

A Multidimensional Analysis of Linguistic Realizations and Rhetorical Move Structure in Geography Research Article Abstracts: A Corpus-Based Study

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Novice Geography researchers need to be acquainted with the rhetorical move structure and organization of scientific research article abstracts (RAAs); yet there is a lack of studies investigating the linguistic realizations involved and their connections to the rhetorical move structure in Geography RAAs. This paper conducted a multidimensional analysis to explore phrase frames/collocations and move length and their connection to the rhetorical move structure and sequence in 190 Geography RAAs from journals indexed in the Web of Science Master Journal List. The move structure was investigated employing Hyland's (2004) move scheme, Introduction-Purpose-Method-Product-Conclusion. The results revealed that Geography RAAs have a five-move structure, consisting of three "essential" moves whose functions are to present Purpose, Methods and Results, and two "conventional" moves, whose functions are to present Introduction and Conclusion. The findings of the multidimensional analyses indicated that the moves that occurred most frequently in Geography RAAs (Purpose, Methods and Results) occupied most text space and included more phrase frames. The findings indicate the importance of combining investigations of the rhetorical move structure in a particular genre with an exploration of the linguistic realizations in each move as this may provide both researchers and English for Academic Purposes (EAP) tutors with valuable resources for understanding the rhetorical and linguistic characteristics of specific RAA types.

Keywords: Geography research article abstract; multidimensional analysis; rhetorical move structure; linguistic realizations; move length; phrase frames

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Un análisis multidimensional de las realizaciones lingüísticas y la estructura de los movimientos retóricos en los resúmenes de los artículos de investigación en geografía. Un estudio basado en corpus

Los investigadores noveles en geografía que buscan difundir su investigación en revistas de impacto necesitan conocer la estructura retórica de los movimientos y la organización de los resúmenes en artículos de investigación (RAI); sin embargo, existe una cierta limitación en el número de estudios que investigan las formas lingüísticas y su conexión con la estructura retórica de movimientos en los RAI de geografía. En este artículo se hace un análisis multidimensional de los marcos y colocaciones de grupos gramaticales y la extensión de los movimientos retóricos de 190 resúmenes de artículos de investigación de dos revistas de geografía indexadas en la *Web of Knowledge*. La estructura de los movimientos se investigó utilizando el esquema de movimientos de Hyland (2004): Introducción-Propósito-Método-Resultado-Conclusión. Los resultados revelan que los RAI sobre geografía tienen una estructura de cinco movimientos con tres movimientos “esenciales”, cuyas funciones son presentar el propósito, los métodos y los resultados, y dos movimientos “convencionales”, cuyas funciones son presentar un trasfondo para la investigación y los comentarios finales. Los hallazgos de los análisis multidimensionales indicaron que los movimientos que ocurren con mayor frecuencia en los RAI en geografía (Propósito, Métodos y Resultados) ocupan la mayor parte del espacio de texto, y que incluyen más marcos de grupos gramaticales. Los hallazgos indican la importancia de combinar la investigación de la estructura retórica de movimientos en un género concreto con la exploración de las formas lingüísticas en cada movimiento, y a su vez pueden ser útiles para los investigadores y profesores de inglés para fines académicos, con el objeto de entender las características retóricas y lingüísticas de tipos concretos de RAI.

Palabras clave: resumen de artículo de investigación en geografía; análisis multidimensionales; estructura de movimientos retóricos; realizaciones lingüísticas; longitud de movimiento; marcos de grupos gramaticales

I. INTRODUCTION

Genre-based approaches to English for Academic Purposes (EAP) research of the rhetorical move-step structure and the linguistic realizations of scientific research articles (RAs) have become common since the publication of Swales' (1981) seminal work *Aspects of Article Introductions*. A *move* is a text segment that serves a communicative function in terms of the overall message, while a *step* is a sub-move that contributes to the communicative function of the move (Kanoksilapatham 2009).

Many scholars argue that novice researchers need to be acquainted with the move structure and organization of scientific RAs (Swales 1981; Hill et al. 1982). A research article abstract (RAA) provides a preview of key information in the full RA. As an RAA is the first section researchers read in order to decide whether to download or read the whole RA, they need to know the rhetorical functions of the moves (i.e., macro-structure) and specific linguistic realizations (i.e., micro-structure) of this important section because moves are constructed from linguistic devices, including word choice, grammatical features and phrase types. Studies have demonstrated the effect of well-structured texts on comprehension and writing (Crossley and McNamara 2010; Cervetti et al. 2016).

Writing a well-structured and organized RAA increases readership, a study's likelihood to pass the initial screening performed by a journal's editors-in-chief, and, consequently, the likelihood of being published and cited by other researchers. An RAA must be "simple, direct, specific, functional, clear, unbiased, honest, concise, precise, self-sufficient, complete, comprehensive, scholarly, balanced, and should not be misleading" (Tullu 2019, S14). Hyland (2004, 63) argues that RAAs "must recognize and replicate the field's organizational structures, beliefs, and authorized institutional practices; they must appeal to readers from within the boundaries of a disciplinary discourse." Authors must be brief and comprehensive and knowledgeable of the move structure expected from their community of practice and the linguistic features associated with each move/step.

A plethora of studies on the generic move structure of specific sections of an RA have been published during the last three decades. The RAA section has received unprecedented attention in the disciplines of Linguistics (Hyland 2004; Zand-Vakili and Kashani 2012; Wang and Tu 2014; Can et al. 2016; Khansari et al. 2016), Social Sciences (Martín 2003; Hyland 2004; Tovar 2019), Literature (Tankó 2017), Accounting (Amnuai 2019), Financial Economics (Chen 2010), Management (Li and Pramoolsook 2015; Zanina 2017), Marketing (Hyland 2004; Li and Pramoolsook 2015), Law (Tessuto 2015), Zoology (Cross and Oppenheim 2006), Ecology (Samraj 2005), Biology (Hyland 2004), Physics (Hyland 2004), Chemistry (Stoller and Robinson 2013; Darabad 2016), Engineering (Hyland 2004; Kanoksilapatham 2013; Maswana et al. 2015; Huang 2018), Medicine (Salager-Meyer 1990), Dentistry (Shamsabadi et al. 2014; Vathanalaoha and Tangkiengsirisin 2018; Alyousef 2021a) and Political Science (Alyousef 2021b).

A growing body of corpus-based research investigating the move structure in RAs has been complemented by the study of the linguistic realizations associated with a particular move/step, such as phrase frames (Durrant 2009; Durrant and Mathews-Aydinli 2011; Cortes 2013; Grabowski 2015; Le and Harrington 2015; Omidian et al. 2018; Barabadi et al. 2020; Gray et al. 2020; Khany and Malmir 2020; Yoon and Casal 2020; Lu et al. 2021) and extended collocations (Biber et al. 1999) and move length (Rashidi and Meihami 2018; Alyousef 2021a, 2021b). The term *phrase frame* (hereafter PF) refers to combinations (or sequences) of two or more words with an open slot that can be filled by different words (Hyland 2008; Lu et al. 2021). PFs are also called formulaic (or multiword) expressions.

