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RHETORICAL STRUCTURES

IN ABSTRACTS OF SCIENTIFIC ARTICLES PUBLISHED IN ECUADORIAN AND NORTH AMERICAN JOURNALS

ESTRUCTURAS RETORICAS EN RESUMENES DE ARTICULOS CIENTIFICOS PUBLICADOS EN REVISTAS ECUATORIANAS Y NORTEAMERICANAS

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ABSTRACT

The community of national and international academic discourses has put emphasis on abstracts of scientific articles (RAC), because they are an important part in all disciplines and languages. In fact, summaries attract readers and increase indexing and citation opportunities. On the other hand, they determine the importance of the articles and classify them as good or ambiguous. The present study examines the rhetorical structures of abstracts in scientific articles written in English by native and non-native speakers. The abstracts were selected from Ecuadorian and North American magazines, published in 2010-2016. The research adopts the model of rhetorical structure of Hyland (2000), such as: introduction, purpose, method, product and conclusion. The analysis is based on a corpus of eighty summaries of humanities and sciences. The results reveal rhetorical variations in their construction in four disciplines: education, sociology, electronics and agronomy. However, the texts written in English by natives and non-natives followed a hierarchical structure of five movements, with three stable rhetorical structures: purpose, method and product. The results of the research affirm that academic writing must be well organized in terms of content and structure; in such a way that readers have a clear and concrete idea of the document. In addition, it throws pedagogical and linguistic implications for experts and inexperienced writers, especially for those with different linguistic and cultural backgrounds.

Keywords: Abstracts, academic writing, genre analysis, rhetorical structure.

RESUMEN

La comunidad de discursos académicos nacionales como internacionales ha puesto énfasis en los resúmenes de artículos científicos (RAC), debido a que son una parte importante en todas las disciplinas e idiomas. De hecho, los resúmenes atraen a los lectores y aumentan las oportunidades de indexación y citación. Por otro lado, determinan la importancia de los artículos y los clasifican como buenos o ambiguos. El presente estudio examina las estructuras retóricas de los resúmenes en artículos científicos escritos en inglés por hablantes nativos y no nativos. Los resúmenes fueron seleccionados de revistas ecuatorianas y estadounidenses, publicados en el 2010-2016. La investigación adopta el modelo de estructura retórica de Hyland (2000), como: introducción, propósito, método, producto y conclusión. El análisis se basa en un corpus de ochenta resúmenes de humanidades y ciencias. Los resultados revelan variaciones retóricas en la construcción de los mismos en cuatro disciplinas: educación, sociología, electrónica y agronomía. Sin embargo, los textos escritos en inglés por nativos y no nativos siguieron una estructura jerárquica de cinco movimientos, con tres estructuras retóricas estables: propósito, método, producto. Los resultados de la investigación afirman que la redacción académica debe estar bien organizada en términos de contenido y estructura; de tal manera que los lectores tengan una idea clara y concreta del documento. Además, arroja implicaciones pedagógicas y lingüísticas para escritores expertos y sin experiencia, especialmente para aquellos con diferente formación lingüística y cultural.

Palabras clave: Resúmenes, escritura académica, análisis de género, estructura retórica.

INTRODUCTION

The wide usage of English as the key means for global communication has led to pay extensive attention to academic writing deployed in English research articles around the world. English, today, is not only the international language of communication, but also the most widespread language in academic publications across disciplines. With the growing number of studies every year, the English language is perhaps the main source in the academia. Even journals publishing articles in other languages accompany their RAs with the English translated version of the original abstract to report the gist of the entire paper within disciplinary communities (Kafes, 2012). In this process, a great majority of RAs published in well-reputed journals summaries their studies by highlighting their research findings and showing that the paper as a whole is worth reading and has something new and relevant to say Hyland (2000). In this way, Ren & Li (2011), state that for abstracts of scientific papers gain a communicative purpose, the information has to be clear and accurate, in terms of content and rhetorical structure. Article abstracts area brief description of the research study, in other words, they are *the abbreviated and accurate representation* of the entire article (Lorés, 2004).

The way in which abstracts of academic papers present the scope of the study has increasingly become the subject of great interest among researchers and scholars across languages (Swales, 1990;. Samraj, 2002; Lorés 2004; Pho, 2008) Kafes, 2012; Doró, 2013; Çakır & Fidan, 2015; Sedan, Erkan & Jingjing, 2016) and disciplines (Hyland, 2000; Lau, 2004); this is, in great part, because abstracts are the first mini text freely available online and the gateways to knowledge production. Abstracts, in fact, are information-managing tools that illustrate the quality of the research as a whole and help readers find out what the article is about. In effect, if the abstract maintains a consistent rhetorical organization and lexical and grammatical choices, readers can follow it, moving easily from one sentence to another and from one paragraph to the next. According to Lorés (2004), abstracts, therefore, are the clear reflection of the entire article in such a way that the information content influences readers' interest in scanning or skimming the paper.

