usually used. Authors who write their research articles usually follow the writing style of other previous studies in their own research area. That is, when such verbs are not found in previous related studies, other researchers will not employ them in their writing.

Verbal processes

Verbal processes are associated with statements, arguments, assertions, and reporting. Some of these processes were analysed in a different way following Hyland's (1999) taxonomy of reporting verbs. To illustrate, some verbs were classified as 'finding' verbs like 'show' and 'find'. However, in the current study, Halliday's (1985) Transitivity System was used, whereby these verbs can accept 'that clause'; therefore, they were classified as Verbal processes. This may justify the high use of such verbs compared with the low percentage of the mental processes. Table 22 lists the frequency and percentage of Verbal processes used, whereby Biology articles had the highest percentage 36.76%.

Table 22 *Verbal verbs 'processes' in abstracts of the hard domain*

NO	Discipline	Frequency	Percentage
1	BIO	25	36.76%
2	CH	10	14.72%
3	CO	14	20.58%
4	EN	19	27.94%

"*We show that differential editing sites between epithelial and mesenchymal phenotypes function by regulating mRNA abundance of their respective genes.*" (P.1/ BIO)

"*The results showed that the degradation kinetics of epalrestat followed first-order reaction kinetics.*" (P.4/ CH)

Behavioural processes

The researchers illustrated that the percentage of Behavioral processes was low based on the data explored and analysed. It was only used once in an abstract of the Computer engineering. In contrast, in the abstracts of Biology, Chemistry, and Engineering, writers did not utilize Behavioral processes ''verbs''.

Table 23 *Behavioural verbs 'processes' in abstracts of the hard domain*

NO	Discipline	Frequency	Percentage
1	BIO	0	0%
2	CH	0	0 %
3	CO	1	100%
4	EN	0	0%

"*we* ***observe*** *a favorable trade-off of objective function evaluation, classification performance, and complexity of the nonparametric regress or extracted by the proposed method*" (P.3/ CO).

Relational processes

In Table 24, it was found that some Relational processes reached 23.65% in Biology, as evidenced by the examples displayed. More specifically, Intensive processes had a higher percentage among Relational processes.

"*One of the most unusual sources of phylogenetically restricted genes* ***is*** *the molecular domestication of transposable elements into a host genome as functional genes* (P.2/ BIO)"

"*The Mediterranean mussel Mytilus galloprovincialis* ***is*** *an ecologically and economically relevant edible marine bivalve, highly invasive and resilient to biotic and abiotic stressors causing recurrent massive mortalities in other bivalves* (P.7/ BIO)"

Table 24 *Relational verbs 'processes' in abstracts of the hard domain*

NO	Discipline	Frequency	Percentage
1	BIO	13	23.65%
2	CH	14	25.45%
3	CO	11	20%
4	EN	17	30.90%

The highest percentage of the use of Relational processes existed in the abstracts of the Engineering articles, followed by Chemistry. In such fields, there is no room for arguments; research is based mainly on facts, and this justifies the frequent use of relational processes. The authors of computer abstracts employed relational processes with 20%, whereby the relational process had the largest percentage of the Intensive processes.

"*The calibration curve* ***was*** *A ¼ 1.6 105C–1.3 103 (r ¼ 0.999) with the liner range of 0.5–24 μg/mL, the intra-day and inter-day precision was less than 2.0%, as was the repeatability* (P.4/ CH)"

"*One important feature* ***is*** *that zenplot and its auxiliary functions in zenplots distinguish layout from plotting which allows one to freely choose and create one- and two-dimensional plot functions; predefined functions are exported for all graphical systems* (P.7/ CO)"

Existential processes

Existential processes are another type classified under the Transitivity System of SFL theory (Halliday, 1985). Table 25 includes the number and percentage used in writing abstracts of the hard domain: Biology, Chemistry, Computer, and Engineering.

Table 25. *Existential verbs 'processes' in abstracts of the hard domain*

NO	Discipline	Frequency	Percentage
1	BIO	1	20%
2	CH	2	40%
3	CO	2	40%
4	EN	0	0%

Based on the results in Table 25, it seems that Existential processes were either never used in Engineering abstracts or were used only once in Biology abstracts, or twice in Chemistry and Computer abstracts. The low use of such processes may reveal authors' awareness that such structures are less used since other stronger linguistics structures are available and can be used instead of this simple structure.

