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Distinguishing textual features characterizing structural variation in research articles across three engineering sub-discipline corpora

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ABSTRACT

Genre analysis has provided insights into the textual organization of different genres. In the research article (RA) genre, previous studies demonstrate that disciplinary variation is discernible. To raise the investigation to the level of sub-disciplines, this study addresses two research questions: (1) What is the textual organization of individual RA sections in corpora from three engineering sub-disciplines? and (2) What are the significant statistical variations in textual organization that distinguish one engineering sub-discipline from another? Initially, three corpora were compiled, consisting of 180 full length high quality RAs representing three sub-disciplines of engineering (civil, software, and biomedical). Then, the corpora were analyzed using genre analysis to identify the textual organization prevalent in individual RA sections of each engineering sub-discipline. Subsequently, units of textual analysis called 'move' and 'step' were quantified and statistically analyzed to capture significant statistical variations in each section. The analysis reveals the influence of the sub-disciplines on the textual organization variations across the corpora, highlighting the unique characteristics and perspectives of each sub-discipline. The findings contribute to enhanced quality professional communication by creating and raising awareness and sensitivity among prospective engineering students and practitioners when they are involved in the task of reading and/or writing RAs.

1. Introduction

Currently, advanced degree students, university faculty members, and practitioners from diverse academic disciplines are encouraged to publish and disseminate their research discoveries in international journals. As a result, the expertise needed to be successfully involved in international professional communication is essential for academic and career growth. In this regard, Swales' genre analysis (1990, 2004), created initially to analyze the research article (RA) introduction section, has been very useful, providing a model that captures textual organization typically followed by RA authors. An increasing body of research along this line has focused on other sections of the academic RA genre (e.g., Basturkmen, 2012; Kanoksilapatham, 2005; Pho, 2008) and non-academic genres, including fund-raising letters (Connor & Gladkov, 2004), and recruitment advertisements (Tisapramotekul, 2008).

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A multitude of genre-based studies have been conducted on the genre of RAs and have provided valuable insight into the rhetorical structure of the RA genre. However, certain criticisms have been raised against the application of genre analysis. First, many genre-based studies have focused on individual RA sections (e.g., Basturkmen, 2012; Bruce, 2008; Kanoksilapatham, 2012; Lim, 2006; Peacock, 2011), resulting in fragmented knowledge of how this genre, in its entirety, is constructed. In addition, many studies have analyzed a small number of texts pertaining to individual sections of RAs which were subjectively selected (e.g., Anthony, 1999; Basturkmen, 2009; Posteguillo, 1999), leading to limited generalization of the findings. Thus, very little is known about textual organization across a large representative sample of texts from a genre. At the same time, corpus studies are currently revolutionizing the study of language use (Biber, Connor, & Upton, 2007). The analysis of large and representative text corpora can therefore provide a more rigorous and accurate description of textual organization that holds across all texts in the corpus (Kanoksilapatham, 2005; Stoller & Robinson, 2013). Moreover, given the inherent nature of textual segmentation which is semantically driven and thus likely to be subjective, the integration of expert coders at the analysis stage can help validate move segmentation performed by different individuals (Basturkmen, 2009, 2012; Stoller & Robinson, 2013). Finally, although studies have congruently revealed the influence of disciplines on the internal discourse structure of each RA section, it remains to be investigated whether the influence of sub-disciplines associated with a single discipline can be observed in textual organization, and if so, to what extent.

This study extends the application of genre analysis to examine the RA textual organization of three different engineering sub-disciplines, by addressing the following two research questions: (1) What is the textual organization of individual RA sections in corpora from three engineering sub-disciplines? and (2) What are the significant statistical variations in textual organization that distinguish one engineering sub-discipline from another? The answers to these two questions provide a representative description of how each RA section is structured. They also highlight the unique characteristics and perspectives of individual sub-disciplines manifested in textual variations.

This article is structured as follows. First, an overview of Swales' genre analysis and previous genre-based studies on different RA sections is presented, as well as their shortcomings, which will be addressed by the current study in order to make the analytical framework of genre analysis more solid and compelling. Next, the compilation and the analysis of three sizeable corpora representing prestigious and full length RAs from the three engineering sub-disciplines are described. Inter-coder analysis involving six experts was conducted to help validate the researcher's textual demarcation. Then, the findings generated from the genre analysis are presented, including the textual organization represented by a sequence of 'moves' and 'steps.' Also, the frequencies of occurrence of individual moves and steps were compared and contrasted to observe significant textual variations across the three corpora. Finally, certain limitations and implications of this study are stated.

2. Genre analysis

This section provides a brief introduction to Swales' genre analysis – the analytical framework adopted by this study. Subsequently, previous genre-based studies are reviewed, particularly those on the four RA sections. Concurrently, drawbacks of the application of the framework are highlighted.

2.1. Swales' genre analysis

The basic tenet of Swales' genre or move analysis (1990, 2004) is that a text within a genre usually follows a typical structural pattern or organization, consisting of a series of moves sequenced in a particular order. A move refers to a text segment that performs a communicative function, contributing to the global function of a whole text. Moves can vary in length, but normally contain a proposition (Connor & Mauranen, 1999) and can be recognized by a set of linguistic features. The flexibility of the model is made possible by incorporating the obligatory versus optional status of the steps, based on the frequency of occurrence of each move. Finally, the model introduces the notion of the 'cyclicity' of moves, referring to a situation in which a move can recur within a single introduction. To help contribute to the function of individual moves, each move may, in turn, contain multiple sub-units or a combination of sub-units called 'steps.'

The analysis of RA introductions from diverse academic disciplines led Swales to propose a three-move model in 1990, which was revised in 2004 to capture the variations of RA introductions reported. Swales' (1990 and 2004) models for RA introductions are generally similar, consisting of three principal moves: *Move 1: Establishing a territory, Move 2: Establishing a niche*, and *Move 3: Presenting the present study*. Move 1 introduces the research topic, Move 2 identifies the specific areas that require further investigation, and Move 3 introduces the current research study highlighting certain prominent features of the research being presented.

In turn, each move can accomplish its function by a number, or combination, of steps, sub-units of a move. For instance, in Swales' (2004) model, Move 2 can be realized by three possible steps including *Step 1: Indicating a gap, Step 2: Adding to what is known*, and *Step 3: Presenting positive justification*. Similarly, Move 3 can be accomplished by as many as seven steps. As opposed to Move 2, Moves 1 and 3 are quite frequent. Finally, as stipulated in the model, Moves 1 and 2 tend to be cyclical or recursive, particularly in longer introductions.