Studies of PFs have revealed their connection to the rhetorical moves in several disciplines. Omidian et al. (2018), for example, examined PFs in RAAs from six sciences (both hard and soft): Applied Linguistics, Marketing, Sociology, Physics, Biology and Mechanical Engineering. The findings revealed that soft disciplines employ more PFs in Purpose and Conclusion moves, while hard disciplines employ more PFs in the Method move. Hyland (2004, 37) reports that “these choices serve to reinforce the epistemological and social understandings of writers.” Cortes (2013) examined PFs in published RA introductions from thirteen disciplines and found that many PFs are correlated with the realization of specific rhetorical moves/steps, concluding that the relationship between PFs and moves needs to be further developed in all sections of RAs. Three types of PFs emerged in Lu et al.’s (2021) study of the connections of PFs to rhetorical functions in a corpus of 600 Social Science RA Introductions (Anthropology, Applied Linguistics, Economics, Political Science, Psychology and Sociology): specialized PFs that appeared in one move-step only, semi-specialized PFs that appeared primarily in one move-step but also others; and non-specialized PFs that appeared in multiple move-steps with no association with any move.

Regarding move length, several scholars (Stoller and Robinson 2013; Tankó 2017; Rashidi and Meihami 2018; Alyousef 2021a, 2021b) state that the Results move is often the longest part of an RAA. Tankó (2017), for example, found that the Results move accounted for more than twice the text space of Purpose and Background combined in literary RAAs. Alyousef (2021a) observed that the Methods and Results moves occupied the most text space in Dentistry RAAs, respectively 37.72% and 29.50%.

The literature reviewed indicates that the linguistic realizations connected with the rhetorical move structure are not the same across all disciplines. It also reveals that researchers have not explored the linguistic realizations of the move structure in Geography RAAs. More specifically, there is a lack of research into PFs/collocations and move length and their connections to the rhetorical move structure in Geography RAAs. The present study is pertinent because Geography RAAs are, unlike most scientific disciplines, not structured with headings (or moves), i.e., not informative. It is important for novice researchers to be aware of the rhetorical move structure and the recurrent linguistic realizations underlying this important section of an article so that they can manage the limited space provided. The aims of this study were thus

twofold: 1) to investigate the prototypical rhetorical move structure and sequence in 190 Geography RAAs; and 2) to examine whether the following linguistic realizations are associated with a specific move/step: move length, PFs and collocations.

This study contributes to the comprehensive line of research on the multidimensional genre analysis of RAAs. The findings will provide novice Geography scholars attempting to publish in a journal of impact with a practical, detailed description of the macro-structure and micro-structure of Geography RAAs. The results are expected to provide theoretically and/or pedagogically significant implications that highlight the major rhetorical and lexico-grammatical features of a Geography RAA.

2. METHODS

The research aims were addressed using a mixed-methods approach to identify and comment on the rhetorical move structure of Geography RAAs and whether the linguistic features under study are associated with specific move/steps.

2.1. Data

A corpus of 190 RAAs were randomly sampled from different volumes and issues of two general readership Geography journals indexed in the Web of Science, the *Geographical Journal* and *Journal of Geographical Sciences*, published between 2018 and 2020. The two journals were selected according to the criterion of having a Web of Science impact factor: that of the *Geographical Journal* being 3.288 (2020) and of the *Journal of Geographical Sciences* being 3.534 (2020). The size of the corpus was considered adequate as a basis for drawing generalizations and implications since such large data sets would yield reliable findings (Alyousef 2021a, 2021b). Writers of an RAA are constrained by a word limit. The required word limit for an RAA, as stated in the submission guidelines in the two journals, ranges between 200-300. The total word count of the corpus was 47,841; the mean length of the RAAs was 251.79 words. The criterion of whether a paper was written by a native or a non-native writer was not considered, because the manuscripts are published in reputable journals. Only full RAs were selected, while commentaries and obituaries were excluded. The authors' guidelines for these two journals do not provide researchers with information about the content and structure of an RAA.

2.2. Coding Scheme

Most previous move structure studies employed one of the following move schemes for an RAA: Dos Santos' (1996) and Kanoksilapatham's (2013) Background-Purpose-Method-Result-Discussion (B-P-M-R-D), Hyland's (2004) Introduction-Purpose-Method-Product-Conclusion (I-P-M-Pr-C), Swales's (1990) Introduction-Method-Result-Discussion (I-M-R-D), and Martín's (2003) and Bhatia's (1993) Introduction-Method-

Result-Conclusion (I-M-R-C). Hyland's (2004) move structure pattern, I-P-M-Pr-C (table 1), was more appropriate for coding the rhetorical moves in Geography RAAs because it has been extensively employed by researchers (Rashidi and Meihami 2018; Amnuai 2019; Paydari and Paramasivam 2019; Kaya and Yağız 2020) and was based on a representative sample of 800 RAAs.

TABLE 1. Move structure scheme for coding moves in RAAs (adapted from Hyland 2004, 67)

Move		Function	Question
M1	Introduction	Establishes the context of the study.	What was already known in the field?
M2	Purpose	Indicates the aim of the study.	What was the aim of the study?
M3	Method	Provides information on materials, design, subjects, procedures, etc.	How was the research conducted?
M4	Product	States and interprets main findings, the arguments, and what was done.	What were the findings?
M5	Conclusion	Interprets or extends results, draws inferences, and highlights research limitations and wider implications.	What conclusions and implications were drawn from the findings?

Research gap is encapsulated under M1, while research limitations and implications or suggestions are encapsulated under M5 in Hyland's (2004) scheme. M1 "sets the scene for the reader, providing essential background and, equally importantly, indicating the significance of the topic to the community and the writer's grasp of the issues involved" (Hyland 2004, 68). M5 presents the overall value and significance of the research study as well as its implications and/or suggestions for future research.

The linguistic realizations studied here, and their functions, are presented in table 2.

TABLE 2. Linguistic aspects investigated and their functions

Linguistic feature	Function	Example
1. Move length	Reveals the most salient move(s).	----
2. PFs (sequences of two or more words with an open slot that can be filled by different words)	Reveal the preferences of a discipline's community and may indicate the onset of a particular move.	"the findings SHOW ¹ that ..."

¹ Capitalization indicates that all forms of the lemma are considered—show/shows/showed.