Abstracts then, depending on their readability may encourage readers to continue into the main paper (Hyland, 2009a) whereas their ill-construction diminishes the possibilities of indexing and citation. Hyland (2009a), points out that, *“a text carries meanings and gains its communicative force only by displaying the patterns and conventions of the community for which it is written”* (p.34). However, writing coherent and cohesive RA abstracts is somehow

challenging, especially for non-experienced writers, who report difficulty not only in the construction of well-structured abstracts, but also to follow the composing patterns set by their discourse community (Sedan, et al., 2016). In this way, Pho (2008), states that *“acquiring the skills of writing an abstract is therefore important to novice writers to enter in the discourse community of their discipline”* (p. 231). That is to say, the knowledge of composing patterns to produce clear abstracts are crucial in academic writing. This knowledge, according to Hyland (2009a), draws attention to the importance of encoding information and the appropriate relationships between lexical and grammatical choices and discourse structures. With the adequate selection of composing patterns, for instance, lexical and grammatical choices, experienced and non-experienced writers can construct better abstracts accompanying research articles. Following Hyland's (2000), five move model, the purpose of the present research study is at examining the rhetorical structures of English-written abstracts in the disciplines of education, sociology, electronics, and agronomy.

The analysis of texts, particularly the genre research articles, has gone beyond the structural and linguistic examinations aiming to understand the context in which such genre is produced (Tovar, 2018). According to Hyland (2009b), *“research articles are central to the academic enterprise”* because they are the major source to disseminate the research findings and new knowledge within disciplines. Thus, while some researchers and scholars have kept their interest in the rhetorical development and social constructions of research articles, others have focused on the rhetorical structures and lexical and grammatical elements, in particular, on the features of RA abstracts (Dos Santos, 1996; Hyland, 2000; Kafes, 2012; Doró, 2013). However, despite the rhetorical structures of abstracts have been investigated from different disciplines and languages, the majority of those research studies examined the hierarchical and non-hierarchical move structures of abstracts written by native and non-native writers from different lingua-cultural backgrounds.

In the initial rhetorical studies, a three-move structure was coined such as establishing the territory, establishing the niche and occupying the niche to describe the functions (rhetorical or linguistic patterns) of the introductions or particular sections of the research articles. Since then, research studies in several fields, for instance, applied linguistics, sociology, linguistics, economics, literature, law, education, among others have shown that the rhetorical and linguistic realizations of abstracts in scientific papers vary across disciplines and languages. As a result, researchers have paid more attention to the analysis

of academic abstracts in which disciplinary functions such as hedges, emphatics, attitude markers, relational markers, and personal markers have been stated to indicate the writer's stance in a text (Hyland, 2014). In this way, several studies have been conducted within specific disciplines (e.g., Dos Santos, 1996; Lorés, 2004; Kafes, 2012) and across different disciplines (e.g. Hyland, 2000; Samraj, 2002; Pho, 2008; Suntara & Usaha, 2013; Doró, 2013; Çakır & Fidan, 2015). Most published research findings written by authors from different disciplines and languages, for instance, Doró, Lorés, and Çakır & Fidan clearly illustrate the variety of moves in RA abstracts.

Kafes (2012), in his contrastive analysis of RA abstracts of American, Taiwanese and Turkish writers found that the introduction was the least frequent rhetorical structure used in the majority of the abstracts. Conclusions were categorized as optional moves because they were sometimes omitted; nevertheless, since over 70% of American abstracts included them, American abstracts were considered more complete than non-native ones in the realization of rhetorical moves. Moreover, the three groups of RA abstracts written by American, Taiwanese and Turkish authors, due to the frequent occurrence of the *purpose, method and result sections* in all writing sub-corpora, are in line with the majority of research studies in which these moves have been taken as conventional or common. However, further analysis showed that these moves are not stable at all because their frequent use relies on the domain of textual organization across disciplines. In other words, discourse conventions of academic writing allow writers to both take a stand and align themselves with disciplinary-oriented value positions to introduce their works (Hyland, 2000, p.199). Rhetorical moves then may be known as conventional patterns in particular disciplines, but their representative function varies according to the writer's intentions.

Research findings of Kafes (2012), are similar to those of Pho (2008), in which three moves (M2: Presenting the research, M3: Describing the methodology, M4: Summarizing the findings) were identified as conventional rhetorical structures in the majority of the RA abstracts of applied linguistics and educational technology. In the same vein, Samraj (2002), found a closely similar move pattern: *purpose, method, result, and conclusion* (PMRC) in RA abstracts of biology and wildlife disciplines. Unlike Kafes' study, *conclusion* sections in Samraj's work were reported as obligatory. Similarly, Dos Santos (1996), examined the macro (rhetorical moves) and micro (linguistic features) level of RA abstracts. His model showed that M2, *establishing the purpose*; M3, *describing the methodology* and M4, *summarizing the results* were obligatory in

the field of applied linguistics and that each move needs particular linguistic features to drive its communicative purpose. The differences in these studies indicate that in the construction of rhetorical moves, the frequency of occurrence varies across disciplines, and moves may be considered either obligatory or optional.