"***There is*** *still a need to develop a cost-effective, reliable and quick labeling method for insulin* (P. 5/ CH/)."

"*Unfortunately, for many queueing networks* ***there is*** *no clear way to proceed with parameter inference from data* (P. 7/ CO)."

The current study illustrates the distinctions and similarities between the soft and hard domains in these two tables in terms of using the Transitivity System. Both domains share a common characteristic represented by the high use of Material processes, followed by Verbal processes, and Relational processes in the third rank. In contrast, only one Behavioral process was used in the hard domain articles. Using the Material processes in the hard domain more than other processes seems to be in line with the norms and standards of writing in the hard domain. That is, disciplines of the hard domain depend on facts, so they emphasise more on employing research verbs and

procedures. On the other hand, disciplines in the soft domain depend more on arguments and the strengths of persuading and convincing. Consequently, Verbal processes rather than Material ones should be used more.

4. Discussion

This study is based on analysing the abstracts of 80 research articles that belong to two domains: hard and soft domains. Two theories were employed in the abstract analysis: ESP and SFL. The first one is based mainly on analysing the rhetorical moves used in writing the abstracts following Hyland's (2000) model with its five elements: Introduction, Purpose, Method, Results, and Conclusion Moves. The second theory, SFL by Halliday (1985), was utilised to analyse the Transitivity System in the rhetorical moves.

The research findings revealed that most authors only used four structure moves—as opposed to five—when producing research abstracts. Introduction, Purpose, Methods, and Result are the main structural components of research abstracts. These results demonstrate that the authors' writing of the abstracts diverges from Hyland's (2000) model. In contrast, the findings showed that some authors adopted Hyland's (2000) model. According to some earlier research, professional writers tend to be more selective when making decisions to better promote their works. To be more informative about the content and structure of their articles, student authors, in contrast, often incorporate all the structural elements (Ren & Li, 2011, Tseng, 2011, Anakib, 2020). Some earlier studies (Ren & Li, 2011; Tseng, 2011; Anakib, 2020) have also examined verb tenses and discovered that the writers used the present tense in the Introduction, the Purpose, and the Conclusion moves, whereas they used the past tense in the Methodology and Findings moves. That is, the authors employed three moves instead of five according to certain earlier studies (Ren & Li, 2011, Tseng, 2011, Anakib, 2020). More specifically, the Introduction, Purpose, and Results moves are the three moves that were used. However, there are parallels with earlier research (AlKhasawneh, 2017; Darabad, 2016; Behnam & Golpour, 2014), which illustrated that abstracts contain four moves rather than five. In other words, for some authors, the Introduction move is optional, whereas the other four moves are required in applied linguistics. In contrast, in this study, it was revealed that the Introduction move was used with 62.5% in the soft domain and 82.5% in the hard domain.

In addition, this study examined the use of processes 'verbs' utilised in 80 article abstracts. 475 processes in the soft domain and 388 in the hard domain were used, including 6 processes with varied frequencies and percentages. The Material processes

occupied the first rank followed by Verbal processes in both domains. On the one hand, the use of Material processes with a high percentage in the hard domain seems to be in line with the norms of academic writing which emphasises more on research verbs and procedures. On the other hand, Material processes contrast with the results of writing in the soft domain (Jomaa & Bidin, 2016).

5. Conclusion

Although numerous studies have been conducted on the same research issue, each study attempted to fill a different need. Consequently, this study differs from earlier studies in three important ways. The researchers depended on data from one of the best websites that hosts lots of academic journals indexed in Scopus (Scientific Journal Ranking). Second, this study utilised two theories to analyze the data, namely Hyland's (2000) model and Halliday's (1985) Transitvity System. The Transitivity System that belongs to the latter theory is comprehensive when compared with other taxonomies (Francis, Hunston & Manning, 1996; Hyland, 1999; Thomas & Hawes, 1994; Thompson & Yiyun, 1991) since it presents an explanation of all verbs 'processes' used. The third point is analysing 80 abstracts derived from (80 articles) in eight disciplines. However, this study was based on analysing qualitatively texts in contexts. Therefore, conducting more studies on analysing the abstracts considering other linguistic features and exploring the context of such studies would enrich the body of literature related to rhetorical moves and the Transitivity system. Future research can also compare postgraduates' research with expert authors' writing as well as explore the challenges faced by them when writing academically.

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