A bottom-up methodology (e.g., Durrant and Mathews-Aydınlı 2011; Cortes 2013) was employed in the investigation of PFs through identifying tokens of the PFs in their context and then annotating their rhetorical function based on their “surrounding context” (Omidian et al. 2018, 5). The lexical analysis software WordSmith Tools and KfNgram (Fletcher 2011) were used to identify the most frequent PFs, these being the tools most commonly used by researchers (Barabadi et al. 2020; Lu et al. 2021). Based on preliminary observations, a search for PFs containing four words and five words yielded, respectively, seven and zero n-grams. Thus, PFs of three to four words were included in the investigation. Expressions with 4-word units with a variable slot in the medial position were annotated. The PFs were then manually scrutinized and matched to their relative rhetorical moves using AntConc software, version 3.5.9 (Anthony 2021). This software is useful for searching and filtering PFs in terms of their functional moves and builds concordance lines once a PF or part of it is entered in the entry box. As for the calculations of text space per move (or move length), they were conducted using MS. Word’s search feature to identify a particular move-tag. Then the number of words within that move-tag were highlighted and counted using the word count feature in this same software. A calculator was also used to sum text space per move while toggling through the RAAs. Lu et al.’s (2021) classification of PFs with respect to their associations with specific move(s) into three types was employed because it reveals the function of each one. As stated earlier, a specialized (or exclusive) PF occurs in one move-step only; a semi-specialized PF occurs primarily in one move-step but also others; and non-specialized PF occurs in multiple move-steps though with no clear semantic relationship with any of them. Following Lu et al. (2021), a multifunctional PF is categorized as semi-specialized (type 2) if at least two-thirds (or 66.7%) of its occurrences appear in one particular move-step, while it is considered non-specialized (type 3) if fewer than two-thirds of its occurrences appear in any particular rhetorical move-step.

Researcher bias was reduced by adopting the following filtering procedures in the identification of PFs. Biber et al.’s (1999) cut-off point for coding PFs was employed by coding PFs only if they appeared at least five times; extended collocations were coded if they appeared ten times (because they occur more frequently than PFs). PFs appearing in less than five RAAs were discarded, such as “urban carbon emission performance,” which was used five times but in only one abstract. PFs were annotated if they had two or more variants (or fillers/n-grams; Lu et al. 2021). Singular and plural forms such as “the result(s)” were collapsed into a single PF. The same method was applied to inflected verbs such as “shows/showed.” Finally, PFs that did not include nouns or verbs were excluded since communicative purpose is best expressed through these lexical items (Hunston 2010, 272).

2.3. Data Analysis

This study is concerned with the communicative function (or purpose) of information content; thus, the unit of coding move boundaries was the rhetorical unit (or the clause)

rather than the sentence because there were instances where two moves were embedded (or merged) in one sentence. Such instances were annotated by most researchers as two moves rather than one because their aim was to map the communicative functions of text segments (Cotos et al. 2017; Moreno and Swales 2018; Lu et al. 2021). Ozturk (2007) and Li and Pramoolsook (2015) annotated the dominant move in terms of text space. The practice of annotating a move even if it occurs mid-sentence confirms Swales' (2004, 228-29) definition of moves as "discoursal or rhetorical units performing coherent communicative functions in texts." Each move boundary (or rhetorical move) was thus identified and marked with double slant lines, even when it occurred in the middle of a sentence.

Kanoksilapatham's (2005) arbitrary cut-off occurrence rate for measuring move stability in the investigated RAAs was employed. If a move occurs in sixty percent of the RAs, it is labeled "conventional," and "optional" if it occurs in less than sixty percent. A third cut-off frequency rate for those moves appearing in over 90% of the RAAs was proposed to account for an "obligatory" ("essential") move because this indicates that most writers are aware of the importance of this move. As Tankó (2017, 44) states, "move stability criteria should be set in conformity with the characteristic features of the discourse community." Kanoksilapatham (2005) proposed cut-off point for classifying "conventional" and "optional" moves was therefore revised in this study to include those appearing in, respectively, between 90% and 100% and between 60% and 89% of the RAAs.

To achieve reliable results, inter-rater coding of 50% of the data was performed by an independent trained analyst. The annotations were then revised until a 90% agreement level was achieved. The codes were validated by being checked for accuracy by the researcher a few days later and by a specialist informant, an Arabic-speaking Geography researcher fluent in English. Move length in RAAs is based on the ratio of move length to the total length of all the moves. It was calculated by multiplying the total word count for each move by 100 and then dividing the result by the total word count of all RAAs (Alyousef 2021a, 2021b).

3. RESULTS AND DISCUSSION

This section presents and discusses the findings related to the two research aims, namely investigating the rhetorical move structure and sequence in the 190 Geography RAAs and examining whether the following linguistic realizations are associated with specific move(s)/step(s): move length and PFs/collocations.

3.1. Rhetorical Functions of Move Structure (Macro-Structure)

The analysis of the frequency of each move in the 190 RAAs revealed that Geography RAAs contain the moves/steps "Introduction-Research Gap-Purpose-Method-Results-Conclusion- Implications/Suggestions" (table 3).

TABLE 3. Frequency of each move/step in the 190 Geography RAAs studied

Move/Step	Freq.	%
M1. Introduction	143	75.2%
S1. Research gap (Optional)	92	48.4%
M2. Purpose	184	96.8%
M3. Methods	176	92.6%
M4. Results	190	100%
M5. Conclusion	127	66.8%
S1. Implications/suggestions (Optional)	10	5.2%

This finding is in line with Hyland's (2004) study of RAAs from eight disciplines, although the steps M1 S1 and M5 S1 in Hyland's study are subsumed under their relevant moves. In the present study, the sub-move M1 S1 occurred in ninety-two RAAs and the sub-move M5 S1 in ten. Hyland's (2004) scheme was revised because of the interdisciplinary variation emerging from the findings of the present study. Thus, a two-level rhetorical structure (with moves and steps) model is proposed for writing Geography RAAs (table 3). This modified scheme involves sub-dividing moves 1 and 5 into steps (or sub-moves) because the aim is to capture the frequency of each move/step: step M1 S1 and step M5 S1. M3 and M5 were rare in Philosophy RAAs in Hyland's study but were observed in the other seven disciplines. Likewise, M3 did not appear in half of Hyland's Conservation Biology and Wildlife Behavior RAAs, leading Samraj (2005) to argue that an RAA is not a mere summary of the full-length RA. This was not the case in the Geography RAAs studied here, as is discussed below.

The moves Purpose, Method and Results are considered "essential" because they appeared in between 90% and 100% of the RAAs; Introduction and Conclusion are considered "conventional" moves because they appeared in between 60% and 89% of the RAAs (table 3). This finding contrasts with Samraj's (2005) study of move stability in Ecology RAAs, which indicated that some moves such as the Method move do not feature prominently. The fact that the Results move is essential in Geography RAAs is to be expected because writers in most soft science disciplines not only report their research findings in M4 but also discuss and interpret the results and their wider significance. The steps "Research Gap" and "Implications/Suggestions" are considered "optional" because their occurrence was below 60% in the RAAs investigated here.

Approximately half of the authors underscored step M1 S1 by explicitly stating the research gap, mostly employing the adversative (or contrasting) conjunctions "yet"

or “however.” These conjunctions are used to introduce a caveat concerning what is already known in the field under study (example 1).

(1) Environmental magnetism has been successfully applied to estimate heavy metal pollution in different environmental systems due to its characteristics of simple processing steps, good sensitivity, and non-destructibility. [M1] **However**, it **has not yet** been applied ... [M1 S1] (G-29).