In the analysis of the RA abstracts from different disciplines, Suntara & Usaha (2013), reported that the abstracts in the field of applied linguistics adhered to the conventional construction of rhetorical moves, in the sense that they included four-moves (PMRC) compared the linguistics abstracts, which had three-moves such as *purpose, method and result* (PMR). Despite the variability in the move patterns in both fields, *purpose, method, results and conclusion* were the frequent pattern used in the majority of the abstracts. The study supports the importance of moves and the organizational variation, which are somehow the result of the writing style and lingua-cultural diversity across disciplines. Suntara & Usaha's findings are also in line with Kafes' (2012), results, in the sense that introduction move was categorized as optional due to its fewer numbers of occurrences in both linguistics and applied linguistics RA abstracts. In addition, unlike Dos Santos' (1996); Kafes' (2012); and Çakır & Fidan's (2015), findings, the conclusion in Suntara & Usaha's research was classified as a conventional rhetorical structure.

Similarly, Lorés, in 2004, reported that the majority of research articles in the field of linguistics followed *the introduction, method, result and discussion* —IMRD conventional model while a few adhered to *establishing the territory, establishing the niche and occupying the niche* —Create a research space (CARS) model. Further analysis showed the presence of the two models (IMRD and CARS) in almost 8% of the abstracts. According to Lorés, the three sub-groups: informative, indicative (descriptive) and informative-indicative function achieve different functions in the organization of RA abstracts. Lorés argues that the reason that research articles abstracts differ from one another is that they embody different functions in the construction of rhetorical moves, and linguistic organization of patterns and features as well.

In order to analyse the construction of rhetorical moves, Lau (2004), used Hyland's (2000), five-move rhetorical structures (IPMRC). The findings revealed that the scholars' abstracts were closely related to the five-move conventional pattern in comparison with the Ph.D. students' texts that showed heterogeneity in their rhetorical organization. The Ph.D. students adopted three rhetoric schemata to build up the RA abstracts such as:

- introduction, purpose, result, conclusion

- introduction, results, conclusion and
- result, conclusion

The asymmetric outcomes in Ph.D. abstracts are the result of student writers' academic inexperience and language proficiency as a result, the information in the abstracts was neither informative nor descriptive. Lau (2004), highlights the importance of exposing novice writers to the construction of RA abstracts, so they can be quite familiar with common conventional patterns and phraseology used in the production of abstracts.

Çakır & Fidan (2015), reported variations in the rhetorical structure of native and non-native academic writings. However, the comparative analysis revealed that the moves: *purposes, methods, and results* were highly used by both native and non-native academic writers, which were categorized as obligatory moves in the majority of the abstracts in six disciplines. As introductions and conclusions had less than 70% of occurrence, they tend to be optional in both Turkish and English written sub-corpora. What is interesting in this study is that compared to humanities and science disciplines, Turkish texts outperformed the frequent occurrence of the three-move pattern. Çakır & Fidan also found that native English writers tend to justify the place of the study before announcing the research purpose while Turkish authors described the purpose without referring to the place. They concluded that these differences cannot be attributed to cross-linguistic reasons but to expectations of the discourse community who decide whether the article is worthy of publishing.

Behnam & Golpour (2014), similarly undertook a cross-linguistic and disciplinary analysis of research articles abstracts written by American and Iranian authors. The research findings revealed that linguistics abstracts follow a four-move conventional pattern: *purpose, method, product, and conclusion* whereas mathematics abstracts in such sub-corpora did not adopt a conventional rhetoric norm in either of the two languages, English and Persian. Thus, whilst mathematics abstracts in English followed a two-move schema, *purpose and method*, abstracts in Persian had a three-move structure, *purpose, method, and product*. Also, writers differ in the constructions of rhetorical structures of RA abstracts across disciplines. These results are in line with those of Dos Santos' (1996), study in which *purpose, method, and product* were the frequent moves used in all the RA abstracts. The *introduction and conclusion* were the least frequent moves across disciplines.

Doró (2013), found that most of the abstracts in the field of linguistics, compared the literature ones, had a three-move rhetorical pattern as *purpose, method, and result*.

Also, literature and linguistics texts were different in terms of organization and frequency of moves. The structure and occurrence of rhetorical moves significantly differed in the literature and linguistics abstracts, in the sense that the rhetorical order of moves was asymmetric. The results also showed that literature research articles introduced their studies through indicative or descriptive abstracts, which in terms of content made them less informative and difficult to understand compared to the linguistic abstracts. Those discourse differences may be attributed to the fact that academic authors belong to different discourse communities and practices. Doró also argues that abstracts with less than three moves are often considered vague, particularly for readers who are outside the given disciplines and discourse communities. Therefore, it is quite unclear to state that abstracts which tend to employ few moves to positioning the scope of the study are less informative and less publishable. On the contrary, this tendency may be the subject of further analysis to explore the content and rhetorical structure in abstracts of scientific papers and to see whether the academic writing of abstracts and publishing practice differ across the fields. That is, how effective and well-organized those RA abstracts are with respect to the disciplines they belong to keep readers' attention towards the complete paper.