Some writers used adjectives expressing evaluation (examples 2-5) to show their knowledge of the topic under study and reveal the significance of conducting their study.

(2) To understand the non-equilibrium morphological adjustment of a river in response to environmental changes, **it is essential to** (i) accurately identify how past conditions of water and sediment have impacted current morphological adjustment of the river and (ii) establish a corresponding simulation for non-equilibrium conditions [M1] (G-06).

(3) It is of **great significance** for regional socioeconomic sustainable development and environmental protection **to conduct** a glacier service value assessment and to analyze its spatiotemporal characteristics [M1] (G-34).

(4) Timely and accurate measures are **desirable** for assessing associated large-scale impacts and are prerequisites to disaster reduction [M1] (G-35).

(5) Revealing the post-disaster economic development and recovery process is **very important** for enhancing disaster prevention and response capacity... [M1] (G-41).

Kanoksilapatham’s (2013) study indicated that writers of Civil Engineering RAAs highlight the importance of their topic by using adjectives such as “challenging” and “increasingly important.” Contextualizing a study is crucial for authors to show their understanding of the issues involved and explain the grounds for their research study. Extraposed “it” constructions occurred primarily in M1, M1 S1 and M5.

Approximately a quarter of the authors did not situate their research; they started their RAAs by stating either the research gap (Frequency, $f = 19$) or the research aims ($f = 32$):

(6) Due to the unique geographical location and historical background of Central Asia, the region’s geo-relation networks are complex and changeable [M1 S1] (G-09).

(7) In this study, we developed an energy security evaluation model (ESEM) from three dimensions, energy supply-transport security, safety of energy utilization, and stability of political-socioeconomic environment... [M2] (G-120).

Notably, M2 and M3 were embedded in one sentence in about ninety-three (48.9%) of the investigated Geography RAAs. Sixty-three (33.16%) of these RAAs included instances of move reversal (M3-M2) in the syntactic ordering of Purpose-Method (examples 8-9), whereas M3 followed M2 in thirty (15.79%) RAAs. This finding indicates that M2 does not always occur in a linear pattern in Geography RAAs. Variation in the position of M2 might be due to the nature of the study in question, which necessitates the Method move to be presented before or after the Purpose move by fully embedding the two moves in one sentence.

(8) **To study** the effects of changes in the rainfall intensity on sediment concentrations in the Loess Plateau, the observed rainfall intensities and sediment concentrations from three typical small watersheds **were used to analyze** the relationship between these parameters [M2 and M3] (G-70).

(9) In this paper, the cumulative number of confirmed cases, number of confirmed cases per day and cumulative number of deaths, **were used to compare** transmission paths, outbreaks timelines, and coping strategies of COVID-19 in China and the US [M3 and M2] (G-02).

Bhatia (1993) argues that the flexibility of English syntax might result in the syntactic order reversal of two moves, especially in RAAs related to experiments, where the Method move often precedes the Purpose move. Instances of fully embedded moves occur more frequently when move order is reversed. M2 is introduced in example 8 by the infinitive “to study” and embedded in a general description of experimental procedures, M3. Although a move boundary of a text’s internal discourse does not coincide with syntactic unit boundaries when a move is fully embedded (e.g., a non-finite subordinate clause with no subject is dependent on the preceding main clause which contains the most important information), it coincides with syntactic unit boundaries in partially embedded moves (Tankó 2017). Writers present information more economically by using move embedding. Notably, the boundary in partially and fully embedded moves in both cases marks a shift in the communicative purpose or topic that can sometimes be associated with different content or function words (Biber et al. 2007). This finding is congruent with Tankó’s (2017) study of rhetorical moves and their linguistic realizations in Literary RAAs, which indicated that partially embedded moves were more frequent ($f = 131$) than fully embedded ones ($f = 20$). Tankó argues that the latter type was less used in order to minimize information loss. Tankó’s (2017) findings indicated the absence of an RAA that employed more than one fully embedded move.

The use of full embedding in the current study could be ascribed to the condensed nature of RAAs. In addition to being merged with the Purpose move in ninety-three instances (48.9%), the Method move is fully or partially combined with the Results move (example 10) in fourteen instances (7.3%). Example 10 fully embeds the moves Method and Results.

(10) **Based on** mixed methods fieldwork in north western Nicaragua, **we find that** rather than produce remittance landscapes, or an abandonment of agriculture, south-south migration is linked to the maintenance of small scale agricultural systems... [M3 and M4] (G-162).

Writers of Geography RAAs are expected to be cognizant of not only the most frequently occurring move-steps but also the most common move sequence (or pattern) employed by professional writers. The finding of the most frequent move sequence in Geography RAAs is presented next.

3.2. Move Sequence

The common organizational move sequence (or pattern) deployed by the 190 Geography RAA authors was analyzed. The findings indicated that over 70% of the investigated RAAs include one of the five move patterns presented in table 4. Thus, most of the RAAs have four- or five-move patterns.

TABLE 4. Frequency and percentages of move patterns in the 190 Geography RAAs

No.	Organization Pattern	Frequency	Percentage
1.	I-G*-P-M-R-C	42	22.11%
2.	I-P-M-Pr-C	38	20.00%
3.	I-P-M-R	21	11.05%
4.	P-M-R-C	20	10.53%
5.	I-G-P-M-R	13	6.84%
	TOTAL	134	70.53%
	Various other patterns	56	29.47%
	Subtotal	190	100.00%

*G= Research Gap

The findings revealed that eighty (42.11%) of the 190 RAAs employed one of the following two move sequences: I-G-P-M-R-C or I-P-M-R-C. This finding is in contrast with Ngai et al.'s (2018) study of the generic structure of 500 RAAs from five science disciplines—Earth, Formal, Life, Physical and Social Sciences—which indicated that only twelve (2.4%) RAAs employed the five-move structure I-P-M-R-C. It is also different from Hyland's (2004) study of the move sequence in RAAs from eight disciplines, which indicated that P-M-Pr (25%) was the most frequently used move sequence, followed by I-P-Pr (15%). Thirty-eight of the 190 RAAs in the current study employed Hyland's (2004) I-P-M-Pr-C move structure scheme. This pattern was

employed in 28.8% of Linguistics RAAs in Wang and Tu's (2014) study. Thus, the typical move pattern in Geography RAAs is one of the four-six-move/step patterns (table 4). As mentioned earlier, Introduction and Conclusion moves are "conventional" because they occurred in over 60% of the RAAs studied, whereas M1 S1, Research Gap, is optional because it was employed in only 48.4% of RAAs (table 3).

3.3. Linguistic Realizations (Micro-Structure)

Steps M1 S1 and M5 S1 were subsumed under their relevant moves in the calculations of move length, whereas they were annotated separately in the analysis of PFs because the aim is to capture the specific linguistic features associated with these steps.