The above-discussed research studies (e.g., Lau, 2004; Suntara & Usaha, 2013; Behnam & Golpour, 2014) clearly argue that the construction of rhetorical structures of abstracts is not universal. This is, in large part, because the sequence of moves does not follow each other in order, on the contrary, it frequently changes the place of occurrence. Connor (2004), states, therefore, that when producing a particular type of texts, discourse community practices and lingua-cultural conventions shape the context of the content. This point of view confirms that each RA abstract is connected to particular linguistic and cultural background, disciplinary phraseology, the context of publication and intended audience, which somehow influence the frequency of moves. Although the investigation of RAs is not a new phenomenon, research on English abstracts written by Ecuadorian writers and comparative studies between native and non-native academic writing have been scarce compared to the published studies that have analysed the rhetorical structures of abstracts across disciplines and languages, as for example the published works in Pho (2008); Ren & Li (2011); Kafes (2012); Doró (2013); Behnam & Golpour (2014); Çakır & Fidan (2015); and Sedan, et al. (2016), over the past decade. To fill this gap, the present study aims to examine the rhetorical structures of RA abstracts written by Ecuadorian and American authors published in online reputed journals indexing organizations like Latindex, Redalyc, Dialnet,

Elsevier, JCR-Chicago Journals and SAGE publishing. The current study expects to answer the following research questions: How do Ecuadorian and American writers in the disciplines of sociology, education, electronics, and agronomy construct the rhetorical structures of RA abstracts? Do RA abstracts from all four disciplines significantly vary in the frequent use of rhetorical structures?

METHODS AND PROCEDURES

In the analysis of the research article abstracts, researchers and scholars have suggested different rhetorical structures. Swales (1990), proposed three-moves: *establishing the territory, establishing the niche and occupying the niche* with various steps within each move. For instance, establishing the territory may be identified by *“claiming centrality, making a topic generalization or reviewing items of previous research”* (p.141). Later, a four-move structure was introduced, as *purpose, method, result and discussion*. Other researchers, meanwhile (e.g. Dos Santos, 1996; Hyland, 2000) suggested a five-move pattern. Although Dos Santos' moves (*situate the research, present the research, describe the methodology, summarize the results, discuss the results*) differ from Hyland's (*introduction, purpose, method, product, conclusion*) move model, both are interwoven, in the sense that the organization of moves that determine the rhetorical construction of abstracts is similar. As Hyland's (2000), model was the result of the analysis of 800 RA abstracts from eight disciplines and seven genres, which examined the relationships between the cultures of academic communities and their discourse practices, the present research study adopts its classification as the analytical framework for the analysis of the rhetorical structures of the RA abstracts by relying on its functions and communicative goals:

- (1) **Introduction**, establishes context of the paper and motivates the research;
- (2) **Purpose**, indicates purpose, outlines the aim behind the paper;
- (3) **Method**, Provides information on design, procedures, data analysis, etc.;
- (4) **Product/Results**, Indicates results and the argument;
- (5) **Conclusion**, Points to applications or wider implications and Interpretation scope of paper (Hyland, 2000, p.67).

In order to determine the functions of each move in the RA abstracts, *phrases and formulaic expressions*, for instance, *in a recent work..., the present study examined..., the purpose of this investigation is..., the article analyses data from..., the data for this research..., the findings reveal..., the results of the study suggest..., the article concludes..., within this context, differences ..., in this project, we...,* were used as reference to differentiate one move from another.

In the analysis of RA abstracts with the use of Hyland's (2000), five-move model, the rhetorical structures of abstracts were examined by exploring the overall textual organization of the sub-corpora in each discipline. As a move pattern may likely be within one or more sentences, the current study uses a top-down and bottom-up approach to recognize moves and set up the boundaries between moves. The former, top-down approach focuses on the content of the RA abstracts, while the latter, bottom-up approach, looks for linguistic signals to categorize the textual boundaries of the moves. Unlike the above-discussed studies which used different criteria to categorize prototypical moves as obligatory, in the present investigation following Hyland (2003), a move is considered as obligatory if it occurs in at least 60% of the articles; less than 60% was categorized as optional. With this analytical criterion, the frequent occurrence of the moves was delineated, so the most frequent moves were taken as conventional patterns whilst the infrequent ones as non-obligatory. The *Word counter* online editor was used to counting the length of the RA abstracts. With this in mind, the research study puts emphasis on the cross-cultural and disciplinary analysis of move frequency and word counting of the RA abstracts published in Ecuadorian and American journals across four disciplines.

CORPUS

Research article abstracts

The study holds an analysis of 80 RA abstracts written in English by native and non-native academic authors. Forty abstracts published in the field of humanities –*education and sociology*–, and the other 40 in the field of science –*electronics and agronomy*– published in Ecuadorian and American journals between 2010 and 2016 constitutes the corpus of the research study. The native and non-native authorship like authors' names and affiliation, were verified on the bio-data section presented at the beginning of the article of each online journal.

The RA abstracts in the four disciplines were randomly selected from Ecuadorian and American peer-reviewed online journals. The data set of American journals includes 40 English RA abstracts published by: American Journal of Education (AJE), Journal of Teacher Education (JTE), American Journal of Sociology (AJS), Sociological Perspectives, Journal of Electronic Materials (JEM), Journal of Electronic Packaging (JEP), Journal of Agricultural and Food Chemistry (JAFC) and Journal of Agricultural Science (JAS). The corpus of each discipline (sociology, education, electronics and agronomy) contains 10 RA abstracts.

Likewise, the Ecuadorian corpus is 40 RA abstracts published in Ecuador in the following journals: *INNOVA Research Journal*, *Alteridad*, *Axioma*, *UTCiencia*, *Revista Tecnológica ESPOL*, *Amazonica*, *Analitika*, *Procesos*, *Perfiles*, *Avances*, *Ingenius* and *La Granja*. All four disciplines encompass 10 RA abstracts each. Ecuadorian journals are indexed in *latindex* (regional cooperative online information system for scholarly journals from Latin America, the Caribbean, Spain and Portugal), as well as in *elsevier*, *dialnet*, *REDIB*, and *e-rivist@s*. These journals are hosted by Ecuadorian Universities. Unlike North-American journals, Ecuadorian ones are mixed, with special sections for particular disciplines.

RESULTS AND DISCUSSION

The cross-linguistic and disciplinary analysis of RA abstracts written by non-native (NNE) and native English (NE) academic writers showed non-linearity and move variation

Table 1. Cross-disciplinary analysis of RA abstracts written by non-native (NNE) and native (NE) English academic writers.

| Move | Education | | Sociology | | Electronics | | Agronomy | |
|--------------------|-----------|------|-----------|------|-------------|------|----------|------|
| | NNE | NE | NNE | NE | NNE | NE | NNE | NE |
| 1. Introduction | 60% | 40% | 50% | 90% | 40% | 60% | 70% | 80% |
| 2. Purpose | 100% | 90% | 95% | 100% | 90% | 100% | 80% | 95% |
| 3. Method | 100% | 100% | 65% | 100% | 90% | 100% | 100% | 95% |
| 4. Product/Results | 80% | 100% | 60% | 100% | 90% | 80% | 100% | 100% |
| 5. Conclusion | 10% | 40% | 30% | 50% | 10% | 30% | 60% | 70% |

The most frequent moves: M2-M3-M4 were found as a conventional pattern in all RA abstracts written by both native and non-native academic writers. However, RA abstracts in the discipline of Agronomy followed the conventional rhetorical structure suggested by Hyland (2000), M1, M2, M3, M4, and M5. Although the percentage of occurrence in the M1 and M5 is not significantly higher compared to the native RA abstracts, this finding showed that the agronomy abstracts followed the five-move pattern more closely than the others, but in the gain, NNE has the lowest figure for agronomy ones. In other words, M1 and M5 sections were hierarchically used in the native English-written text. A possible explanation for this might be that non-native authors conventionally devote more space to the purpose, method and product when shaping the rhetorical organization of academic abstracts. Another important finding is that native academic writers in the field of sociology and electronics, and non-native ones in the field of education often follow the M1-M2-M3-M4 rhetorical structure. A possible explanation for this rhetorical variation might be that L1 and L2 academic authors

in the construction of rhetorical structures across the four disciplines (Table 1) presents the frequency of moves across the disciplines. The introduction and conclusions significantly varied in the frequency of occurrence in the written corpora across RA abstracts. Conclusions (M5) were the least frequent move while introductions (M1) match the results observed in previous studies (e.g. Lau, 2004; Kafes, 2012) where this section was commonly used in RA abstracts. It was also found that English RA abstracts have a non-hierarchical five-move pattern with three stable moves, whose functions are to present the purpose, describe the method and discuss the product of the research in which the frequency of occurrence is above 94%. This finding corroborates the results of the studies of Dos Santos (1996); Pho (2008); Doró (2013); Behnam & Golpour (2014); and Çakır & Fidan (2015), who concluded that M2 (purpose), M3 (method) and M4 (product) are obligatory in almost all RA abstracts.

experience different lingua-cultural conventions within their disciplinary communities. In other words, the most marked finding to emerge from the analysis is that academic writers from different disciplines followed a three-move pattern such as M2, M3 and M4 in the construction of rhetorical structures of abstracts. The introduction and conclusion sections were non-obligatory in the two English sub-corpora.

As can be seen from the comparative analyses across disciplines within humanities and sciences, the reason for the rhetorical variation of RA abstracts written by NNE and NE speakers is mainly explained by the influence of the context of publication, which is different in terms of discourse conventions writers are addressing. Whilst in the field of humanities, purpose (M2) was the first highest frequent move (100%; 90%; 95%), in science; it is the third most frequent one with 100%; 90%; 80% of occurrence. Moreover, in the field of science, method (M3) and product (M4) are the most frequent moves with 100%; 95% and 100%; 90% whereas in humanities, method (M3) was the second most frequent move (100%; 100%; 65%) and product (M4), the

third one with 100%; 80% and 60%. Introduction (M1) is sometimes used in RA abstracts, which occurs in 40%; 50%; 60%; 70%; 80% and 90% of the cases and conclusion (M5) is the least frequent move 10%; 30%; 40%; 50% across disciplines in native and non-native English-written texts. What stands out in the data is that the categorization of prototypical moves, their move frequency and move order are not stable since they vary across the four different academic disciplines. That is, while a move is categorized as obligatory in some disciplines, it is taken as optional, in the other ones. These results revealed less consistency among non-native academic writers at deciding which moves are or are not obligatory to write clear and informative RA abstracts.