3.3.1. Move Length

Analysis of the length of each move reveals a move's status in relation to the other moves. Following Alyousef (2021a, 2021b), the length of steps M1 S1 and M5 S1 was combined with the move related to each step to avoid confounding the study results because annotating these separately is useful when dealing with full-length RAs. The analysis of move-to-text space ratio indicates that the moves that occupied the most text space in Geography RAAs were Results (49.8%), followed by Introduction (16.1%), Method (12.6%), Purpose (11%) and Conclusion (10.2%). This finding indicates that the Results move is the most salient, that is to say that writers of Geography RAAs place more emphasis on presenting their findings. This is in line with Tankó's (2017) study of Literary RAAs, which demonstrated that Results (44.3%) occupied more than twice the text space of Purpose (19.2%) and Background (16.4%). The findings, however, contradict Rashidi and Meihami's (2018) and Alyousef's (2021a) studies of the rhetorical moves in, respectively, Scientometrics and Dentistry RAAs, which demonstrated that the Method and Results moves occupied the most text space. Because most RAAs in science disciplines include experimental studies, it is not surprising that the Method move occupies most of the text space, after the Results move. The Conclusion move provided the least information in the current study as it also did in Rashidi and Meihami's study (5.8%). Also, although most of the RAAs studied here included the Purpose move (table 3), it occupied only 11% of text space. This finding is not, however, that surprising because this move does not require much text space. In addition, as stated earlier, this move occupied less space in ninety-three out of the 190 RAAs because it was merged with the Method move.

3.3.2. Mapping PFs and Collocations to Rhetorical Move Structure

The initial list from the WordSmith Tools included 445 n-gram types comprising 353 three-word, 69 four-word, 17 five-word, 3 six-word, 2 seven-word and 1 eight-word

grams. These were all then analyzed in their context and matched manually to their respective move-steps. Most of the PFs and extended collocations involved three to four words, and they were most frequently employed in M4, Results ($f = 229$), followed by Purpose ($f = 67$), Method ($f = 64$) and Conclusion ($f = 62$) moves. This finding demonstrates a strong correlation between PFs and M4. Because this move occupied 49.8% of text space in Geography RAAs, it is not surprising that most of the PFs were employed in this move. This finding is in line with Omidian et al.'s (2018) investigation of the association of PFs to the moves in RAAs from six soft and hard science disciplines, although the researchers employed Dos Santos' (1996) move analysis scheme which treats Results and Discussion as two distinct moves (M4 and M5) rather than one (M4) as in Hyland's (2004) model (table 1). Hyland (2004, 69) states that "essentially a product is an outcome, or what the paper achieves. In the soft disciplines, this is often an argument, where writers discuss or address a topic rather than report research findings." Thus, the findings in the present study are again in line with Omidian et al.'s (2018), which demonstrated that writers of soft fields employ more PFs in M2 (Purpose) and M5 (Discussion) than in the other moves. The absence of long PFs agrees with Cao and Xiao's (2013) exclusion of 5-grams in their study of RAAs from twelve academic disciplines because they are relatively rare in a moderate-size corpus.

The findings relating to the functions of PFs revealed two specialized PFs (type 1) associated with M2 and M4. First, the PF "this paper explores *" appeared thirteen times, along with "how/the" in M2. The asterisk represents an open slot that can be filled with different word(s). The PF "the main * are as follows" appeared eleven times in M4, with the variants "results/findings." This latter PF serves both a discourse organizing function and a cataphoric referential function with reference to a following run-in list separated with numbers. This finding indicates that "members of different academic domains have different priorities for representing their research in academic abstracts" (Omidian et al. 2018, 12).

Semi-specialized PFs (type 2) were associated with M1, M3, M4 and M5. The PF "(The/This/These) result(s) *" is a semi-specialized PF because it appeared, primarily, in M4 115 times, and in M5 25 times. Notably, its occurrence in M4 (82.1%) exceeded two-thirds (66.7%) of its total appearance across all moves. It comprises an incomplete noun phrase filled by the word sequence "are as follows ($f = 8$)," "are discussed ($f = 1$)," "of this study ($f = 5$)" or one of the following reporting verbs, including their inflected variants: "show" ($f = 76$), "suggest" ($f = 12$), "indicate" ($f = 16$), "demonstrate" ($f = 8$), "highlight" ($f = 4$), "provide" ($f = 4$), "reveal" ($f = 5$) and "call for" ($f = 1$). Hyland (2004) reports that these items signal results, whereas "aim," "attempt," "analyze" and "examine" mark intentions. The findings revealed that the PF "(The/This/These) result(s) *" most frequently appeared with the reporting verbs "show" and "indicate" in M4 to present and/or interpret the researcher(s) findings, rather than with the other verbs, while "suggest" was equally employed in M4 and M5. Most of the instances of these PFs were followed by a run-in list separated with numbers.

Biber et al. (2007, 96; italics in the original) argue that “the frequent use of these verbs represents the authors’ expression of the degree of certainty or commitment associated with the claim stated in the *that* complement clause.” The verbs “demonstrate,” “show” and “indicate” reflect a higher degree of certainty than “suggest” because they are based on facts.

The 4-word n-gram “the result(s) show(s)/(ed) that” appeared 56 times in the RAAs, 38 times in the plural and once in the singular. The past simple tense was employed 17 times.

(11) **The results showed that** significantly increased annual incomes and improved infrastructure occurred widely in the resettlement communities [M4] (G-157).

The subject of the verb “show” is typically an inanimate entity, i.e., study, findings, or results. The collocate “based on *” most frequently occurred to signal the onset of M3 (example 12) or in instances where M3 is merged with M2 (example 13) or M4 (example 14). In the former case, writers provide context for the move that follows by referring readers to details related to M3.

(12) **Based on** household level data collected from the resettlement communities using semi-structured interviews and in-depth questionnaires, the pre- and post-dam differences in per capita land holdings, annual incomes, expenditures, and social capital of those resettled **were analyzed** at a household level using the sustainable livelihoods framework [M3] (G-157).

(13) **Based on** a total of 315 transaction records of apartment sales in two residential precincts located near two typical urban streams in Guangzhou, south China, **this study attempts to assess** the impacts of urban river pollution... [M3 and M2] (G-183).

(14) **Based on** mixed-methods fieldwork in north-western Nicaragua, **we find** that rather than produce remittance landscapes, or an abandonment of agriculture, south-south migration is linked to the maintenance of small-scale agricultural systems... [M3 and M4] (G-162).

This collocate is a semi-specialized type 2 PF because it appeared, primarily, in M3 45 times, where it was merged with M2 or M4, and 18 times in the other moves. It acts as a shorthand reference to M3. This collocate is a concessive conjunction that enhances meaning in another clause. The concessive conjunction “according to” also occurred 13 times in the RAAs, but with different variants. These collocations have the discourse-organizing function of merging two moves. Omidian et al. (2018, 8) state that “soft fields appear to have a tendency to use bundles that help organize a form of argument that justifies their research purpose and its findings.”

Finally, non-specialized PFs (type 3) are associated with all the moves-steps, although the occurrence of this type in step M1 S1 is negligible. Table 5 presents type 3 PFs and their respective variants and the move-steps in which they appeared. The

superscript number next to a PF indicates the number of times a PF occurred in that particular rhetorical move-step.