The analysis of the English-written corpora across disciplines revealed great variation in the move order and rhetorical construction of RA abstracts across the four disciplines in both journals. The following examples in education and electronics texts, belonging to humanities and science, respectively, illustrate the variation and frequent use of the moves. As shown in examples 1 and 2, the move order was M1-M2-M3-M4 in 68% of the education texts, and moves 1, 2, 3, 4 and 5 in 65% of the electronics texts. Moves are numbered and highlighted to facilitate understanding and identification in the texts.

Example 1. Education Text written by NNE

(M1) In a recent work, the motivation and attitudes of university students to a second language is studied. **(M2)** The present study aims to investigate the motivation of... **(M3)** For the purpose of this investigation a questionnaire containing items related to... **(M4)** The results show that all the students are highly motivated..., they also state to be very interested on learning foreign languages.

Example 2. Electronics text written by NE

(M3) Ohmic curing was utilized as a method to improve the conductivity of three-dimensional... **(M2)** The goal was to increase conductivity of the conductive path without inducing damage... **(M3)** The 3D via/interconnect structure was routed within 3D polymeric substrates... **(M4)** Ohmic curing was shown to decrease the measured resistance of the via/interconnect structure without harming the substrate. **(M5)** The work demonstrated a method to overcome the thermal cure temperature limitations of polymeric substrates imposed on the processing parameters of conductive inks during the fabrication of 3D structural electronics.

As can be seen from the example 1 (above), the education text, in the field of humanities written by a non-native English author showed linearity when constructing the

moves of the abstract accompanying the article, that is, the moves are in sequence. Whilst the electronics text (example 2) that belongs to the field of science, written by a native English writer indicates semi-linearity in the move order, in the sense that the moves are not in a sequential order at all as in the education text. The moves in the electronics text are in the following order: M3-M2-M3-M4-M5 whereas in the education one, the moves are constructed in sequence such as M1-M2-M3-M4. The differences in the education and electronics texts rely on the move order so that the education text is categorized as linear and the electronics one is classified as semi-linear. It is because M3 in the electronics text is emphasized two times and overlaps at the beginning of the text, which is unnecessary if the text adopts the four-move order: M2-M3-M4-M5. Although some electronics texts reported semi-linearity, for example, M2-M3-M4; M1-M2-M3 and variation in the frequent use of moves (see example 3 below), these abstracts were worth reading, in terms of content and rhetorical structure compared to the ones which did not include good and well-organized information, as in one of the sociology texts (see example 4). As the sociology text seems to be the result of patchwork paraphrasing when transferring L1 functions to L2 (e.g., */sin secuelas o evidencia física, cometidas/* 'the sequelae or Physical Evidence *sin* committed'), identifying the moves and thus setting up the move order was difficult as well. In other words, due to the inappropriate use of lexico-grammatical features, the length of sentences and vague information, the article abstract showed unclear conventional move structure and weakness in terms of accuracy.

Example 3. Electronics text written by NE

(M2) The effect of a polycrystalline silicon (poly-Si) seeding layer on the properties of relaxer Pb (Zr_{0.53}, Ti_{0.47}) O₃Pb (Zn_{1/3}, Nb_{2/3}) O₃ (PZT-PZN) thin films and energy-harvesting cantilevers was studied. **(M3)** We deposited thin films of the relaxer on two substrates, with and without a poly-Si seeding layer. **(M4)** The seeding layer, which also served as a sacrificial layer to facilitate cantilever release, was found to improve morphology, phase purity, crystal orientation, and electrical properties. **(M4)** We attributed these results to reduction of the number of nucleation sites and, therefore, to an increase in relaxer film grain size. The areal power density of the wet-based released harvester was measured. The power density output of the energy harvester with this relaxer composition and the poly-Si seeding layer was 325 μW/cm².

Example 4. Sociology text written by NNE

(M2) This article explores the reasons why the Manifestations of symbolic violence sonant reproduced

socially tolerated in the majority of cases, impunity a Through the (mM) micro machismos, which is the term that is known to everyday Low Intensity macho aggression, the sequelae or Physical Evidences in committed by both men's and women, and that no child questioned due to the naturalization of inequitable gender schemas, micro machistas: Besides these practices no shares represent deliberate actions generated in the conscious, but obey one patriarchal structures that have internalized historically Sido room, based on stereotypical gender roles nesting one Gender and manifest themselves in many areas of everyday life, such as: street harassment, the use of public space, sexism in language, the distribution of tasks by Genre, the image of men and women in the advertising space, jokes, memes, among others.

Examples 1, 2, 3 and 4 clearly illustrate how academic texts from different disciplines, namely education, electronics, and sociology vary in the construction of abstracts and how the rhetorical structures are organized within the text to communicate the purpose of the whole paper. Thus, example 4 (above) shows that the rhetorical and textual organization in the sociology text are not conventionally structured (see examples a, b, c, d below) compared to

the electronics (example 2, 3) and education (example 1) texts. Results also reveal that although the communicative function of the rhetorical units may change in the different sections of the abstract across discourse communities, authors should pay more attention when writing in a foreign language context in order to avoid vagueness in the information content. This is, in great part, because writing is the way in which both authors and readers consolidate and demonstrate the understanding of the subjects or a particular type of texts (Hyland, 2009b).

- [...] manifestations of symbolic violence son and reproduced socially tolerated in the majority of cases...
- [...], impunity a through the (mM) micro machismos, which is the term that is known to everyday...
- [...], the sequelae or Physical Evidence sin committed by both men's and women, and that no child questioned due to the naturalization of inequitable gender schemas, micro machistas...
- [...], based on stereotypical gender roles nesting one Gender and manifest themselves in many areas of everyday life.

Table 2. Percentage of move sequences: linearity and semi-linearity.

| IPMRC | | IPM | | PMR | | PMRC | | IPM | |
|-------|-----|------|-----|------|-----|------|-----|------|-----|
| NNET | NET | NNET | NET | NNET | NET | NNET | NET | NNET | NET |
| 43% | 65% | 68% | 40% | 30% | 33% | 18% | 20% | 13% | 10% |

From the results above discussed, particularly in examples 1, 2, 3 and 4, and from the different discourse conventions in terms of linearity and semi-linearity of the moves (Table 2), the rhetorical structure, move frequency and move order significantly vary in the distribution and proportion of the move sequence in abstracts of scientific papers. The move sequence, namely introduction, purpose and method have a lower incidence (13-10%) in both English texts while the move linear sequence, as IPMRC frequently occurs in native English texts (65%). The data in chart 1 shows that the semi-linear sequence, for instance, IPMR, PMR, PMRC and IPM were the move patterns that significantly occur when constructing the rhetorical structures of the English article abstracts, either in native or non-native ones.

Rhetorical moves in the native and non-native English sub-corpora

In order to compare the frequent use of rhetorical structures between native and non-native English RA abstracts, the five-move patterns of the English sub-corpora were identified and analysed by establishing their frequent

occurrence (Figure 1) shows the results of the cross-disciplinary analysis.

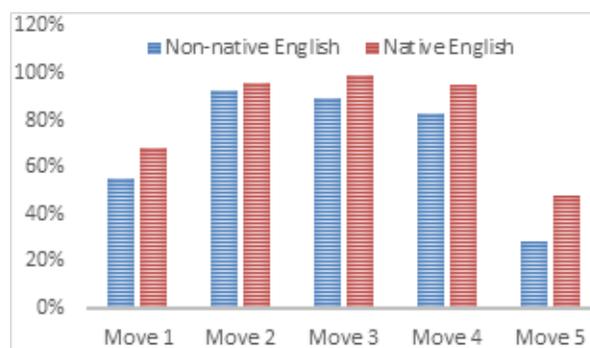


Figure 1. Percentage of rhetorical moves in the whole text.

Table 3 presents the results obtained from the analysis of the native and non-native English written texts. What is interesting about the data in table 3 is that, English abstracts written by native speakers of the language reported significant variation in the frequent occurrence of the introduction and conclusion moves compared to their non-native counterparts. However, further statistical analysis

indicates that native texts adopt the four-move rhetorical structure, which includes the following: introduction, purpose, method, and product (M1-M2-M3-M4), with 68%, 96%, 99% and 95% occurrence rate in the RA abstracts. The results show not only the overall structural organization but also the moves commonly used in native and non-native English article abstracts. This is because authors conventionally follow their own disciplinary practices.

From the data in figure 1, therefore, it is apparent that there is a clear trend of decreasing the frequent use of the five-move schema suggested by Hyland (2000) in both sub-corpora. Nonetheless, the cross-disciplinary analysis reports that those RA abstracts written in the discipline of agronomy follow a five-move pattern (table 1). The finding also reveals that the linear and semi-linear structures conventionally constructed are the result of the lingua-cultural conventions, in which writers create the knowledge and use the language to express their ideas, frame and understand problems emerging in particular academic disciplines and discourse communities. That is, in the academy, authors construct and perform their 'social realities, personal identities, and professional institutions' (Hyland, 2009b).

Since in academic writing, the effective selection of rhetorical and linguistic features can determine publication success, Hyland (2000), suggests that RA abstracts may be constructed by considering the coherent communicate functions that discursive units display in the text. The fact that the Ecuadorian and American texts did not always

Table 3. Word count across disciplines.

| Education | | Sociology | | Electronics | | Agronomy | |
|-----------|--------|-----------|-----|-------------|-----|----------|--------|
| NNET | NET | NNET | NET | NNET | NET | NNET | NET |
| 174,85 | 116,28 | 137,42 | 145 | 152,57 | 190 | 216,42 | 214,72 |