TABLE 5. Type 3 PFs and the move/steps they are associated with in the Geography RAAs

Move 1: Introduction:

“Based on *”²: the.

“the * of the”¹⁵: aftermath, main component, implementation, continuous acceleration, new changes, airspace structure, border areas, emergence, environmental ecology, main cause, preservation, problem, northeastern edge, shapes, sustainable development.

Move 1 S1: Research Gap:

“the * of the”⁹: impacts, background, cooperation, decline, economic development, effects, history, preservation, spatialization.

Move 2: Purpose:

“This study *”²⁴: aims to, investigates, reveals, determines, compared, attempts, analyzes, examines, (could) provide(s), contribute(s), exposes and maps, undertakes, explores, has explored, proposes, develops, reproduced.

“Based on *”⁵: the.

“the * of the”⁹: great significance, contributions, data, evaluation, exploration, impacts, research prospective, size, study.

Move 3: Method:

“This study *”¹⁰: was realized, attempts to fill the gap, extends, uses, employs, took, for, applied in, is based on, analyzes.

“In this study, we *”⁷: selected, collected, developed, reconstructed, apply, established, introduce.

“the * of the”¹⁷: analysis, data analysis, assessment method, changes, consideration, context, framework, perennial mean, spectacle, start, time distribution.

Move 4: Results:

“Based on *”¹⁰: the, a.

“This study *”¹: develops.

“the * of the”⁵⁵: accuracy, adoption, area, average annual growth rates, boundaries, case, center, change, characterization, (main) characteristics, coefficients, compactness, complexity, consequence, effects, end, evaluation, experiences, feasibility and competitiveness, future efficacy, general principle, increase, independence, integration, interactivity, long-term growth, perception, periphery, production, progress, proportion, quality, range, rapid development, results, significance, significant increase, social relations, theory.

Move 5: Conclusion:

“This study *”²⁶: (further) provides, contribute(s), (could) provide(s) new insights/perspectives, characterizes, develops, confirmed.

“(The) (research) results*²⁵: show, suggest, (can) provide, highlight, indicate.

“Based on *”¹: these results.

“the * of the”¹⁵: disadvantages, source, analysis, adjustment, end, function and structure, interaction, inclusion, effective evaluation, optimization, results, robustness.

Type 3 PFs were the largest group in that the total number of their occurrences was 206. The PF “the * of the” with function words is a noun phrase with a post-modifier fragment and provides a syntactic frame for information conveyed (Grabowski 2015). This non-specialized PF serves the discourse-organizing function of forming longer PFs. It occurred in all the moves, with no preferential association with any of them ($f = 120$). The PF “the * of the” mostly appeared in M4 ($f = 55$), followed by M3 ($f = 17$), M1 ($f = 15$), and M5 ($f = 15$) (table 5). Although this PF was mostly employed in M4, it is categorized as non-specialized because the frequency of its use in this move (32%) was less than two-thirds (66.7%) of its total occurrences. Fletcher (2011) states that this 4-word PF has the greatest number of variants and is the most frequent (and most productive). The PF “This study *” appeared 61 times in moves 2-5. It has no particular association with any move-steps because it occurred in all the moves-steps, except in M1, although it mostly occurred in M2 and M5. This PF is of type 3; that is, it is non-specialized although it mostly occurred in Purpose (M2) and Conclusion (M5) because the frequency of its use in these two moves was less than two-thirds (66.7%) of its total occurrences, being respectively 39.3% and 42.6%. The PF “This study *” appeared mostly with the following verbs: “aims to” ($f = 20$), “explores” ($f = 12$), “investigates” ($f = 9$), “proposes” ($f = 1$), “analyzes” ($f = 2$), “attempts” ($f = 1$), “contributes” ($f = 6$), “undertakes” ($f = 3$) and “(could) provide(s)” ($f = 2$).

4. CONCLUSION

This study has aimed to investigate the macro-structure of 190 Geography RAAs and to examine the micro-structure of these RAAs by investigating the linguistic realizations used in each move in terms of move length and PFs. The results revealed that Geography RAAs have a five-move structure, with three “essential” moves whose functions are to present Purpose, Method and Results, and two “conventional” moves whose functions are to present the Introduction and the Conclusion. The Results move in Geography RAAs is often a space for writers to present their arguments, as they not only report their findings but also discuss the topic. Except for the Introduction move, the findings of the multidimensional analyses indicate a close relationship between the move structure and the linguistic realizations involved because the moves that occurred most frequently in the RAAs—Purpose, Method and Results—occupied most text space in Geography RAAs and included more PFs. Although the Introduction move did not feature prominently in Geography RAAs, it was the second move (16.1%), after Results (49.8%), in terms of occupying text space. Also, the move devoted to presenting and interpreting the findings (M4) contained the greatest number of PFs. The results of move length also indicate the importance of presenting and discussing the Results in Geography RAAs as well as contextualizing a study to show an understanding of issues involved and providing grounds for the research study, as these two moves occupied the most text space. The majority of specialized PFs that are associated with a move contribute to the description of research aims and results (M2 and M4). The results showed that the most frequent semi-specialized PFs are those that are composed

of reporting verbs (e.g., 'show', 'indicate') whose function is reporting and interpreting the results. These findings indicate the importance of combining investigations of the move structure in particular texts with an exploration of the linguistic realizations in each move. The present study extends a growing line of research that explores the generic move structure and linguistic realizations in RAAs.

Although the journals selected have a Web of Science impact factor, such journals may not necessarily represent a model for capturing the rhetorical moves and linguistic features in Geography RAAs. Notably, current descriptions of move sequences may be overly restrictive because they, as Hyland (2004) states, seem to be less predictable than previously supposed. Moreover, identification of the use, distribution and functions of PFs and extended collocations in Geography RAAs does not imply that writers are required to use all these resources; rather it is that they have the option of employing those that match their communicative purpose. This study, however, presents a practical, detailed description of the rhetorical move structure and the linguistic realizations underlying Geography RAAs.

5. IMPLICATIONS

This study has implications for novice researchers learning the craft of publishing in high-ranking journals and for tutors on EAP courses. Writers of Geography RAAs need to understand the rhetorical move structure involved and how this structure is realized linguistically. The findings presented here provide Geography researchers and EAP tutors with useful resources for understanding the rhetorical and linguistic characteristics of RAAs. One important implication of the results is that EAP tutors can assign genre analysis activities that require the identification of move structures and linguistic realizations in RAAs related to their students' field of study and extracted from high-impact journals. Such purposeful analysis will promote learners' experiences of the move-linguistic connections.

Another implication is that the list of PFs may expand novice Geography researchers' lexico-grammatical repertoire of frequently used PFs that have a particular move/step, though they need to be recontextualized to facilitate students' learning of the connection between a particular PF and its respective move(s). In summary, the findings can raise Geography researchers' awareness of the expected generic move structure of an RAA and its linguistic realizations. The findings of move-linguistic connections may also inform curriculum designers of ESP writing courses. Finally, the functionally categorized linguistic realizations can be used in genre-based EAP pedagogy.

Further research could further investigate variations and similarities in the rhetorical moves and linguistic realizations in RAAs from different sub-fields of Geography in order to compare the findings with those of this study.²

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WORKS CITED

- ALYOUSEF, Hesham Suleiman. 2021a. "A Move-Structure Model for Dentistry Research Article Abstracts: A Genre-Based Study of Variations and Similarities in Eight Dentistry Subdisciplines." *Discourse & Interaction* 14 (1): 25-52.
- , 2021b. "Structure of Research Article Abstracts in Political Science: A Genre-Based Study." *SAGE Open* 11 (3): 1-8.
- AMNUAL, Wirada. 2019. "Analyses of Rhetorical Moves and Linguistic Realizations in Accounting Research Article Abstracts Published in International and Thai-Based Journals." *Sage Open* 9 (1): 1-9.
- ANTHONY, L. 2021. "AntConc." Waseda University. [Accessed online on 22 January, 2021].
- BARABADI, Elyas, Mohammad Robotjazi and Mokarrameh Bayat. 2020. "A Phraseological Examination of Research Articles in the Field of Environment Using Key Phrase Frame." *Eurasian Journal of Applied Linguistics* 6 (1): 81-100.
- BHATIA, Vijay. 1993. *Analyzing Genre: Language Use in Professional Settings*. London: Longman.
- BIBER, Douglas et al. 1999. *Longman Grammar of Spoken and Written English*. London: Longman.
- BIBER, Douglas, Ulla Connor and Thomas Upton. 2007. *Discourse on the Move: Using Corpus Analysis to Describe Discourse Structure*. Amsterdam and Philadelphia: John Benjamins.
- CAN, Seden, Erkan Karabacak and Jingjing Qin. 2016. "Structure of Moves in Research Article Abstracts in Applied Linguistics." *Publications* 4 (3): 1-16.
- CAO, Yan and Richard Xiao. 2013. "A Multi-Dimensional Contrastive Study of English Abstracts by Native and Non-Native Writers." *Corpora* 8 (2): 209-34.
- CERVETTI, Gina N., Tanya S. Wright and HyeJin Hwang. 2016. "Conceptual Coherence, Comprehension and Vocabulary Acquisition: A Knowledge Effect?" *Reading and Writing: An Interdisciplinary Journal* 29 (4): 761-79.
- CHEN, Jie. 2010. "A Generic Analysis of English Research Article Abstracts and the Use of Modal Verbs for Financial Economics." *Sino-US English Teaching* 7 (12): 33-37.
- CORTES, Viviana. 2013. "'The Purpose of this Study is To': Connecting Lexical Bundles and Moves in Research Article Introductions." *Journal of English for Academic Purposes* 12 (1): 33-43.
- COTOS, Elena, Sarah Huffman and Stephanie Link. 2017. "A Move/Step Model for Methods Sections: Demonstrating Rigour and Credibility." *English for Specific Purposes* 46: 90-106.
- CROOKES, Graham. 1986. "Towards a Validated Analysis of Scientific Text Structure." *Applied Linguistics* 7 (1): 57-70.
- CROSS, Cate and Charles Oppenheim. 2006. "A Genre Analysis of Scientific Abstracts." *Journal of Documentation* 62 (4): 428-46.

- CROSSLEY, Scott A. and Danielle S. McNamara. 2010. "Cohesion, Coherence, and Expert Evaluations of Writing Proficiency." In Ohlsson and Catrambone 2010, 984-89.
- DARABAD, Ali M. 2016. "Move Analysis of Research Article Abstracts: A Cross-Disciplinary Study." *International Journal of Linguistics* 8 (2): 125-40.
- DOS SANTOS, Mauro Bittencourt. 1996. "The Textual Organization of Research Paper Abstracts in Applied Linguistics." *Text-Interdisciplinary Journal for the Study of Discourse* 16 (4): 481-500.
- DURRANT, Philip. 2009. "Investigating the Viability of a Collocation List for Students of English for Academic Purposes." *English for Specific Purposes* 28 (3): 157-69.
- DURRANT, Philip and Julie Mathews-Aydinli. 2011. "A Function-First Approach to Identifying Formulaic Language in Academic Writing." *English for Specific Purposes* 30 (1): 58-72.
- FLETCHER, William H. 2011. "KfNgram." USNA. [Accessed online on 22 January, 2021].
- GRABOWSKI, Łukasz. 2015. "Phrase Frames in English Pharmaceutical Discourse: A Corpus-Driven Study of Intradisciplinary Register Variation." *Research in Language* 13 (3): 266-91.
- GRAY, Bethany, Elena Cotos and Jordan Smith. 2020. "Combining Rhetorical Move Analysis with Multi-Dimensional Analysis: Research Writing across Disciplines." In Römer et al. 2020, 138-68.
- GRIES, Stefan Th., Stephanie Wulff and Mark Davies, eds. 2010. *Corpus Linguistic Applications: Current Studies, New Directions*. Amsterdam and New York: Rodopi.
- HILL, Susan S., Betty F. Soppelsa and Gregory K. West. 1982. "Teaching ESL Students to Read and Write Experimental-Research Papers." *TESOL Quarterly* 16 (3): 333-47.
- HOEY, Michael et al., eds. 2007. *Text, Discourse and Corpora: Theory and Analysis*. London: Continuum.
- HUANG, Ju Chuan. 2018. "Marine Engineering and Sub-Disciplinary Variations: A Rhetorical Analysis of Research Article Abstracts." *Text & Talk* 38 (3): 341-63.
- HUNSTON, Susan. 2010. "Starting with the Small Words: Patterns, Lexis and Semantic Sequences." *International Journal of Corpus Linguistics* 13 (3): 271-95.
- HYLAND, Ken. 2004. *Disciplinary Discourses: Social Interactions in Academic Writing*. Michigan: U of Michigan P.
- , 2008. "'As Can Be Seen': Lexical Bundles and Disciplinary Variation." *English for Specific Purposes* 27 (1): 4-21.
- KANOKSILAPATHAM, Budsaba. 2005. "Rhetorical Structure of Biochemistry Research Articles." *English for Specific Purposes* 24 (3): 269-92.
- , 2009. "Generic Structure of Research Article Abstracts in Sciences." *Journal of English Studies* 4: 95-111.
- , 2013. "Generic Characterization of Civil Engineering Research Article Abstracts." *3L: Language, Linguistics, Literature* 19 (3): 1-10.