From the data in (table3), it can be seen that the word count varies quite considerably across disciplines in the fields of humanities and science. While agronomy and electronics texts written by NE authors report having the highest average word count with 216,42 and 190 words, sociology and education abstracts written by NNE and NE ones had the lowest word count with 137,42 and 116,28. Besides, the data analysis revealed that the electronics and education abstracts of native and non-native English-written RA differ significantly in the number of words compared to the sociology and agronomy texts. Although the length of the abstracts contributes to the fulfilment of the overall communicative purpose of the RA abstracts, this may not be considered as the only or main reason for move structure differences, but as one of the factors that in the text organization and language choices determine

include all five moves is unlikely to be caused just by the word-count restrictions of the journals in which they were published, but also associated with disciplinary conventions and context of the publication. The cross-linguistic analysis among academic writers set out that the average word count for the Ecuadorian RA abstracts written in English (L2) was 170,32 words whereas in American abstracts, it was 166,50 words. In other words, research article abstracts written by non-native academic writes reported the higher word count compared to the American RA abstracts, which had a fewer word count. In addition, one interesting finding in the word count analysis across disciplines is that Agronomy RA abstracts shown the highest average word-count (216, 42) while Education RA written by native English authors have the lowest word count with 116.28 words (figure 1). Although the length of abstracts varies from journal to journal and typically ranges from 150 to 250 words, authors should not exceed the abstract word limit of the journal to which they are submitting the article. However, despite the word limit suggested by the journal editors, within the cross-disciplinary analysis of the native and non-native English-written sub-corpora, longer and shorter abstracts were found. One of the longest abstracts (agronomy) in the data with 301 words displayed verbosity, repetition and complexity of the information whereas the shortest one (education) with 85 words showed organization, in terms of content and rhetorical structure. It is inferred then, that the construction of the rhetorical structures does not depend on the number of words, but on how writers organize the information.

the structure of abstracts in real academic use and according to the genre. This could be the reason that the English texts written in the four disciplines and published in the fields of humanities and sciences indicate variation, in terms of content and rhetorical structure. Nonetheless, it should be borne in mind that there are various reasons for a rhetorical variation.

CONCLUSIONS

As the rhetorical structures work as functional units to communicate information, these structural elements may be optional or obligatory across disciplines (Swales, 1990). The fact that the Ecuadorian and American English-written texts did not always include all five rhetorical structures is unlikely to be caused by the word-count restrictions of

the journals in which they were published. What is more, the linear and semi-linear move sequence found in the abstracts of scientific papers report irrelevance of length texts in the construction of moves that accompany RA abstracts. Although the five moves were not frequently used in the native and non-native English-written texts, the findings revealed that the rhetorical structures of article abstracts written by non-native authors generally reflect the English international move schema; however, differences in the textual organization were observed. This part-genre difference may be ascribed to the fact that unlike non-native English texts, native ones apparently seem to show the effective selection of moves and linguistic features when drafting the information content to promote their research studies.

The results of the above-discussed research study show linguistic and disciplinary differences in both sets of the RA abstracts. Native English-written texts display the frequent use of *introduction, purpose, method and product* sections when introducing their research studies whereas non-native English-written ones adopt a three-move structure such as *purpose, method and product*. The present study confirms that, although academic abstracts could include the five moves when communicating the gist of the complete article (Hyland, 2000), these structural elements are not always hierarchical adopted across languages and disciplines. It is, in great part, because authors from different linguistic and cultural backgrounds follow prevalent discursive practices and conventions. Although a three stable move structure frequently occurred in all the RA abstracts, written by NE and NNE authors in the fields of humanities and science, further analysis revealed that the frequent use of moves and the move occurrence significantly varied across the four disciplines. Nonetheless, only agronomy abstracts reported following a hierarchical schema of five moves, whose functions are establishing the context of the paper, outlining the aim behind the paper, describing the data analysis, indicating the main results and pointing out the implications of the research.

Overall, this study strengthens the idea that different discourse conventions of the language influence the constructions of the rhetorical structures of abstracts in scientific papers. Due to the writers' different linguistic and cultural backgrounds, non-native and native English-written texts followed a non-hierarchical schema with three stable moves (figure 1). In other words, unlike the five-move structures, the occurrence of three-moves, named *purpose, method and product* was throughout the whole corpora. The contribution of this study has been to confirm the findings of Dos Santos (1996); Pho (2008); Doró (2013); Behnam & Golpour (2014); and Çakır & Fidan

(2015), who concluded that purpose move (M2), method move (M3) and product move (M4) are obligatory in almost all RA abstracts in the four disciplines. Despite the fact that the corpus of the present study consists of eighty abstracts in four disciplines, the results indicate that there are differences between native and non-native English-written texts in dealing with the construction of abstracts.

In the era of digital and scientific information, writing an informative and well-structured abstract is unquestionable. The purpose of the abstract is getting someone reading the content to go further and read the paper. That is, the information in the abstract that accompanies the article has to be worth reading as well as clear enough to communicate the purpose of the whole article. The communicative effectiveness of abstracts relies on the effective selection of moves and their appropriate phraseology. In other words, abstracts accompanying articles should convey clear information to disseminate the scope of the research study, theories and approaches. It is important that writers pay close attention to the construction of RA abstracts by taking a writer-responsible sense to communicate the research findings through informative, clear and well-organized content and not simply assume that the understanding of that information depends on the reader's ability to predict such information. In academic writing, assuming the role of a reader-writer is essential. Hyland (2000), points out that when persuading readers about statements, writers must display a stance like disciplinary insiders, which is achieved through a writer-reader dialogue wherein their research, as well as the professional identity, are positioned by establishing relationships between people and ideas. Finally, future studies should be undertaken to examine the contextual factors that affect the structure of abstracts and what kind of grammatical tense is frequently used to construct the moves in the RA abstracts across the four disciplines.

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