- KAYA, Fatma and Oktay Yağız. 2020. "Move Analysis of Research Article Abstracts in the Field of ELT: A Comparative Study." *Journal of Language and Linguistic Studies* 16 (1): 390-404.
- KHANSARI, Delaram et al. 2016. "Regularities and Irregularities in Rhetorical Move Structure of Linguistics Abstracts in Research Articles." *3L: Language, Linguistics, Literature* 22 (1): 39-54.
- KHANY, Reza and Bahareh Malmir. 2020. "A Move-Marker List: A Study of Rhetorical Move-Lexis Linguistic Realizations of Research Article Abstracts in Social and Behavioral Sciences." *RELC Journal* 51 (3): 381-96.
- LE, Thi Ngoc Phuong and Michael Harrington. 2015. "Phraseology Used to Comment on Results in the Discussion Section of Applied Linguistics Quantitative Research Articles." *English for Specific Purposes* 39: 45-61.
- LI, Qian and Issra Pramoolsook. 2015. "Research Article Abstracts in Two Subdisciplines of Business: Move Structure and Hedging between Management and Marketing." *English Language Teaching* 8 (1): 52-62.
- LU, Xiaofei, Jungwan Yoon and Olesya Kisselev. 2021. "Matching Phrase-Frames to Rhetorical Moves in Social Science Research Article Introductions." *English for Specific Purposes* 61: 63-83.
- MARTÍN, Pedro. 2003. "A Genre Analysis of English and Spanish Research Paper Abstracts in Experimental Social Sciences." *English for Specific Purposes* 22 (1): 25-43.
- MASWANA, Sayako, Toshiyuki Kanamaru and Akira Tajino. 2015. "Move Analysis of Research Articles across Five Engineering Fields: What They Share and What They Do Not." *Ampersand* 2: 1-11.
- MORENO, Ana I. and John M. Swales. 2018. "Strengthening Move Analysis Methodology towards Bridging the Function-Form Gap." *English for Specific Purposes* 50: 40-63.
- NGAI, Sing Bik Cindy, Rita Gill Singh and Alex Chun Koon. 2018. "A Discourse Analysis of the Macro-Structure, Metadiscoursal and Microdiscoursal Features in the Abstracts of Research Articles across Multiple Science Disciplines." *PLOS ONE* 13 (10): e0205417.
- OHLSSON, Stellan and Richard Catrambone, eds. 2010. *Proceedings of the 32nd Annual Meeting of the Cognitive Science Society*. Portland: University of Portland.
- OMIDIAN, Taha, Hesamoddin Shahriari and Anna Siyanova-Chanturia. 2018. "A Cross-Disciplinary Investigation of Multi-Word Expressions in the Moves of Research Article Abstracts." *Journal of English for Academic Purposes* 36: 1-14.
- OZTURK, Ismet. 2007. "The Textual Organization of Research Article Introductions in Applied Linguistics: Variability within a Single Discipline." *English for Specific Purposes* 26 (1): 25-38.
- PAYDARI, Sara Seyed and Shamala Paramasivam. 2019. "Rhetorical Move Analysis in Political Science Research Article Abstracts in English in Iranian Journals." *Journal of Language and Communication* 6 (1): 75-90.

- PHO, Phuong. 2010. "Linguistic Realizations of Rhetorical Structure: A Corpus-Based Study of Research Article Abstracts and Introductions in Applied Linguistics and Educational Technology." In Gries, Wulff and Davies 2010, 135-152.
- RASHIDI, Naser and Hussein Meihami. 2018. "Informetrics of Scientometrics Abstracts: A Rhetorical Move Analysis of the Research Abstracts Published in Scientometrics Journal." *Scientometrics* 116 (3): 1975-94.
- RÖMER, Ute, Viviana Cortes and Eric Friginal, eds. 2020. *Advances in Corpus-Based Research on Academic Writing: Effects of Discipline, Register, and Writer Expertise*. Amsterdam and Philadelphia: John Benjamins.
- SALAGER-MEYER, Françoise. 1990. "Discoursal Flaws in Medical English Abstracts: A Genre Analysis per Research-and Text-Type." *Text-Interdisciplinary Journal for the Study of Discourse* 10 (4): 365-84.
- SAMRAJ, Betty. 2005. "An Exploration of a Genre Set: Research Article Abstracts and Introductions in Two Disciplines." *English for Specific Purposes* 24 (2): 141-56.
- SHAMSABADI, Rozana, Parisa Riahipour and Abbas Eslami Rasekh. 2014. "A Genre Analysis on the Rhetorical Moves in Dentistry Research Abstracts." *The Iranian EFL Journal* 10 (3): 419-32.
- STOLLER, Fredricka L. and Marin S. Robinson. 2013. "Chemistry Journal Articles: An Interdisciplinary Approach to Move Analysis with Pedagogical Aims." *English for Specific Purposes* 32 (1): 45-57.
- STUBBS, M. 2007. "Quantitative data on multi-word sequences in English: The case of the word 'world'." In Hoey et al. 2007, 163-89.
- SWALES, John. 1981. *Aspects of Article Introductions*. Michigan: U of Michigan P.
- , 1990. *Genre Analysis: English in Academic and Research Settings*. Cambridge: Cambridge UP.
- , 2004. *Research Genres: Explorations and Applications*. Cambridge: Cambridge UP.
- and Christine B. Feak. 2012. *Academic Writing for Graduate Students*. Michigan: Michigan UP.
- TANKÓ, Gyula. 2017. "Literary Research Article Abstracts: An Analysis of Rhetorical Moves and Their Linguistic Realizations." *Journal of English for Academic Purposes* 27: 42-55.
- TESSUTO, Girolamo. 2015. "Generic Structure and Rhetorical Moves in English-Language Empirical Law Research Articles: Sites of Interdisciplinary and Interdiscursive Cross-Over." *English for Specific Purposes* 37 (1): 13-26.
- TOVAR, Rodrigo. 2019. Rhetorical Move Structure in Abstracts of Research Articles Published in Ecuadorian and American English-Speaking Contexts. *Arab World English Journal* 10 (4): 74-87.
- TULLU, Milind S. 2019. "Writing the Title and Abstract for a Research Paper: Being Concise, Precise, and Meticulous is the Key." *Saudi Journal of Anesthesia* 13 (Supplement 1): S12-S17.

- VATHANALAOHA, Kriangkrai and Supong Tangkiengsirisin. 2018. "Genre Analysis of Experiment-Based Dental Research Article Abstracts: Thai and International Journals." *3L: Language, Linguistics, Literature* 24 (3): 1-14.
- WANG, Shih-ping and Pin-ning Tu. 2014. "Tense Use and Move Analysis in Journal Article Abstracts." *Taiwan Journal of TESOL* 11 (1): 3-29.
- WORDSMITH TOOLS 8. Oxford: Oxford Up.
- YOON, Jungwan and J. Elliott Casal. 2020. "P-Frames and Rhetorical Moves in Applied Linguistics Conference Abstracts." In Römer, Cortés and Friginal 2020, 281-305.
- ZAND-VAKILI, Elham and Alireza Fard Kashani. 2012. "The Contrastive Move Analysis: An Investigation of Persian and English Research Articles' Abstract and Introduction Parts." *Mediterranean Journal of Social Sciences* 3 (2): 129-37.
- ZANINA, Elena. 2017. "Move Structure of Research Article Abstracts on Management: Contrastive Study (The Case of English and Russian)." *Journal of Language and Education* 3 (2): 63-72.

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